HAND SAFETY FIRST

HSF Industrial Hand Safety Encyclopedia

Volume 1

498 terms covering anatomy, injury types, exposure mechanisms, hazard zones, controls, PPE, ergonomics, standards, and programme design across global industrial sectors.

498 TERMS · 20 CATEGORIES · COMPLETE REFERENCE

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EU Machinery Regulation: Regulation (EU) 2023/1230 was adopted in June 2023 and will replace the Machinery Directive 2006/42/EC from 20 January 2027. Both frameworks are referenced during the transition period.

RIDDOR (UK): Amputations of fingers, thumbs, and hands are specified injuries reportable under RIDDOR. Fractures to fingers, thumbs, and toes are excluded from the specified injuries list but may be reportable under the over-seven-day absence rule.

Medical Information: Descriptions of injuries and recovery are for educational purposes only. Always seek qualified medical assessment for workplace injuries.

HOW TO USE THIS ENCYCLOPEDIA

The HSF Industrial Hand Safety Encyclopedia contains 498 core terms covering every aspect of industrial hand exposure, injury prevention, and safer work design, organised in 20 subject categories. Nine supplementary cross-reference terms (S1–S9) follow the core terms.

1. **Find by number.** Terms run 1 to 498 sequentially. Each category begins on a new page and terms continue uninterrupted within it.
2. **Find by category.** Use the Table of Contents to locate the right section. Each category opens with a divider showing the category name and term range.
3. **Find by name.** Use the Alphabetical Index at the back. It lists every term with its number for direct navigation.
4. **Follow cross-references.** Every entry lists Related Terms. These links connect anatomy to injury types, mechanisms to controls, and PPE to programme design.

Entry structure: Every term has four sections — Definition, Why It Matters, Industrial Examples, and Related Terms. Written for frontline workers and safety professionals equally.

CONTENTS BY CATEGORY

Anatomy

1 Distal Phalanx

ANATOMY

DEFINITION

The distal phalanx is the outermost bone of each finger and thumb. It sits beneath the fingernail and fingertip pad.

WHY IT MATTERS

This bone takes the first impact when a fingertip is trapped, struck, or crushed. A small-looking fingertip injury can still involve a tuft fracture, nail-bed injury, or soft tissue loss that later affects sensation and fine control.

INDUSTRIAL EXAMPLES

A distal phalanx can fracture when a finger is caught between two steel plates, hit by a hammer, trapped under a dropped component, pinched in a clamp, or crushed during final alignment.

RELATED TERMS

Fingertip · Nail Bed · Tuft Fracture · Crush Injury · DIP Joint

2 Middle Phalanx

ANATOMY

DEFINITION

The middle phalanx is the central bone of a finger, positioned between the proximal phalanx and the distal phalanx. The thumb does not have a middle phalanx.

WHY IT MATTERS

A fracture through the middle phalanx can stiffen both nearby finger joints, so the worker may lose the ability to make a full fist even after the bone heals. These injuries are often treated like sprains at first because the finger still looks intact.

INDUSTRIAL EXAMPLES

Middle phalanx injuries happen when a finger is caught in a rope that suddenly tightens, trapped between a pipe and a wrench, bent backward during manual handling, or crushed between moving and fixed surfaces.

RELATED TERMS

Distal Phalanx · Proximal Phalanx · PIP Joint · DIP Joint · Finger Fracture

3 Proximal Phalanx

ANATOMY

DEFINITION

The proximal phalanx is the bone at the base of each finger and thumb. It connects the finger to the hand at the main knuckle joint.

WHY IT MATTERS

This bone controls the alignment of the whole finger. A fracture that heals with even slight rotation can make the finger cross over its neighbour when the hand closes, reducing grip and making tool control unreliable.

INDUSTRIAL EXAMPLES

Proximal phalanx injuries occur when a finger is struck sideways by a swinging object, trapped between interlocking parts, crushed by a load, or twisted while a tool is being forced.

RELATED TERMS

MCP Joint · Metacarpal · Finger Alignment · Grip Strength · Fracture

4 Metacarpal

ANATOMY

DEFINITION

A metacarpal is one of the five long bones inside the hand. These bones run from the wrist to the base of the fingers and thumb, forming the framework of the palm.

WHY IT MATTERS

A metacarpal fracture weakens the whole hand, not just one finger, because these bones transfer force from the wrist into the grip. Swelling across the back of the hand can hide a fracture after a blow or crush incident.

INDUSTRIAL EXAMPLES

Metacarpal injuries occur when a falling object lands on the hand, when the hand is trapped between a component and a hard surface, or when a worker forcefully pushes against a jammed object.

RELATED TERMS

Palm | MCP Joint | Hand Bones | Metacarpal Fracture | Crush Injury

5 Carpal Bones

ANATOMY

DEFINITION

The carpal bones are the eight small bones that form the wrist. They connect the hand to the forearm and allow the wrist to bend, extend, and rotate.

WHY IT MATTERS

Carpal injuries reduce grip position and tool control. A scaphoid fracture, one common wrist fracture, can be missed after a fall because pain may seem like a simple wrist sprain.

INDUSTRIAL EXAMPLES

Carpal bone injuries occur when a worker falls onto an outstretched hand, absorbs shock from heavy tools, twists the wrist under load, or braces the hand against a moving object.

RELATED TERMS

Wrist Joint | Scaphoid | Carpal Tunnel | Hand Bones | Repetitive Strain

6 MCP Joint

ANATOMY

DEFINITION

The MCP joint, or metacarpophalangeal joint, is the main knuckle joint at the base of each finger and thumb. It connects the metacarpal bone to the proximal phalanx.

WHY IT MATTERS

The MCP joints form the load-bearing foundation of the grip. Damage here can leave the hand swollen and stiff, and a sideways ligament injury can make a finger unstable during pulling, lifting, or tool use.

INDUSTRIAL EXAMPLES

MCP joint injuries occur when a spanner slips and the knuckles hit steel, when a finger is bent sideways by a moving rope, or when the hand is crushed flat between heavy parts.

RELATED TERMS

Knuckle | Metacarpal | Proximal Phalanx | Dislocation | Grip Strength

7 PIP Joint

ANATOMY

DEFINITION

The PIP joint, or proximal interphalangeal joint, is the middle joint of a finger. It connects the proximal phalanx to the middle phalanx.

WHY IT MATTERS

The PIP joint provides much of the finger bend needed for grip. A dislocation here may be pulled back into place on site and mistaken for a minor sprain, while a small fracture fragment or ligament tear remains untreated.

INDUSTRIAL EXAMPLES

PIP joint injuries occur when a finger is jammed by a dropped part, bent backward by a rope, caught in a closing gap, or trapped while aligning components.

RELATED TERMS

Middle Phalanx | Proximal Phalanx | Finger Joint | Sprain | Dislocation

8 **DIP Joint** ANATOMY

DEFINITION

The DIP joint, or distal interphalangeal joint, is the joint closest to the fingertip. It connects the middle phalanx to the distal phalanx.

WHY IT MATTERS

The tendon that straightens the fingertip attaches near this joint. A sharp blow to the fingertip can cause mallet finger, where the fingertip droops and will not straighten even though the wound may look minor.

INDUSTRIAL EXAMPLES

DIP joint injuries occur when a fingertip is struck end-on by a tool, trapped in a rope loop, crushed between two parts, or bent sharply against a fixed edge.

RELATED TERMS

Distal Phalanx | Fingertip | Extensor Tendon | Mallet Finger | Pinch Injury

9 **Flexor Tendon** ANATOMY

DEFINITION

Flexor tendons are strong cord-like tissues that run along the palm side of the hand and fingers. They pull the fingers inward so the hand can close and grip.

WHY IT MATTERS

A cut flexor tendon means the finger cannot close properly. A worker may dismiss the cut as a normal laceration until they try to grip a tool and notice the finger will not bend.

INDUSTRIAL EXAMPLES

Flexor tendon injuries occur from sharp sheet metal, knife slips while cutting straps, broken glass, sharp wire rope, grinder contact, or deep cuts to the palm side of the fingers.

RELATED TERMS

Tendon | Grip | Palm | Laceration | Finger Movement

10 **Extensor Tendon** ANATOMY

DEFINITION

Extensor tendons run along the back of the hand and fingers. They straighten the fingers and open the hand.

WHY IT MATTERS

Extensor tendons lie close to the skin, so a shallow-looking cut on the back of the hand can sever one. The finger may still bend normally but fail to straighten, which signals a deeper injury than the skin wound suggests.

INDUSTRIAL EXAMPLES

Extensor tendon injuries occur when the back of the hand contacts a grinder, sharp sheet metal, jagged steel, broken glass, or a slipping blade.

RELATED TERMS

Tendon | Back of the Hand | Finger Movement | Laceration | DIP Joint

11 **Nail Bed** ANATOMY

DEFINITION

The nail bed is the soft tissue underneath the fingernail. It supports the nail and helps it grow normally.

WHY IT MATTERS

Crush injury to the nail bed can cause bleeding under the nail, nail loss, infection risk, and permanent nail deformity. The pain may be intense even when the visible wound is small.

INDUSTRIAL EXAMPLES

Nail bed injuries occur when a fingertip is hit by a hammer, crushed under a part, pinched in a clamp, or trapped between metal surfaces.

RELATED TERMS

Fingernail | Fingertip | Distal Phalanx | Crush Injury | Subungual Hematoma

12 **Fingertip Pulp** ANATOMY

DEFINITION

Fingertip pulp is the soft fleshy pad at the end of the finger, below the nail and over the distal phalanx.

WHY IT MATTERS

This pulp gives the fingertip cushioning, grip, and touch sensation. Loss of pulp can leave the finger painful, numb, hypersensitive, or unable to handle small parts accurately.

INDUSTRIAL EXAMPLES

Fingertip pulp injuries occur when handling sharp edges, pressing parts into place, checking alignment by hand, gripping rough surfaces, or being caught in pinch points.

RELATED TERMS

Fingertip | Distal Phalanx | Skin | Sensation | Crush Injury

13 **Thenar Eminence** ANATOMY

DEFINITION

The thenar eminence is the fleshy muscle area at the base of the thumb on the palm side of the hand.

WHY IT MATTERS

This area powers thumb opposition, the movement that lets the thumb meet the fingers. A deep cut, crush, or nerve injury here can reduce pinch strength and make tools difficult to hold securely.

INDUSTRIAL EXAMPLES

Thenar injuries occur when the palm is struck, punctured, crushed against a hard surface, or overloaded during forceful pushing, pulling, or gripping.

RELATED TERMS

Thumb | Palm | Pinch Grip | Grip Strength | Hand Function

14 **Hypothenar Eminence** ANATOMY

DEFINITION

The hypothenar eminence is the fleshy muscle area on the palm at the base of the little finger.

WHY IT MATTERS

This area supports the little-finger side of the grip and often takes pressure when the palm rests on tools or hard edges. Repeated impact or vibration can cause pain, numbness, or reduced grip stability.

INDUSTRIAL EXAMPLES

Hypothenar injuries occur when using heavy tools, striking the side of the hand against steel, resting the palm on vibrating equipment, or pushing forcefully against hard objects.

RELATED TERMS

Palm | Little Finger | Grip | Vibration | Soft Tissue Injury

15 **Web Space** ANATOMY

DEFINITION

The web space is the soft area of skin between the fingers. The thumb-index web space is especially active during grip and tool control.

WHY IT MATTERS

Web spaces tear when the hand is forced open or when skin is trapped under load. A deep web-space cut can limit thumb spread and make normal gripping painful.

INDUSTRIAL EXAMPLES

Web space injuries occur when gripping ropes, pulling straps, using pliers, handling sharp sheets, or when the hand slips into a gap between objects.

RELATED TERMS

Thumb | Finger | Grip | Laceration | Pinch Point

16 **Median Nerve** ANATOMY

DEFINITION

The median nerve is one of the main nerves of the arm and hand. It supplies sensation to parts of the thumb, index finger, middle finger, and ring finger, and helps control some thumb muscles.

WHY IT MATTERS

Median nerve compression can cause numbness, tingling, night pain, and weak thumb control. A worker may start dropping tools or losing fine control before recognising a nerve problem.

INDUSTRIAL EXAMPLES

Median nerve symptoms can appear with repetitive gripping, vibrating tools, awkward wrist posture, swelling after injury, or compression at the wrist.

RELATED TERMS

Nerve | Carpal Tunnel Syndrome | Thumb | Sensation | Numbness

17 **Ulnar Nerve** ANATOMY

DEFINITION

The ulnar nerve is a major nerve that supplies parts of the hand, especially the little-finger side, and controls several small hand muscles.

WHY IT MATTERS

Ulnar nerve injury reduces grip strength, finger coordination, and sensation on the little-finger side of the hand. The hand may feel clumsy when handling small fasteners or controlling a tool.

INDUSTRIAL EXAMPLES

Ulnar nerve irritation occurs from impact near the elbow, repeated pressure on the palm, vibration exposure, or trauma to the wrist or hand.

RELATED TERMS

Nerve | Little Finger | Grip Strength | Numbness | Hand Function

18 **Radial Nerve** ANATOMY

DEFINITION

The radial nerve helps control wrist and finger extension and provides sensation to part of the back of the hand.

WHY IT MATTERS

Radial nerve injury can cause wrist drop, where the wrist cannot lift properly. Without wrist extension, grip becomes weak because the hand cannot hold a stable working position.

INDUSTRIAL EXAMPLES

Radial nerve injuries occur from direct trauma, compression, fractures, awkward arm positioning, or impact to the upper limb.

RELATED TERMS

Nerve | Extensor Tendon | Back of the Hand | Wrist | Finger Movement

19 **Digital Nerves** ANATOMY

DEFINITION

Digital nerves are the small nerves that run along the fingers and thumb. They provide sensation to the skin of the digits.

WHY IT MATTERS

A cut digital nerve can leave part of the finger numb, hypersensitive, or painful. Loss of protective sensation makes heat, sharp edges, and pressure harder to detect during work.

INDUSTRIAL EXAMPLES

Digital nerve injuries occur from cuts, punctures, crush injuries, amputations, sharp edges, or deep lacerations to the fingers.

RELATED TERMS

Finger | Sensation | Numbness | Laceration | Digital Arteries

20 Digital Arteries

ANATOMY

DEFINITION

Digital arteries are small blood vessels that supply blood to the fingers and thumb.

WHY IT MATTERS

Damage to a digital artery can cause heavy bleeding and poor blood flow to the fingertip. If circulation is compromised after a crush or cut, tissue healing and fingertip survival can be affected.

INDUSTRIAL EXAMPLES

Digital artery injuries occur during deep cuts, fingertip amputations, crush injuries, punctures, or contact with sharp tools and metal edges.

RELATED TERMS

Blood Vessels | Finger | Fingertip | Bleeding | Amputation

21 Palm

ANATOMY

DEFINITION

The palm is the inner surface of the hand between the wrist and the fingers. It contains skin, soft tissue, muscles, tendons, nerves, and blood vessels.

WHY IT MATTERS

The palm is used for gripping, pushing, pressing, and supporting objects, so deep injuries can affect several structures at once. A palm cut can involve tendons, nerves, and vessels beneath a wound that looks simple.

INDUSTRIAL EXAMPLES

Palm injuries occur when pushing a heavy part into place, holding rough material, pressing against hot surfaces, supporting a pipe, or placing the hand beside a load.

RELATED TERMS

Hand | Thenar Eminence | Hypothenar Eminence | Flexor Tendon | Grip

22 Back of the Hand

ANATOMY

DEFINITION

The back of the hand is the outer surface opposite the palm. It is also called the dorsum of the hand.

WHY IT MATTERS

The back of the hand has thin skin and little soft tissue over bones and extensor tendons. A scrape, cut, or blow here can damage deeper structures more easily than the wound size suggests.

INDUSTRIAL EXAMPLES

Back-of-hand injuries occur when a tool slips, when the hand scrapes against steel, when working inside confined equipment, or when sharp material contacts the knuckle area.

RELATED TERMS

Extensor Tendon | Knuckle | Abrasion | Impact Injury | Laceration

23 Wrist Joint

ANATOMY

DEFINITION

The wrist joint connects the hand to the forearm. It includes bones, ligaments, tendons, nerves, and blood vessels that allow the hand to bend, rotate, and position itself.

WHY IT MATTERS

Wrist position determines how much grip force a worker can safely apply. A twisted or overloaded wrist can create sprains, tendon irritation, nerve compression, or fractures that reduce tool control.

INDUSTRIAL EXAMPLES

Wrist injuries occur during manual lifting, valve operation, repetitive tool use, grinder work, falls, awkward pushing, or pulling heavy objects.

RELATED TERMS

Carpal Bones | Tendon | Median Nerve | Repetitive Strain | Tool Control

24 **Skin** ANATOMY

DEFINITION

Skin is the outer protective covering of the hand. It acts as a barrier against physical, chemical, thermal, and biological hazards.

WHY IT MATTERS

Broken skin removes the first barrier against infection, chemicals, heat, cold, and deeper injury. Small cuts become serious when dirt, oil, metal filings, or chemicals enter the wound.

INDUSTRIAL EXAMPLES

Skin injuries occur from sharp edges, rough surfaces, oils, solvents, cement, hot parts, cold surfaces, chemicals, metal filings, and repeated friction.

RELATED TERMS

Abrasion | Burn | Dermatitis | Cut | Glove Protection

25 **Subcutaneous Tissue** ANATOMY

DEFINITION

Subcutaneous tissue is the soft tissue layer beneath the skin. It contains fat, blood vessels, nerves, and connective tissue.

WHY IT MATTERS

This layer cushions the hand and separates skin from deeper structures. In punctures, burns, high-pressure injection, and crush injuries, damage can pass into this layer while the surface opening remains deceptively small.

INDUSTRIAL EXAMPLES

Subcutaneous tissue injuries occur from puncture wounds, deep cuts, crushing between metal parts, high-pressure injection, burns, or impact with sharp-edged equipment.

RELATED TERMS

Skin | Soft Tissue Injury | Puncture Wound | Crush Injury | Laceration Draft for review - production batch

Hand Function and Movement

26 **Grip** FUNCTION

DEFINITION

Grip is the ability of the hand to hold, control, or secure an object using the fingers, thumb, and palm.

WHY IT MATTERS

Grip is where many industrial exposures begin because the hand becomes the control device for a load, tool, rope, or workpiece. A weak, awkward, oily, or overloaded grip can lead to tool slip, dropped objects, crushed fingers, or the hand being pulled into the line of fire.

INDUSTRIAL EXAMPLES

A worker grips a spanner while loosening a tight flange bolt, holds a pipe while another person aligns it, pulls a rope to control a swinging load, or steadies a plate while it is being positioned against another steel surface.

RELATED TERMS

Grip Strength | Power Grip | Pinch Grip | Tool Control | Hand-as-Control

27 Grip Strength

FUNCTION

DEFINITION

Grip strength is the amount of force the hand can apply while holding, squeezing, or controlling an object.

WHY IT MATTERS

Loss of grip strength changes worker behaviour. The hand may move closer to the hazard, squeeze harder than normal, brace against a sharp or hot surface, or rely on the supporting hand to keep control. Fatigue-related loss of grip can also cause sudden release of tools or parts.

INDUSTRIAL EXAMPLES

Grip strength is tested when a worker tries to turn a stiff handwheel, hold a vibrating grinder, pull a chain block hand chain, carry a heavy component, or keep a slippery part from rotating during assembly.

RELATED TERMS

Grip | Muscle Fatigue | Forceful Exertion | Tool Slip | Manual Handling

28 Power Grip

FUNCTION

DEFINITION

Power grip is a strong grip where the fingers wrap around an object and the thumb locks it against the palm.

WHY IT MATTERS

A power grip gives more control than fingertip holding, but it also commits the whole hand to the object. If the object rotates, drops, kicks back, or pulls away suddenly, the hand can be dragged into a pinch, crush, or entanglement zone.

INDUSTRIAL EXAMPLES

Power grip is used when holding a hammer handle during striking work, pulling on a bar, using a pipe tool, controlling a lever, or carrying a heavy hand-held tool across a fabrication yard.

RELATED TERMS

Grip | Handle Design | Grip Strength | Tool Control | Pulling

29 Pinch Grip

FUNCTION

DEFINITION

Pinch grip is holding an object between the thumb and one or more fingers, usually without using the full palm.

WHY IT MATTERS

Pinch grip is weaker than a full-hand grip and places fingertips close to the workface. Washers, shims, nuts, pins, and small parts often bring fingertips into the last few millimetres of a closing gap, where there is little time to react if the part moves.

INDUSTRIAL EXAMPLES

Pinch grip is used when a worker places a washer on a bolt, inserts a shim under a base plate, holds a nut behind a bracket, or aligns a small pin by hand before driving it into position.

RELATED TERMS

Thumb | Fingertip | Pinch Point | Precision Grip | Fine Motor Control

30 Precision Grip

FUNCTION

DEFINITION

Precision grip is a controlled grip used for accurate placement or adjustment of small objects.

WHY IT MATTERS

Precision grip gives accuracy but little margin for error. If the part shifts, the tool slips, or the load settles, the fingertips have little space to escape. The injury is often to the fingertip, nail bed, or distal phalanx because these parts are closest to the contact point.

INDUSTRIAL EXAMPLES

Precision grip is used when inserting a split pin, placing a circlip, setting a small spacer into a fixture, adjusting an instrument screw, or positioning a fastener in a confined space.

RELATED TERMS

Pinch Grip | Dexterity | Fingertip | Fine Motor Control | Last-Inch Exposure

31 Hook Grip

FUNCTION

DEFINITION

Hook grip is a grip where the fingers curve around an object while the thumb plays a limited role.

WHY IT MATTERS

Hook grip works for carrying and pulling, but it can fail suddenly when the object is oily, rounded, swinging, or not fully seated in the fingers. If the object shifts against a fixed surface, the curled fingers can be trapped before the worker can open the hand.

INDUSTRIAL EXAMPLES

Hook grip appears when carrying a bucket handle, pulling a tagline, lifting a tool by a loop, dragging a chain, or holding a round bar that can roll inside the fingers.

RELATED TERMS

Grip | Finger | Carrying | Pulling | Manual Handling

32 Hand Function

FUNCTION

DEFINITION

Hand function is the combined ability of the hand to grip, release, feel, position, push, pull, and control objects.

WHY IT MATTERS

Hand function depends on bones, tendons, nerves, joints, skin, and blood supply working together. A small tendon or nerve injury can leave the hand looking intact but unable to grip, feel, straighten, release, or control tools properly.

INDUSTRIAL EXAMPLES

Hand function is used when a fitter holds a spanner while feeling bolt movement, when a rigger guides a load into final position, when a technician connects a hose, or when a mechanic releases a tool after applying force.

RELATED TERMS

Grip | Dexterity | Sensation | Hand Injury | Tool Control

33 Dexterity

FUNCTION

DEFINITION

Dexterity is the ability to use the hands and fingers skillfully for controlled and accurate movement.

WHY IT MATTERS

Dexterity drops when gloves fit poorly, hands are cold, workers are fatigued, or the task is rushed. Reduced dexterity often causes workers to remove gloves, use fingertips instead of tools, or place fingers deeper into the work area to regain control.

INDUSTRIAL EXAMPLES

Dexterity is needed when fitting small bolts inside a guard, connecting hydraulic hose couplings, threading nuts in a tight bracket, using measuring tools, or assembling parts where visibility is limited.

RELATED TERMS

Fine Motor Control | Precision Grip | Glove Fit | Hand Function | Small Parts

34 Fine Motor Control

FUNCTION

DEFINITION

Fine motor control is the ability to make small, accurate movements using the fingers and thumb.

WHY IT MATTERS

Fine control often brings fingertips to the last few millimetres of a task, where gaps close and parts shift. Many crush injuries occur because the hand stays in place for the final adjustment after the load, clamp, pin, or component has already started moving.

INDUSTRIAL EXAMPLES

Fine motor control is used when inserting a dowel pin, placing a washer on a bolt, wiring a control panel, adjusting a gauge, or guiding a small fastener into a threaded hole by hand.

RELATED TERMS

Dexterity | Precision Grip | Fingertip | Pinch Grip | Last-Inch Exposure

35 Gross Motor Control

FUNCTION

DEFINITION

Gross motor control is the ability to make larger movements using the hand, wrist, arm, and shoulder.

WHY IT MATTERS

Large movements create momentum and higher contact force. When a worker tries to push, pull, catch, or stop a moving load with the hands, the hand may become the shock absorber instead of a controlled contact point, leading to wrist strain, crush injuries, or impact against nearby steel.

INDUSTRIAL EXAMPLES

Gross motor control is used when a worker pushes a trolley that suddenly jams, pulls a tagline on a swinging basket, guides a long pipe while it rotates, operates a stiff lever, or carries a heavy plate through a narrow passage.

RELATED TERMS

Pushing | Pulling | Body Position | Manual Handling | Load Control

36 Hand-Eye Coordination

FUNCTION

DEFINITION

Hand-eye coordination is the ability to guide hand movement using what the eyes see.

WHY IT MATTERS

Poor visibility, glare, fatigue, distraction, or blocked line of sight makes the hand arrive in the wrong place or at the wrong time. During alignment work, that mistake can put fingers exactly where two parts close, settle, rotate, or strike.

INDUSTRIAL EXAMPLES

Hand-eye coordination is used when aligning a flange bolt hole while a spool is suspended, guiding a mould box onto locating pins, positioning a machine part under a crane, or placing a tool near a moving component.

RELATED TERMS

Visibility | Alignment | Positioning | Human Error | Line of Fire

37 Sensation

FUNCTION

DEFINITION

Sensation is the ability to feel touch, pressure, temperature, pain, vibration, and texture through the skin and nerves.

WHY IT MATTERS

Sensation warns the hand when an object is hot, sharp, slipping, vibrating, or under pressure. Reduced sensation from vibration, cold, nerve compression, or thick gloves can delay the worker response, so the hand stays in contact longer than it safely should.

INDUSTRIAL EXAMPLES

Sensation is used when a worker feels a sharp burr on sheet metal, notices heat through a glove, detects a tool starting to slip, senses vibration from a grinder, or feels pressure building on a trapped finger.

RELATED TERMS

Nerve | Skin | Touch | Numbness | Tactile Feedback

38 Touch

FUNCTION

DEFINITION

Touch is the sense that allows the hand to detect contact, pressure, shape, and surface texture.

WHY IT MATTERS

Touch helps control work, but it becomes dangerous when the hand is used as the test instrument for sharpness, temperature, movement, or alignment. Many exposures begin with the phrase, "just checking by hand," and end with a cut, burn, pinch, or trapped fingertip.

INDUSTRIAL EXAMPLES

Touch is used when a worker checks whether two flanges are flush, feels for a burr on a cut edge, tests whether a part is still hot, or senses whether a load-control rope is starting to move.

RELATED TERMS

Sensation | Skin | Finger Pad | Tactile Feedback | Glove Protection

39 Tactile Feedback

FUNCTION

DEFINITION

Tactile feedback is information received through touch that helps a person adjust grip, pressure, or movement.

WHY IT MATTERS

Tactile feedback helps with control, but direct feedback from the hazard means the hand is already inside the danger zone. If a worker must feel the final fit by hand, the task may need a tool, fixture, spacer, guide, or visual reference instead.

INDUSTRIAL EXAMPLES

Tactile feedback occurs when a worker feels a bolt tighten, senses a rope going taut, guides a component into a recess by touch, or presses a part until it seems seated against another surface.

RELATED TERMS

Touch | Sensation | Grip | Tool Control | Last-Inch Exposure

40 Range of Motion

FUNCTION

DEFINITION

Range of motion is the amount of movement possible at a joint, such as the fingers, thumb, or wrist.

WHY IT MATTERS

Restricted motion changes grip and posture, while forced motion can tear ligaments or strain tendons. A stiff finger or wrist may push the worker into awkward hand positions, such as reaching around guards or twisting the wrist near moving parts to complete the task.

INDUSTRIAL EXAMPLES

Range of motion becomes visible when a worker reaches inside equipment to start a nut, bends the wrist sharply to use a spanner behind a pipe, grips a large valve handwheel, or tries to hold a part inside a confined machine space.

RELATED TERMS

Joint | Wrist | Finger Joint | Awkward Posture | Sprain

41 Flexion

FUNCTION

DEFINITION

Flexion is the bending movement of a joint. In the hand, flexion closes the fingers and thumb toward the palm.

WHY IT MATTERS

Flexion allows gripping, but forced flexion can injure joints, tendons, or ligaments. A finger trapped while bent has little room to escape when a load settles, a tool shifts, or a hinged part closes.

INDUSTRIAL EXAMPLES

Flexion occurs when a worker grips a hammer handle, curls fingers around a pipe, holds a lifting accessory, carries a component, or keeps the fingers wrapped around a part during final positioning.

RELATED TERMS

Extension | Flexor Tendon | Grip | Finger Joint | Hand Function

42 Extension

FUNCTION

DEFINITION

Extension is the straightening movement of a joint. In the hand, extension opens or straightens the fingers and thumb.

WHY IT MATTERS

Extension allows release. When extensor tendons are cut or joints are injured, a worker cannot open the hand fully — the finger bends but refuses to straighten. A worker who cannot extend a finger properly may catch it on equipment, fail to release a tool cleanly, or be unable to withdraw the hand from a closing gap before contact.

INDUSTRIAL EXAMPLES

Extension occurs when a worker releases a spanner after torqueing, opens the hand after pulling a rope, places the hand flat on a surface, or straightens the fingers to withdraw them from a narrow gap.

RELATED TERMS

Flexion | Extensor Tendon | Finger Joint | Release | Hand Function

43 Abduction

FUNCTION

DEFINITION

Abduction is movement away from the centre line of the hand. In the fingers, it means spreading the fingers apart.

WHY IT MATTERS

Forced abduction can tear web spaces or strain the side ligaments that stabilise finger joints. This happens when one finger catches on a rope, lug, handle, or gap while the rest of the hand continues moving in another direction.

INDUSTRIAL EXAMPLES

Abduction occurs when a worker spreads the fingers around a wide handle, grips an awkward casting, tries to catch a slipping object, or has one finger pulled sideways by a rope loop or protruding lug.

RELATED TERMS

Adduction | Web Space | Finger Joint | Ligament | Grip

44 Adduction

FUNCTION

DEFINITION

Adduction is movement toward the centre line of the hand. In the fingers, it means bringing the fingers together.

WHY IT MATTERS

Adduction becomes hazardous when workers squeeze thin, sharp, or shifting material between the fingers to stabilise it. The sides of the fingers can be pinched, cut, or sheared if the material slides, folds, or is pulled by another force.

INDUSTRIAL EXAMPLES

Adduction occurs when a worker squeezes fingers together around a thin plate edge, holds stacked shims, steadies a flat bar while it is being drilled, or traps a strap or wire between adjacent fingers during pulling.

RELATED TERMS

Abduction | Grip | Finger | Pinch Point | Shear Injury

45 Opposition

FUNCTION

DEFINITION

Opposition is the thumb movement across the palm toward the fingers. It allows the thumb to meet the fingertips.

WHY IT MATTERS

Opposition makes human grip powerful and precise. Injury to thumb muscles, tendons, or nerves can leave the worker unable to pinch fasteners, hold small parts, control a spanner, or apply steady pressure even when the fingers still move.

INDUSTRIAL EXAMPLES

Opposition is used when a worker grips a spanner, holds a bolt against a bracket, uses pliers, turns a small knob, or picks up a washer from a workbench.

RELATED TERMS

Thumb | Pinch Grip | Thenar Eminence | Precision Grip | Hand Function

46 Pronation

FUNCTION

DEFINITION

Pronation is forearm rotation that turns the palm downward or backward, depending on arm position.

WHY IT MATTERS

Forceful pronation under load can strain the wrist and forearm, especially when the tool is stuck and the worker keeps twisting harder. If the tool suddenly releases, the hand may overtravel into a flange edge, nearby steel, hot pipework, or another worker's hand.

INDUSTRIAL EXAMPLES

Pronation occurs when a worker drives a screwdriver downward, turns a stuck valve clockwise from an awkward angle, rotates a spanner on a tight bolt, or twists a pipe tool while bracing the other hand near the workpiece.

RELATED TERMS

Supination | Wrist | Forearm | Tool Use | Twisting Force

47 **Supination** FUNCTION

DEFINITION

Supination is forearm rotation that turns the palm upward or forward, depending on arm position.

WHY IT MATTERS

Forceful supination can strain the wrist, forearm, and elbow when the hand is pulling a tool or handwheel against resistance. Sudden release can make the knuckles strike steel, the wrist twist past its safe range, or the supporting hand slip into the contact zone.

INDUSTRIAL EXAMPLES

Supination occurs when a worker turns a handwheel from below, loosens a fastener with an upward spanner pull, rotates a part palm-up, or carries a component on the palm while the wrist is turned outward.

RELATED TERMS

Pronation | Wrist | Forearm | Tool Slip | Twisting Force

48 **Hand Dominance** FUNCTION

DEFINITION

Hand dominance is the natural preference for using one hand more than the other, usually called right-handedness or left-handedness.

WHY IT MATTERS

The dominant hand usually controls the tool while the other hand steadies the part. The non-dominant supporting hand often sits closer to the blade, hammer, closing gap, drill bit, or moving load, which is why it is frequently the injured hand.

INDUSTRIAL EXAMPLES

A worker may use the dominant hand to operate a grinder, spanner, drill, or hammer while the other hand holds the material, aligns the pipe, steadies the chisel, or prevents the part from rotating.

RELATED TERMS

Supporting Hand | Tool Use | Pinch Point | Line of Fire | Hand Function

49 **Supporting Hand** FUNCTION

DEFINITION

The supporting hand is the hand used to hold, steady, guide, or position an object while the other hand performs the main task.

WHY IT MATTERS

The supporting hand is often the injured hand because it is placed where control is needed, not where safety is highest. It can be hit by a slipped tool, crushed by a closing gap, cut by a moving blade, or trapped when the workpiece shifts.

INDUSTRIAL EXAMPLES

Supporting-hand injuries occur when holding a chisel during hammering, steadying a spanner on a tight nut, guiding a plate under a crane, aligning a pipe flange, or holding material during drilling or cutting.

RELATED TERMS

Hand Dominance | Pinch Point | Line of Fire | Tool Use | Workpiece Control

50 **Tool Control** FUNCTION

DEFINITION

Tool control is the ability to hold, guide, apply, and release a tool safely and accurately during work.

WHY IT MATTERS

Poor tool control creates slips, overtravel, impact injuries, cuts, and sudden hand movement into hazards. Control depends on handle design, grip, force, posture, visibility, and whether the tool is suited to the task instead of being improvised.

INDUSTRIAL EXAMPLES

Tool control is needed when a worker swings a hammer, pulls a spanner, operates a grinder, squeezes pliers, uses a torque wrench, drives a screwdriver, cuts a strap, or uses a push-pull tool to keep hands away from the load.

RELATED TERMS

Grip | Handle Design | Hand-Eye Coordination | Tool Slip | Supporting Hand

Injury Types

51 Cut

INJURY TYPES

DEFINITION

A cut is an opening in the skin caused by a sharp edge, blade, tool, or material surface.

WHY IT MATTERS

A cut that looks clean can still damage tendons, nerves, arteries, or joints underneath. Deep hand cuts are often underestimated until the finger will not bend, will not straighten, or loses sensation.

INDUSTRIAL EXAMPLES

Cuts occur while handling sheet metal, trimming cable ties, cutting straps, working with knives, contacting grinder edges, or scraping against sharp fabricated steel.

RELATED TERMS

Laceration | Abrasion | Puncture Wound | Flexor Tendon | Digital Nerve

52 Laceration

INJURY TYPES

DEFINITION

A laceration is a torn or deep cut in the skin and soft tissue, usually caused by sharp or irregular contact.

WHY IT MATTERS

Lacerations can have crushed or ragged edges that heal poorly and hide deeper damage. When the cut crosses the palm, finger, or knuckle, tendon and nerve injury must be considered.

INDUSTRIAL EXAMPLES

Lacerations happen when a hand strikes jagged steel, broken glass, wire rope ends, burrs, rotating blades, or damaged machine guards.

RELATED TERMS

Cut | Deep Laceration | Tendon Injury | Nerve Injury | Wound Contamination

53 Abrasion

INJURY TYPES

DEFINITION

An abrasion is a surface injury where skin is scraped away by friction against a rough surface.

WHY IT MATTERS

Abrasions are often treated casually, but embedded dirt, metal filings, oil, or chemicals can turn a scrape into an infected wound. Repeated abrasions also break down the skin barrier.

INDUSTRIAL EXAMPLES

Abrasions occur when hands slide along rough steel, concrete, wire rope, castings, chains, pallets, or unfinished edges.

RELATED TERMS

Skin | Friction | Glove Wear | Infection | Contact Hazard

54 Puncture Wound

INJURY TYPES

DEFINITION

A puncture wound is a narrow, deep wound caused by a pointed object entering the skin.

WHY IT MATTERS

Punctures can look small at the surface while carrying dirt, oil, bacteria, or metal fragments deep into tissue. Pain, swelling, and infection may appear later after the worker has continued the task.

INDUSTRIAL EXAMPLES

Puncture wounds occur from nails, wire strands, sharp hooks, broken drill bits, splinters, fishhooks, injection nozzles, or pointed scrap.

RELATED TERMS

Skin | Infection | Subcutaneous Tissue | High-Pressure Injection | Sharp Hazard

55 Crush Injury

INJURY TYPES

DEFINITION

A crush injury happens when the hand or finger is compressed between two surfaces or under a heavy load.

WHY IT MATTERS

Crush injuries damage skin, bone, nail bed, tendons, nerves, and blood vessels together. The outside may show swelling and bruising, while deeper tissue damage and circulation problems develop underneath.

INDUSTRIAL EXAMPLES

Crush injuries occur between flanges, plates, pipe stands, machine beds, landing loads, clamps, rollers, chain blocks, and moving equipment.

RELATED TERMS

Pinch Point | Fracture | Compartment Syndrome | Nail Bed | Amputation

56 Pinch Injury

INJURY TYPES

DEFINITION

A pinch injury occurs when skin or tissue is caught between two objects, often at a closing gap.

WHY IT MATTERS

Pinch injuries range from minor bruising to fingertip amputation. They often happen during final alignment, when the hand remains in the gap to control the last small movement.

INDUSTRIAL EXAMPLES

Pinch injuries occur between sling and hook, plate and support, pipe and flange, door and frame, chain and sprocket, or load and deck.

RELATED TERMS

Pinch Point | Crush Injury | Fingertip | Last-Inch Exposure | Caught-Between

57 Fracture

INJURY TYPES

DEFINITION

A fracture is a broken bone. In the hand, fractures may involve fingertips, finger bones, metacarpals, or wrist bones.

WHY IT MATTERS

Hand fractures can be missed when swelling and bruising are treated as a normal knock. Untreated fractures may heal with stiffness, rotation, pain, or poor grip alignment.

INDUSTRIAL EXAMPLES

Fractures occur when hands are struck by tools, crushed by components, jammed by dropped parts, twisted in ropes, or used to break a fall.

RELATED TERMS

Distal Phalanx | Metacarpal | Carpal Bones | Crush Injury | Dislocation

58 **Dislocation** INJURY TYPES

DEFINITION

A dislocation occurs when a bone is forced out of its normal joint position.

WHY IT MATTERS

A dislocated finger may be pulled back into place on site, but ligament tears or small fractures can remain. Delayed care can leave the joint unstable or stiff.

INDUSTRIAL EXAMPLES

Dislocations occur when fingers are bent backward, caught in ropes, jammed against loads, trapped in closing gaps, or twisted during tool use.

RELATED TERMS

PIP Joint · MCP Joint · Ligament · Sprain · Fracture-Dislocation

59 **Sprain** INJURY TYPES

DEFINITION

A sprain is an injury to a ligament, the tissue that supports a joint.

WHY IT MATTERS

A sprain can make a finger or wrist unstable even without a broken bone. In industrial tasks, instability reduces grip and increases the chance of another slip or pinch event.

INDUSTRIAL EXAMPLES

Sprains occur when a finger is forced sideways, a wrist twists under load, or the hand is pulled unexpectedly by rope, hose, or material.

RELATED TERMS

Ligament · Joint Stability · Dislocation · Wrist Injury · PIP Joint

60 **Strain** INJURY TYPES

DEFINITION

A strain is an injury to a muscle or tendon caused by overstretching or excessive force.

WHY IT MATTERS

Strains build when the hand or forearm repeatedly grips, pulls, twists, or holds tools in awkward positions. Pain and weakness can make tool control less predictable.

INDUSTRIAL EXAMPLES

Strains occur during valve turning, spanner work, heavy gripping, pulling stuck parts, repetitive assembly, or long use of powered hand tools.

RELATED TERMS

Tendon · Muscle Fatigue · Forceful Exertion · Repetitive Strain · Tool Control

61 **Amputation** INJURY TYPES

DEFINITION

An amputation is the loss of all or part of a finger, thumb, hand, or limb.

WHY IT MATTERS

Finger amputations often occur in fast-closing pinch, crush, shear, or cutting zones. Even partial fingertip loss can permanently affect sensation, grip, pain tolerance, and confidence at work.

INDUSTRIAL EXAMPLES

Amputations occur in presses, rollers, chain drives, rope loops, unguarded blades, closing flanges, landing loads, and severe crush incidents.

RELATED TERMS

Fingertip · Crush Injury · Shear Point · Entanglement · Emergency Response

62 Avulsion

INJURY TYPES

DEFINITION

An avulsion is an injury where skin, soft tissue, tendon, or even bone is torn away by force.

WHY IT MATTERS

Avulsions happen when the hand is caught and pulled, not simply cut. Rings, gloves, ropes, and rotating parts can create tearing forces that strip tissue before the worker can react.

INDUSTRIAL EXAMPLES

Avulsions occur when a ring catches on a ladder rung, glove material catches in rotating machinery, or a rope loop tightens around a finger.

RELATED TERMS

Degloving | Ring Avulsion | Entanglement | Soft Tissue Injury | Amputation

63 Degloving Injury

INJURY TYPES

DEFINITION

A degloving injury occurs when skin and soft tissue are peeled away from the hand or finger.

WHY IT MATTERS

Degloving is severe because the outer covering of the hand is separated from the structures beneath it. The finger may survive poorly if blood supply and tissue coverage are damaged.

INDUSTRIAL EXAMPLES

Degloving injuries occur when gloves, rings, or fingers are caught in rollers, rotating shafts, chain drives, ropes, or moving equipment.

RELATED TERMS

Avulsion | Ring Avulsion | Entanglement | Digital Arteries | Soft Tissue Injury

64 Burn

INJURY TYPES

DEFINITION

A burn is tissue damage caused by heat, flame, hot surfaces, steam, chemicals, electricity, or radiation.

WHY IT MATTERS

Hand burns can reduce movement, sensation, grip, and skin flexibility. A small burn across a finger joint can stiffen the joint if it heals with tight scar tissue.

INDUSTRIAL EXAMPLES

Burns occur from hot metal, steam leaks, welding spatter, molten material, chemicals, electrical contact, heated bearings, or hot engine parts.

RELATED TERMS

Thermal Burn | Chemical Burn | Electrical Burn | Skin | Scar Contracture

65 Chemical Burn

INJURY TYPES

DEFINITION

A chemical burn is tissue damage caused by contact with a corrosive or irritating chemical.

WHY IT MATTERS

Chemical burns may continue to damage tissue until the chemical is removed or neutralised according to the correct procedure. Gloves contaminated inside can hold chemicals against the skin and worsen exposure.

INDUSTRIAL EXAMPLES

Chemical burns occur during acid handling, caustic cleaning, battery maintenance, solvent work, cement handling, degreasing, or chemical transfer.

RELATED TERMS

Burn | Dermatitis | Glove Compatibility | Skin | Chemical Exposure

66 Thermal Burn

INJURY TYPES

DEFINITION

A thermal burn is tissue damage caused by heat from hot surfaces, flame, steam, or molten material.

WHY IT MATTERS

Thermal burns to fingers and palms reduce grip and can hide deeper damage when the worker pulls away quickly but continues working. Hot metal can look harmless while still holding enough heat to burn skin.

INDUSTRIAL EXAMPLES

Thermal burns occur while handling hot pipes, castings, bearings, welding workpieces, steam lines, engine parts, or freshly cut metal.

RELATED TERMS

Burn | Heat Exposure | Skin | Contact Hazard | Welding Spatter

67 Electrical Burn

INJURY TYPES

DEFINITION

An electrical burn is tissue damage caused by electric current passing through or across the body.

WHY IT MATTERS

Electrical injury can damage deep tissue, nerves, and muscles while the skin mark appears small. A hand contact point may look minor even when internal damage or heart risk exists.

INDUSTRIAL EXAMPLES

Electrical burns occur during live panel work, damaged cable handling, poor grounding, battery work, welding faults, or contact with energised equipment.

RELATED TERMS

Burn | Electric Shock | Nerve Injury | Entry Wound | Electrical Safety

68 High-Pressure Injection Injury

INJURY TYPES

DEFINITION

A high-pressure injection injury occurs when fluid, grease, paint, oil, or hydraulic material is forced through the skin under pressure.

WHY IT MATTERS

The entry mark may look like a pin prick, but injected material spreads through tissue under the skin. Delay can lead to severe swelling, tissue death, infection, and possible amputation.

INDUSTRIAL EXAMPLES

Injection injuries occur from hydraulic leaks, grease guns, paint sprayers, pressure washers, fuel systems, and compressed fluid lines.

RELATED TERMS

Puncture Wound | Hydraulic Leak | Tissue Necrosis | Amputation | Emergency Response

69 Nerve Injury

INJURY TYPES

DEFINITION

A nerve injury is damage to a nerve that affects sensation, movement, or both.

WHY IT MATTERS

Nerve injuries can leave fingers numb, painful, hypersensitive, weak, or poorly coordinated. A worker may not feel heat, pressure, or sharp edges in the affected area.

INDUSTRIAL EXAMPLES

Nerve injuries occur from deep cuts, crush injuries, vibration exposure, electric shock, wrist compression, or trauma near fingers and joints.

RELATED TERMS

Median Nerve | Ulnar Nerve | Digital Nerve | Numbness | Sensation Loss

70 Tendon Injury

INJURY TYPES

DEFINITION

A tendon injury is damage to the tissue that connects muscle to bone and moves the fingers, thumb, or wrist.

WHY IT MATTERS

A tendon injury changes movement. The finger may not bend, straighten, or grip properly even when the wound looks small and bleeding has stopped.

INDUSTRIAL EXAMPLES

Tendon injuries occur from sheet metal cuts, grinder contact, knife slips, broken glass, sharp tools, or crush injuries across the palm or back of the hand.

RELATED TERMS

Flexor Tendon | Extensor Tendon | Laceration | Finger Movement | Deep Cut

71 Infection

INJURY TYPES

DEFINITION

Infection is the growth of harmful microorganisms in a wound or tissue.

WHY IT MATTERS

Hand infections can spread quickly because tendons, joints, and soft tissue spaces are close together. A small puncture can become a swollen, painful hand that cannot grip.

INDUSTRIAL EXAMPLES

Infections follow contaminated cuts, punctures from nails or wire, dirty abrasions, animal or human bites, oil-contaminated wounds, and untreated crush injuries.

RELATED TERMS

Puncture Wound | Wound Contamination | Skin | Swelling | Medical Treatment

72 Subungual Hematoma

INJURY TYPES

DEFINITION

A subungual hematoma is bleeding trapped under the fingernail after a crush or impact injury.

WHY IT MATTERS

Pressure under the nail can cause severe pain, and the same impact may also fracture the distal phalanx or damage the nail bed. Treating it as only a bruised nail can miss deeper injury.

INDUSTRIAL EXAMPLES

Subungual hematomas occur when fingertips are struck by hammers, caught in doors, crushed between parts, or hit by falling tools.

RELATED TERMS

Nail Bed | Fingernail | Distal Phalanx | Crush Injury | Fingertip

73 Mallet Finger

INJURY TYPES

DEFINITION

Mallet finger is an injury where the fingertip droops because the tendon that straightens the end joint is damaged.

WHY IT MATTERS

The finger may still bend, but the worker cannot actively straighten the fingertip. It is often ignored after a blow because pain may be moderate, but delayed treatment can leave a permanent droop.

INDUSTRIAL EXAMPLES

Mallet finger occurs when a fingertip is struck end-on by a dropped bolt, jammed against steel, caught in a glove, or bent suddenly at the DIP joint.

RELATED TERMS

DIP Joint | Extensor Tendon | Distal Phalanx | Finger Deformity | Impact Injury

74 Compartment Syndrome

INJURY TYPES

DEFINITION

Compartment syndrome is dangerous pressure build-up inside a closed tissue space that reduces blood flow to muscles and nerves.

WHY IT MATTERS

After a severe crush injury, swelling can cut off circulation inside the hand or forearm. Increasing pain, tightness, numbness, and weakness are warning signs that tissue may be dying.

INDUSTRIAL EXAMPLES

Compartment syndrome can follow crushing by machinery, trapped hands under heavy loads, high-energy impact, tight bandaging, or injection injuries.

RELATED TERMS

Crush Injury | Swelling | Blood Flow | Nerve Injury | Emergency Response

75 Scar Contracture

INJURY TYPES

DEFINITION

A scar contracture is tightening of scar tissue that restricts movement across skin or joints.

WHY IT MATTERS

Burns and deep wounds across fingers, palms, or wrists can heal tight, pulling joints into a bent position. The injury may be closed, but the hand may no longer open or grip normally.

INDUSTRIAL EXAMPLES

Scar contractures develop after burns, deep lacerations, skin loss, grafting, infection, or wounds crossing finger joints.

RELATED TERMS

Burn | Skin | Range of Motion | Finger Joint | Rehabilitation Draft for review - production batch

Exposure Mechanisms

76 Pinch Point

MECHANISMS

DEFINITION

A pinch point is a location where a hand or finger can be caught between two objects or surfaces.

WHY IT MATTERS

Pinch points injure hands because movement continues after the worker has placed fingers for control or alignment. The hand is often trapped during the final adjustment, not during the obvious heavy movement.

INDUSTRIAL EXAMPLES

Pinch points appear between flanges, plates, hooks, slings, pipe stands, machine guards, rollers, pallets, doors, and landing loads.

RELATED TERMS

Pinch Injury | Crush Injury | Closing Gap | Last-Inch Exposure | Caught-Between

77 Crush Point

MECHANISMS

DEFINITION

A crush point is a place where enough force can compress the hand, finger, or thumb between surfaces.

WHY IT MATTERS

A crush point can damage bone, skin, tendons, nerves, and blood vessels at the same time. The force may come from a suspended load, moving equipment, hydraulic movement, or stored energy release.

INDUSTRIAL EXAMPLES

Crush points occur under landing loads, between mould boxes, against machine beds, between forks and pallets, or where heavy components are being seated.

RELATED TERMS

Crush Injury | Pinch Point | Stored Energy | Suspended Load | Caught-Between

78 **Shear Point** MECHANISMS

DEFINITION

A shear point is a location where two surfaces move past each other and can cut or slice tissue caught between them.

WHY IT MATTERS

Shear points do not only crush; they can tear or amputate because the surfaces slide across each other. Gloves may give little protection if the finger is pulled into the moving interface.

INDUSTRIAL EXAMPLES

Shear points occur at scissor lifts, guillotine cutters, sliding machine parts, closing dies, hydraulic blades, and moving chains.

RELATED TERMS

Amputation | Cutting Hazard | Moving Parts | Machine Guarding | Entanglement

79 **Caught-Between Hazard** MECHANISMS

DEFINITION

A caught-between hazard exists when a body part can be trapped between two objects, or between an object and a fixed surface.

WHY IT MATTERS

Hands are caught between objects when workers guide, steady, align, or catch moving items manually. Once trapped, withdrawal may be impossible until the load moves again.

INDUSTRIAL EXAMPLES

Caught-between events occur between pipe and rack, plate and support, load and deck, pallet and fork, door and frame, or machine part and stop block.

RELATED TERMS

Pinch Point | Crush Point | Line of Fire | Closing Gap | Load Landing

80 **Line of Fire** MECHANISMS

DEFINITION

Line of fire is the path where a person can be struck, crushed, pulled, cut, or otherwise harmed if energy is released.

WHY IT MATTERS

Hands enter the line of fire when they are used to control movement, hold parts, or stabilise tools. The hand may be small, but it is often the first body part placed in the danger path.

INDUSTRIAL EXAMPLES

Line-of-fire exposure appears near swinging loads, taut ropes, press movement, tool slip paths, spring release, pressure leaks, and falling objects.

RELATED TERMS

Energy Release | Struck-By | Pinch Point | Stored Energy | Exclusion Zone

81 **Last-Inch Exposure** MECHANISMS

DEFINITION

Last-inch exposure is hand exposure that occurs during the final small movement needed to align, seat, land, or position a part.

WHY IT MATTERS

Many serious hand injuries happen when the main lift or movement is almost complete. The worker places fingers close to the gap because the task now needs accuracy, not force.

INDUSTRIAL EXAMPLES

Last-inch exposure occurs while aligning flanges, seating mould boxes, landing equipment, inserting pins, placing shims, or positioning plates.

RELATED TERMS

Final Alignment | Pinch Point | Closing Gap | Precision Grip | Hand-as-Control

82 Hand-as-Control

MECHANISMS

DEFINITION

Hand-as-control describes a task where the worker uses the hand as the main method to guide, stop, hold, or position a load or part.

WHY IT MATTERS

This exposure turns the hand into a tool, sensor, brake, and guide. When the load moves unpredictably, the hand takes the force instead of a designed control device.

INDUSTRIAL EXAMPLES

Hand-as-control is seen when workers steady suspended loads, hold parts during drilling, guide pipes into saddles, stop swinging baskets, or push components by hand.

RELATED TERMS

Load Control | Tool-to-Load Interface | Last-Inch Exposure | Hands-Off Method | Exposure Reduction

83 Closing Gap

MECHANISMS

DEFINITION

A closing gap is the space between two objects that is becoming smaller as one or both objects move.

WHY IT MATTERS

Closing gaps trap fingers because the hand is often placed exactly where the worker wants the final fit to happen. The danger may be slow-moving but still powerful enough to crush tissue.

INDUSTRIAL EXAMPLES

Closing gaps occur between flanges, machine parts, doors, mould boxes, pipe supports, clamps, lifting hooks, and loads landing on supports.

RELATED TERMS

Pinch Point | Crush Point | Final Alignment | Caught-Between | Load Landing

84 Moving Part

MECHANISMS

DEFINITION

A moving part is any component that rotates, slides, reciprocates, travels, or shifts during operation or handling.

WHY IT MATTERS

Moving parts injure hands when workers reach near them for adjustment, cleaning, feeding, removal, or troubleshooting. Slow movement can still carry enough force to trap or shear fingers.

INDUSTRIAL EXAMPLES

Moving parts include rollers, belts, chains, gears, press slides, conveyors, turntables, rotating shafts, fans, and sliding guards.

RELATED TERMS

Machine Guarding | Entanglement | Shear Point | Nip Point | Lockout

85 Rotating Part

MECHANISMS

DEFINITION

A rotating part is a component that spins around an axis, such as a shaft, chuck, wheel, fan, or roller.

WHY IT MATTERS

Rotating parts pull in gloves, sleeves, rings, rags, or fingers before the worker can react. Once material catches, the hand can be wrapped, crushed, or amputated.

INDUSTRIAL EXAMPLES

Rotating-part exposure occurs near drill chucks, lathe workpieces, grinders, rollers, winches, shafts, couplings, and fans.

RELATED TERMS

Entanglement | Nip Point | Moving Part | Ring Avulsion | Machine Guarding

86 Nip Point

MECHANISMS

DEFINITION

A nip point is a location where a rotating or moving surface draws material into a narrowing space.

WHY IT MATTERS

Nip points pull rather than simply trap. A glove fingertip, rag, rope, or sleeve can be drawn in and drag the hand with it.

INDUSTRIAL EXAMPLES

Nip points occur at rollers, belt drives, chain and sprocket sets, gears, conveyor pulleys, winches, and rotating drums.

RELATED TERMS

Entanglement | Rotating Part | Pinch Point | Shear Point | Machine Guarding

87 Entanglement

MECHANISMS

DEFINITION

Entanglement occurs when a hand, glove, clothing, rope, ring, or tool is caught and pulled into moving equipment.

WHY IT MATTERS

Entanglement is fast and unforgiving because the machine supplies continuous pulling force. The injury may progress from glove catch to finger fracture, avulsion, degloving, or amputation.

INDUSTRIAL EXAMPLES

Entanglement occurs near rotating shafts, drill chucks, rollers, conveyor pulleys, winches, chains, wire rope, and spinning tools.

RELATED TERMS

Rotating Part | Nip Point | Avulsion | Degloving Injury | Machine Guarding

88 Stored Energy

MECHANISMS

DEFINITION

Stored energy is energy held in a system that can be released suddenly. It may be mechanical, hydraulic, pneumatic, electrical, gravitational, thermal, or spring energy.

WHY IT MATTERS

Stored energy creates hand injuries when a part moves after it seemed stable. A stuck component, compressed spring, suspended load, pressurised line, or trapped tension can release into the hand.

INDUSTRIAL EXAMPLES

Stored energy is found in springs, pressurised hoses, suspended loads, jammed parts, tensioned ropes, hydraulic systems, compressed air, and elevated objects.

RELATED TERMS

Energy Release | Line of Fire | Lockout | Hydraulic Pressure | Tension

89 Energy Release

MECHANISMS

DEFINITION

Energy release is the sudden movement, pressure, heat, or force that occurs when stored energy is released.

WHY IT MATTERS

Hands are injured when they are placed where the release travels. The worker may be loosening, aligning, holding, or testing a part when the energy path changes instantly.

INDUSTRIAL EXAMPLES

Energy release occurs when a hose bursts, a jam clears, a spring releases, a load shifts, a tool slips, or a pressurised fitting is opened.

RELATED TERMS

Stored Energy | Line of Fire | Struck-By | Pressure Release | Tool Slip

90 Tool Slip

MECHANISMS

DEFINITION

Tool slip occurs when a tool loses purchase and moves suddenly away from the intended contact point.

WHY IT MATTERS

A slipping tool sends the hand into nearby steel, sharp edges, hot surfaces, or the workpiece itself. The supporting hand is often hit because it is holding the part close to the tool path.

INDUSTRIAL EXAMPLES

Tool slip occurs with spanners on rounded nuts, screwdrivers on damaged slots, hammers glancing off punches, pry bars losing bite, or blades deflecting.

RELATED TERMS

Supporting Hand | Tool Control | Impact Injury | Laceration | Line of Fire

91 Overtravel

MECHANISMS

DEFINITION

Overtravel is unintended movement beyond the point where a tool, hand, or component was meant to stop.

WHY IT MATTERS

Overtravel injures hands when force continues after resistance suddenly disappears. The tool or hand shoots forward into edges, hot parts, rotating equipment, or another worker.

INDUSTRIAL EXAMPLES

Overtravel occurs when a stuck bolt breaks free, a pry bar releases, a drill breaks through, a knife passes through material, or a spanner slips.

RELATED TERMS

Tool Slip | Forceful Exertion | Line of Fire | Cutting Hazard | Hand Position

92 Struck-By Hazard

MECHANISMS

DEFINITION

A struck-by hazard exists when a hand can be hit by a moving, falling, swinging, flying, or ejected object.

WHY IT MATTERS

Hands are struck when they are used to steady objects within the movement path. Impact can fracture fingers, split skin, damage nails, or drive the hand into a second hazard.

INDUSTRIAL EXAMPLES

Struck-by events involve falling tools, swinging hooks, moving pipes, ejected chips, snapped ropes, hammer blows, and loads shifting during landing.

RELATED TERMS

Line of Fire | Impact Injury | Falling Object | Swinging Load | Dropped Object

93 Suspended Load

MECHANISMS

DEFINITION

A suspended load is any load hanging from lifting equipment, such as a crane, hoist, chain block, or forklift attachment.

WHY IT MATTERS

Suspended loads move with swing, rotation, drift, and delayed response. Hands placed on the load during landing or alignment can be crushed between the load and the receiving surface.

INDUSTRIAL EXAMPLES

Suspended-load exposure occurs during crane lifts, basket landing, mould-box placement, pipe handling, equipment positioning, and rigging adjustments.

RELATED TERMS

Load Swing | Tagline | Load Landing | Exclusion Zone | Hand-as-Control

94 Load Swing

MECHANISMS

DEFINITION

Load swing is side-to-side or pendulum movement of a suspended load.

WHY IT MATTERS

Swing makes the load arrive where the worker did not expect it. If a person tries to stop the swing by hand, the hand becomes the contact point for the load momentum.

INDUSTRIAL EXAMPLES

Load swing occurs during offshore basket landing, crane trolley movement, wind exposure, uneven lifting, sudden stopping, or long-sling lifts.

RELATED TERMS

Suspended Load | Tagline | Pendulum Effect | Line of Fire | Load Control

95 Load Landing

MECHANISMS

DEFINITION

Load landing is the process of placing a suspended or moved load onto a surface, support, stand, or final position.

WHY IT MATTERS

Load landing creates high hand exposure because alignment becomes precise just as the load has weight and momentum. Fingers are often placed under edges, beside lugs, or near supports.

INDUSTRIAL EXAMPLES

Load landing occurs when placing mould boxes, steel plates, equipment skids, pallets, pipe sections, machine parts, or containers onto supports.

RELATED TERMS

Suspended Load | Last-Inch Exposure | Pinch Point | Closing Gap | Exclusion Zone

96 Final Alignment

MECHANISMS

DEFINITION

Final alignment is the last adjustment made to bring holes, edges, faces, supports, or components into position.

WHY IT MATTERS

Final alignment pulls hands into the danger zone because small movements feel easier by hand. This is where fingertips enter bolt holes, flange gaps, clamp faces, or load contact points.

INDUSTRIAL EXAMPLES

Final alignment occurs while matching flange holes, seating machine parts, inserting pins, aligning plates, placing shims, or positioning pipe.

RELATED TERMS

Last-Inch Exposure | Closing Gap | Pinch Point | Precision Grip | Hand-as-Control

97 Manual Guiding

MECHANISMS

DEFINITION

Manual guiding is using the hands to steer, steady, or direct a part, tool, or load.

WHY IT MATTERS

Manual guiding creates direct exposure because the worker must stay close enough to touch the moving object. If the object shifts, the hand has no separation from the force.

INDUSTRIAL EXAMPLES

Manual guiding is used on suspended loads, pipes, plates, pallets, mould boxes, machine parts, and equipment skids.

RELATED TERMS

Hand-as-Control | Load Control | Push-Pull Tool | Tagline | Exposure Reduction

98 **Manual Holding** MECHANISMS

DEFINITION

Manual holding is using the hand to keep a part or material in position while another action takes place.

WHY IT MATTERS

Manual holding exposes the supporting hand to the tool path and the workpiece movement. The hand may be cut, struck, drilled, crushed, or burned while trying to stabilise the part.

INDUSTRIAL EXAMPLES

Manual holding occurs during drilling, grinding, cutting, hammering, fastening, welding setup, chisel work, or alignment.

RELATED TERMS

Supporting Hand | Tool Path | Workpiece Control | Pinch Point | Cutting Hazard

99 **Exclusion Zone** MECHANISMS

DEFINITION

An exclusion zone is a controlled area where people keep out of the path of moving loads, tools, or released energy.

WHY IT MATTERS

An exclusion zone fails when the task still requires hands inside the zone to guide or align the work. The zone must be supported by tools, fixtures, taglines, or redesigned methods that allow control from outside.

INDUSTRIAL EXAMPLES

Exclusion zones are used around crane lifts, pressure testing, cutting operations, suspended loads, moving equipment, and stored-energy release points.

RELATED TERMS

Line of Fire | Suspended Load | Load Landing | Hands-Off Method | Exposure Reduction

100 **Hands-Off Method** MECHANISMS

DEFINITION

A hands-off method is a work method that avoids direct hand contact with the hazard by using distance, tools, fixtures, mechanical guides, taglines, or redesigned steps.

WHY IT MATTERS

Hands-off methods reduce exposure by changing how control is achieved. The goal is not to make the worker more careful inside the hazard, but to keep the hand out of the hazard path.

INDUSTRIAL EXAMPLES

Hands-off methods include push-pull tools, taglines, magnetic positioning tools, fixtures, clamps, guide poles, tongs, hooks, and pre-alignment aids.

RELATED TERMS

Exposure Reduction | Hand-as-Control | Tool-to-Load Interface | Exclusion Zone | Hierarchy of Controls Draft for review - production batch

HSF INDUSTRIAL HAND SAFETY ENCYCLOPEDIA · VOLUME 1

Hazard Zones and Contact Points

101 **Pinch Point** HAZARD ZONES

DEFINITION

A pinch point is a place where a hand or finger can be caught between two objects, or between a moving object and a fixed object. The gap may be visible, hidden, opening, closing, or changing during the task.

WHY IT MATTERS

Pinch points cause crushed fingertips, nail-bed injuries, fractures, and amputations because the hand is often used to hold alignment just as the gap closes. The danger is often underestimated when the movement looks slow, because even slow movement can trap soft tissue and bone before a worker can pull away.

INDUSTRIAL EXAMPLES

Pinch points appear when aligning flanges, landing a suspended load onto a base frame, setting a die, closing a clamp, adjusting a chain block hook, positioning a steel plate, or guiding a pipe into a support.

RELATED TERMS

Closing Gap | Crush Injury | Fingertip | Last-Inch Exposure | Line of Fire

102 **Crush Zone** HAZARD ZONES

DEFINITION

A crush zone is any area where a body part can be compressed between a load, tool, machine part, structure, or surface. For hand safety, crush zones often form around heavy objects being landed, shifted, or aligned.

WHY IT MATTERS

Crush zones can destroy soft tissue, break phalanges or metacarpals, damage blood vessels, and trap the hand with little warning. Gloves may reduce abrasion but cannot stop the force of a heavy load closing on the hand.

INDUSTRIAL EXAMPLES

A crush zone is created when a mould box is lowered onto supports, a pipe rolls against a stopper, a pallet is pushed against a wall, a skid is jacked sideways, or a plate is adjusted under a crane hook.

RELATED TERMS

Pinch Point | Closing Gap | Crush Injury | Suspended Load | Load Landing

103 **Shear Point** HAZARD ZONES

DEFINITION

A shear point is a location where two surfaces move past each other closely enough to cut, slice, or tear skin and tissue. The movement can be straight, rotating, sliding, or scissoring.

WHY IT MATTERS

Shear points can remove skin, split fingertips, or cut tendons because the hand is caught between surfaces that do not simply press together but slide across each other. These injuries can look like cuts while deeper structures have been crushed or torn.

INDUSTRIAL EXAMPLES

Shear points occur near scissor lifts, sliding doors, rotating couplings, chain links running over sprockets, sheet metal edges moving across each other, and machine guards being closed.

RELATED TERMS

Laceration | Avulsion | Tendon | Sliding Contact | Machine Guard

104 **Nip Point** HAZARD ZONES

DEFINITION

A nip point is a type of pinch point where a rotating part pulls material, clothing, gloves, or fingers into a narrowing gap. It is common around rollers, belts, chains, wheels, and gears.

WHY IT MATTERS

Nip points pull faster than a person can react. A fingertip or glove edge can be drawn in first, followed by more of the hand, causing crush injury, degloving, fracture, or amputation.

INDUSTRIAL EXAMPLES

Nip points appear where conveyor belts pass over rollers, where chain drives meet sprockets, where rope winds onto a drum, where rubber rollers feed sheet material, and where gears mesh.

RELATED TERMS

Entanglement | Roller | Conveyor | Amputation | Line of Fire

105 **Line of Fire** HAZARD ZONES

DEFINITION

Line of fire is the path where a body part can be struck, trapped, pulled, cut, burned, or crushed if energy is released or movement occurs. For hand safety, it is the space the hand enters when controlling or correcting work.

WHY IT MATTERS

Hands enter the line of fire when workers use them as brakes, guides, spacers, or feelers. The injury happens when stored energy releases, a load shifts, a tool slips, or a moving part continues into the hand.

INDUSTRIAL EXAMPLES

A hand is in the line of fire when it holds a chisel under a hammer, steadies a pipe during lifting, reaches beside a grinder disc, catches a swinging load, or keeps fingers near a flange gap during bolt alignment.

RELATED TERMS

Hand-as-Control | Pinch Point | Stored Energy | Tool Slip | Exposure

106 **Struck-By Zone** HAZARD ZONES

DEFINITION

A struck-by zone is an area where a hand can be hit by a moving, falling, swinging, flying, or rebounding object. The object may be a tool, component, load, fastener, or fragment.

WHY IT MATTERS

Struck-by injuries cause bruising, fractures, nail-bed damage, tendon injury, and open wounds. The hand is often injured because it is placed near the work to guide or steady the object just before impact.

INDUSTRIAL EXAMPLES

Struck-by zones occur near hammering, dropped bolts, swinging hooks, rebounding taglines, flying grinding fragments, moving trolley loads, and tools that slip off fasteners.

RELATED TERMS

Impact Injury | Dropped Object | Tool Slip | Line of Fire | Fracture

107 **Caught-Between Hazard** HAZARD ZONES

DEFINITION

A caught-between hazard exists when the hand can be trapped between two objects, commonly during movement, positioning, maintenance, or lifting. One object may be fixed while the other moves.

WHY IT MATTERS

Caught-between injuries are severe because the hand has no escape once the gap closes. The result may be crushed fingers, fracture-dislocation, tendon damage, or amputation, especially during final positioning when workers try to correct alignment by hand.

INDUSTRIAL EXAMPLES

Caught-between hazards occur between a load and a wall, a pipe and a support, a machine door and frame, a flange and gasket, a suspended basket and deck, or a forklift load and rack.

RELATED TERMS

Pinch Point | Crush Zone | Last-Inch Exposure | Suspended Load | Amputation

108 **Draw-In Hazard** HAZARD ZONES

DEFINITION

A draw-in hazard exists when a moving part, rope, belt, chain, roller, or rotating component can pull the hand into the equipment or gap.

WHY IT MATTERS

Draw-in hazards defeat normal reaction time because the movement grabs first and pulls second. A glove finger, loose strap, rag, or fingertip can become the starting point for entanglement, crushing, or amputation.

INDUSTRIAL EXAMPLES

Draw-in hazards appear at winch drums, conveyor rollers, chain drives, rotating shafts, rope sheaves, pipe threading machines, and belt-driven equipment.

RELATED TERMS

Nip Point | Entanglement | Rotating Equipment | Glove Entrapment | Amputation

109 **Entrapment Zone** HAZARD ZONES

DEFINITION

An entrapment zone is a space where the hand can enter but cannot easily withdraw once movement, load shift, or deformation occurs. It may involve gaps, openings, slots, recesses, or cavities.

WHY IT MATTERS

Entrapment zones cause delayed rescue problems because the hand may be trapped without immediate cutting or lifting of the object. Swelling after injury can make the hand even harder to remove, increasing tissue damage.

INDUSTRIAL EXAMPLES

Entrapment zones appear in lifting lugs, chain links, pipe saddles, machine openings, pallet gaps, mould box pockets, steel channel sections, and between stacked components.

RELATED TERMS

Caught-Between Hazard | Crush Zone | Swelling | Rescue | Gap Hazard

110 **Hot Contact Zone** HAZARD ZONES

DEFINITION

A hot contact zone is any surface, object, fluid, or atmosphere hot enough to burn the hand on contact or through radiant heat.

WHY IT MATTERS

Thermal burns damage skin quickly, and workers may react by dropping a load, jerking the hand into another hazard, or pulling back into a sharp edge. A brief contact with hot metal can cause a deep burn even when the surface looks ordinary.

INDUSTRIAL EXAMPLES

Hot contact zones occur around recently welded parts, heated bearings, steam lines, foundry moulds, hot pipes, cutting operations, engine components, and sun-heated metal decks.

RELATED TERMS

Thermal Burn | Contact Burn | Hot Work | Skin | Glove Protection

111 **Sharp-Edge Zone** HAZARD ZONES

DEFINITION

A sharp-edge zone is any area where an edge, burr, blade, wire, or fractured surface can cut the hand. The edge may be obvious or hidden until the hand slides across it.

WHY IT MATTERS

Sharp edges cause lacerations, tendon cuts, nerve cuts, and arterial bleeding. A worker may feel only a small slice at first, then discover that the finger cannot bend or straighten because a tendon has been severed.

INDUSTRIAL EXAMPLES

Sharp-edge zones appear on sheet metal, cut cable ties, broken glass, machined parts with burrs, wire rope fishhooks, freshly cut pipe, banding straps, and damaged steel plates.

RELATED TERMS

Laceration | Flexor Tendon | Extensor Tendon | Burr | Sheet Metal

112 Burr

HAZARD ZONES

DEFINITION

A burr is a rough, sharp, or raised edge left on metal, plastic, or other material after cutting, drilling, grinding, machining, or damage.

WHY IT MATTERS

Burrs are dangerous because they are small enough to be missed during visual checks but sharp enough to slice gloves and skin. A burr can turn a simple handling task into a deep cut or puncture, especially when the hand slides under force.

INDUSTRIAL EXAMPLES

Burrs are found on drilled holes, flame-cut plates, machined grooves, pipe ends, punched brackets, aluminium extrusions, sheet edges, and repaired equipment.

RELATED TERMS

Sharp-Edge Zone | Laceration | Puncture Wound | Deburring | Glove Cut Resistance

113 Protrusion

HAZARD ZONES

DEFINITION

A protrusion is any projecting part, edge, pin, bolt, lug, hook, wire, or corner that sticks out from equipment or material.

WHY IT MATTERS

Protrusions catch gloves, tear skin, bruise knuckles, and create snag points that pull the hand into nearby hazards. They are especially risky when workers guide loads by feel without seeing the far side of the object.

INDUSTRIAL EXAMPLES

Protrusions include lifting lugs on mould boxes, exposed bolts on frames, rebar ends, cotter pins, sharp wire strands, hook tips, corner brackets, and broken machine parts.

RELATED TERMS

Snag Point | Puncture Wound | Laceration | Glove Entrapment | Load Guidance

114 Snag Point

HAZARD ZONES

DEFINITION

A snag point is a place where a glove, sleeve, strap, rope, skin, or finger can catch on a protrusion, edge, rotating part, or rough surface.

WHY IT MATTERS

A snag point can suddenly convert normal hand movement into entanglement or a fall of balance. When the hand catches during lifting or machine work, the worker may be pulled toward a crush zone, rotating part, or sharp edge.

INDUSTRIAL EXAMPLES

Snag points appear on damaged hooks, wire rope strands, pallet nails, exposed split pins, rough castings, rotating shafts, banding straps, and torn mesh.

RELATED TERMS

Protrusion | Entanglement | Glove Entrapment | Draw-In Hazard | Wire Rope

115 Sliding Contact

HAZARD ZONES

DEFINITION

Sliding contact occurs when the hand moves across a surface, or a surface moves across the hand, while pressure is applied.

WHY IT MATTERS

Sliding contact turns friction and hidden edges into injury sources. It can cause abrasions, cuts, burns, degloving, and tendon exposure when the hand is dragged across rough, hot, or sharp material.

INDUSTRIAL EXAMPLES

Sliding contact occurs when guiding a plate into position, pulling a rope through the hand, handling sheet metal, pushing against a rough casting, or trying to slow a moving load with the palm.

RELATED TERMS

Abrasion | Shear Point | Sharp-Edge Zone | Friction Burn | Degloving

116 **Rolling Contact** HAZARD ZONES

DEFINITION

Rolling contact occurs when a round or cylindrical object moves against the hand or when the hand is placed near a rolling object.

WHY IT MATTERS

Rolling contact can trap fingers underneath or pull the hand into the closing gap between the object and floor, support, or another surface. Because round objects move unpredictably, the hand often gets caught while trying to stop rotation.

INDUSTRIAL EXAMPLES

Rolling contact occurs with pipes, rollers, drums, cylinders, rebar bundles, cable reels, shafts, tyres, and round stock being positioned or stored.

RELATED TERMS

Tubular Load | Pinch Point | Crush Injury | Hand-as-Brake | Chock

117 **Rotating Contact** HAZARD ZONES

DEFINITION

Rotating contact occurs when the hand, glove, or tool contacts a spinning shaft, wheel, disc, chuck, coupling, or other rotating part.

WHY IT MATTERS

Rotating contact can wrap gloves, pull fingers into equipment, or throw the hand against nearby metal. Injuries can escalate from a small catch to degloving or amputation before the machine stops.

INDUSTRIAL EXAMPLES

Rotating contact hazards exist around drills, grinders, lathes, couplings, fan shafts, winch drums, polishing wheels, and rotating pipe during threading.

RELATED TERMS

Entanglement | Draw-In Hazard | Nip Point | Glove Entrapment | Amputation

118 **Falling Object Path** HAZARD ZONES

DEFINITION

A falling object path is the vertical or angled route an object may take if dropped, released, dislodged, or knocked loose. Hands are exposed when they are placed beneath or beside the object.

WHY IT MATTERS

Hands are often injured because workers reach under a part to support, catch, or reposition it. A falling object can crush the distal phalanx, split the nail bed, fracture metacarpals, or trap the hand against the floor.

INDUSTRIAL EXAMPLES

Falling object paths appear under suspended tools, loose bolts, lifted plates, stacked steel, removed machine covers, rigging hardware, pallets, and parts being handed down from height.

RELATED TERMS

Dropped Object | Struck-By Zone | Crush Injury | Distal Phalanx | Suspended Load

119 **Swing Radius** HAZARD ZONES

DEFINITION

Swing radius is the area through which a load, tool, hook, boom, pipe, door, or suspended object can swing around a pivot or lifting point.

WHY IT MATTERS

A hand inside the swing radius can be struck or pinned even if the worker is not directly under the load. Swinging movement creates side impact and closing gaps that crush fingers against fixed structures.

INDUSTRIAL EXAMPLES

Swing radius hazards occur around crane hooks, suspended baskets, pipe joints, hinged guards, truck tailgates, rotating doors, long plates, and loads turning during EOT crane travel.

RELATED TERMS

Suspended Load | Struck-By Zone | Side Load | Load Swing | Exclusion Zone

120 **Rebound Zone** HAZARD ZONES

DEFINITION

A rebound zone is the area where a tool, rope, load, spring, bar, or component may snap back after release, impact, slipping, or loss of tension.

WHY IT MATTERS

Rebound injuries happen because the hand remains near the stored energy path after the worker thinks the task is complete. The rebound can strike knuckles, tear web spaces, cut skin, or pull fingers into a gap.

INDUSTRIAL EXAMPLES

Rebound zones appear when a pry bar slips, a tagline snaps back, a tensioned strap releases, a stuck spanner breaks free, a hose kicks, or a hammer glances off a chisel.

RELATED TERMS

Stored Energy | Tool Slip | Line of Fire | Impact Injury | Web Space

121 **Stored Energy Zone** HAZARD ZONES

DEFINITION

A stored energy zone is the area affected by energy held in a compressed, stretched, lifted, pressurised, wound, heated, or jammed system.

WHY IT MATTERS

Stored energy injures hands when it releases suddenly. The hand may be holding the part, checking the fit, or applying force at the moment the system moves, causing impact, crushing, injection, or burns.

INDUSTRIAL EXAMPLES

Stored energy exists in springs, hydraulic lines, pressurised hoses, suspended loads, jammed machinery, stretched straps, compressed seals, tensioned chains, and heated components.

RELATED TERMS

Line of Fire | Rebound Zone | High-Pressure Injection Injury | Hydraulic Energy | Lockout

122 **Pressure Zone** HAZARD ZONES

DEFINITION

A pressure zone is an area where fluid, gas, grease, or air pressure can release toward the hand or inject material through the skin.

WHY IT MATTERS

Pressure release can look harmless at first but cause deep tissue damage. High-pressure injection injuries may leave only a tiny puncture mark while grease, oil, paint, or hydraulic fluid spreads inside the finger or palm.

INDUSTRIAL EXAMPLES

Pressure zones occur at hydraulic hose leaks, grease guns, paint spray systems, pneumatic lines, clogged nozzles, valve fittings, and pressure-test connections.

RELATED TERMS

High-Pressure Injection Injury | Puncture Wound | Hydraulic Energy | Hose Handling | Stored Energy

123 **Chemical Contact Zone** HAZARD ZONES

DEFINITION

A chemical contact zone is an area where the hand can touch, splash, absorb, or be contaminated by a chemical substance. The chemical may be liquid, powder, paste, vapour, residue, or contaminated surface film.

WHY IT MATTERS

Chemical contact can cause burns, dermatitis, delayed skin damage, loss of grip, or contamination transfer to the eyes and mouth. Some chemicals cause serious injury without immediate pain, so a worker may continue the job while damage progresses.

INDUSTRIAL EXAMPLES

Chemical contact zones occur around solvents, acids, alkalis, cement, cleaning agents, degreasers, battery electrolyte, oils, adhesives, resins, and chemical-soaked gloves.

RELATED TERMS

Chemical Burn · Dermatitis · Skin · Contamination · Glove Compatibility

124 **Electrical Contact Zone** HAZARD ZONES

DEFINITION

An electrical contact zone is any area where the hand can contact live conductors, damaged cables, energised equipment, or conductive parts carrying unintended current.

WHY IT MATTERS

Electrical contact can cause burns, shock, muscle contraction, falls, and secondary hand injuries. A worker may be unable to release the object if current causes the hand muscles to clamp down.

INDUSTRIAL EXAMPLES

Electrical contact zones occur near damaged extension cords, open panels, welding leads, battery terminals, wet electrical tools, faulty earthing, exposed terminals, and maintenance work before isolation is confirmed.

RELATED TERMS

Electrical Burn · Shock · Isolation · Lockout · Grip

125 **Cold Contact Zone** HAZARD ZONES

DEFINITION

A cold contact zone is any surface, material, fluid, or environment cold enough to reduce sensation, stiffen fingers, or damage skin on contact.

WHY IT MATTERS

Cold reduces dexterity and touch feedback before the worker notices it. Numb fingers grip poorly, miss sharp edges, and react slowly, raising the risk of cuts, crush injuries, and frostbite in extreme conditions.

INDUSTRIAL EXAMPLES

Cold contact zones occur when handling refrigerated parts, cryogenic lines, cold-weather steel, frozen ropes, chilled pipework, gas cylinders, cold tools, and outdoor equipment in low temperatures.

RELATED TERMS

Cold Injury · Numbness · Dexterity · Skin · Glove Protection Page

126 Manual Positioning

TASK TYPES

DEFINITION

Manual positioning is the use of the hands to place, adjust, align, or hold an object in its final working position.

WHY IT MATTERS

Manual positioning creates high exposure because the hand is usually closest to the final gap, edge, load, or tool. Fingers get trapped when the part shifts, settles, rolls, or needs a last small correction.

INDUSTRIAL EXAMPLES

Manual positioning occurs when fitting a pump onto a base, aligning bolt holes in a flange, setting a plate under a clamp, placing a die, or sliding a bearing housing into place.

RELATED TERMS

Last-Inch Exposure | Pinch Point | Alignment | Hand-as-Control | Final Positioning

127 Final Positioning

TASK TYPES

DEFINITION

Final positioning is the last stage of placing a component, load, tool, or assembly exactly where it needs to sit. It often involves small corrections after the main movement is complete.

WHY IT MATTERS

Final positioning is one of the most dangerous moments for hands because workers stop thinking of the object as moving but still place fingers into the closing gap. The injury often happens during the last few millimetres.

INDUSTRIAL EXAMPLES

Final positioning occurs while landing a suspended mould box, seating a pipe on a support, bringing two flanges together, placing a pallet against a stop, or nudging a machine skid into bolt alignment.

RELATED TERMS

Last-Inch Exposure | Closing Gap | Manual Positioning | Crush Zone | Alignment

128 Alignment

TASK TYPES

DEFINITION

Alignment is the process of bringing holes, faces, edges, shafts, pipes, flanges, or components into the correct relative position.

WHY IT MATTERS

Alignment work pulls fingers into danger because hands are used to feel mismatch, hold parts steady, and make small corrections. Sudden settling can crush fingertips or trap a finger used as a spacer.

INDUSTRIAL EXAMPLES

Alignment happens when matching flange holes, lining up baseplate bolts, seating guards, positioning couplings, joining pipe sections, setting mould boxes, or fitting brackets.

RELATED TERMS

Manual Positioning | Finger-as-Spacer | Pinch Point | Drift Pin | Final Positioning

129 Hole Matching

TASK TYPES

DEFINITION

Hole matching is the task of aligning holes in two or more parts so that bolts, pins, or fasteners can pass through.

WHY IT MATTERS

Hole matching creates severe fingertip exposure when workers use fingers to feel alignment or test whether a hole is clear. If the parts shift, the finger becomes the pin being trapped between edges.

INDUSTRIAL EXAMPLES

Hole matching occurs during flange assembly, structural steel erection, machine base fitting, guard installation, bracket mounting, and rigging hardware adjustment.

RELATED TERMS

Alignment | Finger-as-Spacer | Pinch Point | Drift Pin | Bolt-Up

130 Bolt-Up

TASK TYPES

DEFINITION

Bolt-up is the process of inserting, tightening, and securing bolts through aligned components such as flanges, plates, frames, and equipment bases.

WHY IT MATTERS

Bolt-up exposes hands to spanner slip, flange gaps, finger trapping, thread cuts, and pinch points between washers, nuts, and joint faces. The supporting hand is often closer to the injury than the hand turning the tool.

INDUSTRIAL EXAMPLES

Bolt-up occurs on pipe flanges, pump bases, structural frames, machine guards, crane rails, valve assemblies, and heavy equipment mounts.

RELATED TERMS

Supporting Hand | Spanner Slip | Hole Matching | Pinch Point | Torque Tool

131 Load Landing

TASK TYPES

DEFINITION

Load landing is the controlled placement of a suspended, lifted, jacked, or shifted load onto its support, base, floor, stand, or final position.

WHY IT MATTERS

Load landing creates crush zones because the load may settle suddenly, swing sideways, rotate, or drop the last small distance. Hands placed under, beside, or between the load and support can be crushed before the signaler can react.

INDUSTRIAL EXAMPLES

Load landing occurs when placing mould boxes, steel plates, pallets, baskets, pumps, motors, skids, pipe bundles, and machine components onto supports.

RELATED TERMS

Suspended Load | Crush Zone | Final Positioning | Tagline | Exclusion Zone

132 Load Guidance

TASK TYPES

DEFINITION

Load guidance is the act of controlling the direction, rotation, swing, or approach of a load during movement.

WHY IT MATTERS

Load guidance becomes hazardous when the hand or body is used as the control device. A swinging load can pin fingers against a structure, pull a worker off balance, or drag the hand into a closing gap.

INDUSTRIAL EXAMPLES

Load guidance occurs when steering a basket onto a deck, controlling a crane-lifted frame, rotating a pipe spool, guiding a mould box, or moving a long plate through a bay.

RELATED TERMS

Hand-as-Control | Suspended Load | Swing Radius | Tagline | Push-Pull Tool

133 Tagline Handling

TASK TYPES

DEFINITION

Tagline handling is the use of a rope or line to help control a suspended or moving load from a distance.

WHY IT MATTERS

Taglines can reduce direct hand contact, but they also create rope burns, snap-back zones, entanglement, and sudden pull forces. A wrapped hand can be dragged when the load swings or the line tightens.

INDUSTRIAL EXAMPLES

Tagline handling is used for crane lifts, offshore baskets, long pipe spools, steel frames, panels, equipment skids, and loads exposed to wind or trolley movement.

RELATED TERMS

Rebound Zone | Load Guidance | Rope Burn | Entanglement | Suspended Load

134 **Manual Lifting** TASK TYPES

DEFINITION

Manual lifting is the use of body force to raise, lower, carry, or reposition an object without mechanical lifting as the main support.

WHY IT MATTERS

Manual lifting exposes hands to crush and pinch injuries when workers grip under edges, place fingers beneath loads, or lose control during a change in balance. The injury often occurs when setting the load down, not when first picking it up.

INDUSTRIAL EXAMPLES

Manual lifting includes carrying pumps, lifting covers, moving plates, raising toolboxes, shifting drums, carrying sacks, and placing machine parts onto benches.

RELATED TERMS

Grip | Set-Down Point | Crush Zone | Manual Handling | Finger Placement

135 **Set-Down Point** TASK TYPES

DEFINITION

A set-down point is the place where a carried or lifted object is lowered onto a surface, support, pallet, or floor.

WHY IT MATTERS

Set-down points injure hands when fingers remain under the object during the last part of lowering. A worker may focus on the weight and forget that the hand is becoming the cushion between the load and surface.

INDUSTRIAL EXAMPLES

Set-down point injuries happen when lowering toolboxes, motors, steel sections, pallets, covers, plates, drums, and spare parts onto floors, benches, or stands.

RELATED TERMS

Manual Lifting | Crush Zone | Last-Inch Exposure | Finger Placement | Load Landing

136 **Pushing Task** TASK TYPES

DEFINITION

A pushing task is any task where force is applied away from the body through the hand, palm, tool, handle, or pole.

WHY IT MATTERS

Pushing becomes hazardous when the object suddenly releases, causing the hand to overtravel into steel, hot surfaces, sharp edges, or moving parts. A bent wrist during pushing reduces grip strength — if the object releases suddenly, the wrist buckles and the palm slides across the work surface or strikes the next hard edge in its path.

INDUSTRIAL EXAMPLES

Pushing tasks include moving trolleys, nudging plates, seating components, closing heavy doors, shifting skids with bars, and pushing loads away from pinch points.

RELATED TERMS

Overtravel | Tool Control | Wrist Joint | Hand-as-Brake | Push-Pull Tool

137 **Pulling Task** TASK TYPES

DEFINITION

A pulling task is any task where force is applied toward the body through the hand, fingers, rope, handle, chain, or tool.

WHY IT MATTERS

Pulling exposes the hand to snap-back, finger hooking, loss of balance, and sudden release. When the object breaks free, the hand can hit nearby steel or pull the worker into the load path.

INDUSTRIAL EXAMPLES

Pulling tasks include pulling straps, ropes, chains, trolley handles, stuck components, hoses, cables, guards, and heavy drawers.

RELATED TERMS

Rebound Zone | Hook Grip | Rope Burn | Sudden Release | Line of Fire

138 **Prying** TASK TYPES

DEFINITION

Prying is the use of a bar, lever, screwdriver, wedge, or similar tool to force a part to move, separate, lift, or align.

WHY IT MATTERS

Prying stores energy in the tool and the stuck part. When the bar slips or the part releases, the supporting hand can be struck, crushed, or driven into the gap the worker was trying to open.

INDUSTRIAL EXAMPLES

Prying occurs when separating flanges, lifting a plate edge, moving a skid, freeing jammed equipment, shifting mould boxes, or adjusting machine bases.

RELATED TERMS

Stored Energy | Rebound Zone | Tool Slip | Supporting Hand | Pinch Point

139 **Hammering** TASK TYPES

DEFINITION

Hammering is the use of a hammer or striking tool to deliver impact to another tool, fastener, component, or surface.

WHY IT MATTERS

Hammering injures hands when the struck tool shifts, the hammer glances off, or the supporting hand holds the target too close. Common outcomes include crushed fingertips, split nails, fractures, and web-space cuts.

INDUSTRIAL EXAMPLES

Hammering occurs while driving pins, striking chisels, loosening stuck parts, adjusting wedges, fitting keys, breaking slag, or seating components.

RELATED TERMS

Struck-By Zone | Fingersaver | Chisel Holder | Impact Injury | Supporting Hand

140 **Chiselling** TASK TYPES

DEFINITION

Chiselling is the use of a chisel or punch to cut, chip, mark, loosen, or drive material using repeated hammer blows.

WHY IT MATTERS

Chiselling places the supporting hand close to impact. A missed strike can crush the fingers, while mushroomed chisel heads can throw metal fragments into the hand.

INDUSTRIAL EXAMPLES

Chiselling is used for removing slag, cutting rivets, marking steel, freeing stuck pins, breaking concrete, cleaning welds, and adjusting fitted parts.

RELATED TERMS

Hammering | Struck-By Zone | Supporting Hand | Flying Fragment | Fingersaver

141 **Cutting Task** TASK TYPES

DEFINITION

A cutting task is any task where material is separated using a blade, saw, grinder, shear, torch, snip, knife, or powered cutting tool.

WHY IT MATTERS

Cutting tasks expose the hand to laceration, amputation, burns, flying fragments, and kickback. The non-cutting hand often becomes the support hand and is placed directly in the blade path.

INDUSTRIAL EXAMPLES

Cutting tasks include cutting straps, sheet metal, cable ties, pipe, hoses, packaging, rope, rubber, insulation, and steel sections.

RELATED TERMS

Blade Path | Laceration | Supporting Hand | Kickback | Sharp-Edge Zone

142 **Grinding Task** TASK TYPES

DEFINITION

A grinding task uses an abrasive wheel or disc to remove, shape, clean, or cut material.

WHY IT MATTERS

Grinding injures hands through disc contact, flying fragments, sparks, burns, and tool kickback. A slipping grinder can cut extensor tendons on the back of the hand before the worker understands the depth of the wound.

INDUSTRIAL EXAMPLES

Grinding tasks include weld cleaning, edge preparation, cutting bolts, deburring plates, removing rust, shaping brackets, and cleaning castings.

RELATED TERMS

Rotating Contact | Extensor Tendon | Flying Fragment | Burn | Tool Kickback

143 **Drilling Task** TASK TYPES

DEFINITION

A drilling task uses a rotating drill bit to create or enlarge a hole in material.

WHY IT MATTERS

Drilling exposes hands when parts are held by hand instead of clamped. The bit can grab the part, spin it, cut fingers, or pull gloves into rotating contact.

INDUSTRIAL EXAMPLES

Drilling tasks include drilling plates, brackets, guards, pipes, structural members, covers, and maintenance repairs on benches or in the field.

RELATED TERMS

Rotating Contact | Glove Entrapment | Workholding | Sharp-Edge Zone | Burr

144 **Workholding** TASK TYPES

DEFINITION

Workholding is the method used to secure a part during cutting, drilling, grinding, assembly, inspection, or repair.

WHY IT MATTERS

Poor workholding makes the hand act as a clamp. When the tool grabs or the part shifts, the supporting hand takes the cut, twist, impact, or crush force.

INDUSTRIAL EXAMPLES

Workholding includes using clamps, vices, fixtures, magnetic holders, jigs, chocks, stands, and dedicated holding tools instead of fingers near the work.

RELATED TERMS

Supporting Hand | Drilling Task | Cutting Task | Fixture | Hand-as-Clamp

145 **Hand Feeding** TASK TYPES

DEFINITION

Hand feeding is the act of placing or guiding material into a machine, tool, roller, press, cutter, or process using the hands.

WHY IT MATTERS

Hand feeding places fingers near moving tools and draw-in points. A small hesitation, material grab, glove catch, or misfeed can pull fingertips into rollers, blades, dies, or pinch gaps.

INDUSTRIAL EXAMPLES

Hand feeding occurs on presses, rollers, cutting machines, saws, conveyors, packaging equipment, shears, and small fabrication machines.

RELATED TERMS

Draw-In Hazard | Nip Point | Machine Guard | Amputation | Push Stick

146 Manual Guiding

TASK TYPES

DEFINITION

Manual guiding is the use of the hands to steer, steady, or correct the movement of material, equipment, or a load.

WHY IT MATTERS

Manual guiding becomes dangerous when the hand is used to correct movement that should be controlled by a tool, guide, fixture, tagline, or mechanical aid. The hand becomes the first point of contact if the object shifts.

INDUSTRIAL EXAMPLES

Manual guiding occurs when steering pipe into saddles, keeping plates straight through a machine, guiding pallets, controlling suspended loads, or aligning components by hand.

RELATED TERMS

Hand-as-Control | Load Guidance | Push-Pull Tool | Fixture | Pinch Point

147 Valve Operation

TASK TYPES

DEFINITION

Valve operation is the opening, closing, throttling, or freeing of a valve using a handwheel, lever, wrench, handle, or actuator.

WHY IT MATTERS

Valve work can cause knuckle impact, wrist strain, sudden release, burns from hot lines, and crush injuries if the hand slips into nearby structures. Stuck valves create stored energy as the worker applies more force.

INDUSTRIAL EXAMPLES

Valve operation occurs on steam lines, hydraulic systems, fuel systems, water lines, gas manifolds, marine piping, process plants, and maintenance isolation points.

RELATED TERMS

Stored Energy | Sudden Release | Wrist Joint | Hot Contact Zone | Tool Control

148 Hose Handling

TASK TYPES

DEFINITION

Hose handling is the movement, connection, disconnection, guiding, or control of flexible hoses used for fluids, gas, air, hydraulic systems, or transfer operations.

WHY IT MATTERS

Hoses injure hands when they whip, kink, pressurise unexpectedly, leak under pressure, or trap fingers at couplings. A tiny high-pressure leak can inject fluid into the hand.

INDUSTRIAL EXAMPLES

Hose handling occurs with hydraulic hoses, air lines, fuel transfer hoses, cement hoses, water hoses, steam hoses, chemical hoses, and marine bunker lines.

RELATED TERMS

High-Pressure Injection Injury | Hose Whip | Coupling | Pressure Zone | Chemical Contact Zone

149 Material Stacking

TASK TYPES

DEFINITION

Material stacking is the placement of objects in layers, piles, racks, pallets, or bundles for storage or movement.

WHY IT MATTERS

Hands are injured when workers use fingers to align or adjust layers. If the upper layer settles, slides, or tilts, the finger becomes the spacer and is crushed.

INDUSTRIAL EXAMPLES

Material stacking includes stacking plates, pipes, billets, cartons, drums, pallets, mould boxes, rebar, timber, and fabricated parts.

RELATED TERMS

Finger-as-Spacer | Crush Zone | Rolling Contact | Chock | Storage Stability

150 **Maintenance Access** TASK TYPES

DEFINITION

Maintenance access is the act of reaching into, around, under, or behind equipment to inspect, adjust, clean, repair, or replace parts.

WHY IT MATTERS

Maintenance access creates hidden hand exposure because the worker may not see pinch points, sharp edges, hot surfaces, stored energy, or moving parts inside the equipment. The hand often reaches farther than the eye can inspect.

INDUSTRIAL EXAMPLES

Maintenance access occurs inside guards, conveyors, engine compartments, pump bases, electrical panels, valve pits, gearboxes, machinery frames, and under lifted covers.

RELATED TERMS

Blind Reach | Lockout | Sharp-Edge Zone | Stored Energy | Machine Guard Page

151 **Handle** TOOLS

DEFINITION

A handle is the part of a tool, device, or object designed to be held by the hand during use.

WHY IT MATTERS

A poor handle forces awkward grip, high squeeze force, slipping, or knuckle exposure. When the handle is too small, sharp, oily, or poorly positioned, the worker loses control and the hand moves into the hazard.

INDUSTRIAL EXAMPLES

Handles appear on hammers, spanners, trolleys, valves, grinders, hooks, doors, guards, lifting accessories, push-pull tools, and maintenance equipment.

RELATED TERMS

Grip | Tool Control | Handle Design | Knuckle Clearance | Slip Resistance

152 **Handle Design** TOOLS

DEFINITION

Handle design refers to the size, shape, texture, orientation, and clearance of a handle in relation to the hand and task.

WHY IT MATTERS

Good handle design helps the worker grip without excessive force or awkward posture. Bad design creates blisters, strains, tool slip, knuckle impact, and wrist overtravel during sudden release.

INDUSTRIAL EXAMPLES

Handle design matters on torque tools, valve keys, pull handles, push-pull poles, lifting aids, grinders, pliers, hammers, and machine doors.

RELATED TERMS

Handle | Grip Strength | Wrist Joint | Tool Slip | Ergonomics

153 Knuckle Clearance

TOOLS

DEFINITION

Knuckle clearance is the free space around the hand when gripping a handle, tool, or object.

WHY IT MATTERS

Low knuckle clearance causes the back of the hand to strike steel, guards, frames, or sharp edges when force is applied. Many knuckle injuries happen when the tool moves normally but the surrounding space was too tight.

INDUSTRIAL EXAMPLES

Knuckle clearance matters when using spanners near flanges, pulling drawer handles, operating valves, pushing trolleys, lifting covers, and using tools inside confined equipment.

RELATED TERMS

Back of the Hand | Impact Injury | Handle Design | Spanner Slip | Confined Space Work

154 Grip Surface

TOOLS

DEFINITION

A grip surface is the part of a tool, handle, or object that contacts the hand during holding or force application.

WHY IT MATTERS

A slippery, sharp, oily, hot, or damaged grip surface makes the hand squeeze harder and still lose control. The resulting slip can send fingers into blades, edges, pinch points, or hot metal.

INDUSTRIAL EXAMPLES

Grip surfaces include tool handles, ropes, bars, plates, levers, valve wheels, trolley handles, ladders, push-pull tools, and handheld parts.

RELATED TERMS

Grip | Slip Resistance | Handle | Friction | Tool Control

155 Slip Resistance

TOOLS

DEFINITION

Slip resistance is the ability of a surface, glove, handle, floor, or tool to resist unwanted sliding during contact.

WHY IT MATTERS

Low slip resistance leads to tool slips, dropped parts, overtravel, and sudden hand movement into nearby hazards. A worker may grip harder, increasing fatigue without truly improving control.

INDUSTRIAL EXAMPLES

Slip resistance matters when handling oily tools, wet ropes, greasy valves, smooth pipes, polished steel, painted handles, gloves contaminated with oil, and wet deck surfaces.

RELATED TERMS

Grip Surface | Tool Slip | Glove Grip | Overtravel | Fatigue

156 Tool Slip

TOOLS

DEFINITION

Tool slip is the sudden loss of contact or control between a tool and the workpiece, fastener, handle, or hand.

WHY IT MATTERS

Tool slip drives knuckles into steel, cuts the supporting hand, causes overtravel, and can release stored energy. A small slip during high force can cause a fracture, deep laceration, or tendon injury.

INDUSTRIAL EXAMPLES

Tool slip occurs when a spanner rounds off a nut, a screwdriver slips from a slot, a grinder jumps, a pry bar loses purchase, or a knife slips while cutting packaging.

RELATED TERMS

Spanner Slip | Overtravel | Laceration | Impact Injury | Tool Control

157 **Spanner Slip** TOOLS

DEFINITION

Spanner slip is the sudden loss of grip between a spanner or wrench and the fastener being turned.

WHY IT MATTERS

Spanner slip commonly injures the knuckles and back of the hand. The worker's force continues after the tool releases, driving the hand into flanges, pipework, brackets, or sharp steel.

INDUSTRIAL EXAMPLES

Spanner slip happens on rounded nuts, oily fasteners, wrong-size spanners, awkward flange positions, corroded bolts, and high-force loosening tasks.

RELATED TERMS

Tool Slip | Knuckle Clearance | Back of the Hand | Bolt-Up | Sudden Release

158 **Overtravel** TOOLS

DEFINITION

Overtravel is the extra movement that occurs after a tool, load, part, or hand suddenly releases or moves farther than expected.

WHY IT MATTERS

Overtravel injures hands because the worker's force continues into the next surface or hazard. The hand may hit steel, enter a gap, strike a hot pipe, or cross into a blade path.

INDUSTRIAL EXAMPLES

Overtravel occurs when a stuck valve breaks free, a spanner slips, a push suddenly releases, a pry bar jumps, a drill bit breaks through, or a load shifts during alignment.

RELATED TERMS

Sudden Release | Tool Slip | Pushing Task | Pronation | Supination

159 **Supporting Tool** TOOLS

DEFINITION

A supporting tool is a device used to hold, steady, separate, guide, or position work so the hand does not have to do that job directly.

WHY IT MATTERS

Supporting tools reduce injuries by moving the hand away from the pinch, cut, crush, or impact zone. Without them, the worker often uses fingers as clamps, spacers, or guides.

INDUSTRIAL EXAMPLES

Supporting tools include chisel holders, fingersavers, push sticks, clamps, magnetic holders, drift pins, wedges, hooks, tongs, fixtures, and guide poles.

RELATED TERMS

Hand-as-Clamp | Supporting Hand | Fixture | Distance Tool | Fingersaver

160 **Distance Tool** TOOLS

DEFINITION

A distance tool is a tool that lets a worker push, pull, guide, hold, or position an object while keeping the hand away from the hazard.

WHY IT MATTERS

Distance tools do not remove every hazard, but they change where the hand is located during the dangerous moment. This can prevent crushed fingertips, impact injuries, and last-inch exposure.

INDUSTRIAL EXAMPLES

Distance tools include push-pull poles, guide hooks, tongs, magnetic tools, taglines, long-handled tools, pipe positioners, and tools used to guide suspended or awkward loads.

RELATED TERMS

Push-Pull Tool | No-Touch Handling | Last-Inch Exposure | Load Guidance | Hand Distance

161 Push-Pull Tool

TOOLS

DEFINITION

A push-pull tool is a distance tool used to push, pull, steer, hold, or guide a load or object without placing the hand directly on it.

WHY IT MATTERS

Push-pull tools reduce direct hand contact during load guidance and final positioning. They are most useful when the task involves swing, rolling, sliding, or closing gaps that would otherwise invite hand contact.

INDUSTRIAL EXAMPLES

Push-pull tools are used for guiding suspended loads, positioning plates, steering baskets, moving pipe spools, aligning mould boxes, and keeping hands away from pinch points.

RELATED TERMS

Distance Tool | Load Guidance | Hand Distance | Suspended Load | No-Touch Handling

162 Guide Pole

TOOLS

DEFINITION

A guide pole is a long-handled tool used to direct, push, pull, or steady an object from a safer distance.

WHY IT MATTERS

A guide pole helps prevent workers from using palms or fingertips as the control point. If the load swings or shifts, the tool takes the first contact instead of the hand.

INDUSTRIAL EXAMPLES

Guide poles are used with crane-lifted parts, long plates, offshore baskets, pipe sections, mould boxes, pallets, and objects moving near structures.

RELATED TERMS

Push-Pull Tool | Distance Tool | Load Guidance | Swing Radius | Hand Distance

163 Tagline

TOOLS

DEFINITION

A tagline is a rope or line attached to a load to help control swing, rotation, or orientation during lifting or movement.

WHY IT MATTERS

A tagline can move the worker away from the load, but it creates its own hazards if wrapped around the hand or used too close to the load path. Sudden tension can burn, pull, or entangle the hand.

INDUSTRIAL EXAMPLES

Taglines are used on suspended baskets, structural frames, pipe spools, long plates, offshore lifts, equipment skids, and loads affected by wind or crane movement.

RELATED TERMS

Tagline Handling | Load Guidance | Rebound Zone | Entanglement | Suspended Load

164 Hook Tool

TOOLS

DEFINITION

A hook tool is a handled tool with a hook-shaped end used to pull, catch, move, or guide an object without direct hand contact.

WHY IT MATTERS

Hook tools can keep fingers away from edges and gaps, but they must match the task. A hook that slips can rebound, drop the load, or pull the worker's hand toward the hazard.

INDUSTRIAL EXAMPLES

Hook tools are used to pull straps, position rings, guide loads, handle hot items, retrieve parts, move hoses, and control objects with lugs or openings.

RELATED TERMS

Distance Tool | Tool Slip | Load Guidance | Hand Distance | Protrusion

165 **Tong** TOOLS

DEFINITION

A tong is a gripping tool with jaws used to hold, lift, move, or position objects without direct hand contact.

WHY IT MATTERS

Tongs protect hands from heat, sharp edges, chemicals, and pinch points by moving the grip point away from the object. Poorly matched tongs can slip and drop the object onto fingers or feet.

INDUSTRIAL EXAMPLES

Tongs are used in foundries, heat treatment, laboratories, fabrication shops, steel handling, maintenance work, and handling hot or sharp parts.

RELATED TERMS

Grip | Distance Tool | Hot Contact Zone | Sharp-Edge Zone | Dropped Object

166 **Clamp** TOOLS

DEFINITION

A clamp is a device used to hold parts together, hold a workpiece in position, or apply controlled pressure during a task.

WHY IT MATTERS

Clamps prevent the hand from acting as the holding device. They also create pinch points at the jaws, screw, toggle, or closing surface if fingers remain in the clamp path.

INDUSTRIAL EXAMPLES

Clamps are used during drilling, welding, cutting, assembly, gluing, machining, plate fitting, pipe work, and bench repairs.

RELATED TERMS

Workholding | Hand-as-Clamp | Pinch Point | Fixture | Supporting Tool

167 **Fixture** TOOLS

DEFINITION

A fixture is a purpose-made device that holds, locates, or supports a part in the correct position during work.

WHY IT MATTERS

Fixtures reduce hand exposure by controlling the part before force is applied. Without a fixture, the worker may hold the part by hand while drilling, cutting, welding, bolting, or aligning.

INDUSTRIAL EXAMPLES

Fixtures are used for repeat fabrication, welding frames, drilling brackets, machining parts, holding castings, positioning guards, and locating components during assembly.

RELATED TERMS

Workholding | Jig | Clamp | Hand-as-Clamp | Engineering Control

168 **Jig** TOOLS

DEFINITION

A jig is a tool that guides another tool or workpiece so that a task can be repeated accurately. It often controls position, angle, or hole location.

WHY IT MATTERS

Jigs reduce the need for fingers to guide the tool or part. When a worker uses the hand as the guide instead, drilling, cutting, or alignment errors can become hand injuries.

INDUSTRIAL EXAMPLES

Jigs are used for drilling hole patterns, cutting repeated shapes, locating brackets, assembling small parts, welding repeat components, and positioning machine parts.

RELATED TERMS

Fixture | Workholding | Drilling Task | Tool Control | Engineering Control

169 **Chock** TOOLS

DEFINITION

A chock is a wedge or block used to prevent rolling, sliding, or unwanted movement of an object.

WHY IT MATTERS

Chocks protect hands by controlling movement before a worker reaches in. Without a chock, a pipe, drum, wheel, or cylinder can roll onto fingers during stacking or adjustment.

INDUSTRIAL EXAMPLES

Chocks are used under pipes, drums, wheels, cylindrical stock, reels, rollers, pallets, and round loads during storage, maintenance, and transport.

RELATED TERMS

Rolling Contact | Material Stacking | Crush Zone | Stored Energy | Wedge

170 **Wedge** TOOLS

DEFINITION

A wedge is a tapered object used to hold a gap open, separate parts, support an object, or control small movement.

WHY IT MATTERS

Wedges can keep fingers out of a closing gap, but they can also eject suddenly if overloaded or struck badly. A loose wedge can become a struck-by hazard or allow the gap to close on the hand.

INDUSTRIAL EXAMPLES

Wedges are used in flange separation, machine alignment, door holding, plate positioning, mould work, construction, and maintenance fitting.

RELATED TERMS

Prying | Closing Gap | Pinch Point | Stored Energy | Chock

171 **Drift Pin** TOOLS

DEFINITION

A drift pin is a tapered pin or bar used to align holes in parts before inserting bolts or fasteners.

WHY IT MATTERS

A drift pin prevents workers from using fingers to test hole alignment. If the parts shift while a finger is in the hole, the finger can be crushed or amputated at the fingertip.

INDUSTRIAL EXAMPLES

Drift pins are used in flange work, structural steel erection, machinery base alignment, bracket fitting, rigging hardware assembly, and heavy fabrication.

RELATED TERMS

Hole Matching | Alignment | Finger-as-Spacer | Bolt-Up | Pinch Point

172 **Fingersaver** TOOLS

DEFINITION

A fingersaver is a hand safety tool designed to hold a chisel, punch, spanner, or similar item away from the worker’s fingers during striking or impact work.

WHY IT MATTERS

A fingersaver moves the supporting hand out of the hammer path. This reduces crushed fingertips, split nails, fractures, and missed-strike injuries during repeated blows.

INDUSTRIAL EXAMPLES

Fingersavers are used while holding chisels, punches, drift pins, slogging spanners, wedges, and small tools that would otherwise be held close to the impact point.

RELATED TERMS

Hammering | Chiselling | Supporting Hand | Struck-By Zone | Impact Injury

Controls and Prevention Concepts

173 Machine Guard

TOOLS

DEFINITION

A machine guard is a physical barrier or device that prevents contact with moving, cutting, rotating, or hazardous parts of machinery.

WHY IT MATTERS

Machine guards fail as a hand-safety control when they are removed, bypassed, poorly fitted, or opened before energy stops. Fingers can reach nip points, blades, belts, or rotating parts in seconds.

INDUSTRIAL EXAMPLES

Machine guards are used on conveyors, grinders, presses, saws, drills, rollers, fans, couplings, chain drives, and rotating shafts.

RELATED TERMS

Nip Point · Draw-In Hazard · Lockout · Hand Feeding · Rotating Contact

174 Two-Hand Control

TOOLS

DEFINITION

A two-hand control is a machine control method that requires both hands to operate controls at the same time, keeping them away from the hazard zone.

WHY IT MATTERS

Two-hand controls prevent one hand from being inside the machine while the cycle starts. If bypassed or poorly designed, the operator may still reach into the die, blade, or closing gap.

INDUSTRIAL EXAMPLES

Two-hand controls are used on presses, shears, forming machines, punching machines, and other equipment where a closing or cutting action could injure the hand.

RELATED TERMS

Machine Guard · Hand Feeding · Closing Gap · Engineering Control · Amputation Page

175 Hand Distance

CONTROLS

DEFINITION

Hand distance is the physical separation between the worker’s hand and the hazard during a task.

WHY IT MATTERS

More hand distance gives time and space for error, movement, swing, or release. When the hand is directly on the load or tool interface, even a small unexpected movement can become a crush or cut injury.

INDUSTRIAL EXAMPLES

Hand distance is increased by using push-pull tools, taglines, clamps, fixtures, tongs, guide poles, chocks, and better task setup instead of direct hand contact.

RELATED TERMS

Distance Tool · No-Touch Handling · Exposure Reduction · Last-Inch Exposure · Engineering Control

176 **No-Touch Handling** CONTROLS

DEFINITION

No-touch handling is a work method that avoids direct hand contact with the load, material, or hazard during the dangerous part of the task.

WHY IT MATTERS

No-touch handling reduces crush, pinch, burn, cut, and struck-by injuries by removing the hand from the contact point. It does not mean no control; it means control through a safer interface.

INDUSTRIAL EXAMPLES

No-touch handling is used when guiding suspended loads, moving hot parts, handling sharp material, positioning plates, steering baskets, or aligning components with tools instead of fingers.

RELATED TERMS

Hand Distance | Distance Tool | Push-Pull Tool | Tool-to-Load Interface | Exposure Reduction

177 **Hands-Free Handling** CONTROLS

DEFINITION

Hands-free handling is the use of tools, fixtures, mechanical aids, or planned methods so the worker does not place hands directly in the hazard zone.

WHY IT MATTERS

Hands-free handling is often misunderstood as meaning the worker is absent from the task. In practice, the worker still controls the work — but through a tool, fixture, tagline, or mechanical aid rather than direct hand contact. This is the key distinction from no-touch handling: hands-free is about method design. A crew using taglines and push-pull tools is working hands-free; their hands are safe but they remain fully in control.

INDUSTRIAL EXAMPLES

Hands-free handling includes using taglines, guide poles, magnetic lifters, tongs, clamps, fixtures, push-pull tools, chocks, jigs, and mechanical positioning aids.

RELATED TERMS

No-Touch Handling | Hand Distance | Engineering Control | Load Guidance | Fixture

178 **Exposure Reduction** CONTROLS

DEFINITION

Exposure reduction is the process of lowering how often, how long, or how closely hands enter a hazard zone.

WHY IT MATTERS

A site may have few recorded injuries while still having high exposure. Reducing exposure prevents the injury before luck runs out, especially in repetitive tasks where fingers enter the same gap many times each shift.

INDUSTRIAL EXAMPLES

Exposure reduction applies to lifting, alignment, bolt-up, cutting, drilling, hammering, maintenance access, load landing, material stacking, and manual handling.

RELATED TERMS

Hand Exposure | Hand Distance | Engineering Control | Frequency | Last-Inch Exposure

179 **Hierarchy of Controls** CONTROLS

DEFINITION

The hierarchy of controls is a safety framework that ranks controls from most effective to least effective: eliminate, substitute, engineer, administrate, and protect with PPE.

WHY IT MATTERS

For hand safety, the hierarchy prevents overreliance on gloves. Gloves can reduce some injuries, but they do not remove the hand from a crush zone, nip point, or line of fire.

INDUSTRIAL EXAMPLES

Hierarchy-based control means redesigning the task, using a fixture, changing the handling method, adding guarding, using distance tools, improving procedures, and selecting suitable gloves for remaining exposure.

RELATED TERMS

Engineering Control | Administrative Control | PPE | Elimination | Substitution

180 **Elimination** CONTROLS

DEFINITION

Elimination means removing the hazard or task step completely so the hand no longer has to enter the danger area.

WHY IT MATTERS

Elimination is the strongest control because the worker no longer depends on behaviour, timing, gloves, or perfect attention. If the hand does not need to enter the gap, the pinch injury cannot happen there.

INDUSTRIAL EXAMPLES

Elimination may involve pre-assembled components, redesigned lifting points, self-locating fixtures, automated feeds, remote operation, or removing the need for manual alignment.

RELATED TERMS

Hierarchy of Controls | Task Redesign | Engineering Control | Exposure Reduction | Hand Distance

181 **Substitution** CONTROLS

DEFINITION

Substitution means replacing a hazardous material, tool, method, or task with a safer alternative that reduces hand exposure.

WHY IT MATTERS

Substitution helps when the task cannot be removed but can be made less dangerous. The wrong tool, sharp material edge, manual method, or high-force approach is replaced with something less likely to injure the hand.

INDUSTRIAL EXAMPLES

Substitution includes using a safer cutting method, replacing manual hand feeding with a guide, using pre-drilled parts, changing a sharp-edged component, or using a handling aid instead of direct contact.

RELATED TERMS

Hierarchy of Controls | Task Redesign | Exposure Reduction | Safer Method | Engineering Control

182 Engineering Control

CONTROLS

DEFINITION

An engineering control is a physical change to equipment, tools, layout, guarding, fixtures, or process design that reduces or removes hand exposure.

WHY IT MATTERS

Engineering controls are stronger than reminders because they change the work itself. A clamp, guard, fixture, or distance tool can keep the hand away even when the worker is tired, rushed, or distracted.

INDUSTRIAL EXAMPLES

Engineering controls include machine guards, interlocks, fixtures, clamps, jigs, chocks, push-pull tools, tongs, magnetic holders, two-hand controls, and improved lifting interfaces.

RELATED TERMS

Hierarchy of Controls | Fixture | Machine Guard | Distance Tool | Hand Distance

183 Administrative Control

CONTROLS

DEFINITION

An administrative control is a rule, procedure, training, permit, sign, checklist, or instruction used to guide how work is done.

WHY IT MATTERS

Administrative controls depend on people remembering and following the rule at the exact moment of risk. They help standardise work, but they are weaker than physical controls when a hand can still enter the hazard.

INDUSTRIAL EXAMPLES

Administrative controls include toolbox talks, SOPs, exclusion-zone rules, lifting plans, pre-job briefs, hand placement instructions, permit systems, and supervision.

RELATED TERMS

Hierarchy of Controls | SOP | Toolbox Talk | Behaviour | PPE

184 PPE

CONTROLS

DEFINITION

PPE, or personal protective equipment, is equipment worn by the worker to reduce injury if contact occurs. For hands, this usually includes gloves and sometimes arm protection.

WHY IT MATTERS

PPE is the last line of defence. Gloves can reduce cuts, abrasion, heat contact, or chemical exposure, but they cannot stop a heavy load from crushing fingers or a roller from pulling the hand in.

INDUSTRIAL EXAMPLES

Hand PPE includes cut-resistant gloves, heat gloves, chemical gloves, impact gloves, insulated gloves, disposable gloves, sleeves, and task-specific protective handwear.

RELATED TERMS

Glove Protection | Hierarchy of Controls | Cut Resistance | Impact Glove | Chemical Compatibility

185 Task Redesign

CONTROLS

DEFINITION

Task redesign is the deliberate change of a work method so the same job can be done with less hand exposure.

WHY IT MATTERS

Task redesign matters when injuries are caused not by carelessness but by the way the task forces hands into gaps, edges, loads, or tools. Redesign changes the demand on the worker instead of only asking for more caution.

INDUSTRIAL EXAMPLES

Task redesign may change the lifting sequence, add a fixture, introduce a guide tool, pre-stage parts, improve access, remove manual holding, or move alignment to a safer position.

RELATED TERMS

Elimination | Substitution | Engineering Control | Exposure Reduction | Work Method

186 **Safe System of Work** CONTROLS

DEFINITION

A safe system of work is an organised way of planning, controlling, and performing a task so known hazards are managed before work starts.

WHY IT MATTERS

A safe system of work prevents improvised hand placement during difficult moments. It defines who controls movement, where hands stay out, what tools are used, and when the task stops if alignment fails.

INDUSTRIAL EXAMPLES

A safe system of work is used for lifting plans, confined maintenance, hot work, flange assembly, machine isolation, suspended-load handling, and heavy component installation.

RELATED TERMS

SOP | Pre-Job Brief | Stop Work | Exclusion Zone | Task Redesign

187 **SOP** CONTROLS

DEFINITION

An SOP, or standard operating procedure, is a written instruction that describes how a task should be performed in a consistent and controlled way.

WHY IT MATTERS

An SOP helps only if it names the actual hand exposure points. A procedure that says “keep hands clear” but does not identify the closing gap, tool slip, or final positioning risk leaves the worker to improvise.

INDUSTRIAL EXAMPLES

SOPs are used for bolt-up, lifting, cutting, machine cleaning, valve operation, hose handling, material stacking, inspection, and maintenance access.

RELATED TERMS

Administrative Control | Safe System of Work | Hand Placement Rule | Pre-Job Brief | Exposure Reduction

188 **Pre-Job Brief** CONTROLS

DEFINITION

A pre-job brief is a short discussion before work starts to confirm the task steps, hazards, controls, roles, and stop points.

WHY IT MATTERS

A useful pre-job brief names where hands could be crushed, cut, burned, pulled, or struck. Without that discussion, the team may discover the hand exposure only during the last few inches of the job.

INDUSTRIAL EXAMPLES

Pre-job briefs are used before crane lifts, shutdown maintenance, flange work, confined access, hot work, pressure testing, heavy positioning, and unusual repairs.

RELATED TERMS

Toolbox Talk | Safe System of Work | Stop Work | Hand Exposure | Last-Inch Exposure

189 **Toolbox Talk** CONTROLS

DEFINITION

A toolbox talk is a short safety discussion with workers before or during work, usually focused on a specific hazard, task, or lesson learned.

WHY IT MATTERS

A toolbox talk can reset attention, but it should not replace physical controls. The best hand-safety toolbox talks show the exact task photo, identify where the hand enters, and agree what tool or method will keep it out.

INDUSTRIAL EXAMPLES

Toolbox talks cover pinch points, glove selection, suspended loads, grinder safety, hammering, pressure hazards, sharp edges, housekeeping, and recent near misses.

RELATED TERMS

Administrative Control | Pre-Job Brief | Hand Exposure | Behaviour | Exposure Reduction

190 **Hand Placement Rule** CONTROLS

DEFINITION

A hand placement rule is a specific instruction about where hands may and may not go during a task.

WHY IT MATTERS

A vague rule such as “watch your hands” does not prevent injury. A strong rule names the forbidden zone, such as no fingers between flange faces, no hands under suspended loads, or no palm on the rolling pipe.

INDUSTRIAL EXAMPLES

Hand placement rules are used during load landing, flange alignment, stacking, drilling, cutting, material feeding, hammering, and valve operation.

RELATED TERMS

SOP | Pinch Point | Last-Inch Exposure | Finger-as-Spacer | Safe System of Work

191 **Exclusion Zone** CONTROLS

DEFINITION

An exclusion zone is a defined area that people, hands, or body parts must stay out of during a hazardous operation.

WHY IT MATTERS

For hand safety, the exclusion zone may be small and task-specific. It can be the gap under a load, the swing radius of a basket, the roller entry point, or the blade path of a cutting tool.

INDUSTRIAL EXAMPLES

Exclusion zones are used around suspended loads, crane lifts, forklifts, rotating equipment, pressure testing, cutting, grinding, load landing, and moving machinery.

RELATED TERMS

Line of Fire | Swing Radius | Load Landing | Machine Guard | Safe System of Work

192 **Stop Work** CONTROLS

DEFINITION

Stop work is the authority and action to pause a task when conditions become unsafe or unclear.

WHY IT MATTERS

Stop work protects hands when the planned method no longer controls the risk. If a load will not align, a tool does not fit, or someone reaches into the gap, stopping prevents improvisation from becoming injury.

INDUSTRIAL EXAMPLES

Stop work is used when a lift swings unexpectedly, a flange will not align, a guard is missing, a tool slips repeatedly, a hose leaks, or a worker must place hands in a forbidden zone.

RELATED TERMS

Safe System of Work | Pre-Job Brief | Hand Placement Rule | Line of Fire | Task Redesign

193 **Hold Point** CONTROLS

DEFINITION

A hold point is a planned pause in a task where work stops until a condition, inspection, signal, or control is confirmed.

WHY IT MATTERS

Hold points prevent workers from rushing into high-exposure moments. They are useful before load landing, pressure release, machine restart, cutting, energisation, or final alignment.

INDUSTRIAL EXAMPLES

Hold points are used before lowering loads, removing pins, opening lines, starting machines, tightening flanges, testing pressure, releasing straps, and entering maintenance areas.

RELATED TERMS

Stop Work | Safe System of Work | Pre-Job Brief | Stored Energy | Load Landing

194 **Buddy Check** CONTROLS

DEFINITION

A buddy check is a second-person check of a worker's setup, position, PPE, tool choice, or exposure before or during a task.

WHY IT MATTERS

A buddy can see hand placement and line-of-fire exposure that the worker performing the task may not see. This helps catch fingers in gaps, poor tool position, and unsafe supporting-hand placement before movement starts.

INDUSTRIAL EXAMPLES

Buddy checks are used during lifting, confined repairs, hammering, cutting, pressure work, electrical isolation, glove selection, and tasks requiring awkward reach.

RELATED TERMS

Pre-Job Brief | Hand Placement Rule | Line of Fire | Supporting Hand | Stop Work

195 **Visual Control** CONTROLS

DEFINITION

A visual control is a marking, sign, colour, label, boundary, or indicator that makes a hazard, rule, or correct position easier to see.

WHY IT MATTERS

Visual controls help prevent hand placement mistakes when tasks are repeated or noisy. They can mark pinch zones, no-hand areas, lift points, tool positions, safe grips, and stop lines.

INDUSTRIAL EXAMPLES

Visual controls include painted no-hand zones, red pinch-point markings, floor exclusion lines, arrows on tools, labels on hot surfaces, and markings around machine guards.

RELATED TERMS

Exclusion Zone | Hand Placement Rule | SOP | Pinch Point | Behaviour

196 **Mechanical Aid** CONTROLS

DEFINITION

A mechanical aid is equipment used to lift, support, move, hold, or position a load with less direct hand force.

WHY IT MATTERS

Mechanical aids reduce hand injuries when they replace manual lifting, holding, dragging, or final correction by hand. They must still be controlled so they do not create new pinch or crush zones.

INDUSTRIAL EXAMPLES

Mechanical aids include hoists, jacks, trolleys, manipulators, lifters, turntables, roller stands, balancers, winches, lifting magnets, and positioning devices.

RELATED TERMS

Engineering Control | Manual Handling | Load Landing | Crush Zone | Workholding

197 **Tool-to-Load Interface** CONTROLS

DEFINITION

A tool-to-load interface is the point where a tool contacts the load to push, pull, hold, lift, guide, or position it.

WHY IT MATTERS

A good interface transfers control without slipping or damaging the load. A poor interface slips off, twists, rebounds, or forces the worker back to direct hand contact.

INDUSTRIAL EXAMPLES

Tool-to-load interfaces include hook heads, magnetic heads, rubber pads, V-heads, jaws, clamps, tongs, lifting points, guide slots, and shaped contact surfaces.

RELATED TERMS

No-Touch Handling | Push-Pull Tool | Hook Tool | Grip Surface | Tool Slip

198 **Human Factors** CONTROLS

DEFINITION

Human factors are the physical, mental, organisational, and environmental conditions that affect how people perform work.

WHY IT MATTERS

Human factors explain why “be careful” is not enough. Fatigue, time pressure, poor visibility, awkward access, noise, heat, and unclear roles all increase the chance that a hand enters the hazard zone.

INDUSTRIAL EXAMPLES

Human factors appear during shutdown pressure, night shifts, hot work, repetitive tasks, emergency repairs, poor lighting, congested work areas, and multi-person lifts.

RELATED TERMS

Behaviour | Fatigue | Visibility | Task Redesign | Administrative Control

199 **Residual Risk** CONTROLS

DEFINITION

Residual risk is the risk that remains after controls have been applied. It is not the original hazard; it is what is still left to manage.

WHY IT MATTERS

Residual hand risk matters because even good controls may leave some exposure. A push-pull tool may reduce direct contact, but swing, rebound, sharp edges, or wrong use may still need procedures, training, and PPE.

INDUSTRIAL EXAMPLES

Residual risk is reviewed after adding guards, tools, fixtures, taglines, SOPs, PPE, mechanical aids, or task redesign to check what hand exposure remains.

RELATED TERMS

Exposure Reduction | Hierarchy of Controls | PPE | Engineering Control | Safe System of Work Page

Hand Protection and PPE

200 **Glove Protection** PPE

DEFINITION

Glove protection is the use of hand-worn protective equipment to reduce contact with sharp, hot, chemical, abrasive, or impact hazards. Gloves protect the skin and some soft tissue, but they do not remove the hazard from the task.

WHY IT MATTERS

Gloves can reduce injury severity, but they can also give false confidence. A cut-resistant glove does not prevent a fingertip crush, an impact glove does not stop a hand being trapped under a load, and a loose glove can be pulled into moving machinery.

INDUSTRIAL EXAMPLES

Glove protection is used while handling sheet metal, wire rope, hot castings, chemicals, fasteners, and rough materials. The wrong glove becomes visible when a worker uses a cut glove for chemical work, a bulky glove for small pins, or a loose glove near rollers.

RELATED TERMS

PPE Limitation | Cut-Resistant Glove | Impact Glove | Glove Entrapment | Glove Fit

201 **Cut-Resistant Glove** PPE

DEFINITION

A cut-resistant glove is designed to reduce slicing injuries from sharp edges, blades, burrs, and sheet material. Its performance depends on material, construction, fit, and the type of sharp contact.

WHY IT MATTERS

Cut resistance is not the same as cut-proof protection. A worker can still be cut by a sharp edge under pressure, and the glove will not stop crush, puncture, heat, or the hand being pulled into a machine.

INDUSTRIAL EXAMPLES

Cut-resistant gloves are used for sheet metal handling, cut pipe ends, machined parts, blades, packing knives, and deburring work. They fail when a worker uses the gloved hand as a clamp under a grinder or holds a sharp plate while it shifts.

RELATED TERMS

Laceration | Sharp-Edge Zone | Burr | Glove Cut Rating | PPE Limitation

202 **Impact Glove** PPE

DEFINITION

An impact glove has padded areas on the back of the hand, fingers, or knuckles to reduce injury from blows and glancing impacts. The padding is usually placed over exposed bones and joints.

WHY IT MATTERS

Impact padding can reduce bruising and some minor fractures, but it cannot absorb the force of a trapped hand between two heavy objects. A worker may still suffer a crushed finger, nail-bed injury, or fracture when the hand is used to guide a moving load.

INDUSTRIAL EXAMPLES

Impact gloves are common in rigging, oilfield work, steel handling, maintenance, and assembly. They help when knuckles strike a frame but fail when a finger is caught between a flange and a tool.

RELATED TERMS

Back of the Hand | Knuckle | Crush Injury | Impact Injury | PPE Limitation

203 **Chemical Glove** PPE

DEFINITION

A chemical glove is made from material selected to resist contact with specific chemicals. Common materials include nitrile, neoprene, butyl, PVC, and natural rubber, each with different limits.

WHY IT MATTERS

Chemical gloves fail when the wrong material is selected or when the chemical passes through after exposure time. A worker may feel dry on the outside while the chemical has already permeated the glove and reached the skin.

INDUSTRIAL EXAMPLES

Chemical gloves are used for solvents, oils, acids, caustics, cleaners, paints, and resins. A common failure is using a disposable glove for prolonged solvent cleaning or reusing a contaminated glove inside-out.

RELATED TERMS

Chemical Burn | Chemical Permeation | Breakthrough Time | Glove Contamination | Dermatitis

204 **Thermal Glove** PPE

DEFINITION

A thermal glove is designed to protect the hand from hot surfaces, radiant heat, sparks, or short contact with heated materials. The level of protection depends on temperature, contact time, and glove construction.

WHY IT MATTERS

Thermal gloves do not make the hand heat-proof. Heat can pass through the glove during longer contact, and a hot object can still crush or trap the fingers while the worker focuses only on temperature.

INDUSTRIAL EXAMPLES

Thermal gloves are used near hot castings, welding work, ovens, furnaces, heated bearings, and steam-line parts. They fail when a worker holds a hot plate too long or grips a hot part that suddenly shifts.

RELATED TERMS

Burn | Hot Contact Zone | Heat Stress | PPE Limitation | Glove Degradation

205 **Cryogenic Glove** PPE

DEFINITION

A cryogenic glove is designed for very low-temperature materials such as liquid nitrogen, dry ice, or cryogenic gases. It reduces cold contact and splash exposure when used correctly.

WHY IT MATTERS

Cryogenic gloves are not general-purpose work gloves. If liquid enters the cuff or soaks the glove, the cold can be held against the skin and cause a freezing injury instead of preventing one.

INDUSTRIAL EXAMPLES

Cryogenic gloves are used while filling dewars, handling frozen components, working near liquid nitrogen lines, or moving dry ice. A dangerous situation occurs when a short glove cuff allows liquid to run inside.

RELATED TERMS

Cold Burn | Glove Cuff | Thermal Injury | Chemical Glove | PPE Limitation

206 **Disposable Glove** PPE

DEFINITION

A disposable glove is a thin glove intended for short-term contamination control rather than heavy mechanical protection. Nitrile, latex, and vinyl are common materials.

WHY IT MATTERS

Disposable gloves tear easily, offer limited puncture resistance, and provide almost no crush or impact protection. A worker may keep using a torn glove and spread contamination onto tools, controls, and skin.

INDUSTRIAL EXAMPLES

Disposable gloves are used for inspection, light chemical handling, cleaning, painting, and medical-style first aid. They fail when used for sharp metal, rotating parts, wire rope, or heavy maintenance tasks.

RELATED TERMS

Glove Contamination | Chemical Glove | Puncture Resistance | Tear Resistance | PPE Limitation

207 Leather Glove

PPE

DEFINITION

A leather glove is a durable glove made from animal hide, often used for abrasion, heat, sparks, and rough material handling. Its protection varies with leather type, thickness, and construction.

WHY IT MATTERS

Leather can protect against rough contact, but it stiffens when wet, loses dexterity, and may snag on moving parts. A worker using a thick leather glove may lose feel and place fingers deeper into a gap than intended.

INDUSTRIAL EXAMPLES

Leather gloves are used for welding support, rigging, steel handling, wire rope, and general maintenance. They fail when used around rotating shafts, oily small parts, or chemicals that soak through.

RELATED TERMS

Abrasion Resistance | Glove Dexterity | Glove Snagging | Thermal Glove | PPE Limitation

208 Coated Glove

PPE

DEFINITION

A coated glove has a fabric liner with a coating on the palm, fingers, or full hand. Common coatings include nitrile, latex, polyurethane, and PVC.

WHY IT MATTERS

The coating improves grip or liquid resistance, but it can wear, crack, harden, or become slippery with oil and dust. A worker may trust the grip until the coating suddenly slides on a pipe, plate, or oily handle.

INDUSTRIAL EXAMPLES

Coated gloves are used for assembly, packing, light fabrication, maintenance, and material handling. They fail when coating wear exposes fabric or when oil turns the grip surface into a slip point.

RELATED TERMS

Grip Coating | Glove Degradation | Glove Fit | Slip | Abrasion Resistance

209 Grip Coating

PPE

DEFINITION

Grip coating is the surface layer on a glove designed to improve friction between the hand and the object. It may be smooth, textured, foamed, sandy, or crinkled.

WHY IT MATTERS

Grip coating helps only when it matches the surface and contamination. A coating that grips dry steel may slip on oil, and a very aggressive coating can catch edges or pull the hand unexpectedly.

INDUSTRIAL EXAMPLES

Grip coating is used for cartons, plates, tools, pipes, fasteners, and oily parts. Problems appear when workers handle wet pipe with a dry-grip glove or use a sticky coating near moving belts.

RELATED TERMS

Coated Glove | Slip | Tool Control | Glove Snagging | PPE Limitation

210 Glove Cuff

PPE

DEFINITION

The glove cuff is the part of the glove that extends around or beyond the wrist. It may be short, elastic, gauntlet-style, knit, or safety cuff design.

WHY IT MATTERS

Cuff design affects contamination, snagging, and removal speed. A short cuff can let chemicals or hot particles enter, while a loose long cuff can catch on moving parts or machinery projections.

INDUSTRIAL EXAMPLES

Gauntlet cuffs are used in welding and chemical work, while knit cuffs are common in handling gloves. Failures occur when sparks fall inside a short cuff or a loose cuff catches on a conveyor bracket.

RELATED TERMS

Wrist Joint | Glove Entrapment | Chemical Glove | Thermal Glove | PPE Limitation

211 Glove Entrapment

PPE

DEFINITION

Glove entrapment occurs when a glove is caught, snagged, or pulled into a moving part, closing gap, hook, wire, or rough surface. The glove becomes the link that drags the hand into the hazard.

WHY IT MATTERS

This is one of the most dangerous PPE failures because the glove changes from protection into a trap. A loose fingertip, torn cuff, textured coating, or bulky seam can catch first, then pull the finger, nail bed, or whole hand into a nip, roller, shaft, or chain.

INDUSTRIAL EXAMPLES

Glove entrapment occurs near conveyors, rotating shafts, drill bits, wire rope, chain drives, hooks, and rough plate edges. A worker may only feel a light snag before the glove tightens and pulls the hand forward.

RELATED TERMS

Glove Snagging | Entanglement | Nip Point | Rotating Shaft | PPE Limitation

212 Glove Fit

PPE

DEFINITION

Glove fit is how closely the glove matches the size and shape of the worker's hand. A good fit allows grip and movement without loose material or excessive tightness.

WHY IT MATTERS

Poor fit changes how the hand behaves. A loose glove can snag or fold under the fingers, while a tight glove reduces circulation, touch, and dexterity during small-part work.

INDUSTRIAL EXAMPLES

Fit problems appear when a worker handles small washers in an oversized glove, uses a tight glove during long assembly work, or works near moving machinery with loose fingertips.

RELATED TERMS

Glove Sizing | Glove Dexterity | Glove Entrapment | Grip | PPE Limitation

213 Glove Sizing

PPE

DEFINITION

Glove sizing is the selection of glove size based on hand dimensions, finger length, and work task. It includes palm width, finger length, and cuff comfort.

WHY IT MATTERS

Correct size affects both safety and work quality. Oversized gloves reduce control and increase snag risk near moving parts. Undersized gloves fatigue the hand and often cause workers to remove them at the moment fine work demands both protection and feel. A worker removing gloves to place a pin or insert a washer signals that the glove size or style does not fit the task.

INDUSTRIAL EXAMPLES

Sizing issues show up during bolt fitting, valve operation, rope handling, packaging, and inspection. A worker who removes gloves to place a pin often signals that the glove size or style does not fit the task.

RELATED TERMS

Glove Fit | Glove Dexterity | Pinch Grip | Fine Motor Control | PPE Limitation

214 Glove Dexterity

PPE

DEFINITION

Glove dexterity is the ability to move the fingers accurately while wearing gloves. It depends on glove thickness, stiffness, fit, grip surface, and finger construction.

WHY IT MATTERS

Low dexterity pushes workers into unsafe shortcuts. They may remove gloves, use fingertips as spacers, or place the hand closer to the hazard because the glove reduces feel and precision.

INDUSTRIAL EXAMPLES

Dexterity matters when inserting pins, handling washers, wiring panels, checking threads, using small tools, and placing shims. Bulky gloves can turn a simple fit-up task into fingertip exposure.

RELATED TERMS

Dexterity | Fine Motor Control | Glove Fit | Finger-as-Spacer | PPE Limitation

215 Glove Cut Rating

PPE

DEFINITION

A glove cut rating is a test-based indication of how much cut resistance a glove material provides. It does not describe all types of cutting hazards or all real work conditions.

WHY IT MATTERS

A high cut rating can mislead workers if they treat it as total protection. Cut tests do not reproduce every jagged edge, pinch, powered blade, or sharp part under body weight.

INDUSTRIAL EXAMPLES

Cut ratings are checked for sheet metal, glass, blades, machined edges, and fabrication work. The rating fails as a decision tool when the task also includes crushing, puncture, heat, oil, or moving machinery.

RELATED TERMS

Cut-Resistant Glove | Laceration | Sharp-Edge Zone | PPE Limitation | Glove Selection

216 Puncture Resistance

PPE

DEFINITION

Puncture resistance is the ability of glove material to resist penetration by pointed objects such as wire ends, splinters, needles, or sharp burrs.

WHY IT MATTERS

Puncture resistance is different from cut resistance. A glove that resists slicing may still be pierced by a wire strand, nail, fishhook, sharp casting flash, or metal splinter.

INDUSTRIAL EXAMPLES

Puncture hazards appear in wire rope, pallets, scrap metal, cables, nails, broken packaging, and sharp machined parts. The injury often looks small but can drive contamination deep into tissue.

RELATED TERMS

Puncture Wound | Wire Rope Handling | Burr | Cut-Resistant Glove | PPE Limitation

217 Abrasion Resistance

PPE

DEFINITION

Abrasion resistance is the ability of glove material to resist wearing away from rubbing against rough surfaces.

WHY IT MATTERS

Abrasion protection reduces skin loss but does not stop crushing, cutting through sharp edges, or chemical exposure. A glove can look usable on top while the palm coating has worn thin enough to expose the hand.

INDUSTRIAL EXAMPLES

Abrasion resistance matters when handling ropes, castings, concrete, steel plates, pallets, and rough tools. Failures appear as worn fingertips, exposed fabric, and sudden loss of grip.

RELATED TERMS

Abrasion | Coated Glove | Leather Glove | Grip Coating | Glove Degradation

218 **Tear Resistance** PPE

DEFINITION

Tear resistance is the ability of a glove to resist ripping once a small cut, snag, or hole begins.

WHY IT MATTERS

A small tear can quickly become an opening that exposes skin or catches on equipment. Workers often keep using torn gloves because the damage looks minor until the glove splits during a pull.

INDUSTRIAL EXAMPLES

Tear resistance matters in rigging, sheet handling, wire rope work, packaging, and maintenance. A torn glove fingertip can snag on a burr and pull the finger into a closing gap.

RELATED TERMS

Glove Degradation | Glove Entrapment | Puncture Resistance | Abrasion Resistance | PPE Limitation

219 **Chemical Permeation** PPE

DEFINITION

Chemical permeation is the movement of a chemical through glove material at a molecular level. The glove may look unchanged while the chemical passes through.

WHY IT MATTERS

Permeation is dangerous because the worker may not see any tear, wet patch, or hole. Skin contact can continue inside the glove, causing dermatitis, chemical burn, or absorption exposure.

INDUSTRIAL EXAMPLES

Permeation occurs during solvent cleaning, degreasing, resin handling, painting, acid work, and caustic washing. It becomes worse when gloves are reused beyond their safe contact time.

RELATED TERMS

Chemical Glove | Breakthrough Time | Glove Contamination | Chemical Burn | Dermatitis

220 **Breakthrough Time** PPE

DEFINITION

Breakthrough time is the time it takes for a chemical to pass through a glove material under test conditions. It helps guide chemical glove selection but is not a guarantee in every field condition.

WHY IT MATTERS

Real work can shorten breakthrough time through heat, stretching, abrasion, repeated use, or mixed chemicals. A worker may be exposed while believing the glove is still protective because the outside looks intact.

INDUSTRIAL EXAMPLES

Breakthrough time matters in degreasing, chemical transfer, paint mixing, resin application, and cleaning operations. It fails when the same glove is worn for hours after repeated chemical contact.

RELATED TERMS

Chemical Permeation | Chemical Glove | Glove Degradation | Glove Contamination | PPE Limitation

221 Glove Contamination

PPE

DEFINITION

Glove contamination occurs when hazardous material remains on the glove surface or inside the glove. It can spread from the glove to skin, tools, controls, and other work areas.

WHY IT MATTERS

A contaminated glove can carry the hazard after the original task ends. Workers may touch their face, phone, steering wheel, or clean tools with a glove that still holds chemicals, oil, metal dust, or biological material.

INDUSTRIAL EXAMPLES

Contamination appears after chemical handling, oily maintenance, paint work, grease application, cement work, or first aid. A common failure is removing one glove with the contaminated fingers of the other hand.

RELATED TERMS

Chemical Glove | Disposable Glove | Dermatitis | Decontamination | PPE Limitation

222 Glove Snagging

PPE

DEFINITION

Glove snagging occurs when glove material catches on an edge, projection, wire, burr, hook, or moving part. It may stop the hand briefly or pull it toward the hazard.

WHY IT MATTERS

Snagging often comes before entrapment. A worker may instinctively pull back, tightening the glove around the fingers or dragging the hand into a sharper edge, rotating part, or closing gap.

INDUSTRIAL EXAMPLES

Snagging happens around wire rope, splinters, pallet nails, rotating shafts, rough castings, hooks, and punched metal. Torn cuffs and loose fingertips increase the risk.

RELATED TERMS

Glove Entrapment | Burr | Sharp-Edge Zone | Entanglement | PPE Limitation

223 Glove Degradation

PPE

DEFINITION

Glove degradation is the weakening, cracking, swelling, stiffening, or breakdown of glove material from use, chemicals, heat, sunlight, abrasion, or age.

WHY IT MATTERS

A degraded glove may fail during the task even though it looks familiar to the worker. Stiff gloves reduce dexterity, cracked gloves leak chemicals, and worn palms lose grip at the moment force is applied.

INDUSTRIAL EXAMPLES

Degradation appears in chemical gloves that swell, thermal gloves with scorched palms, coated gloves with peeling grip, and leather gloves hardened by oil and heat.

RELATED TERMS

Chemical Permeation | Breakthrough Time | Abrasion Resistance | Grip Coating | PPE Limitation

224 PPE Limitation

PPE

DEFINITION

PPE limitation is the point where protective equipment reduces harm but does not remove the hazard or make the task safe by itself.

WHY IT MATTERS

This term matters because many hand injuries happen while the worker is wearing gloves. PPE cannot hold a load back, stop a closing gap, prevent a finger from being used as a spacer, or redesign the task.

INDUSTRIAL EXAMPLES

PPE limitations appear when cut gloves are used during crush exposure, impact gloves are used under suspended loads, and chemical gloves are used without checking breakthrough time.

RELATED TERMS

Glove Protection | Hierarchy of Controls | Glove Entrapment | Cut-Resistant Glove | No-Touch Handling

Machinery and Moving Parts

225 Conveyor

MACHINERY

DEFINITION

A conveyor is a powered or gravity system that moves materials using belts, rollers, chains, screws, or tracks. Hands are exposed where material enters, exits, jams, or transfers.

WHY IT MATTERS

Conveyors create hand injuries when workers clear jams, straighten moving items, or reach under guards while the system still has energy. A glove or fingertip can be drawn into a roller before the worker has time to pull away.

INDUSTRIAL EXAMPLES

Conveyor exposure appears at belt tail pulleys, roller beds, transfer points, package guides, scrap chutes, and cleaning points. A common incident starts with a worker nudging a skewed carton or plate by hand.

RELATED TERMS

Conveyor Roller · Pulley Nip · Unexpected Start-Up · Machine Guard · Glove Entrapment

226 Conveyor Roller

MACHINERY

DEFINITION

A conveyor roller is a rotating cylinder that supports or moves belts, packages, plates, or other materials. It may be powered or free-rolling.

WHY IT MATTERS

Rollers look harmless when moving slowly, but they can pull a glove, sleeve, or fingertip into the gap between roller and belt, frame, or adjacent material. The worker often reaches in only to correct one misaligned item.

INDUSTRIAL EXAMPLES

Roller hazards appear on package conveyors, plate lines, warehouse rollers, fabrication tables, and return rollers under belts. Injuries occur during jam clearing and cleaning.

RELATED TERMS

Conveyor · Nip Point · Glove Entrapment · Hand-as-Brake · Machine Guard

227 Belt Drive

MACHINERY

DEFINITION

A belt drive uses a moving belt and pulleys to transmit power between machine parts. The belt may be exposed during maintenance, adjustment, or guarding gaps.

WHY IT MATTERS

Belt drives create severe draw-in points where the belt enters the pulley. A fingertip, glove cuff, rag, or cleaning cloth can be pulled in and wrapped around before the worker reacts.

INDUSTRIAL EXAMPLES

Belt drives appear on fans, compressors, pumps, conveyors, workshop machines, and HVAC equipment. Incidents often happen during inspection, tension adjustment, or cleaning near a moving belt.

RELATED TERMS

Pulley Nip · Entanglement · Machine Guard · Lockout/Tagout · Glove Entrapment

228 **Chain Drive** MACHINERY

DEFINITION

A chain drive uses a moving chain and sprockets to transmit power or move material. The chain has hard links that engage the sprocket teeth.

WHY IT MATTERS

A chain drive can crush, pinch, or draw fingers into the sprocket. Gloves and rags can catch in the links, turning a quick adjustment into a hand-entrapment event.

INDUSTRIAL EXAMPLES

Chain drives are found on conveyors, hoists, lifting tables, machinery drives, and agricultural equipment. Injuries occur when workers lubricate, clear debris, or check tension while parts can move.

RELATED TERMS

Gear Mesh | Entanglement | Lockout/Tagout | Glove Entrapment | Machine Guard

229 **Gear Mesh** MACHINERY

DEFINITION

Gear mesh is the point where two gear teeth engage and transfer motion. It is a moving contact zone with high force in a small area.

WHY IT MATTERS

Gear mesh can crush fingertips, tear gloves, and pull in loose material. Even slow gears can generate enough force to destroy soft tissue because the contact area is small and hard.

INDUSTRIAL EXAMPLES

Gear mesh hazards appear in gearboxes, open drives, winches, conveyors, lathes, and maintenance rigs. Exposure occurs during inspection, lubrication, cleaning, or testing with covers removed.

RELATED TERMS

Chain Drive | Crushing Point | Machine Guard | Lockout/Tagout | Glove Entrapment

230 **Rotating Shaft** MACHINERY

DEFINITION

A rotating shaft is a spinning machine part that transmits power or motion. It may be smooth, keyed, threaded, splined, or fitted with couplings.

WHY IT MATTERS

A rotating shaft can catch gloves, sleeves, rags, or hair and wrap them around the shaft. Smooth shafts still entangle because friction and rotation pull material tighter as it turns.

INDUSTRIAL EXAMPLES

Rotating shafts appear on pumps, motors, mixers, winches, lathes, fans, conveyors, and drive units. Injuries happen during wiping, measuring, adjustment, or working near exposed couplings.

RELATED TERMS

Entanglement | Coupling | Glove Entrapment | Machine Guard | Unexpected Start-Up

231 **Coupling** MACHINERY

DEFINITION

A coupling connects two rotating shafts so they turn together. It may have bolts, keys, guards, flanges, or flexible elements.

WHY IT MATTERS

Couplings create impact, snag, and entanglement hazards because projections rotate with the shaft. A glove fingertip or sleeve can catch on a bolt head or keyway and pull the hand around.

INDUSTRIAL EXAMPLES

Coupling exposure appears during pump alignment, motor testing, drive maintenance, and guard removal. A worker checking vibration by touch near a coupling can be pulled into the rotating assembly.

RELATED TERMS

Rotating Shaft | Glove Entrapment | Machine Guard | Lockout/Tagout | Entanglement

232 **Pulley Nip** MACHINERY

DEFINITION

A pulley nip is the point where a belt, rope, or cable enters a pulley, sheave, or wheel. It is a high-risk draw-in location.

WHY IT MATTERS

The pulley nip pulls material inward, so a finger or glove placed near the entry point can be drawn between belt and pulley. The injury can progress from fingertip trapping to fracture or amputation.

INDUSTRIAL EXAMPLES

Pulley nips appear on belt drives, conveyors, winches, lifting equipment, and tensioning systems. Incidents occur when workers guide belts, clear debris, or check tracking by hand.

RELATED TERMS

Belt Drive | Conveyor | Nip Point | Glove Entrapment | Machine Guard

233 **Auger** MACHINERY

DEFINITION

An auger is a rotating screw used to move material such as grain, powder, chips, sludge, or debris. The spiral flighting draws material along its length.

WHY IT MATTERS

Augers pull hands inward while also crushing and cutting soft tissue. A worker clearing a blockage with fingers, a stick, or a rag can be caught when the auger turns or restarts.

INDUSTRIAL EXAMPLES

Augers are used in mixers, hoppers, conveyors, drilling systems, food processing, cement handling, and waste equipment. Exposure occurs during cleaning, blockage removal, and inspection.

RELATED TERMS

Draw-In Hazard | Unexpected Start-Up | Lockout/Tagout | Machine Guard | Amputation

234 **Blade Path** MACHINERY

DEFINITION

Blade path is the route traveled by a cutting blade during operation, coast-down, or kickback. It includes the visible cutting line and the possible path if the tool shifts.

WHY IT MATTERS

Hands are injured when they support material inside the blade path or cross it during adjustment. The danger continues during coast-down because a blade that looks almost stopped can still cut deeply.

INDUSTRIAL EXAMPLES

Blade path exposure occurs on saws, cutters, shears, knives, trimming tools, and rotating blades. A common case is the supporting hand holding a small part close to the cut line.

RELATED TERMS

Supporting Hand | Cut Injury | Tool Kickback | Machine Guard | Two-Hand Control

235 **Grinder Wheel** MACHINERY

DEFINITION

A grinder wheel is a rotating abrasive disc or wheel used for cutting, grinding, or finishing. It can remove metal, throw fragments, and catch edges.

WHY IT MATTERS

Grinder wheels injure hands through contact, kickback, disc breakage, and sparks. A worker using the other hand to steady a part can put fingertips directly in the wheel path.

INDUSTRIAL EXAMPLES

Grinder exposure appears during cutting pipe, deburring plates, cleaning welds, and removing seized fasteners. Incidents occur when the wheel bites into the edge and jumps toward the supporting hand.

RELATED TERMS

Blade Path | Flying Fragment | Tool Kickback | Supporting Hand | Laceration

236 Drill Bit Entanglement

MACHINERY

DEFINITION

Drill bit entanglement occurs when a rotating drill catches glove material, hair, clothing, wire, or swarf and pulls it around the bit.

WHY IT MATTERS

The drill may look small, but rotation can wrap a glove fingertip faster than a worker can release. The hand is pulled toward the bit, chuck, or workpiece, causing laceration, fracture, or degloving injury.

INDUSTRIAL EXAMPLES

Entanglement occurs on bench drills, magnetic drills, hand drills, and drilling fixtures. A common trigger is holding a small part by hand instead of clamping it.

RELATED TERMS

Rotating Contact | Glove Entrapment | Hand-as-Clamp | Machine Guard | Laceration

237 Lathe Chuck

MACHINERY

DEFINITION

A lathe chuck is a rotating clamping device that holds a workpiece on a lathe. It may have jaws, bolts, keys, or projections.

WHY IT MATTERS

Lathe chucks create severe entanglement and impact risk because the rotating jaws strike and pull. A glove, sleeve, rag, or finger near the chuck can be caught instantly.

INDUSTRIAL EXAMPLES

Lathe chuck injuries occur during polishing, measuring, deburring, or reaching across the rotating workpiece. Leaving a chuck key in place creates an ejection hazard when the machine starts.

RELATED TERMS

Rotating Shaft | Entanglement | Flying Fragment | Lockout/Tagout | Machine Guard

238 Press Brake

MACHINERY

DEFINITION

A press brake bends sheet metal using an upper tool and lower die. The hand risk is concentrated where the material and tooling close together.

WHY IT MATTERS

Press brakes crush fingers during setup, part support, and small-bend work. The danger increases when a worker holds the sheet close to the bend line and the metal lifts or flips during the stroke.

INDUSTRIAL EXAMPLES

Press brake exposure occurs during short flange bending, small part forming, tooling changes, and two-person sheet support. Fingers can be trapped between the sheet, die, back gauge, or tooling.

RELATED TERMS

Closing Gap | Two-Hand Control | Finger-as-Spacer | Machine Guard | Crush Injury

239 Hydraulic Press

MACHINERY

DEFINITION

A hydraulic press uses hydraulic force to press, form, fit, straighten, or remove parts. It can apply very high force with slow movement.

WHY IT MATTERS

Slow press motion can make workers underestimate the hazard. A finger used to hold a bush, bearing, pin, or plate in position can be crushed before the operator notices misalignment.

INDUSTRIAL EXAMPLES

Hydraulic press injuries occur during bearing pressing, pin removal, straightening work, tooling setup, and workshop repairs. Hands enter when fixtures are poor or parts will not stay aligned.

RELATED TERMS

Closing Gap | Stored Energy Release | Finger-as-Spacer | Two-Hand Control | Crush Injury

240 **Pneumatic Tool** MACHINERY

DEFINITION

A pneumatic tool uses compressed air to create motion, impact, rotation, or force. Examples include impact wrenches, grinders, nailers, chippers, and riveters.

WHY IT MATTERS

Pneumatic tools can jump, overtravel, recoil, or fire unexpectedly if the trigger, hose, or pressure is poorly controlled. The supporting hand is often close to the impact point.

INDUSTRIAL EXAMPLES

Pneumatic tool exposure appears during chipping, bolting, riveting, grinding, cleaning, and nailing. Injuries happen when a tool skips off the work or a hose movement pulls the hand into the line of fire.

RELATED TERMS

Reaction Torque | Tool Rebound | Supporting Hand | Compressed Air | Tool Control

241 **Compressed Air** MACHINERY

DEFINITION

Compressed air is air stored or delivered under pressure for tools, cleaning, control systems, or process equipment. It can release suddenly through hoses, nozzles, or fittings.

WHY IT MATTERS

Compressed air can inject debris into skin, propel particles, whip hoses, and damage tissue if directed at the body. A small leak or nozzle may still produce enough force to injure eyes, skin, and hands.

INDUSTRIAL EXAMPLES

Compressed air exposure occurs during blow-down, pneumatic tool use, hose connection, fitting leaks, and cleaning. Injuries happen when workers use air to clean gloves or skin.

RELATED TERMS

Compressed Air Injection | Flying Fragment | Hose Whip | Pneumatic Tool | High-Pressure Fluid Leak

242 **High-Pressure Fluid Leak** MACHINERY

DEFINITION

A high-pressure fluid leak is a small opening where hydraulic oil, grease, fuel, water, or chemical fluid escapes under pressure. The jet may be almost invisible.

WHY IT MATTERS

A high-pressure jet can penetrate skin like a needle and cause a high-pressure injection injury. The wound may look like a pin prick while fluid spreads through tissue and threatens the finger or hand.

INDUSTRIAL EXAMPLES

High-pressure leaks occur on hydraulic hoses, grease guns, pressure washers, fuel lines, and test rigs. A common mistake is running a finger along a hose to find the leak.

RELATED TERMS

High-Pressure Injection Injury | Hydraulic Energy | Puncture Wound | Lockout/Tagout | PPE Limitation

243 **Stored Energy Release** MACHINERY

DEFINITION

Stored energy release is the sudden movement or force released from springs, pressure, tension, gravity, compressed parts, or trapped loads.

WHY IT MATTERS

Stored energy injures hands because the release happens faster than deliberate movement. A part that looked stable can jump, snap, drop, rotate, or eject as soon as a bolt, clamp, pin, or line is removed.

INDUSTRIAL EXAMPLES

Stored energy appears in springs, hydraulic cylinders, compressed hoses, tensioned belts, loaded pallets, pipe supports, and jammed mechanisms. Hands are exposed during disassembly and troubleshooting.

RELATED TERMS

Residual Energy | Sudden Release | Snap-Back | Unexpected Start-Up | Line of Fire

244 Unexpected Start-Up

MACHINERY

DEFINITION

Unexpected start-up occurs when equipment starts, moves, cycles, or releases energy without the exposed worker expecting it.

WHY IT MATTERS

Hands are often inside guards, gaps, tools, or mechanisms during cleaning and clearing tasks. If the machine starts, the worker has no time to remove fingers from rollers, blades, presses, or conveyors.

INDUSTRIAL EXAMPLES

Unexpected start-up occurs during jam clearing, maintenance, testing, sensor resets, remote operation, and automatic cycles. It is common where isolation is incomplete or communication fails.

RELATED TERMS

Lockout/Tagout | Residual Energy | Conveyor | Machine Guard | Fatal Hand Exposure

245 Machine Guard

MACHINERY

DEFINITION

A machine guard is a physical barrier or device that prevents contact with moving parts, energy points, or dangerous tool paths. It may be fixed, interlocked, adjustable, or presence-sensing.

WHY IT MATTERS

A guard protects only when it remains in place and covers the real exposure point. Removed, bypassed, badly adjusted, or poorly designed guards leave workers to rely on timing and luck.

INDUSTRIAL EXAMPLES

Guards are used on presses, grinders, conveyors, belts, saws, drills, and rotating shafts. Failures occur when guards are removed for cleaning, defeated for speed, or left open after maintenance.

RELATED TERMS

Machine Guarding | Lockout/Tagout | Unexpected Start-Up | Blade Path | Conveyor

246 Interlock

MACHINERY

DEFINITION

An interlock is a device that prevents a machine from operating unless a guard, door, cover, or condition is correctly in place.

WHY IT MATTERS

Interlocks fail as a control when they are bypassed, damaged, or misunderstood. A worker may open a cover believing the machine cannot move, while stored energy, coast-down, or another mode still creates hand exposure.

INDUSTRIAL EXAMPLES

Interlocks are used on machine doors, robot cells, presses, conveyors, and guarded enclosures. Incidents occur when magnets, tape, or spare actuators are used to defeat the system.

RELATED TERMS

Machine Guard | Unexpected Start-Up | Lockout/Tagout | Residual Energy | Guard Removal Control

247 Tool Kickback

MACHINERY

DEFINITION

Tool kickback is the sudden backward, sideways, or upward movement of a tool or workpiece when the tool catches, binds, or releases force.

WHY IT MATTERS

Kickback sends the tool into the supporting hand, body, or nearby worker. It also makes the operator’s gripping hand overtravel into steel, edges, or the cutting path.

INDUSTRIAL EXAMPLES

Kickback occurs with grinders, saws, drills, impact tools, nailers, cutting discs, and jammed fasteners. It often starts when the tool is misaligned or the workpiece is not clamped.

RELATED TERMS

Grinder Wheel | Blade Path | Reaction Torque | Tool Rebound | Supporting Hand

248 **Flying Fragment** MACHINERY

DEFINITION

A flying fragment is a small piece of material, tool, wheel, fastener, or debris ejected by force. It can travel from cutting, grinding, impact, pressure, or breakage.

WHY IT MATTERS

Fragments injure hands when workers use the hand to shield, hold, or clear the work area. The fragment can puncture the skin, lodge under the nail, or cut through glove material.

INDUSTRIAL EXAMPLES

Flying fragments occur during grinding, chipping, hammering, drilling, press work, pressure release, and disc failure. Hands are exposed when clearing swarf by hand or holding parts too close.

RELATED TERMS

Puncture Wound · Grinder Wheel · Ejection Hazard · Eye Protection · Supporting Hand

249 **Ejection Hazard** MACHINERY

DEFINITION

An ejection hazard is the risk that a part, tool, chuck key, pin, spring, fragment, or workpiece will be thrown out by stored energy or machine motion.

WHY IT MATTERS

Ejected objects create impact and puncture injuries and can make workers reflexively grab or block the item with their hands. The hand then enters the line of fire of a moving object.

INDUSTRIAL EXAMPLES

Ejection hazards occur in presses, lathes, grinders, spring assemblies, hydraulic testing, pipe plugs, and clamped fixtures. A loose part in a rotating chuck can become a projectile.

RELATED TERMS

Flying Fragment · Stored Energy Release · Line of Fire · Lathe Chuck · Tool Kickback

Manual Handling and Materials

250 **Finger-as-Spacer** MANUAL HANDLING

DEFINITION

Finger-as-spacer is the unsafe use of a finger to hold a gap, align a part, or maintain separation between two surfaces. The finger becomes a temporary shim in the task.

WHY IT MATTERS

This behavior leads directly to crush and amputation injuries because the gap can close without warning. A worker may use one fingertip for “just a second” while a plate settles, a flange pulls in, or stacked material shifts.

INDUSTRIAL EXAMPLES

Finger-as-spacer appears during flange alignment, shim placement, material stacking, press setup, pipe positioning, and load landing. The injury usually occurs at the last few millimeters of movement.

RELATED TERMS

Alignment · Closing Gap · Distal Phalanx · Pinch Point · Finger-as-Feeler

251 Hand-as-Brake

MANUAL HANDLING

DEFINITION

Hand-as-brake is the use of the hand to slow, stop, or steady moving material. The hand becomes the braking device instead of a tool, stop, fixture, or control system.

WHY IT MATTERS

The hand cannot safely absorb the force of a swinging, rolling, sliding, or drifting object. When the load keeps moving, fingers are crushed, gloves are dragged, or the palm is forced across sharp or hot surfaces.

INDUSTRIAL EXAMPLES

Hand-as-brake occurs when workers try to stop a rolling pipe, slow a swinging basket, control a moving trolley, or hold back a sliding plate. It often happens during the final approach to a landing zone.

RELATED TERMS

Load Swing | Pipe Rolling | Hand-as-Control | Crush Line | No-Touch Handling

252 Hand-as-Clamp

MANUAL HANDLING

DEFINITION

Hand-as-clamp is the use of the hand to hold a part in position while another tool, machine, or worker acts on it. The hand substitutes for a clamp, fixture, or holding aid.

WHY IT MATTERS

The supporting hand is then placed next to drilling, grinding, cutting, hammering, pressing, or tightening forces. If the part shifts or the tool slips, the hand takes the injury first.

INDUSTRIAL EXAMPLES

Hand-as-clamp appears when holding a small bracket under a drill, steadying a plate during grinding, gripping a pipe while another worker cuts, or holding a nut while torque is applied.

RELATED TERMS

Supporting Hand | Drill Bit Entanglement | Grinder Wheel | Finger-as-Spacer | Fixture

253 Blind Reach

MANUAL HANDLING

DEFINITION

Blind reach is reaching into a space where the worker cannot fully see the hand, the hazard, or the contact point. The hand enters before the eyes confirm the risk.

WHY IT MATTERS

Blind reach turns unknown edges, hot surfaces, moving parts, stored energy, and sharp debris into direct hand exposure. A worker may discover the hazard only when the fingertip is cut, burned, pinched, or trapped.

INDUSTRIAL EXAMPLES

Blind reach occurs inside machine guards, behind pipework, under pallets, inside bins, behind panels, and around blind corners. It is common during cleaning, inspection, jam clearing, and retrieval of dropped items.

RELATED TERMS

Poor Visibility | Blind Spot | Pinch Point | Sharp-Edge Zone | Lockout/Tagout

254 Manual Carry

MANUAL HANDLING

DEFINITION

Manual carry is moving an object by holding it in the hands or arms without mechanical assistance. The hands provide grip, balance, and load control.

WHY IT MATTERS

Carrying exposes fingers to crush when the load slips, is set down, or contacts a wall, frame, door, or another load. Heavy or awkward items also pull the wrist into weak positions.

INDUSTRIAL EXAMPLES

Manual carry appears with boxes, plates, tools, motors, valves, buckets, hoses, and small fabricated parts. Injuries occur when fingers are trapped under the load during placement.

RELATED TERMS

Grip Strength | Load Shift | Material Placement | Crush Injury | Working Height

255 **Team Lift** MANUAL HANDLING

DEFINITION

A team lift is a manual handling task where two or more workers lift, carry, or position one object together. The load is shared but timing must be coordinated.

WHY IT MATTERS

Team lifting fails when one person changes direction, loses grip, or sets down early. The other worker's fingers may be caught under the load or between the load and a fixed surface.

INDUSTRIAL EXAMPLES

Team lifts occur with long pipes, plates, motors, pallets, doors, frames, and large boxes. Hand injuries happen during verbal miscommunication, uneven footing, and final placement.

RELATED TERMS

Communication Cue | Manual Carry | Load Shift | Hand Placement | Crush Injury

256 **Plate Handling** MANUAL HANDLING

DEFINITION

Plate handling is the lifting, carrying, sliding, aligning, or stacking of flat metal, plastic, glass, or composite plates. Plates are often heavy with sharp or burred edges.

WHY IT MATTERS

Plate edges cut while plate weight crushes. A worker may grip the edge for control, then lose fingertip clearance when the plate slides, tips, or settles against another surface.

INDUSTRIAL EXAMPLES

Plate handling appears in fabrication shops, steel stores, shipyards, machine shops, and maintenance work. Injuries occur while aligning holes, stacking plates, or lowering plates onto supports.

RELATED TERMS

Sharp-Edge Zone | Material Stacking | Hand-as-Brake | Finger-as-Spacer | Cut-Resistant Glove

257 **Pipe Rolling** MANUAL HANDLING

DEFINITION

Pipe rolling is the movement of round pipe, bar, or tubular material by rolling it on the ground, rack, rollers, or supports.

WHY IT MATTERS

Rolling pipe can trap fingers under the pipe or between adjacent pipes. A worker trying to stop the pipe by hand can be pulled into the crush line when the pipe keeps turning.

INDUSTRIAL EXAMPLES

Pipe rolling happens on pipe racks, fabrication floors, truck beds, yards, and spool shops. Injuries occur when workers push from the side or grab between pipes to correct alignment.

RELATED TERMS

Hand-as-Brake | Tubular Handling | Crush Line | Bundle Handling | Load Shift

258 **Bundle Handling** MANUAL HANDLING

DEFINITION

Bundle handling is the movement or adjustment of grouped materials such as pipes, rods, bars, timber, profiles, or cable reels. The bundle may be strapped, loose, or partly released.

WHY IT MATTERS

Bundles can shift internally even when the outside looks stable. Fingers placed between pieces can be crushed when one item rolls, drops, or springs outward.

INDUSTRIAL EXAMPLES

Bundle handling appears in steel yards, warehouses, construction sites, and fabrication shops. Incidents occur when straps are cut, slings tighten, or one bar is pulled from the bundle.

RELATED TERMS

Strap Cutting | Pipe Rolling | Load Shift | Material Stacking | Crush Injury

259 Pallet Handling

MANUAL HANDLING

DEFINITION

Pallet handling is the movement, adjustment, loading, or unloading of goods on or with pallets. Hands are exposed to boards, nails, straps, forks, and unstable loads.

WHY IT MATTERS

Pallets injure hands through splinters, nail punctures, shifting cartons, fork contact, and crush during set-down. Workers often place fingers under the pallet edge to pull or steer it.

INDUSTRIAL EXAMPLES

Pallet handling occurs in warehouses, stores, trucks, workshops, and production lines. Injuries happen when adjusting a load by hand while a pallet jack or forklift is still moving.

RELATED TERMS

Puncture Wound | Material Stacking | Forklift Interface | Hand Placement | Manual Carry

260 Material Stacking

MANUAL HANDLING

DEFINITION

Material stacking is placing items in layers or piles for storage, transport, or staging. The stack may include plates, pipes, cartons, timber, blocks, or components.

WHY IT MATTERS

Hands are injured when workers use fingers to align or adjust layers. If the upper layer settles, slides, or tilts, the finger becomes the spacer and is crushed.

INDUSTRIAL EXAMPLES

Material stacking occurs with plates, pallets, pipes, crates, castings, and machined parts. Incidents happen when a worker reaches between layers to adjust the stack during lowering.

RELATED TERMS

Finger-as-Spacer | Load Shift | Plate Handling | Bundle Handling | Crush Injury

261 Sharp-Edge Handling

MANUAL HANDLING

DEFINITION

Sharp-edge handling is work involving edges capable of cutting skin or glove material. Edges may be newly cut, broken, burred, machined, sheared, or corroded.

WHY IT MATTERS

Sharp edges cause lacerations when workers grip the edge for control or slide the hand along it while repositioning material. A glove can reduce the cut but still fail under pressure or repeated rubbing.

INDUSTRIAL EXAMPLES

Sharp-edge handling appears with sheet metal, cut pipe, blades, broken pallets, glass, castings, and machined parts. Injuries occur when the worker checks an edge by touch or catches a hidden burr.

RELATED TERMS

Laceration | Burr | Cut-Resistant Glove | Plate Handling | PPE Limitation

262 Burr Contact

MANUAL HANDLING

DEFINITION

Burr contact occurs when the hand touches a sharp raised edge left by cutting, drilling, machining, sawing, or punching. Burrs can be small but very sharp.

WHY IT MATTERS

Burrs cut fingertips and catch gloves during normal handling. A worker may not see the burr until the glove snags or the fingertip slides across it under pressure.

INDUSTRIAL EXAMPLES

Burr contact occurs on drilled holes, cut pipe ends, punched plates, machined slots, brackets, and deburred parts that were not fully finished.

RELATED TERMS

Sharp-Edge Handling | Laceration | Glove Snagging | Puncture Resistance | Fingertip

263 Sheet Metal Handling

MANUAL HANDLING

DEFINITION

Sheet metal handling is lifting, carrying, feeding, aligning, or stacking thin metal sheets. Sheets may be flexible, sharp, oily, and difficult to control.

WHY IT MATTERS

Thin sheets cut like blades and can whip, bow, or slide unexpectedly. A worker may hold one edge while the opposite edge moves, pulling fingers into an edge or closing gap.

INDUSTRIAL EXAMPLES

Sheet metal handling occurs in fabrication, ducting, press work, roofing, packaging, and maintenance. Injuries happen while feeding sheets, separating stacks, or supporting sheets during bending.

RELATED TERMS

Plate Handling | Sharp-Edge Handling | Press Brake | Cut-Resistant Glove | Hand-as-Clamp

264 Wire Rope Handling

MANUAL HANDLING

DEFINITION

Wire rope handling is work with steel wire rope, slings, winch lines, or cable assemblies. Broken wires, tension, and recoil create hand hazards.

WHY IT MATTERS

Wire rope injures hands through punctures, cuts, crushing, and snap-back. Broken strands can pierce gloves, while tensioned rope can trap fingers as it tightens around hardware.

INDUSTRIAL EXAMPLES

Wire rope handling occurs in lifting, winching, towing, rigging, mooring, and crane work. Incidents occur when workers run gloved hands along rope to inspect or guide it.

RELATED TERMS

Puncture Resistance | Snap-Back | Glove Snagging | Sling Tensioning | Laceration

265 Strap Cutting

MANUAL HANDLING

DEFINITION

Strap cutting is the removal of plastic, steel, or fabric straps from packages, bundles, or pallets. The strap may be under tension.

WHY IT MATTERS

When a strap is cut, stored tension can release into the hand or face. The worker holding the strap near the cut can suffer lacerations, punctures, or knuckle impact.

INDUSTRIAL EXAMPLES

Strap cutting occurs on pipe bundles, pallets, steel packs, cartons, timber, and equipment crates. Injuries happen when the free end snaps back or when a knife slips toward the supporting hand.

RELATED TERMS

Stored Energy Release | Laceration | Supporting Hand | Bundle Handling | PPE Limitation

266 Hose Handling

MANUAL HANDLING

DEFINITION

Hose handling is moving, connecting, disconnecting, guiding, or storing flexible hose used for air, water, steam, chemicals, hydraulic fluid, or product transfer.

WHY IT MATTERS

Hoses injure hands when pressure, weight, whip, heat, or coupling movement is underestimated. A hose that looks flexible can suddenly stiffen, kick, or leak under pressure.

INDUSTRIAL EXAMPLES

Hose handling occurs during fuel transfer, hydraulic testing, pneumatic tool use, washdown, chemical transfer, and steam work. Injuries occur at couplings, leaks, and trapped loops.

RELATED TERMS

Hose Whip | High-Pressure Fluid Leak | Coupling | Chemical Glove | Hand-as-Brake

267 Valve Handling

MANUAL HANDLING

DEFINITION

Valve handling is the manual operation, adjustment, removal, or installation of valves and valve components. It may involve handwheels, levers, stems, flanges, and pressure.

WHY IT MATTERS

Valve work exposes hands to pinch, torque, pressure release, hot surfaces, and sudden movement. A stuck valve can release suddenly, causing knuckles to strike nearby steel or trapping fingers in the handwheel.

INDUSTRIAL EXAMPLES

Valve handling occurs in process plants, ships, utilities, oilfields, and maintenance shops. Injuries happen when using cheater bars, gripping spokes, or loosening pressurized fittings.

RELATED TERMS

Reaction Torque | Hot Contact Zone | Stored Energy Release | Handwheel | Pronation

268 Shackle Handling

MANUAL HANDLING

DEFINITION

Shackle handling is the positioning, pinning, unpinning, or carrying of lifting shackles. Hands often work close to the pin, bow, sling, and load connection.

WHY IT MATTERS

Shackles create pinch and crush exposure when the sling tightens or the load shifts. Fingers placed through the bow or near the pin can be trapped as the rigging comes under tension.

INDUSTRIAL EXAMPLES

Shackle handling occurs during crane lifts, rigging setup, load landing, offshore basket handling, and heavy equipment movement. Injuries occur while aligning pins under load or freeing stuck shackles.

RELATED TERMS

Rigging Pinch Point | Sling Tensioning | Finger-as-Spacer | Suspended Load | Crush Injury

269 Sling Handling

MANUAL HANDLING

DEFINITION

Sling handling is the use, positioning, adjustment, or removal of web, wire rope, chain, or synthetic slings around a load.

WHY IT MATTERS

Slings tighten, shift, and bite into hands when the load takes weight. A worker guiding the sling into position may trap fingers between sling and load or inside a choke point.

INDUSTRIAL EXAMPLES

Sling handling occurs with plates, pipe spools, motors, mould boxes, skids, baskets, and bundles. Incidents happen during sling tensioning, load rotation, and removal after landing.

RELATED TERMS

Sling Bite | Sling Tensioning | Shackle Handling | Suspended Load | Pinch Point

270 Chain Block Handling

MANUAL HANDLING

DEFINITION

Chain block handling is the operation or positioning of a manual chain hoist, including hand chains, load chains, hooks, and suspended loads.

WHY IT MATTERS

Hands are exposed to pinch points in chain links, hook movement, load drift, and sudden tension. A worker pulling a hand chain can also have fingers caught if the chain jumps or twists.

INDUSTRIAL EXAMPLES

Chain blocks are used in maintenance bays, workshops, rigging jobs, shipyards, and erection work. Injuries occur during final positioning when workers guide the load by hand.

RELATED TERMS

Suspended Load | Chain Drive | Hook Throat | Load Drift | Hand-as-Brake

271 **Drum Handling** MANUAL HANDLING

DEFINITION

Drum handling is the movement, tilting, rolling, opening, or lifting of barrels and drums. Drums may contain liquids, chemicals, oils, powders, or waste.

WHY IT MATTERS

Drums roll, tip, and trap fingers between the rim and floor, pallet, wall, or another drum. Chemical residue and sharp rims add skin and puncture risks.

INDUSTRIAL EXAMPLES

Drum handling occurs in stores, chemical areas, workshops, ships, and factories. Injuries happen when workers stop a rolling drum by hand or place fingers under the rim to tilt it.

RELATED TERMS

Hand-as-Brake | Chemical Glove | Crush Line | Manual Carry | Pallet Handling

272 **Cylinder Handling** MANUAL HANDLING

DEFINITION

Cylinder handling is moving or securing gas cylinders, hydraulic cylinders, or similar round pressure vessels. The load is heavy, round, and often unstable.

WHY IT MATTERS

Cylinders can roll, tip, and crush fingers during placement. The valve end adds impact risk, while pressure contents increase the consequence if the cylinder falls or is struck.

INDUSTRIAL EXAMPLES

Cylinder handling occurs with oxygen, acetylene, nitrogen, LPG, hydraulic cylinders, and gas bottles. Injuries occur when rolling cylinders by hand or trapping fingers in retaining chains.

RELATED TERMS

Pipe Rolling | Hand-as-Brake | Load Shift | Stored Energy Release | Manual Carry

273 **Manual Alignment** MANUAL HANDLING

DEFINITION

Manual alignment is positioning parts by hand so holes, faces, pins, flanges, or edges line up. It often happens at the final stage of assembly or installation.

WHY IT MATTERS

Alignment becomes dangerous when fingers are used to feel the gap or pull parts into position. Sudden settling can crush fingertips, especially when bolts, pins, or clamps start drawing parts together.

INDUSTRIAL EXAMPLES

Manual alignment appears in flange work, press setup, machine assembly, steel fabrication, bearing fitting, and rigging landings. Injuries happen when the final movement is small but forceful.

RELATED TERMS

Alignment | Finger-as-Spacer | Last-Inch Exposure | Closing Gap | Drift Pin

274 **Hand Placement** MANUAL HANDLING

DEFINITION

Hand placement is the position of the fingers, palm, and wrist in relation to a task, tool, load, or hazard. It determines whether the hand is inside or outside the injury path.

WHY IT MATTERS

Many hand injuries are decided before movement begins because the hand is already in the wrong place. If fingers are under a load, inside a gap, around a strap, or behind a tool, the worker has little recovery time.

INDUSTRIAL EXAMPLES

Hand placement matters while lifting, stacking, guiding loads, tightening tools, cutting straps, opening valves, and clearing jams. A safe task can become unsafe when the supporting hand is placed in the line of fire.

RELATED TERMS

Line of Fire | Supporting Hand | Finger-as-Spacer | Hand-as-Clamp | Exposure Recognition

275 **Pre-Task Hand Placement Review** WORK SYSTEMS

DEFINITION

A pre-task hand placement review is a short check of where hands will be during each critical step of a job. It asks where fingers, palms, and supporting hands will go before work starts.

WHY IT MATTERS

This review catches hazards that generic procedures miss. A crew may know the lift plan but still have no agreed answer for who will guide the last inch, where hands will be kept, or what tool will replace the hand.

INDUSTRIAL EXAMPLES

The review is used before load landing, flange alignment, press work, belt maintenance, pallet adjustment, and jam clearing. The best result is a clear decision that hands will not be used as spacers, clamps, or brakes.

RELATED TERMS

Hand Placement | Finger-as-Spacer | Last-Inch Exposure | Job Safety Analysis | No-Touch Handling

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Work Systems and Observation

276 **Dynamic Risk Assessment** WORK SYSTEMS

DEFINITION

Dynamic risk assessment is the ongoing reassessment of risk as conditions change during the job. It happens in the field, not only before the permit or form is signed.

WHY IT MATTERS

Hand exposure often appears after the job starts: a part jams, visibility drops, a load swings, or a tool does not fit. Without reassessment, workers improvise with their hands to keep the job moving.

INDUSTRIAL EXAMPLES

Dynamic assessment is used during crane lifts, maintenance, shutdown work, rig moves, fabrication, and troubleshooting. A worker pauses when the planned push tool cannot reach and selects another method before hands enter.

RELATED TERMS

Last-Minute Risk Change | Stop-Work Authority | Field Verification | Hand Placement | Residual Risk

277 **Last-Minute Risk Change** WORK SYSTEMS

DEFINITION

A last-minute risk change is any unexpected change in task conditions after planning, such as a stuck part, changed load path, missing tool, poor lighting, or new obstruction.

WHY IT MATTERS

These changes create many hand injuries because the crew tries to finish using the original method. The hand becomes the substitute for the missing control, fixture, tool, or space.

INDUSTRIAL EXAMPLES

Last-minute changes occur when a bolt seizes, a basket swings, a pallet shifts, a glove is too bulky, or a machine guard blocks access. The safe response is to pause and revise the method.

RELATED TERMS

Dynamic Risk Assessment | Stop-Work Authority | Hand-as-Control | Field Verification | Residual Risk

278 **Stop-Work Authority** WORK SYSTEMS

DEFINITION

Stop-work authority is the right and responsibility to pause work when a serious or uncontrolled risk is present. It applies to anyone who sees the exposure, not only the supervisor.

WHY IT MATTERS

For hand safety, stop-work matters most at the moment someone is about to place fingers into a gap, under a load, near a blade, or inside moving equipment. A short pause can prevent a crush, amputation, or injection injury.

INDUSTRIAL EXAMPLES

Stop-work is used when a lift starts swinging, a guard is removed, a glove snags, a hand is used as a spacer, or a press setup looks unstable. The pause should lead to a safer method, not just a warning.

RELATED TERMS

Dynamic Risk Assessment | Last-Minute Risk Change | Supervisor Intervention | No-Touch Handling | Serious Hand Injury

279 **Field Verification** WORK SYSTEMS

DEFINITION

Field verification is checking the actual worksite conditions against the planned method before and during the task. It confirms whether the written control can work in the real location.

WHY IT MATTERS

A procedure may look safe on paper but fail in the field because access is tight, tools do not fit, lighting is poor, or the load behaves differently. Without verification, workers compensate with their hands.

INDUSTRIAL EXAMPLES

Field verification is used before lifting, maintenance isolation, confined-area work, conveyor cleaning, and material stacking. The crew checks reach, visibility, tool clearance, and hand position before starting.

RELATED TERMS

Task Walkdown | Hand Placement | Poor Visibility | Method Statement Gap | Dynamic Risk Assessment

280 **Task Walkdown** WORK SYSTEMS

DEFINITION

A task walkdown is a physical review of the job area and work steps before execution. The crew follows the task path and looks for exposures that may not appear in documents.

WHY IT MATTERS

Walkdowns reveal where hands will be tempted into service: around corners, under loads, between layers, inside guards, or near hot surfaces. This prevents the plan from becoming a clipboard exercise.

INDUSTRIAL EXAMPLES

Task walkdowns are used before shutdown jobs, complex lifts, equipment removal, conveyor work, and plant maintenance. The crew identifies pinch points, access problems, and tool gaps before work starts.

RELATED TERMS

Field Verification | Exposure Recognition | Hand Placement | Job Safety Analysis | Last-Inch Exposure

281 Job Safety Analysis

WORK SYSTEMS

DEFINITION

Job Safety Analysis, or JSA, is a task planning method that breaks a job into steps, identifies hazards, and assigns controls. For hand safety, it must identify hand location and hand purpose in each step.

WHY IT MATTERS

A JSA that says “pinch point hazard” without saying where the hand enters leaves the worker to solve the problem live. The useful JSA names the gap, the movement, the supporting hand, and the control method.

INDUSTRIAL EXAMPLES

A hand-focused JSA is used for lifting, alignment, cutting, drilling, maintenance, material handling, and machine cleaning. It improves when task photos or sketches show hand positions.

RELATED TERMS

Hand Placement | Exposure Recognition | Pre-Task Hand Placement Review | SOP Gap | Residual Risk

282 SOP Gap

WORK SYSTEMS

DEFINITION

An SOP gap is a missing or weak part of a procedure that leaves workers to improvise. In hand safety, the gap is often where the procedure tells workers what to achieve but not how to keep hands out.

WHY IT MATTERS

The phrase “keep hands clear” is not a control if the task still requires a hand to guide, hold, align, or feel the part. The gap pushes workers back into hand-as-control behavior.

INDUSTRIAL EXAMPLES

SOP gaps appear in load landing, press setup, jam clearing, valve work, and flange alignment. A procedure may specify PPE but not the distance tool, fixture, stop, or communication cue needed.

RELATED TERMS

SOP | Hand-as-Control | No-Touch Handling | Tool-to-Load Interface | Method Statement Gap

283 Method Statement Gap

WORK SYSTEMS

DEFINITION

A method statement gap is the difference between the planned written method and the real method workers must use to complete the job. It becomes visible when the stated control is not practical in the field.

WHY IT MATTERS

Workers fill gaps with judgment, speed, and hands. If the method does not specify how to align, stop, support, or inspect safely, the hand becomes the missing tool.

INDUSTRIAL EXAMPLES

Method statement gaps appear when a push tool is too short, a fixture is missing, a lifting point is awkward, or lighting hides the contact point. The crew then improvises unless the job is paused.

RELATED TERMS

SOP Gap | Field Verification | Dynamic Risk Assessment | Hand Placement | Task Redesign

284 Toolbox Demonstration

WORK SYSTEMS

DEFINITION

A toolbox demonstration is a short practical demonstration of the safe method before the job, using the actual tool, load, or mock-up when possible.

WHY IT MATTERS

Demonstration exposes misunderstandings that a verbal briefing misses. A worker may nod during the talk but still place the supporting hand in the closing gap when asked to show the task.

INDUSTRIAL EXAMPLES

Toolbox demonstrations work well for push-pull tools, drift pins, taglines, shackle handling, press setup, and strap cutting. The crew shows where hands go and where they must not go.

RELATED TERMS

Toolbox Talk | Hand Placement | Training Transfer | Field Verification | No-Touch Handling

285 Exposure Observation

WORK SYSTEMS

DEFINITION

Exposure observation is watching the task to identify where and why hands enter hazardous zones. It focuses on behavior in relation to the task design, not blame.

WHY IT MATTERS

Observation often shows that workers put hands in danger because the task gives them no better option. The fix may be a tool, stop, fixture, layout change, or different sequence rather than another reminder.

INDUSTRIAL EXAMPLES

Exposure observation is used during crane landings, assembly, stacking, grinding, jam clearing, and maintenance. The observer notes hand-as-spacer, hand-as-clamp, blind reach, and last-inch exposure.

RELATED TERMS

Exposure Recognition | Hand-as-Control | Observation Card | Task Redesign | Residual Risk

286 Observation Card

WORK SYSTEMS

DEFINITION

An observation card is a simple record of a field observation, usually noting the task, hazard, behavior, and corrective action. For hand safety, it should capture the specific hand exposure.

WHY IT MATTERS

Cards lose value when they only say “unsafe act” or “use gloves.” They are useful when they record the exact moment: fingertip between plates, hand on tagline under tension, or glove near roller.

INDUSTRIAL EXAMPLES

Observation cards are used by supervisors, HSE teams, and peer observers. Good cards support trend analysis and show which tasks repeatedly require hands in danger.

RELATED TERMS

Exposure Observation | Exposure Count | Hand Placement | Near Miss | Task Redesign

287 Exposure Count

WORK SYSTEMS

DEFINITION

Exposure count is the number of times hands enter a defined hazard zone during a task, shift, or observation period. It measures exposure before injury occurs.

WHY IT MATTERS

A site can have zero hand injuries while still having hundreds of high-risk hand entries every day. Counting exposure shows whether controls are reducing the need for hands, not just whether luck held.

INDUSTRIAL EXAMPLES

Exposure counts are used for load landing, machine feeding, stacking, alignment, and tool use. Observers count each hand entry into pinch, crush, cut, burn, or line-of-fire zones.

RELATED TERMS

Exposure Observation | Leading Indicator | Hand Placement | Task Redesign | Residual Risk

288 Leading Indicator

WORK SYSTEMS

DEFINITION

A leading indicator is a measure that gives warning before an injury happens. In hand safety, exposure counts and uncontrolled hand entries are stronger leading indicators than injury counts alone.

WHY IT MATTERS

Injury rates can stay low until one serious event occurs. Leading indicators show whether workers are still placing hands in closing gaps, under loads, or near moving parts even when no one is hurt yet.

INDUSTRIAL EXAMPLES

Leading indicators include hand exposure counts, unresolved SOP gaps, missing fixtures, repeated glove entrapment observations, and tasks requiring finger-as-spacer behavior.

RELATED TERMS

Exposure Count | Near Miss | Residual Risk | Hand Placement | Serious Hand Injury

289 **Near Miss** WORK SYSTEMS

DEFINITION

A near miss is an event where an injury could have occurred but did not. For hand safety, it often involves a hand almost being crushed, cut, burned, injected, or pulled in.

WHY IT MATTERS

Near misses reveal the same exposure pathways as injuries without the injury outcome. Ignoring them allows the same gap, tool slip, load swing, or blind reach to continue until the next worker is hurt.

INDUSTRIAL EXAMPLES

Near misses include a glove catching on a roller but releasing, a plate landing beside a fingertip, a knife slipping past the supporting hand, or a hose leak narrowly missing the palm.

RELATED TERMS

Observation Card | Leading Indicator | Glove Entrapment | Last-Inch Exposure | Stop-Work Authority

290 **Communication Cue** WORK SYSTEMS

DEFINITION

A communication cue is an agreed word, signal, gesture, or command that coordinates movement during a task. It tells the crew when to lift, lower, stop, hold, release, or move away.

WHY IT MATTERS

Poor cues put hands at risk because one worker moves while another still has fingers in the contact zone. Clear cues prevent sudden settling, load movement, and tool activation during hand placement.

INDUSTRIAL EXAMPLES

Communication cues are used during team lifts, crane landing, press work, shackle handling, pallet movement, and valve operation. A simple “hands clear” cue must be confirmed, not assumed.

RELATED TERMS

Team Lift | Signal Person | Crew Positioning | Hand Placement | Load Landing

291 **Signal Person** WORK SYSTEMS

DEFINITION

A signal person is the worker assigned to communicate movement instructions to an operator or crew. The role is common in lifting, vehicle movement, and load positioning.

WHY IT MATTERS

The signal person affects hand safety by controlling timing and stopping movement before workers enter the crush line. Confused signals can move a load while hands are still guiding or aligning it.

INDUSTRIAL EXAMPLES

Signal persons are used with cranes, forklifts, winches, hoists, and large equipment movement. The role is critical when the operator cannot see the hand placement near the load.

RELATED TERMS

Communication Cue | Spotter Position | Load Landing | Exclusion Zone | Crew Positioning

292 **Spotter Position** WORK SYSTEMS

DEFINITION

Spotter position is where a spotter stands to observe hazards, guide movement, and warn the crew without entering the line of fire.

WHY IT MATTERS

A spotter who stands too close becomes another exposed worker. A spotter who cannot see the hand contact point cannot prevent a finger from entering the closing gap.

INDUSTRIAL EXAMPLES

Spotters are used during reversing vehicles, crane landings, confined equipment movement, blind lifts, and machine maintenance. Good positioning allows clear sight of hands, load, operator, and escape path.

RELATED TERMS

Signal Person | Line of Fire | Exclusion Zone | Poor Visibility | Crew Positioning

293 **Crew Positioning** WORK SYSTEMS

DEFINITION

Crew positioning is the planned placement of workers around a task so each person has a safe role, sightline, and escape route.

WHY IT MATTERS

Bad positioning creates hidden hand exposure. One worker may be safe from the load but place a hand behind a flange, under a pallet, or near another worker's tool path.

INDUSTRIAL EXAMPLES

Crew positioning is planned for lifting, pushing, pulling, team carries, machine setup, and maintenance. The plan should state who touches the load, who uses tools, and who stays outside the danger zone.

RELATED TERMS

Spotter Position | Communication Cue | Exclusion Zone | Hand Placement | Line of Fire

294 **Energy Isolation Check** WORK SYSTEMS

DEFINITION

An energy isolation check is the confirmation that hazardous energy has been isolated, locked, relieved, and tested before hands enter the equipment.

WHY IT MATTERS

Hand injuries during maintenance often happen because energy remains: pressure, gravity, rotation, spring force, heat, or automatic restart. The check proves the machine is safe to touch, not just switched off.

INDUSTRIAL EXAMPLES

Isolation checks are used on conveyors, presses, hydraulic systems, rotating equipment, steam lines, and electrical panels. The worker verifies zero movement and zero pressure before reaching in.

RELATED TERMS

Lockout/Tagout | Residual Energy | Stored Energy Release | Unexpected Start-Up | Blind Reach

295 **Guard Removal Control** WORK SYSTEMS

DEFINITION

Guard removal control is the system used when a machine guard must be removed for maintenance, cleaning, setup, or inspection. It defines authorization, isolation, and reinstatement.

WHY IT MATTERS

Removing a guard changes the task from normal operation to direct exposure. If the control is weak, workers may put hands near belts, shafts, gears, or blades without full isolation.

INDUSTRIAL EXAMPLES

Guard removal control is used for conveyors, grinders, drills, presses, gearboxes, and rotating equipment. The guard should not come off until energy is isolated and the exposed points are known.

RELATED TERMS

Machine Guard | Interlock | Energy Isolation Check | Unexpected Start-Up | Lockout/Tagout

296 **Temporary Control** WORK SYSTEMS

DEFINITION

A temporary control is a short-term measure used to reduce risk until a permanent engineering or process control is installed. It may include barriers, tools, signage, supervision, or revised sequence.

WHY IT MATTERS

Temporary controls can be useful but easily become permanent excuses. A warning sign or extra person does not replace a fixture, guard, stop, distance tool, or redesigned method when hands still enter the hazard.

INDUSTRIAL EXAMPLES

Temporary controls are used during shutdowns, repair work, trial operations, damaged guards, and unusual lifts. They must state what hand exposure remains and when the permanent fix is due.

RELATED TERMS

Residual Risk | Hierarchy of Controls | Task Redesign | Supervisor Intervention | Field Verification

297 **Training Transfer** WORK SYSTEMS

DEFINITION

Training transfer is the extent to which workers apply what they learned in training to the actual job. It is visible in the field, not in attendance records.

WHY IT MATTERS

A worker may pass a hand safety briefing but still use a finger as a spacer when production pressure starts. Transfer happens when the real task, tools, supervision, and layout support the trained method.

INDUSTRIAL EXAMPLES

Training transfer is checked after toolbox talks, new tool introductions, glove changes, machine training, and lifting campaigns. Supervisors look for whether the safe method survives real work.

RELATED TERMS

Toolbox Demonstration | Exposure Observation | Supervisor Intervention | Hand Placement | Task Redesign

298 **Post-Job Review** WORK SYSTEMS

DEFINITION

A post-job review is a short discussion after work to capture what went well, what changed, and where hands were exposed. It turns field learning into better future controls.

WHY IT MATTERS

Post-job reviews catch hazards that planning missed. If workers had to improvise with hands, struggle with tools, or enter a pinch zone, the next job should not repeat the same weakness.

INDUSTRIAL EXAMPLES

Post-job reviews are used after lifts, shutdown tasks, maintenance jobs, incidents, near misses, and new methods. The best review records the exposure and assigns a fix.

RELATED TERMS

Near Miss | Lessons Learned | Task Redesign | Exposure Count | Method Statement Gap

Injury Consequences and Recovery

299 **First Aid Response** RECOVERY

DEFINITION

First aid response is the immediate care given after a hand injury before medical treatment is available. It includes stopping bleeding, cooling burns, protecting wounds, immobilising injured fingers or wrists, and arranging further care when needed.

WHY IT MATTERS

The first few minutes can change the outcome. A deep cut that keeps bleeding, a crushed fingertip, a chemical burn, or a high-pressure injection injury can become worse if the hand is wrapped casually and the worker is sent back to the job. Early first aid also prevents small wounds from becoming contaminated while the decision about hospital transfer is made.

INDUSTRIAL EXAMPLES

A fitter cuts the palm on a sharp plate edge during shutdown work; the wound is covered, the hand is kept still, and the supervisor checks whether tendon movement is affected before arranging medical review. On a deck, a crushed fingertip is elevated and protected instead of being squeezed repeatedly to see if it still hurts.

RELATED TERMS

Wound Contamination | Hospital Transfer | Crush Injury | Laceration | Functional Assessment

300 **Wound Contamination** RECOVERY

DEFINITION

Wound contamination means dirt, oil, metal particles, chemicals, rust, seawater, cement, or other foreign material has entered a cut, puncture, burn, or crushed area of the hand.

WHY IT MATTERS

Contamination increases the risk of infection, delayed healing, and tissue damage. In industrial work, the wound may look like a simple cut but may contain grinding dust, hydraulic oil, grease, or metal fragments. If contamination is missed, the worker may return with swelling, pus, stiffness, or spreading infection that threatens hand function.

INDUSTRIAL EXAMPLES

A worker slices a finger on oily sheet metal, wipes it on a rag, and tapes it up while continuing the job. Later the finger swells because oil and metal debris remained inside the wound. A marine worker with a rope burn exposed to seawater faces a different contamination risk from a clean office cut.

RELATED TERMS

First Aid Response | Infection | Laceration | Puncture Wound | Debridement

301 **Golden Hour** RECOVERY

DEFINITION

The golden hour is a practical term for the early period after a serious injury when rapid assessment and transfer can improve the chance of saving tissue, function, or life.

WHY IT MATTERS

For hand injuries, the idea matters most when blood flow, crushed tissue, amputation, deep contamination, or injection injury is involved. A fingertip, tendon, nerve, or artery problem may not wait until the end of the shift. Delayed treatment can turn a repairable injury into stiffness, infection, tissue loss, or permanent disability.

INDUSTRIAL EXAMPLES

After a finger is partly amputated by a closing machine guard, the team protects the part, controls bleeding, and sends the worker for urgent treatment instead of waiting for the company doctor to finish another round. A high-pressure grease injection mark is treated as an emergency even though it looks like a pin prick.

RELATED TERMS

Hospital Transfer | Amputation Replantation | High-Pressure Injection Injury | Tissue Loss | First Aid Response

302 **Hospital Transfer** RECOVERY

DEFINITION

Hospital transfer is the organised movement of an injured worker from the worksite to a hospital or specialist care centre for assessment and treatment.

WHY IT MATTERS

Hand injuries are often underestimated at the site because the worker can still move some fingers or because the wound is small. Transfer becomes critical when there is uncontrolled bleeding, suspected fracture, tendon injury, loss of sensation, chemical exposure, burn, crushed tissue, amputation, or high-pressure injection. The consequence of delay is not just pain; it can be loss of movement, infection, or failed repair.

INDUSTRIAL EXAMPLES

A welder with a deep cut across the back of the hand can still bend his fingers, but one finger will not straighten fully. The supervisor arranges hospital transfer because an extensor tendon may be cut. A worker with numbness after a crush injury is sent out rather than kept for observation in the workshop.

RELATED TERMS

First Aid Response · Hand Surgery · Tendon Repair · Nerve Repair · Functional Assessment

303 **Hand Surgery** RECOVERY

DEFINITION

Hand surgery is specialist surgical treatment for injuries or conditions affecting the fingers, thumb, palm, wrist, tendons, nerves, bones, vessels, skin, and soft tissue.

WHY IT MATTERS

The hand has many small structures packed into a small space. A wound that looks narrow on the surface can involve a tendon, nerve, artery, joint, or bone underneath. Hand surgery may be needed to restore movement, sensation, blood supply, alignment, or skin coverage after an industrial injury.

INDUSTRIAL EXAMPLES

A grinder cut across the knuckle exposes an extensor tendon and needs surgical repair. A crushed finger from a press requires cleaning, bone stabilisation, and soft tissue cover. A wire rope laceration that causes numbness along one side of the finger may require digital nerve repair.

RELATED TERMS

Tendon Repair · Nerve Repair · Bone Fixation · Skin Graft · Functional Assessment

304 **Tendon Repair** RECOVERY

DEFINITION

Tendon repair is a procedure used to reconnect a cut or torn tendon so the finger, thumb, or wrist can move again.

WHY IT MATTERS

A tendon injury changes function immediately: a cut flexor tendon can stop a finger from closing, while a cut extensor tendon can stop it from straightening. Repair is only the start. The tendon must glide during healing without snapping or sticking, so delayed treatment or poor rehabilitation can leave the worker with a stiff finger that cannot grip tools safely.

INDUSTRIAL EXAMPLES

A strap-cutting knife slips across the palm side of the index finger, and the worker later notices the fingertip will not bend. In another case, a shallow-looking cut over the knuckle leaves one finger drooping when the worker tries to open the hand. Both need tendon assessment, not just a dressing.

RELATED TERMS

Flexor Tendon | Extensor Tendon | Hand Surgery | Splinting | Hand Therapy

305 **Nerve Repair** RECOVERY

DEFINITION

Nerve repair is treatment to reconnect or manage a damaged nerve so sensation or movement may recover as much as possible.

WHY IT MATTERS

Nerve injury can leave a finger numb, hypersensitive, weak, or poorly controlled. A worker who cannot feel pressure or heat properly may grip too hard, miss a burn, or fail to notice a slipping object. Recovery is slow because nerves grow back gradually, and the hand may remain sensitive or numb for months.

INDUSTRIAL EXAMPLES

A sharp sheet-metal cut along the side of a finger leaves the fingertip numb even after bleeding stops. A crush injury at the wrist causes tingling and weak thumb control. These signs matter because the visible wound does not show how much nerve function has been lost.

RELATED TERMS

Median Nerve | Digital Nerves | Sensation | Hypersensitivity | Functional Assessment

306 **Bone Fixation** RECOVERY

DEFINITION

Bone fixation is the stabilisation of a broken bone using splints, pins, wires, plates, screws, or other methods so the bone can heal in the correct position.

WHY IT MATTERS

Hand bones must heal in alignment because small changes can affect grip. A rotated finger fracture may look acceptable when the hand is open but cross over another finger when the worker makes a fist. Poor fixation or missed displacement can leave permanent weakness, stiffness, or loss of dexterity.

INDUSTRIAL EXAMPLES

A metacarpal fracture from a falling component is fixed so the knuckle line and finger rotation are restored. A crushed distal phalanx under a dropped flange may need protection and alignment so the fingertip does not heal shortened, crooked, or painfully sensitive.

RELATED TERMS

Fracture | Metacarpal | Phalanges | Hand Surgery | Grip Recovery

307 **Skin Graft** RECOVERY

DEFINITION

A skin graft is a surgical procedure where skin is moved from one area of the body to cover a wound where skin has been lost.

WHY IT MATTERS

Skin cover protects tendons, bones, nerves, and blood vessels. Without stable skin coverage, the hand may remain painful, open to infection, or unable to tolerate friction from tools and gloves. A graft can close the wound, but grafted skin may be less flexible or sensitive than normal skin.

INDUSTRIAL EXAMPLES

A worker loses skin from the back of the hand after a conveyor abrasion. A hot metal burn removes skin from the palm. In both cases, the wound may need grafting before hand therapy and return to work can begin safely.

RELATED TERMS

Burn | Abrasion | Tissue Loss | Hand Surgery | Scar Management

308 **Amputation Replantation** RECOVERY

DEFINITION

Amputation replantation is the surgical reattachment of a completely separated finger, thumb, or part of the hand when conditions allow.

WHY IT MATTERS

Replantation depends on the type of injury, contamination, crush damage, time since injury, and available specialist care. A clean cut has a better chance than a crushed, dirty, or torn-off part. Even successful replantation usually requires long rehabilitation and may leave stiffness, cold intolerance, altered sensation, or reduced strength.

INDUSTRIAL EXAMPLES

A guillotine-type cut from a sharp machine part may be considered for replantation if the amputated part is protected and transfer is rapid. A finger crushed and contaminated in a chain sprocket may be less suitable because the vessels, nerves, and tissue are badly damaged.

RELATED TERMS

Amputation | Golden Hour | Hospital Transfer | Hand Surgery | Long-Term Outcome

309 **Hand Therapy** RECOVERY

DEFINITION

Hand therapy is rehabilitation focused on restoring movement, strength, sensation, coordination, and safe function after a hand or wrist injury.

WHY IT MATTERS

Surgery or wound closure does not automatically restore hand use. Tendons can stick, joints can stiffen, scars can tighten, and the worker may protect the hand so much that strength disappears. Hand therapy guides safe movement so healing structures are protected while function gradually returns.

INDUSTRIAL EXAMPLES

After tendon repair, a worker follows a controlled exercise programme rather than forcing the finger into a fist. After a fracture, therapy helps regain wrist and finger motion before the worker returns to spanners, grinders, rigging lines, or manual lifting.

RELATED TERMS

Rehabilitation Exercise | Splinting | Grip Recovery | Functional Assessment | Work Hardening

310 **Splinting** RECOVERY

DEFINITION

Splinting is the use of a support to hold the finger, thumb, hand, or wrist in a specific position during healing or rehabilitation.

WHY IT MATTERS

A splint can protect a repaired tendon, stabilise a fracture, reduce pain, or prevent a joint from stiffening in the wrong position. The wrong splint position, poor fit, or early removal can damage a repair or leave the hand stiff. A worker may feel ready because pain has reduced, but the injured structure may still be weak.

INDUSTRIAL EXAMPLES

A mallet finger is splinted so the fingertip stays straight while the tendon heals. A wrist splint protects a suspected carpal fracture. After tendon repair, a custom splint limits movement so the repaired tendon does not rupture during early healing.

RELATED TERMS

Tendon Repair | Fracture | Hand Therapy | Mallet Finger | Modified Duties

311 **Scar Management** RECOVERY

DEFINITION

Scar management is the process of reducing the effect of scar tissue on movement, comfort, grip, and appearance after a wound, burn, surgery, or crush injury.

WHY IT MATTERS

Scar tissue can stick to tendons, tighten across joints, become painful, or make glove use uncomfortable. A scar over the palm can pull during gripping; a scar over a knuckle can limit bending. Poor scar management may turn a healed wound into a long-term work limitation.

INDUSTRIAL EXAMPLES

A burn scar across the palm tightens when the worker tries to hold a handle. A laceration scar over the finger catches painfully inside a glove. Therapy, massage, pressure, stretching, or protective coverings may be used so the scar does not control the hand.

RELATED TERMS

Scar Contracture | Skin Graft | Hand Therapy | Hypersensitivity | Return to Work

312 **Return to Work** RECOVERY

DEFINITION

Return to work is the planned process of bringing an injured worker back to suitable duties after medical treatment and recovery.

WHY IT MATTERS

Returning too early can reopen wounds, rupture tendon repairs, displace fractures, or place a numb hand back into danger. Returning too late can reduce confidence, strength, and work readiness. The key question is not whether the wound is closed, but whether the worker can safely grip, release, feel, react, and control tools for the task assigned.

INDUSTRIAL EXAMPLES

A rigger after a finger fracture may return first to inspection and low-force tasks before handling taglines. A fitter after tendon repair may avoid forceful gripping, hammering, and spanner work until cleared for progressive loading.

RELATED TERMS

Modified Duties | Functional Assessment | Grip Recovery | Work Hardening | Long-Term Outcome

313 **Modified Duties** RECOVERY

DEFINITION

Modified duties are temporary or long-term work tasks adjusted to match a worker's current medical restrictions after injury.

WHY IT MATTERS

Modified work prevents a recovering hand from being overloaded while keeping the worker engaged with the workplace. Poorly chosen duties can be as risky as the original job if they still require forceful grip, vibration, pinch exposure, or contaminated handling. The task must match the actual limitation, not just the job title.

INDUSTRIAL EXAMPLES

A worker recovering from a tendon repair may do tool inspection, documentation, or supervised observation instead of cutting straps or using spanners. A worker with cold intolerance after fingertip injury may avoid outdoor night deck work until the hand tolerates temperature changes.

RELATED TERMS

Return to Work | Functional Assessment | Work Restrictions | Hand Therapy | Grip Recovery

314 **Permanent Disability** RECOVERY

DEFINITION

Permanent disability is lasting loss of hand function, sensation, movement, strength, or comfort after an injury has healed as much as expected.

WHY IT MATTERS

A permanent hand disability can affect work, income, self-care, and confidence. The visible injury may be small, but loss of thumb opposition, fingertip sensation, grip strength, or joint movement can prevent safe tool handling. Some workers return to site but cannot perform the same task safely or at the same pace.

INDUSTRIAL EXAMPLES

A worker loses part of a fingertip and later cannot tolerate pressure on a wrench. Another has a stiff PIP joint after a crush injury and cannot make a full fist around a handle. The disability is measured by function, not by the size of the scar.

RELATED TERMS

Long-Term Outcome | Functional Assessment | Grip Recovery | Amputation | Modified Duties

315 **Psychological Impact** RECOVERY

DEFINITION

Psychological impact is the emotional and mental effect of a hand injury, including fear, stress, loss of confidence, sleep disturbance, anger, or anxiety about returning to the task.

WHY IT MATTERS

Hands are closely linked to independence and work identity. A worker who watched a finger get crushed may avoid similar tasks, grip tools too cautiously, or rush to prove recovery. Ignoring the psychological side can lead to unsafe return, poor communication, underreporting of pain, or withdrawal from skilled work.

INDUSTRIAL EXAMPLES

After a near amputation in a press, a worker freezes when asked to feed material near the same machine. A rigger who had a hand trapped during landing becomes tense whenever a suspended load approaches final position. The response is not weakness; it is part of recovery.

RELATED TERMS

Return to Work | Near Miss Culture | Pain Sensitivity | Modified Duties | Learning from Incidents

316 **Pain Sensitivity** RECOVERY

DEFINITION

Pain sensitivity is an increased or reduced pain response after injury, nerve irritation, burn, crush injury, or surgery.

WHY IT MATTERS

Abnormal pain can interfere with grip, glove use, sleep, therapy, and return to work. A worker may avoid using the hand because even light contact feels sharp, or may push through pain and overload healing tissue. Pain that does not match the visible wound may still reflect nerve or soft tissue injury.

INDUSTRIAL EXAMPLES

A healed fingertip crush remains painful when pressed against a tool handle. A scar across the back of the hand burns when a glove rubs over it. During therapy, the worker may need graded exposure rather than sudden forceful use.

RELATED TERMS

Hypersensitivity | Nerve Repair | Scar Management | Hand Therapy | Long-Term Outcome

317 **Cold Intolerance** RECOVERY

DEFINITION

Cold intolerance is pain, numbness, colour change, stiffness, or reduced function in a previously injured hand or finger when exposed to cold.

WHY IT MATTERS

Cold intolerance can stop a worker from safely using tools in outdoor, marine, freezer, mining, or night-shift environments. The hand may lose sensation and grip before the worker realises control is failing. It is common after fingertip crush injuries, amputations, nerve injuries, and vascular damage.

INDUSTRIAL EXAMPLES

A deck worker with a replanted finger cannot hold a wet metal shackle on a cold morning because the finger becomes numb and painful. A maintenance worker recovering from fingertip amputation struggles to use small fasteners in winter because the injured finger stiffens quickly.

RELATED TERMS

Digital Arteries | Amputation Replantation | Nerve Repair | Sensation | Modified Duties

318 **Hypersensitivity** RECOVERY

DEFINITION

Hypersensitivity is an exaggerated response to touch, pressure, vibration, temperature, or friction after an injury, especially when nerves or scars are involved.

WHY IT MATTERS

A hypersensitive finger may be technically healed but unusable for work contact. Light glove pressure, tool vibration, or brushing against metal can cause sharp pain. If the worker avoids all contact, the hand may remain weak; if forced too quickly, the pain response may worsen.

INDUSTRIAL EXAMPLES

A worker after a fingertip injury cannot press the finger pad against a control button. A scar over the knuckle becomes painful whenever the glove seam moves across it. Therapy may use gradual desensitisation before heavier tool use returns.

RELATED TERMS

Pain Sensitivity | Digital Nerves | Scar Management | Hand Therapy | Grip Recovery

319 **Grip Recovery** RECOVERY

DEFINITION

Grip recovery is the gradual return of the ability to hold, control, squeeze, and release objects after a hand or wrist injury.

WHY IT MATTERS

Safe return to tool use usually comes in stages: light grip, controlled release, sustained hold, then forceful or vibrating tool work. A worker may be able to hold a cup but not safely control a grinder, spanner, tagline, or heavy part. Testing only pain or wound closure misses whether grip is reliable under real task conditions.

INDUSTRIAL EXAMPLES

After a metacarpal fracture, a worker may start with light assembly or inspection before returning to hammering. After tendon repair, the hand may grip a foam block before progressing to hand tools, then to controlled work with heavier loads.

RELATED TERMS

Grip Strength | Functional Assessment | Hand Therapy | Return to Work | Work Hardening

320 **Functional Assessment** RECOVERY

DEFINITION

Functional assessment is the evaluation of what the injured hand can actually do, including grip, pinch, range of motion, sensation, coordination, pain tolerance, and task safety.

WHY IT MATTERS

A healed wound does not prove the hand is ready for work. The hand must be tested against the demands of the job: holding a tool, releasing quickly, feeling pressure, tolerating gloves, and staying out of hazard zones. Without functional assessment, a worker can return with hidden weakness or numbness that creates a new incident.

INDUSTRIAL EXAMPLES

A technician can bend the injured finger in clinic but cannot hold a screwdriver under load. A rigger can close the hand but cannot feel a rope slipping. Functional assessment connects medical recovery to the actual task, not just the injury label.

RELATED TERMS

Return to Work | Grip Recovery | Modified Duties | Hand Therapy | Work Hardening

321 **Rehabilitation Exercise** RECOVERY

DEFINITION

Rehabilitation exercise is controlled movement and strengthening prescribed to restore hand function after injury or surgery.

WHY IT MATTERS

Exercise must match the stage of healing. Too little movement can cause stiffness and tendon sticking; too much force can reopen wounds, rupture repairs, or increase swelling. The goal is not gym-style effort but safe recovery of movement, control, and work capacity.

INDUSTRIAL EXAMPLES

After a tendon repair, the worker may perform guided finger gliding exercises inside a protective splint. After a fracture heals enough, grip strengthening is introduced gradually before the worker returns to pliers, spanners, or lifting tasks.

RELATED TERMS

Hand Therapy | Splinting | Grip Recovery | Range of Motion | Work Hardening

322 **Work Hardening** RECOVERY

DEFINITION

Work hardening is a structured rehabilitation stage where the recovering worker practises job-like tasks to rebuild strength, endurance, coordination, and confidence.

WHY IT MATTERS

A hand may perform well in therapy but fail during a long shift with vibration, cold, wet gloves, awkward reach, or repeated gripping. Work hardening bridges that gap. It reduces the chance of re-injury by testing the hand against real work demands before full duty resumes.

INDUSTRIAL EXAMPLES

A fitter recovering from wrist injury progresses from light grip tools to longer periods of spanner use, then controlled simulated maintenance tasks. A warehouse worker practises repeated box handling before returning to full picking and stacking work.

RELATED TERMS

Return to Work | Grip Recovery | Functional Assessment | Modified Duties | Rehabilitation Exercise

323 **Long-Term Outcome** RECOVERY

DEFINITION

Long-term outcome is the final or lasting effect of a hand injury after treatment, healing, rehabilitation, and return-to-work decisions.

WHY IT MATTERS

The long-term result may include full recovery, reduced strength, stiffness, cold intolerance, numbness, pain, cosmetic change, altered duties, or permanent disability. A small injury can have a large outcome if it involves the thumb, fingertip sensation, tendon glide, or joint movement.

INDUSTRIAL EXAMPLES

A worker with a healed laceration returns to full duty with no limitation. Another with a crushed fingertip remains unable to tolerate vibration and cold. A worker with a stiff finger after a fracture can work, but not safely on tasks requiring tight grip around small handles.

RELATED TERMS

Permanent Disability | Return to Work | Functional Assessment | Cold Intolerance | Grip Recovery Hand Safety First | Production Draft

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Industrial Sectors and Context

324 Offshore Hand Safety

SECTORS

DEFINITION

Offshore hand safety refers to the prevention of hand injuries during work on offshore platforms, rigs, vessels, and marine energy installations.

WHY IT MATTERS

Offshore work combines moving loads, wet decks, wind, vessel motion, restricted space, and time pressure. Hands often enter the hazard during landing, connecting, guiding, securing, or freeing equipment. A small loss of balance or sudden load movement can turn a routine hand placement into a crush, pinch, or line-of-fire injury.

INDUSTRIAL EXAMPLES

During backloading, a worker reaches to steady a swinging basket as it lands on a wet deck. The basket settles sideways and traps the fingertips against a deck stopper. The dominant exposure is the final approach and landing zone, not the lift itself.

RELATED TERMS

Marine Deck Work | Crane Operations | Suspended Load | Last-Inch Exposure | No-Touch Handling

325 Oil and Gas Rigging

SECTORS

DEFINITION

Oil and gas rigging is the lifting, moving, landing, and securing of equipment, tubulars, baskets, skids, and heavy components in drilling and production environments.

WHY IT MATTERS

Rigging injuries often happen when the load is almost in place. Hands go in to rotate a shackle, pull a sling free, guide a skid, or correct alignment. The load may be heavy, unstable, suspended, or resting on uneven supports, so a small movement can crush fingers or trap the hand.

INDUSTRIAL EXAMPLES

A rigger places one hand near a pad eye while trying to remove a sling from a mud pump skid. The skid shifts as the crane takes slack, closing the gap between the sling hardware and the load surface.

RELATED TERMS

Crane Operations | Sling Pinch | Load Landing | Hand-as-Control | Tagline

326 **Marine Deck Work** SECTORS

DEFINITION

Marine deck work includes handling, securing, lifting, landing, mooring, and maintenance tasks performed on vessel decks and offshore support vessels.

WHY IT MATTERS

Deck conditions change quickly because of water, oil, motion, wind, and moving cargo. A hand used to catch a moving rope, stop a rolling item, or steady a swinging load can be pulled into a bite, trapped against steel, or burned by rope friction.

INDUSTRIAL EXAMPLES

A deckhand grabs a mooring line as it surges across the deck and tries to stop it by hand. The line tightens around the glove and pulls the hand toward a fairlead before the worker can release.

RELATED TERMS

Rope Bite | Glove Entrapment | Hand-as-Brake | Offshore Hand Safety | Line of Fire

327 **Shipyard Fabrication** SECTORS

DEFINITION

Shipyard fabrication is the cutting, fitting, welding, grinding, lifting, and assembly of steel structures used in ships, offshore units, and marine equipment.

WHY IT MATTERS

Shipyard hands are exposed during fit-up. Plates, stiffeners, pipes, and brackets rarely meet perfectly on the first attempt, so workers use fingers to hold edges, feel gaps, place wedges, and steady parts. When a plate shifts or a clamp tightens, the hand becomes the spacer.

INDUSTRIAL EXAMPLES

A fabricator holds a small bracket against a bulkhead while another worker tacks it. The bracket slips under clamp pressure and catches the finger between the bracket edge and the steel surface.

RELATED TERMS

Alignment | Welding Hand Exposure | Finger-as-Spacer | Closing Gap | Sharp Edge

328 **Construction Hand Exposure** SECTORS

DEFINITION

Construction hand exposure refers to the ways hands enter hazards during building, civil, structural, mechanical, and finishing work.

WHY IT MATTERS

Construction sites combine changing layouts, temporary access, manual handling, sharp materials, powered tools, and multiple trades working close together. Hands are exposed when workers carry, align, cut, drill, tie, hold, or guide materials that are not yet stable.

INDUSTRIAL EXAMPLES

A worker holds a steel channel against a column while another worker drills through it. The channel shifts as the drill bites, trapping the supporting hand against the column edge.

RELATED TERMS

Supporting Hand | Drill Press Contact | Manual Carry | Steel Erection | Work Coordination

329 **Steel Erection** SECTORS

DEFINITION

Steel erection is the placement, alignment, bolting, and securing of structural steel members such as beams, columns, bracing, and connections.

WHY IT MATTERS

Hands are exposed during final alignment at height. Workers may reach into bolt holes, pull members into line, hold drift pins, or steady plates while loads are suspended or partially supported. Movement from the crane, wind, or bolt tension can close gaps suddenly.

INDUSTRIAL EXAMPLES

An erector uses a drift pin to line up bolt holes, then reaches near the connection to start a bolt by hand. The beam settles as the sling slack changes, trapping the fingertips between the connection plates.

RELATED TERMS

Alignment | Drift Pin | Bolt Hole | Suspended Load | Pinch Point

330 **Mining Hand Safety** SECTORS

DEFINITION

Mining hand safety covers hand injury risks in surface and underground mining operations, including maintenance, material handling, drilling, hauling, and processing.

WHY IT MATTERS

Mining exposes hands to heavy components, poor visibility, vibration, dust, sharp rock, moving conveyors, and large mobile equipment. Hands often enter danger when freeing jammed material, changing worn parts, handling drill steel, or servicing equipment under pressure.

INDUSTRIAL EXAMPLES

A maintenance worker reaches under a conveyor skirt to clear packed material while the area is cramped and dusty. The hand enters a hidden trap between belt, idler, and accumulated material.

RELATED TERMS

Conveyor Contact | Blind Reach | Stored Energy | Maintenance Shutdown | Crush Injury

331 **Foundry Work** SECTORS

DEFINITION

Foundry work involves moulding, casting, pouring, cooling, shakeout, fettling, and handling of cast metal and moulding materials.

WHY IT MATTERS

Foundry hand exposure combines heat, heavy moulds, sharp casting fins, dust, suspended loads, and unpredictable surface conditions. Hands are often placed near mould boxes, cores, tongs, hot parts, or casting edges during alignment and finishing.

INDUSTRIAL EXAMPLES

A worker guides a mould box into position under an EOT crane and places a hand near a side lug to correct the last few millimetres. The box settles and traps the fingers against a locating pin.

RELATED TERMS

Hot Contact Zone | Load Landing | Mould Box Handling | Sharp Edge | No-Touch Handling

332 **Automotive Assembly** SECTORS

DEFINITION

Automotive assembly is the production-line fitting, fastening, testing, and movement of vehicle parts, modules, and components.

WHY IT MATTERS

Assembly work may look controlled, but hands repeat the same reach, push, pinch, and fasten cycles hundreds of times. Injuries happen when a hand supports a part while a powered tool, fixture, clamp, or moving conveyor completes the operation.

INDUSTRIAL EXAMPLES

An operator holds a trim component in position while a pneumatic tool drives a fastener. The part shifts and the supporting finger is caught between the trim edge and the fixture.

RELATED TERMS

Supporting Hand | Repetitive Strain Injury | Powered Tool Control | Fixture Point | Work Pace

333 **Food Processing Hand Safety** SECTORS

DEFINITION

Food processing hand safety focuses on preventing injuries while cutting, sorting, cleaning, packing, deboning, mixing, and operating food production equipment.

WHY IT MATTERS

Wet surfaces, knives, moving blades, conveyors, cold rooms, and repetitive tasks create a mix of acute and cumulative hazards. Gloves may protect against cuts but can also reduce feel or become caught if used near rotating parts.

INDUSTRIAL EXAMPLES

A worker clears a small jam near a slicing machine because product flow is backing up. The glove touches the moving edge and pulls the finger toward the blade before the worker can withdraw.

RELATED TERMS

Cut-Resistant Glove | Glove Entrapment | Conveyor Contact | Repetitive Strain Injury | Lockout

334 Chemical Plant Work

SECTORS

DEFINITION

Chemical plant work includes operating, maintaining, sampling, cleaning, and repairing equipment used to handle chemicals, gases, liquids, powders, and process materials.

WHY IT MATTERS

Hand exposure is not only mechanical. A glove that resists one chemical may fail against another, and a small leak during hose disconnection can enter the glove cuff or soak through material. Chemical exposure can continue after the task if contaminated gloves are reused.

INDUSTRIAL EXAMPLES

During line breaking, a worker loosens a flange and a small amount of caustic liquid runs into the glove cuff. The burn develops under the glove because the worker keeps the glove on while finishing the job.

RELATED TERMS

Chemical Burn | Chemical Permeation | Breakthrough Time | Hose Handling | Decontamination

335 Electrical Trade Exposure

SECTORS

DEFINITION

Electrical trade exposure refers to hand risks during installation, maintenance, testing, cable pulling, termination, panel work, and electrical troubleshooting.

WHY IT MATTERS

Electrical work exposes hands to shock, arc flash, sharp cable armour, tight panels, screws, hot components, and awkward reaches. A hand placed inside a panel may contact live parts, sharp edges, or stored energy if isolation and verification are weak.

INDUSTRIAL EXAMPLES

An electrician reaches behind a panel to guide a cable into a gland while the view is blocked. The hand scrapes across a sharp edge and moves close to an unverified conductor.

RELATED TERMS

Blind Reach | Arc Flash | Cut Injury | Lockout | Competency Verification

336 HVAC Installation

SECTORS

DEFINITION

HVAC installation involves fitting ducts, pipes, supports, insulation, fans, dampers, and air-conditioning or ventilation equipment.

WHY IT MATTERS

Hands are exposed to sharp sheet-metal edges, overhead work, awkward reaches, screws, brackets, and heavy units being lifted into tight spaces. Gloves may reduce cuts but can make small screws and tabs harder to control.

INDUSTRIAL EXAMPLES

A technician reaches into a duct opening to pull a damper blade into position. The sheet-metal edge cuts through the glove at the web space while the other hand holds the drill overhead.

RELATED TERMS

Sharp Edge | Overhead Work | Supporting Hand | Glove Selection | Awkward Posture

337 **Maintenance Shutdown** SECTORS

DEFINITION

A maintenance shutdown is a planned stoppage where equipment is inspected, repaired, cleaned, replaced, or upgraded under compressed schedules.

WHY IT MATTERS

Shutdowns concentrate hand exposure because many trades work together around open equipment, temporary supports, removed guards, dirty parts, and time pressure. Hands go into gaps for alignment, cleaning, bolting, inspection, and removal of stuck components.

INDUSTRIAL EXAMPLES

During a plant shutdown, a mechanic reaches between a pump base and motor foot to place a shim while another worker adjusts the jack bolt. The gap closes before the hand is clear.

RELATED TERMS

Line Breaking | Alignment | Production Pressure | Stored Energy | Pre-Task Hand Placement Review

338 **Confined Space Hand Safety** SECTORS

DEFINITION

Confined space hand safety deals with hand exposure inside tanks, vessels, pits, silos, boilers, ducts, and other restricted-entry spaces.

WHY IT MATTERS

Limited visibility and restricted body movement make the hand the exploring tool. Workers may reach around corners, brace against sharp surfaces, handle tools in awkward positions, or struggle to withdraw the hand quickly when something moves.

INDUSTRIAL EXAMPLES

Inside a vessel, a worker reaches behind a baffle to guide a tool onto a bolt that cannot be seen. The hand catches on a sharp edge and remains trapped because the arm cannot rotate freely.

RELATED TERMS

Blind Reach | Restricted Access | Awkward Posture | Sharp Edge | Rescue Planning

339 **Scaffolding Work** SECTORS

DEFINITION

Scaffolding work includes erecting, altering, dismantling, carrying, joining, and securing scaffold tubes, boards, clamps, and fittings.

WHY IT MATTERS

Hands are exposed during tube alignment, clamp tightening, board placement, and handover between workers at height. A finger can be trapped between tube and coupler, tube and structure, or board and transom when the part shifts.

INDUSTRIAL EXAMPLES

A scaffolder holds a tube steady while another tightens a right-angle coupler. The tube rotates slightly and the finger between tube and coupler is pinched before the worker can release.

RELATED TERMS

Closing Gap | Tube Handling | Supporting Hand | Working at Height | Pinch Point

340 **Crane Operations** SECTORS

DEFINITION

Crane operations involve lifting, slewing, travelling, lowering, landing, and positioning loads using cranes and lifting accessories.

WHY IT MATTERS

Hand injuries cluster around hooking, unhooking, guiding, taglines, and final landing. The crane moves tonnes, but the worker’s hand often tries to correct centimetres. If the load swings, settles, or rotates, fingers can be caught between load, rigging, and landing surface.

INDUSTRIAL EXAMPLES

A worker reaches to remove a hook from a lifting lug while the load is still settling. The hook rotates and traps the glove between the hook throat and lug edge.

RELATED TERMS

Suspended Load | Load Landing | Tagline | Sling Pinch | Exclusion Zone

341 Welding Hand Exposure

SECTORS

DEFINITION

Welding hand exposure includes risks to the hands during welding, tack welding, fit-up, grinding, positioning, and handling of hot or sharp workpieces.

WHY IT MATTERS

The hazard is not only arc heat. The supporting hand often holds parts in position before the tack, while the welding hand controls the torch. Hot metal, sharp edges, clamps, and sudden part movement can injure the hand that is not holding the welding tool.

INDUSTRIAL EXAMPLES

A welder tack-welds a small bracket while the helper holds it by hand because the clamp does not fit. The bracket shifts, burning the glove and trapping the helper’s finger against the plate.

RELATED TERMS

Hot Contact Zone | Supporting Hand | Alignment | Closing Gap | Burn

342 Sandblasting

SECTORS

DEFINITION

Sandblasting is abrasive blasting used to clean, roughen, or prepare surfaces using high-velocity media such as sand, grit, shot, or other abrasives.

WHY IT MATTERS

Hands face impact from rebound abrasive, hose movement, nozzle reaction force, poor visibility, and abrasive wear. A glove may protect from minor impact but not from a misdirected blast stream or a hose that whips during pressure changes.

INDUSTRIAL EXAMPLES

A blaster adjusts the nozzle angle near a steel corner and rebound abrasive strikes the glove and wrist. During hose repositioning, the hand is placed near a coupling that jerks when pressure changes.

RELATED TERMS

Flying Fragment | Hose Handling | Abrasion | PPE Limitation | Line of Fire

343 Painting and Coating

SECTORS

DEFINITION

Painting and coating work includes surface preparation, spraying, brushing, rolling, mixing, cleaning, and handling coatings, solvents, and application equipment.

WHY IT MATTERS

Hand exposure involves chemicals, solvents, skin contamination, pressure injection, sharp masking edges, and slippery coated surfaces. A small spray-gun leak or solvent-soaked glove can expose the skin longer than the task itself.

INDUSTRIAL EXAMPLES

A worker clears a blocked spray tip with a finger while pressure remains in the line. A fine injection injury or chemical exposure can result even though the mark looks small.

RELATED TERMS

Chemical Permeation | High-Pressure Injection Injury | Skin Contact | Decontamination | Glove Selection

344 **Warehouse Operations** SECTORS

DEFINITION

Warehouse operations include receiving, picking, packing, stacking, palletising, wrapping, loading, unloading, and moving goods.

WHY IT MATTERS

Hand injuries often occur during ordinary movements repeated at speed: fingers under cartons, hands between pallets, wrists twisted while lifting awkward packages, or fingertips caught in straps and shrink wrap. The hazard is usually the gap created by a moving package, not the package itself.

INDUSTRIAL EXAMPLES

A picker slides a heavy carton from a high rack and places one hand underneath to control it. The carton drops onto the pallet edge and crushes the fingertips.

RELATED TERMS

Manual Carry | Material Stacking | Finger-as-Spacer | Strapping Band | Work Pace

345 **Agricultural Hand Safety** SECTORS

DEFINITION

Agricultural hand safety covers hand risks in farming, livestock, harvesting, machinery maintenance, irrigation, storage, and food handling tasks.

WHY IT MATTERS

Agricultural work combines moving machinery, sharp tools, animals, ropes, chemical exposure, and outdoor conditions. Hands are injured when workers clear blockages, handle blades, repair equipment in the field, or restrain animals under unpredictable movement.

INDUSTRIAL EXAMPLES

A worker reaches into a jammed baler intake to pull crop material free before all stored motion has stopped. The hand enters a crush and cutting zone created by parts that can move suddenly.

RELATED TERMS

Stored Energy | Machine Guarding | Cut Injury | Chemical Exposure | Blind Reach

346 **Wind Turbine Maintenance** SECTORS

DEFINITION

Wind turbine maintenance includes inspection, repair, lifting, alignment, bolting, blade work, gearbox work, electrical service, and component replacement in wind energy systems.

WHY IT MATTERS

Hand exposure is shaped by height, wind, confined nacelle space, heavy components, torque tools, hydraulic systems, and awkward body positions. Hands often enter risk zones during final alignment of parts that are heavy, suspended, or hard to access.

INDUSTRIAL EXAMPLES

A technician inside a nacelle guides a gearbox component into position while space is limited and the suspended part rotates slightly. The hand placed near a mounting face is trapped as the component settles.

RELATED TERMS

Confined Space Hand Safety | Alignment | Torque Tool | Suspended Load | Awkward Posture

347 **Subsea Equipment Handling** SECTORS

DEFINITION

Subsea equipment handling involves lifting, positioning, connecting, testing, and securing equipment used underwater or in offshore subsea operations.

WHY IT MATTERS

Subsea equipment is often heavy, awkward, wet, and fitted with lifting points, protective frames, hydraulic lines, and connector interfaces. Hands enter danger when workers guide frames, connect hoses, remove protective caps, or align equipment before deployment.

INDUSTRIAL EXAMPLES

A crew member steadies a wet subsea frame as it is lowered toward a cradle. The frame shifts and the hand is trapped between the protective frame and the cradle guide.

RELATED TERMS

Offshore Hand Safety | Hose Handling | Load Landing | Tool-to-Load Interface | Pinch Point

348 **Petrochemical Turnaround** SECTORS

DEFINITION

A petrochemical turnaround is a major planned shutdown where process units are opened, inspected, cleaned, repaired, and restarted.

WHY IT MATTERS

Turnarounds create hand exposure through line breaking, flange work, valve removal, scaffolding, confined spaces, hot work, contamination, and many contractors working under schedule pressure. The danger is often a hand placed into a gap for a task that was supposed to be routine.

INDUSTRIAL EXAMPLES

During flange opening, a worker places fingers near the gasket face to pull out old material while another worker loosens the final bolt. Residual pressure, stuck gasket release, or flange movement can trap or cut the hand.

RELATED TERMS

Maintenance Shutdown | Line Breaking | Flange Gap | Production Pressure | Chemical Exposure Hand Safety First | Production Draft

349 **Repetitive Strain Injury** ERGONOMICS

DEFINITION

Repetitive strain injury is damage or irritation caused by repeating the same hand, wrist, or arm movement over time.

WHY IT MATTERS

The injury usually builds slowly, so the worker may treat early pain as normal tiredness. Repeated gripping, twisting, squeezing, or tool trigger use can inflame tendons, irritate nerves, or weaken grip. By the time the worker reports it, the hand may already be painful during ordinary tasks.

INDUSTRIAL EXAMPLES

A technician uses pliers for hundreds of cable ties each day and gradually develops thumb and wrist pain. A production worker repeatedly pushes clips into place until the finger joints ache and grip strength fades before the end of the shift.

RELATED TERMS

Cumulative Trauma | Work Pace | Rest Pause | Grip Force | Tendonitis

350 **Cumulative Trauma** ERGONOMICS

DEFINITION

Cumulative trauma is gradual damage that builds from repeated force, posture, vibration, pressure, or contact over days, months, or years.

WHY IT MATTERS

A fitter who has used heavy spanners for twenty years may not remember one single injury event. The damage comes from thousands of pulls, knocks, vibrations, and awkward grips. Cumulative trauma matters because the absence of one accident does not mean the hand was not being injured.

INDUSTRIAL EXAMPLES

A rig mechanic tightens and loosens fittings every shift, often with the wrist bent and the palm pressed into steel edges. Over time, the hand becomes painful in the morning and loses grip before the hardest job of the day starts.

RELATED TERMS

Repetitive Strain Injury | Contact Stress | Vibration Exposure | Fatigue | Long-Term Outcome

351 **Awkward Posture** ERGONOMICS

DEFINITION

Awkward posture is a hand, wrist, arm, or body position that places joints away from a comfortable neutral working position.

WHY IT MATTERS

Awkward posture reduces control and increases force. A bent wrist has less grip strength, so the worker squeezes harder and may lose control when the tool slips or the load moves. Long periods in awkward posture can also irritate tendons and nerves.

INDUSTRIAL EXAMPLES

A worker reaches behind a pump to tighten a hidden bolt with the wrist bent sideways. When the spanner releases, the knuckles strike the casing because the hand has no room to move away safely.

RELATED TERMS

Neutral Wrist Position | Reach Zone | Force Exertion | Tool Control | Repetitive Strain Injury

352 **Force Exertion** ERGONOMICS

DEFINITION

Force exertion is the amount of physical effort used by the hand, wrist, or arm to grip, push, pull, squeeze, lift, hold, or turn something.

WHY IT MATTERS

High force reduces fine control and pushes the hand closer to failure. When a stuck part suddenly releases, the hand may overtravel into steel, hot surfaces, or another worker’s hand. Repeated high force also increases tendon strain and fatigue.

INDUSTRIAL EXAMPLES

A fitter pulls hard on a spanner to free a seized nut. When it breaks loose, the hand travels forward and hits the flange edge. A worker squeezing a clamp all shift loses finger strength and starts placing the other hand closer to the hazard for support.

RELATED TERMS

Grip Force | Pinch Force | Fatigue | Overtravel | Tool Slip

353 **Contact Stress** ERGONOMICS

DEFINITION

Contact stress is pressure from a hard, sharp, or narrow surface pressing into the hand or fingers.

WHY IT MATTERS

Contact stress can compress nerves, blood vessels, tendons, and skin. It may begin as a sore palm or numb finger and later affect grip or sensation. Hard edges on handles, pipe, tools, or workpieces concentrate force into small areas of the hand.

INDUSTRIAL EXAMPLES

A worker carries flat bar stock with the edge pressing into the fingers. A mechanic leans the palm against a sharp machine edge while reaching for a bolt. Over time, the pressure point becomes painful and the worker changes grip in unsafe ways.

RELATED TERMS

Grip Force | Contact Time | Digital Nerves | Glove Padding | Cumulative Trauma

354 **Vibration Exposure** ERGONOMICS

DEFINITION

Vibration exposure is contact with vibration transmitted through tools, handles, machines, or workpieces into the hand and arm.

WHY IT MATTERS

Vibration can reduce sensation, fatigue the hand, and contribute to nerve and blood vessel problems. A worker may lose feel in the fingertips and grip harder to compensate, which increases strain and reduces tool control.

INDUSTRIAL EXAMPLES

A grinder operator works for long periods on heavy weld seams and later notices tingling in the fingers. A jackhammer user grips tighter as the tool vibrates, then struggles to feel small fasteners during the next task.

RELATED TERMS

Hand-Arm Vibration Syndrome | Vibration White Finger | Tool Weight | Contact Time | Anti-Vibration Glove

355 **Whole-Body Vibration** ERGONOMICS

DEFINITION

Whole-body vibration is vibration transmitted through the feet, seat, or body from vehicles, mobile equipment, or vibrating platforms.

WHY IT MATTERS

Whole-body vibration fatigues the hands and arms as well as the core and back. An operator who has absorbed hours of platform or cab vibration arrives at a manual task with reduced grip sensitivity and slower hand reaction. The hand may grip harder than needed, miss the feel of a slipping tool, or fail to withdraw from a closing gap at the speed a rested worker would manage.

INDUSTRIAL EXAMPLES

A haul-truck driver finishes a long shift on rough ground, then handles rigging chains with hands already fatigued and partially desensitised from continuous vibration. A drill platform operator exposed to whole-body vibration during a shift finds manual tasks — inserting pins, feeling thread engagement — harder than expected because the hands have been absorbing vibration throughout.

RELATED TERMS

Fatigue | Vibration Exposure | Work Pace | Manual Handling | Situational Awareness

356 **Hand-Arm Vibration Syndrome** ERGONOMICS

DEFINITION

Hand-arm vibration syndrome, often called HAVS, is a condition caused by repeated exposure to vibration through the hands and arms.

WHY IT MATTERS

HAVS can damage blood vessels, nerves, and muscles, leading to numbness, tingling, reduced grip, pain, and cold-triggered colour changes in the fingers. The worker may struggle to hold tools, feel small parts, or notice heat and sharp edges.

INDUSTRIAL EXAMPLES

A worker who has used grinders for years begins dropping small bolts because the fingertips feel numb. On cold mornings, the fingers turn pale and painful after handling metal tools.

RELATED TERMS

Vibration Exposure | Vibration White Finger | Numbness | Grip Recovery | Long-Term Outcome

357 **Vibration White Finger** ERGONOMICS

DEFINITION

Vibration white finger is a vibration-related condition where fingers become pale, numb, painful, or cold-sensitive due to blood vessel disturbance.

WHY IT MATTERS

The worker may lose usable finger function in cold or wet conditions. A hand that looks normal indoors may become numb on a deck, in a freezer room, or during outdoor maintenance, making tool control and release unreliable.

INDUSTRIAL EXAMPLES

A fitter with vibration white finger cannot feel a nut properly during winter shutdown work. A grinder user removes gloves to regain feel, then exposes the fingertips to sharp edges and cold metal.

RELATED TERMS

Hand-Arm Vibration Syndrome | Cold Intolerance | Digital Arteries | Sensation | Anti-Vibration Glove

358 **Contact Time** ERGONOMICS

DEFINITION

Contact time is the length of time the hand remains in contact with a tool, surface, chemical, vibration source, or load.

WHY IT MATTERS

Longer contact increases exposure even when the force or hazard seems moderate. A glove soaked in solvent, a palm pressed on a hard edge, or fingers wrapped around a vibrating tool can cause more harm because the contact continues minute after minute.

INDUSTRIAL EXAMPLES

A worker holds a vibrating grinder through a long weld-cleaning task without breaks. Another keeps a chemical-wet glove on until the end of the job, extending skin exposure far beyond the splash moment.

RELATED TERMS

Vibration Exposure | Chemical Permeation | Contact Stress | Rest Pause | Exposure Count

359 **Recovery Time** ERGONOMICS

DEFINITION

Recovery time is the period allowed for the hand, wrist, muscles, tendons, nerves, or skin to recover between exposures.

WHY IT MATTERS

Without recovery time, small amounts of strain accumulate. The worker may start the next task with tired grip, swollen tendons, reduced sensation, or irritated skin. Short pauses can matter when the exposure is repetitive, forceful, vibrating, or chemically irritating.

INDUSTRIAL EXAMPLES

After continuous crimping, a technician's thumb starts aching but the next batch begins immediately. During a shutdown, the same crew alternates between hammering, grinding, and lifting with no hand recovery between high-force tasks.

RELATED TERMS

Rest Pause | Work Pace | Fatigue | Cumulative Trauma | Task Rotation

360 **Rest Pause** ERGONOMICS

DEFINITION

A rest pause is a short break or interruption in a task that allows the hand and arm to recover before continuing.

WHY IT MATTERS

Rest pauses reduce fatigue and help keep grip reliable. A worker with tired fingers may hold a tool less securely, place the supporting hand closer, or miss early warning signs like tingling and soreness. The pause is a control against loss of control, not just comfort.

INDUSTRIAL EXAMPLES

A team using impact tools rotates short pauses into the work so hands do not stay on vibration continuously. On an assembly line, micro-pauses between repetitive clips reduce thumb overload before pain starts driving risky shortcuts.

RELATED TERMS

Recovery Time | Fatigue | Work Pace | Task Rotation | Repetitive Strain Injury

361 Task Rotation

ERGONOMICS

DEFINITION

Task rotation is the planned movement of workers between different tasks to reduce repeated exposure to the same force, posture, vibration, or contact hazard.

WHY IT MATTERS

Rotation only helps if the next task uses different body parts or lower exposure. Moving from grinding to hammering may not rest the hand at all. Poor rotation gives the appearance of control while the same tendons, nerves, and grip muscles remain overloaded.

INDUSTRIAL EXAMPLES

A worker rotates from repetitive screw driving to inspection work, allowing the hand to recover. In a weak rotation plan, the worker moves from chipping to heavy spanner work, keeping the same vibration and force exposure active.

RELATED TERMS

Recovery Time | Work Pace | Repetitive Strain Injury | Fatigue | Exposure Count

362 Workstation Design

ERGONOMICS

DEFINITION

Workstation design is the arrangement of tools, parts, surfaces, heights, reaches, and workflow around a task.

WHY IT MATTERS

A poorly designed workstation makes the hand reach too far, bend the wrist, hold parts without support, or work near sharp and moving areas. Good design keeps the task close, visible, supported, and controlled so the hand does not become a clamp, spacer, or guide.

INDUSTRIAL EXAMPLES

An assembly bench places bins behind the worker, forcing repeated twisting and long reach. A better layout brings fasteners within easy reach and uses a fixture so the worker does not hold the part while driving screws.

RELATED TERMS

Reach Zone | Neutral Wrist Position | Fixture | Hand-as-Clamp | Work Pace

363 Reach Zone

ERGONOMICS

DEFINITION

Reach zone is the area a worker can comfortably and safely reach without overextension, twisting, or loss of control.

WHY IT MATTERS

When the task lies outside the safe reach zone, the worker loses strength and reaction time. The hand may enter blind spaces, sharp edges, hot surfaces, or moving equipment because the body cannot reposition quickly.

INDUSTRIAL EXAMPLES

A mechanic reaches behind a motor to place a washer on a bolt he cannot see. The hand is stretched, the wrist bent, and the fingertips enter a gap between the motor foot and baseplate.

RELATED TERMS

Blind Reach | Awkward Posture | Workstation Design | Last-Inch Exposure | Tool Extension

364 **Neutral Wrist Position** ERGONOMICS

DEFINITION

Neutral wrist position is a wrist posture where the hand is roughly aligned with the forearm rather than bent sharply up, down, or sideways.

WHY IT MATTERS

A neutral wrist gives better grip and control. When the wrist bends, grip strength falls and the worker often compensates by squeezing harder. That increases fatigue and makes the hand less able to recover if a tool slips or a part moves.

INDUSTRIAL EXAMPLES

A technician using a screwdriver above shoulder height bends the wrist backward and loses control when the screw bites. A valve operator turns a wheel from an offset position and strains the wrist while trying to maintain force.

RELATED TERMS

Awkward Posture | Grip Force | Tool Control | Force Exertion | Workstation Design

365 **Pinch Force** ERGONOMICS

DEFINITION

Pinch force is the effort applied between the thumb and one or more fingers to hold, press, pull, or position an object.

WHY IT MATTERS

Pinch force is much weaker than full-hand grip and places high load on small tendons and joints. It also brings fingertips close to the hazard. Repeated or forceful pinch can cause pain, loss of control, and fingertip exposure to crush or cut points.

INDUSTRIAL EXAMPLES

A worker pinches a small shim while another person adjusts the machine foot. A technician repeatedly pinches cable clips into position until thumb pain builds and the hand slips toward a sharp bracket edge.

RELATED TERMS

Pinch Grip | Fingertip | Finger-as-Spacer | Repetitive Strain Injury | Grip Force

366 **Grip Force** ERGONOMICS

DEFINITION

Grip force is the effort used by the whole hand to hold, squeeze, pull, or control an object.

WHY IT MATTERS

Too little grip causes slips; too much grip causes fatigue and overcontrol. Workers often increase grip force when gloves are slippery, tools vibrate, or handles are poorly shaped. That can hide the real problem: the task or tool does not give the hand a safe interface.

INDUSTRIAL EXAMPLES

A grinder operator squeezes harder because the handle vibrates and the glove is wet. A rigger grips a rope tightly during a swinging load and is pulled toward the line of fire when the rope suddenly tightens.

RELATED TERMS

Grip Strength | Force Exertion | Sustained Grip | Tool Handle | Fatigue

367 Sustained Grip

ERGONOMICS

DEFINITION

Sustained grip is holding an object or tool continuously for an extended period without fully relaxing the hand.

WHY IT MATTERS

Sustained grip reduces blood flow, increases fatigue, and can make the hand stiff or numb. The worker may still be holding the tool, but control is degrading. When a sudden correction is needed, the hand may not release or reposition quickly enough.

INDUSTRIAL EXAMPLES

A worker holds a heavy grinder throughout a long pass instead of pausing between sections. A deck worker keeps tension on a tagline for several minutes while the load is manoeuvred and later cannot release smoothly when the line jerks.

RELATED TERMS

Grip Force | Contact Time | Fatigue | Vibration Exposure | Rest Pause

368 Static Loading

ERGONOMICS

DEFINITION

Static loading is muscle effort held in one position without much movement, such as holding a tool, part, or posture steady.

WHY IT MATTERS

Static loading feels less dramatic than lifting, but it tires the hand and forearm quickly because the muscles stay contracted. A tired hand may tremble, lose fine control, or drift into a pinch point while trying to keep a part steady.

INDUSTRIAL EXAMPLES

A worker holds a bracket overhead while waiting for another person to bring a fastener. A mechanic keeps the wrist bent and the hand steady on a valve stem during a long adjustment, then loses control when force is finally applied.

RELATED TERMS

Sustained Grip | Fatigue | Awkward Posture | Supporting Hand | Workstation Design

369 Tool Weight

ERGONOMICS

DEFINITION

Tool weight is the mass of a hand-held or manually supported tool, including any attachments, hoses, batteries, guards, or accessories.

WHY IT MATTERS

A heavy tool increases grip force, wrist strain, and fatigue. When the tool is used overhead, sideways, or for long periods, the worker may brace the other hand near the workpiece, turning the supporting hand into the exposed hand.

INDUSTRIAL EXAMPLES

A worker uses a heavy impact wrench above shoulder height and rests the other hand near the socket to steady the tool. When the socket slips, the supporting fingers are close to the rotating contact and impact zone.

RELATED TERMS

Grip Force | Static Loading | Tool Control | Overhead Work | Fatigue

370 **Anti-Vibration Glove** ERGONOMICS

DEFINITION

An anti-vibration glove is a glove designed to reduce some vibration transmitted from tools or equipment into the hand.

WHY IT MATTERS

These gloves can reduce certain vibration exposure, but they do not remove the hazard and may reduce grip, dexterity, or tactile feedback. A worker may grip harder to control the tool, which can reduce the benefit and increase fatigue. They also do not make unlimited tool time safe.

INDUSTRIAL EXAMPLES

A grinder user switches to anti-vibration gloves but still works continuously for long periods. The glove reduces some vibration, yet the hand still becomes tired and numb because contact time and tool condition were not controlled.

RELATED TERMS

Vibration Exposure | Hand-Arm Vibration Syndrome | PPE Limitation | Contact Time | Grip Force

371 **Ergonomic Tool Design** ERGONOMICS

DEFINITION

Ergonomic tool design is the shaping and arrangement of a tool so it can be used with better grip, posture, force, reach, and control.

WHY IT MATTERS

A well-designed tool reduces the need for bent wrists, high pinch force, sharp contact pressure, and excessive grip. Poor design forces the worker to adapt the hand to the tool, often by gripping harder, bracing with the other hand, or placing fingers near the workpiece.

INDUSTRIAL EXAMPLES

A handle that is too narrow digs into the palm during repeated pulling. A better handle spreads force across the hand and allows a neutral wrist. A trigger placed awkwardly causes thumb strain during repeated cycles.

RELATED TERMS

Tool Handle | Neutral Wrist Position | Contact Stress | Grip Force | Workstation Design

372 **Work Pace** ERGONOMICS

DEFINITION

Work pace is the speed and rhythm at which tasks are performed, including cycle time, output targets, and recovery between movements.

WHY IT MATTERS

Fast pace reduces the time available to reposition, check hand placement, and recover from grip fatigue. The worker may start using shortcuts: holding a part by hand instead of using a fixture, reaching before the load stops, or clearing a jam without pausing.

INDUSTRIAL EXAMPLES

On a packing line, the worker places fingers under each carton to keep up with belt speed. During shutdown work, the crew rushes flange alignment and one worker uses a finger to hold a shim because the next lift is waiting.

RELATED TERMS

Production Pressure | Rest Pause | Task Rotation | Finger-as-Spacer | Fatigue

373 **Fatigue** ERGONOMICS

DEFINITION

Fatigue is reduced physical or mental capacity caused by effort, long hours, repetition, poor sleep, heat, vibration, stress, or sustained attention.

WHY IT MATTERS

Fatigue changes hand safety before the worker notices. Grip weakens, attention narrows, reactions slow, and familiar shortcuts feel easier. A tired worker may place the hand in a gap they would normally avoid or fail to remove it before the load settles.

INDUSTRIAL EXAMPLES

Near the end of a shutdown shift, a worker holds a pipe while another aligns the flange. The worker is slow to move the hand when the pipe rolls slightly, and the fingertips are trapped against the flange edge.

RELATED TERMS

Work Pace | Recovery Time | Shift Handover Risk | Situational Awareness | Cognitive Overload Hand Safety First | Production Draft

Behavioural and Organisational Factors

374 **Risk Normalisation** BEHAVIOUR

DEFINITION

Risk normalisation is the gradual acceptance of a hazardous condition or behaviour because it has happened many times without injury.

WHY IT MATTERS

The worker is not necessarily careless; the system has taught everyone that the shortcut works. A hand placed near a closing gap becomes normal because the last hundred alignments ended safely. This should make supervisors uncomfortable because the organisation may be rewarding exposure until the day the gap closes faster than expected.

INDUSTRIAL EXAMPLES

A crew routinely steadies suspended loads by hand during final landing because no one has been hurt yet. New workers learn the same method by watching experienced people and begin treating the exposed hand position as part of the job.

RELATED TERMS

Shortcut Behaviour | Safety Culture | Near Miss Culture | Last-Inch Exposure | Hand-as-Control

375 **Shortcut Behaviour** BEHAVIOUR

DEFINITION

Shortcut behaviour is a faster or easier way of doing a task that bypasses part of the intended safe method.

WHY IT MATTERS

Shortcuts often come from real work pressure, poor tools, awkward layouts, or procedures that do not match the task. The worker may use a finger as a spacer, hold a part instead of clamping it, or reach into a machine because the proper method is slow or unavailable. The fix must examine the system, not only the person.

INDUSTRIAL EXAMPLES

A fitter holds a shim by hand because the magnetic holder is missing and the lift team is waiting. The shortcut saves a minute but places the fingertip in the gap between motor foot and baseplate.

RELATED TERMS

Production Pressure | Rule Violation | Finger-as-Spacer | SOP Gap | Task Redesign

376 **Overconfidence** BEHAVIOUR

DEFINITION

Overconfidence is a situation where a worker, supervisor, or team believes their skill or experience can control a hazard more safely than it actually can.

WHY IT MATTERS

Experience improves judgement, but it can also hide exposure. A skilled worker may believe they can pull the hand away in time, catch a rolling pipe, or control a swinging load because they have done it before. The hazard still moves faster and heavier than the hand can react.

INDUSTRIAL EXAMPLES

An experienced rigger steadies a landing basket by hand instead of using a tagline because he knows how the load normally behaves. A small gust rotates the basket and traps the hand against the landing frame.

RELATED TERMS

Risk Normalisation | Hand-as-Brake | Situational Awareness | Line of Fire | Near Miss

377 **Distraction** BEHAVIOUR

DEFINITION

Distraction is anything that diverts attention away from the hand position, tool path, load movement, or changing work condition.

WHY IT MATTERS

Hand injuries can occur in the small gap between looking away and the hazard moving. Noise, radio calls, phone alerts, another worker's question, or a second task can break the timing needed to remove the hand before contact.

INDUSTRIAL EXAMPLES

A worker is aligning a flange and turns his head when someone calls from behind. At that moment the pipe settles and the finger used to feel the gap is trapped between the flange faces.

RELATED TERMS

Attention Failure | Communication Cue | Situational Awareness | Last-Minute Risk Change | Pinch Point

378 **Complacency** BEHAVIOUR

DEFINITION

Complacency is reduced caution during a familiar task because the work feels routine or low risk.

WHY IT MATTERS

The task may be familiar, but the conditions are rarely identical. A different load weight, worn tool, wet glove, tired worker, or misaligned part can change the exposure. Complacency matters when the hand enters the same hazard zone without a fresh check.

INDUSTRIAL EXAMPLES

A maintenance worker opens a small machine guard to clear the same jam that happens every week. This time the jam releases suddenly and the hand is pulled toward a moving roller.

RELATED TERMS

Risk Normalisation | Habitual Behaviour | Dynamic Risk Assessment | Near Miss Culture | Machine Guarding

379 **Production Pressure** BEHAVIOUR

DEFINITION

Production pressure is the pressure to complete work quickly because of targets, downtime, schedules, cost, or customer demand.

WHY IT MATTERS

Production pressure can push the hand into the hazard indirectly. Workers may skip a clamp, avoid fetching the right tool, remove a glove, hold a part by hand, or continue after fatigue starts because the job has to move. The person feels the pressure, but the organisation creates the conditions.

INDUSTRIAL EXAMPLES

During a plant shutdown, the crew is behind schedule, so a worker holds a bracket by hand while another drills. The part spins when the drill catches, cutting the supporting hand.

RELATED TERMS

Time Pressure | Shortcut Behaviour | Safety Culture | Work Pace | Management of Change

380 **Time Pressure** BEHAVIOUR

DEFINITION

Time pressure is the immediate feeling that there is not enough time to complete the task safely, calmly, or by the planned method.

WHY IT MATTERS

Time pressure narrows attention to finishing the step rather than controlling the hand position. It often appears at the last moment: the crane is waiting, the line must restart, the supervisor is watching, or the weather window is closing. That is when fingers become spacers and hands become brakes.

INDUSTRIAL EXAMPLES

A load is almost landed, but the crane operator is waiting for a signal. The rigger reaches in to nudge the corner by hand instead of repositioning with a tool, and the load settles onto the fingertips.

RELATED TERMS

Production Pressure | Last-Inch Exposure | Finger-as-Spacer | Decision Under Pressure | Shortcut Behaviour

381 Peer Influence

BEHAVIOUR

DEFINITION

Peer influence is the effect coworkers have on how a person judges and performs a task.

WHY IT MATTERS

Workers learn from the crew around them. If experienced workers use hands to guide loads, new workers may copy the method to fit in. If the crew respects stopping and resetting, new workers learn that too. Peer influence can spread both exposure and protection.

INDUSTRIAL EXAMPLES

A new worker sees others catching pipe by hand as it rolls on the rack and does the same during the next lift. No one gives a formal instruction; the behaviour is learned by watching what the crew accepts.

RELATED TERMS

New Worker Risk · Safety Culture · Risk Normalisation · Supervision Quality · Near Miss Culture

382 New Worker Risk

BEHAVIOUR

DEFINITION

New worker risk is the increased exposure faced by workers who are new to a site, task, crew, tool, or industry.

WHY IT MATTERS

New workers may not yet recognise the hidden gap, stored energy, glove entrapment risk, or informal shortcut. They may also hesitate to stop work or question a method. The risk is highest when training explains the rule but not the exact moment where the hand gets injured.

INDUSTRIAL EXAMPLES

A trainee helps align a pump base and places a finger under the foot to feel the shim gap because no one explained why fingers must not be used as spacers. The jack bolt turns and the gap closes.

RELATED TERMS

Peer Influence · Competency Verification · Pre-Task Hand Placement Review · Finger-as-Spacer · Supervision Quality

383 **Fatigue Effect** BEHAVIOUR

DEFINITION

Fatigue effect is the way tiredness changes movement, judgement, attention, grip, and reaction during work.

WHY IT MATTERS

A fatigued worker may still know the rule but loses the sharp timing needed to follow it. The hand stays in the gap too long, the grip slips, the tool is not released cleanly, or the worker does not notice a changing load path. Fatigue turns familiar exposure into a higher-risk moment.

INDUSTRIAL EXAMPLES

At the end of a night shift, a worker guiding a heavy plate is slow to step back when the plate swings. The hand remains on the edge and is crushed against the support.

RELATED TERMS

Fatigue | Shift Handover Risk | Attention Failure | Situational Awareness | Work Pace

384 **Shift Handover Risk** BEHAVIOUR

DEFINITION

Shift handover risk is the exposure created when information, task status, equipment condition, or hazard controls are not transferred clearly between shifts or crews.

WHY IT MATTERS

Hands are placed in danger when the next crew does not know what was loosened, isolated, jammed, supported temporarily, or left incomplete. The incoming worker may treat a part as stable when it is actually held by friction, one bolt, or stored energy.

INDUSTRIAL EXAMPLES

A night crew leaves a conveyor guard removed and a blocked chute partly cleared. The morning crew reaches in to finish the job without knowing the belt tension changed during the previous attempt.

RELATED TERMS

Stored Energy | Communication Cue | Dynamic Risk Assessment | Maintenance Shutdown | Supervision Quality

385 **Supervision Quality** BEHAVIOUR

DEFINITION

Supervision quality is the effectiveness of frontline leadership in planning work, recognising exposure, correcting unsafe methods, and supporting workers who stop or reset a task.

WHY IT MATTERS

Good supervision sees the hand position before the injury. Weak supervision focuses only on output or paperwork and misses the moment when workers start using hands as clamps, spacers, or brakes. The supervisor sets what the crew believes is acceptable under pressure.

INDUSTRIAL EXAMPLES

A supervisor watching a lift stops the job when a worker reaches toward the landing gap and asks for a push-pull tool. On another crew, the same hand placement is ignored because the load is nearly down and everyone wants the lift finished.

RELATED TERMS

Safety Culture | Accountability | Pre-Task Hand Placement Review | Production Pressure | Peer Influence

386 **Safety Culture** BEHAVIOUR

DEFINITION

Safety culture is the shared pattern of beliefs, behaviours, priorities, and decisions that shows how safety is actually treated in daily work.

WHY IT MATTERS

A hand-safety culture is revealed at the last few inches of the task. If people pause, reset, and get the right tool, exposure is controlled. If people keep hands in gaps to save time, the written policy is not the real culture.

INDUSTRIAL EXAMPLES

A company displays hand safety posters but crews still guide suspended loads by hand because no one challenges the practice. Another site gives workers time and equipment to avoid hand contact during final alignment, even when work is delayed.

RELATED TERMS

Risk Normalisation | Near Miss Culture | Supervision Quality | Accountability | Learning from Incidents

387 **Accountability** BEHAVIOUR

DEFINITION

Accountability is clear responsibility for decisions, conditions, behaviours, and controls that affect hand safety.

WHY IT MATTERS

Accountability is not the same as blaming the injured worker. It means asking who designed the task, supplied the tool, approved the method, supervised the job, and accepted the exposure. Without shared accountability, the hand becomes the final control because every earlier control failed quietly.

INDUSTRIAL EXAMPLES

After a finger crush during alignment, the review asks why the job required a worker to hold the shim by hand, why no fixture was available, and why the procedure allowed the step to continue under time pressure.

RELATED TERMS

Safety Culture | Supervision Quality | Task Redesign | SOP Gap | Learning from Incidents

388 **Competency Verification** BEHAVIOUR

DEFINITION

Competency verification is confirmation that a worker can perform a task safely and understands the specific hazards, controls, and limits of the work.

WHY IT MATTERS

Training attendance does not prove task competence. A worker may know the rule but not recognise the line of fire, closing gap, stored energy, or glove entrapment risk in a real job. Verification connects knowledge to observed performance.

INDUSTRIAL EXAMPLES

A new operator demonstrates how to isolate a conveyor, test for zero energy, and clear a jam using tools instead of reaching into the chute. The supervisor checks the actual method, not only the training record.

RELATED TERMS

New Worker Risk | Supervision Quality | Lockout | Pre-Task Hand Placement Review | Rule Violation

389 **Rule Violation** BEHAVIOUR

DEFINITION

Rule violation is a deliberate departure from a known rule, procedure, or control requirement.

WHY IT MATTERS

A violation may be reckless, but it may also be a signal that the rule is difficult to follow under real conditions. If every crew violates the same step to get the work done, the system needs review. The goal is to understand why the hand entered the hazard, not simply label the worker as the problem.

INDUSTRIAL EXAMPLES

A procedure requires a clamp for drilling, but workers often hold small brackets by hand because the clamp does not fit the part shape. The repeated violation points to a tooling and procedure gap.

RELATED TERMS

Shortcut Behaviour | SOP Gap | Production Pressure | Accountability | Safety Culture

390 **Situational Awareness** BEHAVIOUR

DEFINITION

Situational awareness is the ability to understand what is happening around the task, what is changing, and what may happen next.

WHY IT MATTERS

Hand safety depends on tracking load movement, tool direction, body position, coworker actions, stored energy, and escape space. A worker can lose awareness when attention narrows to the bolt, the signal, or the stuck part while the hand remains in the hazard zone.

INDUSTRIAL EXAMPLES

During a lift, the rigger watches the hook and misses that the load corner is rotating toward the hand resting on the edge. The danger is not lack of skill; the attention is focused on one part of a changing task.

RELATED TERMS

Attention Failure | Distraction | Dynamic Risk Assessment | Line of Fire | Last-Minute Risk Change

391 **Attention Failure** BEHAVIOUR

DEFINITION

Attention failure is a moment when the worker's attention is not on the hand position, hazard movement, or task change that matters for safety.

WHY IT MATTERS

Attention can fail even during a familiar job. The hand may remain in a closing gap while the eyes follow a signal, a radio call, or a tool setting. The injury occurs because the hazard changed during the attention gap.

INDUSTRIAL EXAMPLES

A worker adjusts a clamp while looking at the supervisor for confirmation. The part slides and catches the finger under the clamp jaw because the hand was not withdrawn before the force was applied.

RELATED TERMS

Distraction | Situational Awareness | Communication Cue | Pinch Point | Fatigue Effect

392 **Habitual Behaviour** BEHAVIOUR

DEFINITION

Habitual behaviour is an action repeated so often that it becomes automatic and is performed with little conscious thought.

WHY IT MATTERS

Habits help skilled workers move efficiently, but they can carry old exposure into new conditions. A hand placement that worked on a small load may be repeated on a heavier, hotter, sharper, or unstable one. Automatic action is risky when the task has changed.

INDUSTRIAL EXAMPLES

A worker always steadies a valve body with the left hand while tightening bolts with the right. On a heavier valve, the same habit places the hand under a flange edge that drops when support is removed.

RELATED TERMS

Risk Normalisation | Complacency | Dynamic Risk Assessment | Peer Influence | Hand-as-Control

393 **Cognitive Overload** BEHAVIOUR

DEFINITION

Cognitive overload occurs when a worker has too much information, pressure, noise, decision-making, or task complexity to process clearly.

WHY IT MATTERS

When mental load is high, the worker may focus on the most urgent signal and miss hand position. Complex lifts, simultaneous radio messages, alarms, changing weather, or multiple permits can overload attention and reduce the ability to predict the next movement.

INDUSTRIAL EXAMPLES

During a critical lift, the signal person manages radio calls, crane signals, taglines, and deck crew movement at once. A worker's hand remains on the load edge because no one has enough spare attention to notice the exposure.

RELATED TERMS

Situational Awareness | Distraction | Decision Under Pressure | Communication Cue | Fatigue

394 **Memory Failure** BEHAVIOUR

DEFINITION

Memory failure is forgetting a step, control, hazard, or instruction that is needed to perform the task safely.

WHY IT MATTERS

Memory failure is more likely when tasks are interrupted, complex, rushed, or performed rarely. A worker may forget that a part is still under tension, that a guard was removed, or that a glove was contaminated. The hand then enters a condition the worker no longer remembers as dangerous.

INDUSTRIAL EXAMPLES

A crew loosens a spring-loaded component, pauses for another job, and later returns without remembering that the spring was not released. A hand placed near the cover is struck when the stored energy releases.

RELATED TERMS

Stored Energy | Shift Handover Risk | Permit to Work | Cognitive Overload | Dynamic Risk Assessment

395 **Decision Under Pressure** BEHAVIOUR

DEFINITION

Decision under pressure is a choice made while facing urgency, uncertainty, production demand, weather, equipment delay, or social pressure.

WHY IT MATTERS

Under pressure, people choose the option that seems to keep the job moving. The decision may be understandable but still unsafe: hold the part by hand, skip the reset, pull the rope harder, or reach once more. Good systems make the safe decision the easiest one before pressure peaks.

INDUSTRIAL EXAMPLES

A rigger sees the load drifting and chooses to push it by hand because stopping the crane would delay the lift. The hand enters the crush zone between the load and the landing frame.

RELATED TERMS

Time Pressure | Production Pressure | Shortcut Behaviour | Situational Awareness | Stop Work Authority

396 **Injury Underreporting** BEHAVIOUR

DEFINITION

Injury underreporting is when hand injuries, pain, symptoms, or near injuries are not reported through the proper system.

WHY IT MATTERS

Underreporting hides the true exposure. Small cuts, numb fingers, near pinches, and hand pain may seem minor, but they reveal where the task is damaging workers or almost injuring them. If they are hidden, the organisation sees a clean record while the hazard remains unchanged.

INDUSTRIAL EXAMPLES

A worker with finger numbness after vibration exposure says nothing because he does not want to lose overtime. Another tapes a cut from sheet metal and continues, so the repeated sharp-edge problem never reaches supervision.

RELATED TERMS

Near Miss Culture | Safety Culture | Repetitive Strain Injury | Learning from Incidents | Accountability

397 **Near Miss Culture** BEHAVIOUR

DEFINITION

Near miss culture is the way an organisation responds to events where injury almost occurred but was avoided.

WHY IT MATTERS

A strong near miss culture treats the almost-crushed finger as information, not luck. If near misses are ignored, the same exposure repeats until timing changes and injury occurs. If workers fear blame, they keep near misses quiet and the system loses its warning signals.

INDUSTRIAL EXAMPLES

A worker pulls a hand away just before a load lands on the spot where his fingers were resting. The crew reports it, reviews why the hand was there, and changes the landing method before the next lift.

RELATED TERMS

Injury Underreporting | Learning from Incidents | Risk Normalisation | Safety Culture | Pre-Task Hand Placement Review

398 **Learning from Incidents** BEHAVIOUR

DEFINITION

Learning from incidents is the process of using injuries, near misses, and observations to improve the work system and prevent recurrence.

WHY IT MATTERS

Real learning goes beyond telling workers to be careful. It identifies the hand position, exposure mechanism, task design, tool gap, communication breakdown, and pressure that made the incident possible. The lesson must change the next job, not just the report.

INDUSTRIAL EXAMPLES

After a fingertip crush during shim placement, the team maps the exact moment the finger entered the gap and introduces a holder, revised sequence, and supervisor check. The learning is built into the work, not left as a reminder poster.

RELATED TERMS

Near Miss Culture | Accountability | Task Redesign | SOP Gap | Exposure Count Hand Safety First | Production Draft

399 **Hand Safety Standard** STANDARDS

DEFINITION

A hand safety standard is a documented set of requirements, principles, or specifications that define how hand hazards must be identified, assessed, and controlled. Standards may be international, national, industry-specific, or company-level.

WHY IT MATTERS

Standards matter because they set the minimum expectation for what counts as adequate protection. A site that follows a recognised hand safety standard can demonstrate that controls were based on established knowledge, not guesswork. Gaps between the standard and actual practice are where injuries tend to occur.

INDUSTRIAL EXAMPLES

Hand safety standards apply to glove selection, machine guarding, rigging procedures, permit systems, and training requirements. A site may follow ISO standards for glove performance, company standards for load handling, and national regulations for machine safety simultaneously.

RELATED TERMS

ISO 21420 | EN 388 | PPE Regulation | Risk Assessment Requirement | Compliance Gap

400 **ISO 21420** STANDARDS

DEFINITION

ISO 21420 is the international standard that sets general requirements for protective gloves. It covers ergonomics, sizing, marking, innocuousness, and the information glove manufacturers must provide.

WHY IT MATTERS

ISO 21420 is the foundation standard that all performance glove standards sit on top of. A glove that meets EN 388 for cut resistance must also meet ISO 21420 requirements. A glove that does not carry the correct markings may not have been tested to any verified standard, leaving the buyer without reliable performance data.

INDUSTRIAL EXAMPLES

ISO 21420 markings appear on glove packaging and indicate size, performance level, and the certifying body. A purchasing manager checking whether a new supplier's gloves are compliant would start with ISO 21420 conformity before reviewing cut or heat ratings.

RELATED TERMS

Hand Safety Standard | EN 388 | EN 407 | EN 374 | CE Marking

401 **EN 388** STANDARDS

DEFINITION

EN 388 is the European standard for gloves offering protection against mechanical risks including abrasion, cut, tear, puncture, and impact. Each hazard is tested and given a performance level that appears in a sequence on the glove marking.

WHY IT MATTERS

EN 388 levels allow comparison between gloves, but they do not translate directly into field protection. A high abrasion rating does not mean the glove resists a blade under body weight, and a glove rated for cut resistance in a laboratory may still be penetrated in the field under different contact conditions.

INDUSTRIAL EXAMPLES

An EN 388 marking of 4X43EP indicates specific performance levels for abrasion, cut, tear, puncture, and impact. A safety manager selecting gloves for sheet metal handling would look at the blade cut level and puncture level while also checking that glove dexterity suits the task.

RELATED TERMS

Cut-Resistant Glove | ISO 21420 | Glove Cut Rating | Puncture Resistance | PPE Limitation

402 **EN 407** STANDARDS

DEFINITION

EN 407 is the European standard for gloves protecting against thermal risks including contact heat, convective heat, radiant heat, small splashes of molten metal, large splashes, and contact with flames.

WHY IT MATTERS

EN 407 performance levels are specific to each thermal hazard type. A glove with a high contact-heat rating may offer poor protection against molten metal splash. Using an EN 407 glove outside its tested range, such as holding a hot object for longer than the test duration, can still result in a burn.

INDUSTRIAL EXAMPLES

EN 407 gloves are used for welding, foundry work, hot bearing handling, and furnace maintenance. A worker selecting gloves for both welding spatter and brief hot-metal contact would need to check the relevant EN 407 sub-levels rather than relying on a general thermal label.

RELATED TERMS

Thermal Glove | EN 388 | ISO 21420 | Hot Contact Zone | PPE Limitation

403 **EN 374** STANDARDS

DEFINITION

EN 374 is the European standard for gloves protecting against chemicals and microorganisms. It covers resistance to penetration, permeation, and degradation for specific chemical substances.

WHY IT MATTERS

EN 374 tests are conducted with specific chemicals under laboratory conditions. The rating does not cover every chemical a worker may encounter, and field conditions such as heat, abrasion, and mixed chemicals can shorten the protective time significantly below what the test indicates.

INDUSTRIAL EXAMPLES

EN 374 markings guide selection for acid handling, solvent cleaning, degreasing, and chemical transfer. A worker using a glove rated for one solvent may still be exposed if the task involves a different chemical or a mixture not included in the test set.

RELATED TERMS

Chemical Glove | Chemical Permeation | Breakthrough Time | ISO 21420 | PPE Limitation

404 **ANSI/ISEA 105** STANDARDS

DEFINITION

ANSI/ISEA 105 is the American National Standard for hand protection classification and performance. It provides test methods and performance levels for cut resistance, puncture resistance, abrasion, chemical permeation, flame resistance, and other properties.

WHY IT MATTERS

ANSI/ISEA 105 uses a different cut-resistance scale to EN 388, which creates confusion when purchasing gloves across US and European supply chains. A glove rated A4 under ANSI is not directly equivalent to a level D under EN 388 without checking the test method and blade force used.

INDUSTRIAL EXAMPLES

ANSI/ISEA 105 ratings are used for glove procurement in North America across fabrication, oil and gas, warehousing, and construction. A global safety programme must specify which standard applies in each region to avoid comparing incompatible ratings.

RELATED TERMS

EN 388 | Glove Cut Rating | Cut-Resistant Glove | Hand Safety Standard | PPE Limitation

405 **PPE Regulation** STANDARDS

DEFINITION

PPE Regulation refers to the legal framework governing the design, manufacture, testing, certification, and supply of personal protective equipment. In the UK and EU, this is set out in specific regulations that define employer and manufacturer duties.

WHY IT MATTERS

PPE regulation places a legal duty on employers to provide suitable, maintained, and correctly used protective equipment as a last resort after higher-level controls have been applied. Providing gloves without first considering engineering controls does not satisfy the hierarchy of controls requirement even if the gloves are certified.

INDUSTRIAL EXAMPLES

PPE regulations apply when purchasing gloves, selecting hand protection for chemical work, providing impact protection for rigging, and ensuring glove compatibility with the task. An employer who provides uncertified gloves or fails to ensure correct use may be in breach of regulation.

RELATED TERMS

Hierarchy of Controls | Hand Safety Standard | Duty of Care | ISO 21420 | Compliance Gap

406 **Risk Assessment Requirement** STANDARDS

DEFINITION

A risk assessment requirement is the legal or procedural obligation to identify hazards, evaluate the likelihood and severity of harm, and record the controls applied before work begins.

WHY IT MATTERS

For hand safety, a risk assessment must name the specific exposure — where the hand enters, what force or energy is present, and how often. A generic assessment that lists pinch point as a hazard without describing the task step, the hand position, and the control is unlikely to prevent the injury.

INDUSTRIAL EXAMPLES

Risk assessments are required before introducing new machinery, changing work methods, using new chemicals, employing new workers on hazardous tasks, and returning to tasks after an incident. A hand-specific assessment would record each task step where fingers, palms, or wrists enter a hazard zone.

RELATED TERMS

Job Safety Analysis | Safe System of Work | Duty of Care | Hand Safety Standard | Compliance Gap

407 **COSHH** STANDARDS

DEFINITION

COSHH, or Control of Substances Hazardous to Health, is the UK regulatory framework requiring employers to assess and control exposure to hazardous substances including those that affect the skin and hands.

WHY IT MATTERS

COSHH requires hand exposure to chemicals to be assessed before work starts. Dermatitis, chemical burns, and skin absorption are COSHH-relevant hand injuries. A COSHH assessment for hand exposure identifies the substance, the contact route, the duration, and the skin protection required.

INDUSTRIAL EXAMPLES

COSHH applies to solvent cleaning, cement work, degreasing, epoxy handling, acid work, and oil contact. A site using cutting fluid on a lathe would assess skin contact frequency, provide barrier cream and gloves, and monitor workers for early signs of dermatitis.

RELATED TERMS

Dermatitis | Chemical Glove | Chemical Burn | Chemical Permeation | Risk Assessment Requirement

408 **HAVS Regulation** STANDARDS

DEFINITION

HAVS regulation refers to the legal requirements governing the management of hand-arm vibration syndrome. In the UK, this falls under the Control of Vibration at Work Regulations, which set exposure action values and exposure limit values for vibration.

WHY IT MATTERS

HAVS regulation requires employers to measure vibration exposure, inform workers of risks, reduce exposure where possible, and provide health surveillance. A worker developing early HAVS symptoms may not connect them to vibration until permanent nerve and blood vessel damage has already occurred.

INDUSTRIAL EXAMPLES

HAVS regulation applies to grinding, drilling, chipping, compacting, and other high-vibration tool use. An employer must assess daily vibration doses for each tool type and rotation period, and health surveillance must begin once the exposure action value is regularly exceeded.

RELATED TERMS

Hand-Arm Vibration Syndrome | Vibration White Finger | Anti-Vibration Glove | Exposure Assessment | PPE Regulation

409 **Reportable Injury** STANDARDS

DEFINITION

A reportable injury is a work-related injury that meets the legal threshold for notification to a regulatory authority. Thresholds vary by jurisdiction but commonly include amputations, fractures other than fingers and toes, loss of consciousness, and injuries requiring hospital admission.

WHY IT MATTERS

Hand injuries are among the most commonly reportable workplace injuries. A fingertip amputation, a crush fracture, or a tendon repair requiring surgery will typically meet reporting thresholds. Underreporting removes the data needed to identify patterns and drive prevention.

INDUSTRIAL EXAMPLES

Reportable hand injuries include partial or complete amputations, fractures from crush events, degloving injuries, and high-pressure injection injuries requiring surgery. A site with frequent near misses but no reportable injuries may be accumulating unreported minor injuries that signal a serious event ahead.

RELATED TERMS

RIDDOR | Hand Injury Register | Incident Investigation | Amputation | Compliance Gap

410 **RIDDOR** STANDARDS

DEFINITION

RIDDOR, or the Reporting of Injuries, Diseases and Dangerous Occurrences Regulations, is the UK legal framework requiring employers and self-employed persons to report specified workplace injuries, occupational diseases, and dangerous occurrences to the Health and Safety Executive.

WHY IT MATTERS

RIDDOR requires reporting of amputations of fingers, thumbs, or hands as specified injuries, regardless of joint involvement. Fractures are listed as specified injuries — but fractures to fingers, thumbs, and toes are explicitly excluded from that category. A finger fracture may still be reportable under the over-seven-day absence rule if the worker cannot perform normal duties. This distinction is important: finger fractures are not automatically specified reportable injuries, but amputations always are.

INDUSTRIAL EXAMPLES

RIDDOR reports are submitted when a worker loses a finger in a press, fractures a metacarpal in a crush event, or undergoes hand surgery following a tendon laceration. A site safety manager must understand which injuries trigger the reporting duty and submit within the required timeframe.

RELATED TERMS

Reportable Injury | Hand Injury Register | Amputation | Crush Injury | Compliance Gap

411 **OSHA Hand Safety** STANDARDS

DEFINITION

OSHA hand safety refers to the requirements under the US Occupational Safety and Health Administration that relate to hand protection, machine guarding, lockout/tagout, and related standards. OSHA 1910.138 specifically addresses hand protection requirements.

WHY IT MATTERS

OSHA requires employers to select hand protection based on the hazards present in the task, not on convenience or cost. Selecting an inappropriate glove, providing no glove, or failing to train workers on glove use can result in citations, penalties, and liability following a hand injury.

INDUSTRIAL EXAMPLES

OSHA 1910.138 applies when hands are exposed to cuts, abrasions, punctures, chemicals, burns, or electrical hazards. An employer must assess each task for hand hazards and document the selection rationale for the glove provided.

RELATED TERMS

PPE Regulation | Hand Safety Standard | Risk Assessment Requirement | Glove Selection | Duty of Care

412 **HSE Guidance** STANDARDS

DEFINITION

HSE guidance refers to non-statutory advice and information published by the UK Health and Safety Executive to help employers and workers understand how to comply with health and safety law. Guidance does not have the force of law but describes accepted good practice.

WHY IT MATTERS

HSE guidance on hand safety covers vibration, dermatitis, manual handling, machine guarding, and PPE selection. Following HSE guidance does not guarantee legal compliance, but departing from it without an equivalent or better approach may be difficult to defend after an injury.

INDUSTRIAL EXAMPLES

HSE guidance documents relevant to hand safety include guidance on HAVS management, COSHH assessment for skin exposure, safe use of angle grinders, and safe handling of sheet metal. A safety manager reviewing glove selection or vibration controls would consult HSE guidance as a baseline.

RELATED TERMS

RIDDOR | HAVS Regulation | COSHH | PPE Regulation | Duty of Care

413 **Duty of Care** STANDARDS

DEFINITION

Duty of care is the legal and moral obligation on employers, designers, manufacturers, and individuals to take reasonable steps to prevent foreseeable harm to others. In the workplace, it applies to anyone who could be affected by work activities.

WHY IT MATTERS

Employers who allow workers to place hands in closing gaps, under suspended loads, or near unguarded blades when alternatives exist may be in breach of their duty of care. The test is not whether an injury occurred but whether the foreseeable risk was reasonably managed.

INDUSTRIAL EXAMPLES

Duty of care applies when designing a new task, specifying machinery, selecting PPE, supervising workers, and investigating incidents. A contractor who knows a task requires fingers to align flanges without providing a drift pin or alternative method may fail the duty of care test.

RELATED TERMS

Safe Place of Work | Risk Assessment Requirement | PPE Regulation | Hierarchy of Controls | Competent Person

414 **Safe Place of Work** STANDARDS

DEFINITION

Safe place of work is the legal requirement that employers provide and maintain a workplace and work environment that is, as far as reasonably practicable, safe and without risk to health.

WHY IT MATTERS

For hand safety, a safe place of work means that pinch points are guarded, hot surfaces are identified, tools are suitable for the task, and workers do not have to improvise with hands to complete the job. A workplace that relies entirely on worker caution rather than physical controls does not meet this standard.

INDUSTRIAL EXAMPLES

Safe place of work requirements apply to machine guarding, housekeeping, tool condition, lighting, access around equipment, and the availability of handling aids. A poorly lit maintenance area where workers reach behind panels without sight lines or stop blocks is a safe-place-of-work failure.

RELATED TERMS

Duty of Care | Risk Assessment Requirement | Engineering Control | Machine Guard | PPE Regulation

415 **Competent Person** STANDARDS

DEFINITION

A competent person is someone with sufficient training, experience, knowledge, and other qualities to perform a specific task safely. The level of competence required depends on the complexity and risk of the task.

WHY IT MATTERS

Competence for hand-hazardous tasks means more than completing a training course. A competent rigger understands where hands enter the crush line during landing. A competent press operator knows the closing gap and its pinch points. Gaps between certified training and actual task knowledge are where hand injuries occur.

INDUSTRIAL EXAMPLES

Competent persons are required for lifting operations, machine maintenance, confined space entry, permit-to-work authorisation, and risk assessment. A site that certifies workers through a written test without field verification of hand placement behaviour may not be producing competent persons.

RELATED TERMS

Competency Framework | Risk Assessment Requirement | Duty of Care | Training Transfer | Permit to Work

416 Method Statement Requirement

STANDARDS

DEFINITION

A method statement requirement is the obligation to prepare a written description of how a hazardous task will be carried out, what controls will be used, and what the sequence of steps will be. It is typically required by clients, regulators, or contract conditions.

WHY IT MATTERS

A method statement that does not describe hand placement, the tools used to keep hands out, or the moment of highest exposure is incomplete for hand safety purposes. The document exists to ensure everyone involved understands the controlled method before the work starts.

INDUSTRIAL EXAMPLES

Method statements are required for lifting operations, demolition, confined maintenance, machine installation, and work near live services. A method statement for flange alignment that does not address how holes are matched or what tool replaces fingers leaves the critical exposure uncontrolled.

RELATED TERMS

Safe System of Work | SOP | Method Statement Gap | Risk Assessment Requirement | Competent Person

417 Permit to Work

STANDARDS

DEFINITION

A permit to work is a formal document that authorises specific people to carry out specific work within a defined area and time. It confirms that hazards have been assessed, controls are in place, and responsible persons have signed off.

WHY IT MATTERS

For hand safety, a permit to work controls the conditions under which hands enter dangerous areas — inside machinery, near live services, or in confined spaces. A permit that does not specify hand controls leaves workers to interpret safety requirements in the moment.

INDUSTRIAL EXAMPLES

Permits to work are used for confined space entry, hot work, electrical isolation, work on pressurised systems, and machine maintenance. A permit for conveyor maintenance should confirm that all drives are isolated, all stored energy is released, and hand placement within the equipment is authorised under confirmed safe conditions.

RELATED TERMS

Isolation Certificate | Energy Isolation Check | Lockout/Tagout | Safe System of Work | Competent Person

418 **Isolation Standard** STANDARDS

DEFINITION

An isolation standard is the documented requirement for how energy must be identified, isolated, and verified before hands or any body part enter hazardous equipment. It defines the steps, the responsible persons, and the verification method.

WHY IT MATTERS

An isolation standard that does not cover all energy forms leaves residual energy that can move equipment after the worker's hand enters. Gravity, spring, pressure, stored hydraulic energy, and thermal energy can remain after electrical isolation and cause hand injuries during maintenance.

INDUSTRIAL EXAMPLES

Isolation standards apply to conveyors, presses, hydraulic equipment, rotating machinery, steam systems, and spring-loaded mechanisms. A rigorous standard requires the worker who will place hands inside the equipment to apply their own personal lock, not rely on a shared lock applied by another person.

RELATED TERMS

Lockout/Tagout | Energy Isolation Check | Permit to Work | Residual Energy | Unexpected Start-Up

419 **Lifting Operations Regulation** STANDARDS

DEFINITION

Lifting operations regulation refers to the legal requirements governing the planning, supervision, and execution of lifting tasks. In the UK, this is primarily covered by the Lifting Operations and Lifting Equipment Regulations, known as LOLER.

WHY IT MATTERS

Hand injuries during lifting operations are common because workers guide, steady, or correct loads by hand during the final stage of placement. LOLER requires lifts to be planned by a competent person, which should include identifying where hands will be during landing and what controls prevent contact with closing gaps.

INDUSTRIAL EXAMPLES

LOLER applies to crane lifts, chain blocks, hoists, forklifts, and lifting accessories including slings and shackles. A compliant lift plan addresses hand exposure at each stage: rigging, movement, landing, and sling removal.

RELATED TERMS

Lift Plan | Suspended Load | Load Landing | Competent Person | Rigging Plan

420 **Machinery Directive and Machinery Regulation** STANDARDS

DEFINITION

The Machinery Directive (2006/42/EC) is the European legislative framework setting essential health and safety requirements for machinery placed on the market. It is being succeeded by Regulation (EU) 2023/1230, adopted in June 2023. Machinery placed on the EU market before 20 January 2027 must comply with the current Machinery Directive; from that date, the Machinery Regulation applies.

WHY IT MATTERS

Machinery designed to either framework should address hand exposure at the design stage — guarding, interlocks, and safe access. When a machine arrives on site without adequate guarding, the employer must assess the residual risk before workers place hands near it. The transition to the Machinery Regulation means that conformity declarations and technical files will need updating for new machinery placed on the EU market from January 2027.

INDUSTRIAL EXAMPLES

The directive applies to presses, conveyors, lathes, grinders, drills, and automated equipment. A machine with an inadequate guard at the nip point may not comply with the directive, and an employer who continues using it without additional controls takes on liability for any resulting hand injury.

RELATED TERMS

Machine Guard | Interlock | CE Marking | Two-Hand Control | Safe Place of Work

421 **CE Marking** STANDARDS

DEFINITION

CE marking is a conformity mark indicating that a product meets the requirements of applicable European directives, including those for personal protective equipment and machinery. It is applied by the manufacturer after conformity assessment.

WHY IT MATTERS

CE marking on gloves indicates the product has been tested to the relevant standard, but it does not guarantee performance in every field condition. A glove with a CE mark that is used outside its tested parameters, beyond its service life, or for a hazard it was not tested against, may still fail to protect.

INDUSTRIAL EXAMPLES

CE marking appears on gloves, machine guards, and safety equipment sold in European markets. A purchasing team verifying glove compliance would check the CE mark, the standard reference, and the performance levels on the packaging before approving a new supplier.

RELATED TERMS

ISO 21420 | EN 388 | Machine Safety Directive | PPE Regulation | Glove Cut Rating

422 **Type Examination** STANDARDS

DEFINITION

Type examination is the process by which a notified body assesses a sample of a product to verify that it meets the requirements of applicable standards and directives before the manufacturer can apply a conformity mark.

WHY IT MATTERS

Type examination gives users confidence that the tested design meets the standard, but production quality, batch variation, counterfeit products, and storage degradation can mean a specific pair of gloves performs below the tested sample. Procurement from verified suppliers reduces this gap.

INDUSTRIAL EXAMPLES

Type examination certificates are issued by bodies such as BSI, SGS, and TÜV for gloves, guards, and other PPE. A site purchasing large quantities of cut-resistant gloves for a shutdown would request the type examination certificate as part of supplier qualification.

RELATED TERMS

CE Marking · ISO 21420 · EN 388 · Hand Safety Standard · Compliance Gap

423 **Compliance Gap** STANDARDS

DEFINITION

A compliance gap is the difference between what is required by law, standard, or company policy and what is actually in place or practised in the field. For hand safety, it is the space where injuries are most likely to occur.

WHY IT MATTERS

Compliance gaps are often invisible to those sitting in offices. A procedure may say use a drift pin, but the drift pin may not be available at the workface. A standard may require guarding, but the guard may be removed for speed. Finding and closing these gaps is the practical work of hand safety management.

INDUSTRIAL EXAMPLES

Compliance gaps appear when workers use wrong-size spanners because the correct ones are not on the job, when guards are removed and not replaced, when glove selection is left to the worker without a register, and when SOPs do not match the actual task sequence.

RELATED TERMS

SOP Gap · Method Statement Gap · Risk Assessment Requirement · Audit · Hand Safety Programme

Hand Safety Programme Design

424 Hand Safety Programme

PROGRAMME

DEFINITION

A hand safety programme is an organised set of activities, standards, controls, measurements, and reviews designed to reduce hand injuries across a workplace or organisation. It connects individual task controls to organisational management.

WHY IT MATTERS

A programme is stronger than a campaign because it does not end. It measures exposure before injury, tracks what controls are in place, and reviews performance regularly. A site with a mature programme can explain why hand injury rates are low, not just that they are.

INDUSTRIAL EXAMPLES

A hand safety programme includes glove registers, tool registers, exposure observation schedules, SOP reviews, training records, near miss reporting, incident investigation, and management review. A programme without exposure measurement is likely relying on luck rather than control.

RELATED TERMS

Exposure Baseline · Hand Injury Rate · Critical Control · Maturity Model · Continuous Improvement

425 Exposure Baseline

PROGRAMME

DEFINITION

An exposure baseline is the initial measurement of how often, how long, and how closely workers place hands in hazardous zones across the site or operation. It establishes the starting point from which improvement is measured.

WHY IT MATTERS

Without a baseline, a programme cannot show progress. A site may reduce hand injuries but increase hand exposure if the baseline has not been established. The baseline is most useful when it counts actual hand entries, not just hours worked near hazards.

INDUSTRIAL EXAMPLES

An exposure baseline is created by observing tasks, counting hand entries into pinch, crush, cut, burn, and line-of-fire zones, and recording which tasks, tools, and departments generate the most exposure. It is repeated periodically to show whether controls are reducing exposure.

RELATED TERMS

Exposure Count · Exposure Observation · Leading Indicator · Hand Safety Programme · Hand Injury Rate

426 **Risk Register** PROGRAMME

DEFINITION

A risk register is a documented record of identified hazards, their associated risks, the controls in place, the residual risk level, and the owner responsible for maintaining each control.

WHY IT MATTERS

A hand safety risk register that only lists hazard categories without naming specific tasks, tools, and exposure points is too general to drive action. The register is most useful when it links each hand hazard to a specific task, a specific control, and a specific review date.

INDUSTRIAL EXAMPLES

A risk register for a fabrication site would include entries for press brake hand feeding, plate alignment, grinder use, bolt-up, and crane landing. Each entry would record the control — fixture, guarding, drift pin, push-pull tool — and the residual risk level after that control.

RELATED TERMS

Risk Assessment Requirement | Critical Control | Compliance Gap | Residual Risk | Hand Safety Programme

427 **Hand Injury Rate** PROGRAMME

DEFINITION

Hand injury rate is a measure of how frequently hand injuries occur relative to hours worked or number of workers. It is typically expressed as injuries per million hours worked or per hundred workers per year.

WHY IT MATTERS

Hand injury rate is a lagging indicator — it measures what already happened. A rate of zero does not mean hands are safe; it may mean exposures are not being counted or minor injuries are not being reported. The rate should be reviewed alongside leading indicators to give a complete picture.

INDUSTRIAL EXAMPLES

Hand injury rates are tracked monthly and annually for each department, contractor group, and task type. A rate spike after a shutdown may reflect increased exposure during maintenance, not a change in culture. Drilling into task-specific rates produces more useful information than a site total.

RELATED TERMS

Leading Indicator | Lagging Indicator | Lost Time Injury | Hand Injury Investigation | Exposure Count

428 **Lost Time Injury** PROGRAMME

DEFINITION

A lost time injury is a work-related injury where the worker is unable to perform their normal duties on any day after the day of injury. For hands, it commonly follows fractures, tendon injuries, amputations, and crush events.

WHY IT MATTERS

Lost time from hand injuries is often longer than the initial injury suggests. A worker with a fractured proximal phalanx may return to office duties quickly but be away from tool use for weeks. Tracking return-to-task dates alongside return-to-work dates gives a more accurate picture of functional recovery.

INDUSTRIAL EXAMPLES

Lost time hand injuries are recorded and investigated to identify task, tool, and method patterns. A site with multiple lost-time injuries during load landing might find that the same flange alignment method is responsible for most events.

RELATED TERMS

Hand Injury Rate | Restricted Work Case | Medical Treatment Case | Hand Injury Investigation | Return to Work

429 **Medical Treatment Case** PROGRAMME

DEFINITION

A medical treatment case is a work injury that requires treatment beyond first aid, such as stitches, medication, or specialist assessment, but does not result in lost time away from the job.

WHY IT MATTERS

Medical treatment cases for hands often involve lacerations, punctures, and minor fractures that are treated and the worker returns the same day. These cases contain valuable information about which tasks, tools, and methods create hand contact events, regardless of severity.

INDUSTRIAL EXAMPLES

Medical treatment cases are recorded when a worker receives stitches for a sheet metal cut, an X-ray for a crush injury, or antibiotic treatment for an infected puncture wound. A high volume of medical cases for one task type signals a task that needs engineering control rather than more first aid.

RELATED TERMS

Lost Time Injury | Restricted Work Case | Hand Injury Rate | First Aid Response | Hand Injury Investigation

430 **Restricted Work Case** PROGRAMME

DEFINITION

A restricted work case is a work injury where the worker can return to work but cannot perform all normal duties. For hands, this typically means light duties, single-handed work, or office-based activity while the injury heals.

WHY IT MATTERS

Restricted work cases for hands reveal the functional impact of injuries that may not show up in lost time statistics. A worker on light duties because a tendon repair is healing may cost the organisation more in total than a short lost-time case.

INDUSTRIAL EXAMPLES

Restricted work cases occur after finger fractures, tendon lacerations, severe burns, and crush injuries. A site tracking restricted work by task type may find that a specific machine or method repeatedly produces injuries requiring weeks of modified duties.

RELATED TERMS

Lost Time Injury | Medical Treatment Case | Return to Work | Modified Duties | Hand Injury Rate

431 **Hand Injury Investigation** PROGRAMME

DEFINITION

A hand injury investigation is a structured review of a hand injury event to identify the immediate cause, the underlying causes, and the systemic factors that allowed the exposure to occur.

WHY IT MATTERS

Investigations that stop at the immediate cause — the worker placed their hand in the gap — miss the deeper reasons the task required that hand placement and why no control prevented it. A useful investigation asks why the hand needed to be there and what change would have prevented the exposure.

INDUSTRIAL EXAMPLES

A hand injury investigation for a fingertip crush between flange faces would examine the task method, the availability of a drift pin, the SOP content, the pre-job brief, the lighting, and the supervision quality. Each finding becomes a corrective action target.

RELATED TERMS

Root Cause Analysis | Near Miss | SOP Gap | Method Statement Gap | Compliance Gap

432 Root Cause Analysis

PROGRAMME

DEFINITION

Root cause analysis is an investigation method that traces an event back through its contributing factors to identify the fundamental conditions that allowed it to happen. It goes beyond symptoms to the system-level causes.

WHY IT MATTERS

For hand injuries, the root cause is rarely inattention. It is more often a task design that required hand entry, a missing tool, a procedure that did not address the exposure, or a supervision gap. Addressing only the immediate cause leaves the next worker in the same position.

INDUSTRIAL EXAMPLES

Root cause analysis of a glove entrapment in a roller would examine guarding status, isolation procedure, the reason the worker was near the roller, what the task required, and whether the SOP covered that situation. Each root cause generates a recommendation that addresses the system, not just the behaviour.

RELATED TERMS

Hand Injury Investigation | Bow-Tie Analysis | SOP Gap | Compliance Gap | Task Redesign

433 Bow-Tie Analysis

PROGRAMME

DEFINITION

A bow-tie analysis is a risk visualisation tool that maps the causes of a hazardous event on the left, the event itself in the centre, and the consequences on the right. Controls are placed on each side to show what prevents the event and what mitigates its consequences.

WHY IT MATTERS

For hand safety, a bow-tie for crush injury between flange faces would show causes such as no drift pin, no stop block, and finger used as spacer on the left, and consequences such as fracture, amputation, and long-term disability on the right. Gaps in the control lines are where the next injury will occur.

INDUSTRIAL EXAMPLES

Bow-tie analysis is used in oil and gas, offshore, and process industries to manage critical risks. A hand-safety bow-tie for load landing would map all causes of hand entry and all consequences of crush contact, then assign owners for each control barrier.

RELATED TERMS

Root Cause Analysis | Critical Control | Risk Register | Hand Injury Investigation | Residual Risk

434 Critical Control

PROGRAMME

DEFINITION

A critical control is a control measure whose failure would directly result in a serious injury or fatality. For hand safety, critical controls are those that, if removed, would allow a hand to enter a life-altering crush, shear, or amputation zone.

WHY IT MATTERS

Not all controls are equal. A lockout procedure that prevents unexpected machine start-up is a critical control. A reminder sticker on a press is not. Identifying which controls are critical allows organisations to prioritise their verification activity on what actually prevents serious hand injuries.

INDUSTRIAL EXAMPLES

Critical hand safety controls include machine guards on rotating equipment, isolation before maintenance access, drift pin use during hole matching, and tagline use during suspended load handling. Verifying these controls in the field, not just on paper, is the core of a hand safety assurance programme.

RELATED TERMS

Performance Standard | Bow-Tie Analysis | Hierarchy of Controls | Audit | Machine Guard

435 Performance Standard

PROGRAMME

DEFINITION

A performance standard is a document that defines what a critical control must do, who is responsible for it, how it is verified, and what the response is if it is found to be non-functional.

WHY IT MATTERS

A performance standard for machine guarding would define what condition the guard must be in, how often it is inspected, who removes it and under what authority, and what happens if a guard is found missing or damaged. Without this standard, a guard may be removed and not replaced for weeks before anyone notices.

INDUSTRIAL EXAMPLES

Performance standards are written for guards, isolation procedures, drift pin use, glove registers, and tagline handling. Each standard is verified during audits and field checks. A programme without performance standards relies on general intent rather than defined expectation.

RELATED TERMS

Critical Control | Audit | Compliance Gap | Hand Safety Programme | Safe System of Work

436 **Audit** PROGRAMME

DEFINITION

An audit is a systematic and independent examination of whether activities and results comply with planned arrangements and whether these arrangements are implemented effectively.

WHY IT MATTERS

A hand safety audit that only checks paperwork may find full compliance while workers in the field are still placing fingers in closing gaps without drift pins. Effective audits include field observation of the actual task at the moment of exposure, not just a review of the procedure.

INDUSTRIAL EXAMPLES

Hand safety audits check glove registers against tasks, verify guarding on machines, confirm isolation procedures are being followed, observe hand placement during load landing, and review near miss reporting rates. Audit findings drive the corrective action register.

RELATED TERMS

Performance Standard | Compliance Gap | Inspection | Hand Safety Programme | Exposure Observation

437 **Inspection** PROGRAMME

DEFINITION

An inspection is a routine check of a specific item, area, or activity to confirm it meets the required standard. Unlike an audit, inspection is usually task-specific and may be carried out by the user or supervisor.

WHY IT MATTERS

Regular inspection of gloves, guards, tools, and handling aids prevents degraded equipment from being used at the point of highest exposure. A glove inspection that identifies a torn palm before the shift starts is more effective than a post-injury investigation.

INDUSTRIAL EXAMPLES

Inspections are carried out on gloves before use, machine guards at shift start, lifting accessories before each lift, and tool condition before maintenance tasks. A simple pre-use checklist for a worker's gloves and a guard check at shift start can catch degradation before an injury occurs.

RELATED TERMS

Glove Degradation | Machine Guard | Performance Standard | Audit | Pre-Job Brief

438 **Management Review** PROGRAMME

DEFINITION

A management review is a periodic senior-level assessment of the performance of the safety programme, including injury trends, leading indicators, audit results, and the effectiveness of critical controls.

WHY IT MATTERS

Management review converts data into decisions. A programme where hand injury rates, near miss counts, exposure observations, and audit findings are reviewed but not acted on is going through a motion rather than managing risk. Decisions about resource, investment, and priority must come from this process.

INDUSTRIAL EXAMPLES

Management reviews for hand safety examine monthly injury data, observation card trends, unresolved corrective actions, glove register gaps, and field audit results. A pattern of recurring crush injuries during one task type is a management review finding that demands a task redesign, not a reminder.

RELATED TERMS

Hand Safety Programme | Hand Injury Rate | Leading Indicator | Continuous Improvement | Programme Review

439 **Contractor Hand Safety** PROGRAMME

DEFINITION

Contractor hand safety is the management of hand injury risk for workers employed by third-party contractors operating on a site or under a client's control. Contractors often carry disproportionate risk for hand injuries.

WHY IT MATTERS

Contractors are frequently injured because they face unfamiliar tasks, tools, layouts, and cultures while working under time pressure. A client site that applies its hand safety standards to its own workers but not to contractors creates an uneven protection baseline.

INDUSTRIAL EXAMPLES

Contractor hand safety management includes induction, task-specific briefing, glove provision or verification, observation during critical tasks, and inclusion in near miss reporting. A site that discovers a contractor's workers are regularly placing fingers in closing gaps during load landing has a contractor management gap.

RELATED TERMS

Induction | Competency Framework | Hand Safety Programme | Compliance Gap | Duty of Care

440 Induction

PROGRAMME

DEFINITION

Induction is the initial training and orientation given to a new or visiting worker before they start work. For hand safety, induction should cover the site's critical hand hazards, controls, and expected behaviours.

WHY IT MATTERS

An induction that lists general hand safety principles without naming site-specific pinch points, required tools, or forbidden practices leaves new workers to discover hazards through experience. A task-specific induction for the first day on a new job site is more protective than a generic presentation.

INDUSTRIAL EXAMPLES

Hand safety induction covers glove requirements for each area, the use of drift pins and push-pull tools, load landing procedures, near miss reporting, and stop-work authority. A new contractor working in a fabrication bay should know which machines have unguarded nip points before they reach their first task.

RELATED TERMS

Training Transfer | Competency Framework | Contractor Hand Safety | Toolbox Talk | Hand Placement Rule

441 Competency Framework

PROGRAMME

DEFINITION

A competency framework defines the knowledge, skills, and demonstrated behaviours required for a worker to perform a specific hand-hazardous task safely. It goes beyond course completion to include observed performance.

WHY IT MATTERS

A competency framework for rigging, press operation, or machine maintenance identifies what the worker must be able to do, not just what they must know. A worker who can answer exam questions about drift pin use but places fingers in flange gaps during practical work has not achieved competency.

INDUSTRIAL EXAMPLES

Competency frameworks are used for crane signallers, riggers, press operators, maintenance technicians, and grinding machine operators. Each role has a competency profile that includes field assessment, not just classroom completion.

RELATED TERMS

Competent Person | Training Transfer | Induction | Contractor Hand Safety | Performance Standard

442 **Campaign** PROGRAMME

DEFINITION

A hand safety campaign is a time-limited communications and engagement effort focused on raising awareness, changing behaviours, or promoting a specific hand safety practice across a site or organisation.

WHY IT MATTERS

Campaigns can shift attention and prompt short-term behaviour change, but they do not substitute for engineering controls, task redesign, or management systems. A site that runs campaigns instead of fixing identified SOP gaps is managing communications rather than managing risk.

INDUSTRIAL EXAMPLES

Campaigns focus on glove compliance, push-pull tool adoption, stop-work use, near miss reporting, or load landing procedures. The most effective campaigns are linked to a specific identified problem, followed by a task redesign or tool introduction, and measured for behaviour change after the campaign ends.

RELATED TERMS

Toolbox Talk | Hand Safety Programme | Behaviour | Training Transfer | Exposure Observation

443 **Glove Register** PROGRAMME

DEFINITION

A glove register is a controlled list of approved gloves matched to specific tasks, hazards, and work areas. It ensures that glove selection is made on the basis of assessed risk rather than worker preference or availability.

WHY IT MATTERS

A glove register prevents mismatched protection. A worker who picks up the nearest available glove may be wearing a heat-rated glove for chemical work or a thin disposable for grinder use. The register converts the glove selection decision from an individual judgment to an organisational one.

INDUSTRIAL EXAMPLES

A glove register for a fabrication site would list the approved glove type for plate handling, grinder use, welding support, chemical cleaning, and rigging. Each entry includes the hazard, the glove standard reference, the approved supplier, and the review date.

RELATED TERMS

Glove Selection | PPE Regulation | Glove Fit | Cut-Resistant Glove | Compliance Gap

444 **Tool Register** PROGRAMME

DEFINITION

A tool register is a controlled list of approved tools for specific tasks, including distance tools, handling aids, and safety-critical equipment. It ensures that the right tool is available and in serviceable condition for each task.

WHY IT MATTERS

A missing tool is often the direct reason a hand enters a hazard zone. A drift pin that is not on the job forces fingers into the alignment gap. A push-pull tool not in the tool register may simply not exist at the workface. The register converts availability from luck into a managed condition.

INDUSTRIAL EXAMPLES

A tool register would list drift pins by size and location, push-pull tools by type and task, fingersavers for chisel work, and chocks for pipe rolling. Each item has a condition check frequency and a replacement process. A pre-job check confirms the required tool is present before work starts.

RELATED TERMS

Drift Pin · Push-Pull Tool · Fingersaver · Distance Tool · Performance Standard

445 **Hand Safety KPI** PROGRAMME

DEFINITION

A hand safety key performance indicator is a specific measure used to track whether the programme is achieving its objectives. KPIs may be leading or lagging and should reflect both injury outcomes and exposure levels.

WHY IT MATTERS

A KPI set that includes only injury rate is a lagging set — it shows what already happened. Adding exposure count per shift, glove compliance rate, near miss frequency, and critical control verification rate creates a leading set that shows whether the programme is working before the next injury.

INDUSTRIAL EXAMPLES

Hand safety KPIs might include number of hand entries into pinch zones per shift, percentage of tasks completed with drift pin in use, glove compliance rate in high-risk areas, near miss reports per hundred workers, and percentage of critical controls verified during the month.

RELATED TERMS

Leading Indicator · Lagging Indicator · Exposure Count · Hand Injury Rate · Management Review

446 **Maturity Model** PROGRAMME

DEFINITION

A maturity model is a framework that describes levels of development in a safety programme, from reactive management of incidents to proactive management of exposure. It helps organisations understand where they are and what the next level requires.

WHY IT MATTERS

A site at a reactive maturity level manages hand injuries after they occur. A site at a proactive level counts and reduces hand exposure before injuries occur. Most organisations believe they are more mature than their data shows — closing the gap requires honest self-assessment against field evidence.

INDUSTRIAL EXAMPLES

A hand safety maturity model might define five levels from reactive injury response through compliant procedures, active observation, exposure reduction, and finally predictive exposure management. Assessment at each level uses field evidence: are drift pins actually used, are exposure counts taken, are SOP gaps identified and closed.

RELATED TERMS

Hand Safety Programme | Continuous Improvement | Exposure Baseline | Leading Indicator | Programme Review

447 **Continuous Improvement** PROGRAMME

DEFINITION

Continuous improvement in hand safety is the ongoing cycle of measurement, review, action, and reassessment that progressively reduces hand exposure and injury rates. It prevents the programme from plateauing after initial gains.

WHY IT MATTERS

Most sites achieve initial injury reductions through basic controls and then plateau. Continuous improvement asks what the next layer of exposure reduction requires — better tools, redesigned tasks, improved procedures, or different measurement. Without this question, the programme stagnates while residual risk remains.

INDUSTRIAL EXAMPLES

Continuous improvement cycles in hand safety include quarterly reviews of exposure observation data, annual revision of the glove register, post-campaign measurement of behaviour change, and regular task redesign reviews for the highest-exposure tasks.

RELATED TERMS

Management Review | Maturity Model | Exposure Baseline | Programme Review | Task Redesign

448 **Programme Review** PROGRAMME

DEFINITION

A programme review is a periodic comprehensive assessment of the entire hand safety programme, including its objectives, performance data, critical controls, resource allocation, and plans for the next period.

WHY IT MATTERS

A programme review is the moment when leadership decides whether the current approach is working or whether a new focus, additional resource, or fundamental change is needed. It is most useful when it is based on field-level evidence rather than aggregated statistics.

INDUSTRIAL EXAMPLES

A programme review for hand safety might examine whether exposure baselines have been established, whether the glove register is current, whether the top five highest-exposure tasks have assigned controls, and whether serious hand injuries have been investigated to root cause. The output is a set of prioritised actions for the next twelve months.

RELATED TERMS

Management Review | Continuous Improvement | Hand Safety KPI | Hand Safety Programme | Maturity Model

449 **Rigging Plan** RIGGING

DEFINITION

A rigging plan is a documented method for how a load will be lifted, including the attachment points, sling configuration, equipment to be used, weight, centre of gravity, and sequence of operations.

WHY IT MATTERS

A rigging plan that does not address hand exposure during hook-up, tensioning, landing, and sling removal leaves the riskiest moments without a defined safe method. The plan is most useful when it specifies not just what equipment to use but where hands must not be during each stage.

INDUSTRIAL EXAMPLES

A rigging plan for lifting a pump would include the attachment points, sling type and length, the lift sequence, the landing supports, and the method for guiding the load without direct hand contact. A plan that says 'guide by hand' at the landing stage has an unresolved exposure.

RELATED TERMS

Lift Plan | Sling Handling | Suspended Load | Competent Person | Hand Placement

HSF INDUSTRIAL HAND SAFETY ENCYCLOPEDIA · VOLUME 1

Load Handling and Rigging Specifics

450 **Lift Plan** RIGGING

DEFINITION

A lift plan is a documented set of instructions for a specific lifting operation, prepared by a competent person, covering the load, equipment, method, roles, hazards, and controls.

WHY IT MATTERS

For hand safety, a lift plan must address the moment of landing — the point where load weight and hand proximity combine most dangerously. A plan that ends when the load is in the air misses the stage where most hand crush injuries occur.

INDUSTRIAL EXAMPLES

Lift plans are prepared for crane picks, chain block lifts, forklift tasks, and multi-point lifts. A lift plan for placing a mould box onto locating pins should specify the tagline method, the exclusion zone, the signal cue for final lowering, and the tool used for final alignment.

RELATED TERMS

Rigging Plan | Load Landing | Lifting Operations Regulation | Signal Person | Exclusion Zone

451 **Centre of Gravity** RIGGING

DEFINITION

The centre of gravity is the point at which a load's weight is balanced in all directions. When a load is lifted, it will rotate or tilt until its centre of gravity is directly below the lifting point.

WHY IT MATTERS

A load that tilts unexpectedly during a lift can rotate, shift slings, and change the approach angle to the landing point. Workers guiding the load by hand when this happens may be struck, crushed, or dragged as the load moves to its balanced position.

INDUSTRIAL EXAMPLES

Centre of gravity matters when lifting asymmetric loads, long pipes, frames with uneven weight distribution, and machinery with heavy internal components. A worker who does not know a pump's centre of gravity may find it rotating away from the intended landing orientation at the last moment.

RELATED TERMS

Load Rotation | Rigging Plan | Lift Plan | Suspended Load | Sling Angle

452 **Load Path** RIGGING

DEFINITION

Load path is the route a load travels from its pick-up point to its set-down point, including all intermediate positions, turns, lifts, and approaches.

WHY IT MATTERS

Workers who stand in the load path to guide, catch, or slow the load are in the highest-risk position. Understanding the full load path before the lift starts allows the crew to position bodies, hands, and tools outside the movement corridor.

INDUSTRIAL EXAMPLES

Load path planning identifies where the load will swing if tension is released, which structures it might contact, and where workers must not stand. For an offshore crane pick, the load path analysis would include deck obstacles, sling angle changes, and final approach to the landing zone.

RELATED TERMS

Line of Fire | Exclusion Zone | Swing Radius | Lift Plan | Suspended Load

453 **Sling Angle** RIGGING

DEFINITION

Sling angle is the angle between the sling leg and the horizontal plane. As the angle decreases below 90 degrees, the tension in each sling leg increases, reducing the effective load capacity.

WHY IT MATTERS

Low sling angles increase tension forces and can cause slings to slip inward on the load, changing the centre of gravity position and causing unexpected load movement. Workers adjusting slings under tension or guiding a shifting load face crush and entanglement exposure.

INDUSTRIAL EXAMPLES

Sling angle effects become critical below 60 degrees. At 30 degrees, each sling leg carries twice the load it would at 90 degrees. A rigger who shortens one sling to correct load tilt changes the sling angles and load balance, which can cause the load to swing during adjustment.

RELATED TERMS

Sling Handling | Working Load Limit | Safety Factor | Load Rotation | Rigging Plan

454 **Choke Hitch** RIGGING

DEFINITION

A choke hitch is a sling configuration where the sling passes around the load and back through its own eye or end fitting, tightening as the load takes weight. It is used to grip loads without defined lifting points.

WHY IT MATTERS

A choke hitch tightens under load, which means the sling bites into the load and changes position as tension increases. Workers guiding the load or adjusting the hitch position under tension may have fingers caught between the sling and the load surface.

INDUSTRIAL EXAMPLES

Choke hitches are used for lifting pipes, beams, and other loads without dedicated lifting eyes. An experienced rigger positions the choke point before the lift, verifies it will not slip, and ensures no fingers are between sling and load when the crane takes weight.

RELATED TERMS

Sling Handling | Sling Angle | Basket Hitch | Working Load Limit | Crush Injury

455 **Basket Hitch** RIGGING

DEFINITION

A basket hitch is a sling configuration where the load is cradled in the bight of the sling, with both ends attached to the hook. It provides higher load capacity than a choke hitch but requires the load to be balanced.

WHY IT MATTERS

A basket hitch can allow the load to roll or slide sideways if the attachment points are not centred over the centre of gravity. A load that rolls during a basket lift can trap or crush the hands of workers guiding it toward the landing position.

INDUSTRIAL EXAMPLES

Basket hitches are used for lifting pipes, structural members, bundles, and flat plates. A worker supporting a pipe in a basket hitch during final positioning must keep hands on the outside of the sling path, not between the sling and the landing structure.

RELATED TERMS

Choke Hitch | Vertical Hitch | Sling Handling | Load Rotation | Crush Injury

456 **Vertical Hitch** RIGGING

DEFINITION

A vertical hitch is a sling configuration where the sling is attached directly to the load at one end and the hook at the other, with the load hanging vertically below. It provides the lowest capacity of the three common hitch types.

WHY IT MATTERS

Vertical hitches require a positive attachment point on the load. A load that spins freely in a vertical hitch can rotate during the lift, wrapping the tagline around a worker's hand or swinging the load into the guiding crew.

INDUSTRIAL EXAMPLES

Vertical hitches are used with shackles, hooks, and lifting eyes. An operator lowering a load on a single vertical hitch would use a tagline to prevent spin and maintain orientation, keeping hands on the tagline rather than on the load.

RELATED TERMS

Basket Hitch | Choke Hitch | Tagline | Load Rotation | Anti-Rotation Device

457 **Working Load Limit** RIGGING

DEFINITION

Working load limit, or WLL, is the maximum load that lifting equipment, a sling, shackle, or accessory is designed to handle under normal conditions. It is marked on the equipment and must not be exceeded.

WHY IT MATTERS

Exceeding the WLL increases the risk of equipment failure, which can drop the load onto the rigging crew or cause sudden shock loading. Workers guiding a load when sling failure occurs have no warning before the load drops or swings.

INDUSTRIAL EXAMPLES

WLL markings appear on shackles, slings, hooks, and lifting eyes. A rigger selecting a shackle for a heavy lift checks the WLL against the calculated load including dynamic factors. A shackle used beyond its WLL may not fail immediately but may fail under the next load or shock event.

RELATED TERMS

Safety Factor | Sling Inspection | Rigging Plan | Dynamic Load | Shock Load

458 **Safety Factor** RIGGING

DEFINITION

Safety factor in rigging is the ratio between a component's minimum breaking strength and its working load limit. A typical safety factor for rigging equipment is 5:1, meaning the breaking strength is five times the working load limit.

WHY IT MATTERS

Safety factors account for dynamic loads, wear, inspection intervals, and field conditions. A rigging accessory used at its WLL under dynamic conditions, or one that has degraded since last inspection, may have a reduced effective safety factor without showing visible damage.

INDUSTRIAL EXAMPLES

Safety factors are applied when selecting slings, shackles, wire rope, and below-the-hook devices. A chain sling with a 5:1 safety factor and a WLL of two tonnes has a minimum breaking strength of ten tonnes, but shock loading, kinking, and angle changes reduce this margin in practice.

RELATED TERMS

Working Load Limit | Dynamic Load | Shock Load | Sling Inspection | Rigging Plan

459 **Dynamic Load** RIGGING

DEFINITION

A dynamic load is the force applied to lifting equipment when a load is accelerated, decelerated, or subjected to impact. It is higher than the static weight of the load.

WHY IT MATTERS

Dynamic loads can exceed the WLL of rigging equipment, especially when a crane lifts quickly, a load swings and is arrested, or a tagline is jerked to stop rotation. Workers trying to arrest load movement by hand are absorbing dynamic load forces with their grip, fingers, and wrists.

INDUSTRIAL EXAMPLES

Dynamic loads are generated when a crane hook is raised quickly before the sling is fully taut, when a load swings and hits a stop, or when offshore equipment is lifted from a moving supply vessel. Rigging plans for dynamic conditions use a higher safety factor and specify controlled movement speeds.

RELATED TERMS

Shock Load | Working Load Limit | Safety Factor | Tagline | Load Swing

460 **Shock Load** RIGGING

DEFINITION

A shock load is a sudden high-force impact applied to rigging equipment or a structure, typically caused by a load dropping and then being arrested, or by a snatch lift where tension builds suddenly.

WHY IT MATTERS

Shock loads can exceed breaking strength and cause sudden equipment failure. A worker holding a tagline when the rigging shocks may have the rope pulled violently through the hand, causing rope burns, degloving, or fractures. Wrapping a tagline around the hand prevents release and worsens injury.

INDUSTRIAL EXAMPLES

Shock loads occur when a crane hook is raised before the sling is properly seated, when a load is dropped a short distance and caught by a taut sling, or when a supply vessel drops away from under a lifted load offshore. Rigging standards prohibit sudden acceleration and require smooth controlled lifts.

RELATED TERMS

Dynamic Load | Working Load Limit | Tagline Handling | Snap-Back | Rigging Plan

461 **Side Load** RIGGING

DEFINITION

A side load is a horizontal or angled force applied to a hook, shackle, lifting eye, or other component designed to bear vertical load only. Side loading reduces the effective capacity and can cause bending, deformation, or failure.

WHY IT MATTERS

Workers trying to guide a load laterally by hand, or pulling on a tagline at an angle, may inadvertently side-load a hook or shackle. A deformed hook may not release the sling after landing, requiring the worker to place hands close to the load to free the accessory.

INDUSTRIAL EXAMPLES

Side loading occurs when a crane hook moves horizontally while a load remains stationary, when a tagline is pulled too sharply, or when a load is dragged sideways on the ground before being lifted. Riggers check for hook gate deformation and side-loading damage during inspection.

RELATED TERMS

Working Load Limit | Hook Latch | Shackle Handling | Load Swing | Sling Inspection

462 **Load Rotation** RIGGING

DEFINITION

Load rotation is the spinning or turning of a suspended load around its vertical axis during a lift. It may be caused by sling twist, asymmetric attachment, wind, or load shape.

WHY IT MATTERS

A rotating load can wrap taglines around a worker's hand, swing the load unpredictably, and make final positioning unreliable. Attempting to stop load rotation by placing hands on the load during the lift creates severe impact and crush exposure.

INDUSTRIAL EXAMPLES

Load rotation is common when lifting long pipes on a single vertical hitch, asymmetric frames, or loads with a high centre of gravity. Anti-rotation devices and correctly deployed taglines manage rotation without hand contact.

RELATED TERMS

Anti-Rotation Device | Tagline | Vertical Hitch | Centre of Gravity | Load Swing

463 **Tag Point** RIGGING

DEFINITION

A tag point is a dedicated attachment location on a load where a tagline is connected to control rotation and movement during a lift. It is built into the load design rather than improvised during the lift.

WHY IT MATTERS

A load without a designated tag point forces workers to improvise tagline attachment or to control the load directly by hand. An improvised attachment may slip, release suddenly, or not give effective control, pushing the worker closer to the load to compensate.

INDUSTRIAL EXAMPLES

Tag points are welded onto mould boxes, equipment frames, pipe spools, and structural steel. A designer who specifies lifting eyes without tag points shifts the tagline problem to the rigging crew on the day of the lift.

RELATED TERMS

Tagline | Load Rotation | Anti-Rotation Device | Rigging Plan | Pad Eye

464 **Lifting Lug** RIGGING

DEFINITION

A lifting lug is a structural attachment point welded or bolted to a load to provide a connection for slings, shackles, or hooks. It must be designed, fabricated, and tested to the weight and load path it will carry.

WHY IT MATTERS

A poorly designed or damaged lifting lug can fail suddenly, dropping the load onto the rigging crew. Workers aligning the load during hook-up or guiding the load during landing need to know whether lifting lugs have been rated and inspected.

INDUSTRIAL EXAMPLES

Lifting lugs are welded onto pressure vessels, skids, frames, and large components for fabrication and installation lifts. A rigging plan specifies the rated lug locations and prohibits attaching rigging to non-rated protrusions.

RELATED TERMS

Pad Eye | Rigging Plan | Working Load Limit | Shackle Handling | Sling Handling

465 **Pad Eye** RIGGING

DEFINITION

A pad eye is a fixed lifting point consisting of a plate and eye welded to a structure, vessel, or load. It provides a rated connection point for lifting accessories and is a common alternative to a bolt-on lifting lug.

WHY IT MATTERS

A pad eye that is corroded, cracked at the weld, or not rated for the actual lift load creates a failure risk. Workers landing a load using a failed pad eye have no warning before the load drops. Inspection before use is essential.

INDUSTRIAL EXAMPLES

Pad eyes are found on offshore structures, pressure vessels, lifting frames, and heavy equipment. An inspection before a lift checks for corrosion, weld cracks, through-hole condition, and any deformation from previous use.

RELATED TERMS

Lifting Lug | Rigging Plan | Sling Inspection | Working Load Limit | Shackle Handling

466 **Below-the-Hook Device** RIGGING

DEFINITION

A below-the-hook device is lifting equipment that connects between the crane hook and the load, such as a spreader bar, lifting beam, rotating hook, or vacuum lifter. Each device has its own WLL and operating requirements.

WHY IT MATTERS

Below-the-hook devices can reduce the need for workers to hold, guide, or steady asymmetric loads directly. However, a device that is too large, too short, or poorly matched to the load shape may require manual correction of the load position, reintroducing hand exposure.

INDUSTRIAL EXAMPLES

Below-the-hook devices are used for long structural members, delicate surfaces, and loads that cannot be choked. A spreader bar on a long pipe lift distributes the load across multiple attachment points, reducing the risk of pipe bending and load rotation without hand contact.

RELATED TERMS

Spreader Bar | Rigging Plan | Working Load Limit | Load Rotation | Sling Handling

467 **Spreader Bar** RIGGING

DEFINITION

A spreader bar is a rigid below-the-hook device used to maintain a specified horizontal distance between sling attachment points, preventing sling loads from bearing inward on the load.

WHY IT MATTERS

A spreader bar reduces compressive forces on the load sides, but it must be matched to the attachment point spacing on the load. A bar that is too wide or too narrow forces the slings into incorrect angles, creating side loads and increasing the chance of load rotation during landing.

INDUSTRIAL EXAMPLES

Spreader bars are used to lift thin-walled vessels, long structural sections, panels, and equipment with multiple lifting eyes. A rigging team using a spreader bar still needs taglines and a clear landing plan to manage final positioning without hand contact.

RELATED TERMS

Below-the-Hook Device | Sling Angle | Load Rotation | Rigging Plan | Tag Point

468 **Load Cell** RIGGING

DEFINITION

A load cell is an instrument that measures the tension or weight in a rigging arrangement during a lift. It gives a real-time indication of actual load, which can differ from the estimated weight.

WHY IT MATTERS

An unexpected high load reading during a lift may indicate that the load is snagged, that the sling angle is more severe than planned, or that the weight estimate was incorrect. Workers guiding a load that is heavier than expected face higher crush forces if fingers enter the closing gap.

INDUSTRIAL EXAMPLES

Load cells are used during test lifts, lifts near WLL limits, offshore operations, and when load weight is uncertain. A load cell reading above the estimated weight before the load clears the ground is a stop-work trigger.

RELATED TERMS

Working Load Limit | Dynamic Load | Rigging Plan | Lift Plan | Safety Factor

469 **Softener** RIGGING

DEFINITION

A softener is a piece of protective material, typically rubber, timber, or padding, placed between a sling and a load edge to prevent the sling from being cut, abraded, or damaged by the contact.

WHY IT MATTERS

A sling without a softener at a sharp edge can be cut or weakened during the lift, creating a failure risk. Workers who do not add softeners and must place hands near the sling during load guidance are working near a rigging component whose integrity has been compromised.

INDUSTRIAL EXAMPLES

Softeners are placed at corners of steel plates, on flanges of structural members, and on any sharp edge where a sling crosses the load. A rigging plan for a fabricated steel frame specifies softener placement at each contact point before the lift begins.

RELATED TERMS

Sling Inspection | Sling Handling | Working Load Limit | Rigging Plan | Safety Factor

470 **Sling Inspection** RIGGING

DEFINITION

Sling inspection is the examination of a sling before use to identify cuts, kinks, broken wires, corrosion, heat damage, chemical damage, deformation, or reduced capacity. It is required before each use for lifting accessories.

WHY IT MATTERS

A sling that passes visual inspection may still have internal wire breaks, corrosion, or previous overload deformation that reduces its capacity. Workers relying on a degraded sling that fails during a lift may be struck, crushed, or caught in collapsing rigging.

INDUSTRIAL EXAMPLES

Sling inspection covers wire rope slings for broken outer wires, kinks, and fish-hooked strands; chain slings for elongation and cracked links; and synthetic slings for cuts, UV damage, and chemical staining. A sling found defective is removed from service immediately.

RELATED TERMS

Working Load Limit | Softener | Rigging Plan | Lifting Lug | PPE Regulation

471 **Hook Latch** RIGGING

DEFINITION

A hook latch is the spring-loaded safety catch on a lifting hook that prevents an accidentally dislodged sling, shackle, or load from falling out of the hook throat.

WHY IT MATTERS

A missing, damaged, or tied-open hook latch removes the secondary retention for the sling or load. A sling that backs off the hook during landing can drop the load without warning onto the hands of workers guiding the final position.

INDUSTRIAL EXAMPLES

Hook latches are checked during rigging inspections and before each use. A bent latch that does not close fully, or a latch that has been wired open for convenience, is an unsafe condition that must be corrected before the lift starts.

RELATED TERMS

Shackle Handling | Sling Handling | Working Load Limit | Side Load | Rigging Plan

472 **Anti-Rotation Device** RIGGING

DEFINITION

An anti-rotation device is a swivel, bearing, or mechanical attachment that allows a suspended load to be held in a fixed orientation, preventing or controlling rotation during a lift.

WHY IT MATTERS

Without an anti-rotation device, a load on a vertical hitch may spin freely. A spinning load that is stopped by hand rather than by a tagline or swivel can entangle the tagline around the worker's arm or force the worker to move into the swing radius to regain control.

INDUSTRIAL EXAMPLES

Anti-rotation devices are used for long pipe lifts, asymmetric equipment, and loads that have previously shown rotation tendencies. They reduce the need for workers to maintain hand contact with the load to prevent spin.

RELATED TERMS

Load Rotation | Vertical Hitch | Tagline | Tag Point | Below-the-Hook Device

473 **Rigging Signal** RIGGING

DEFINITION

A rigging signal is a standardised hand, verbal, or radio signal used to communicate movement instructions between a signal person and a crane operator or equipment driver. Signals must be agreed and understood before the lift begins.

WHY IT MATTERS

A misunderstood rigging signal can move a load when a worker's hand is in the closing gap, under the load, or inside the sling path. Using non-standard or improvised signals during a complex lift creates the conditions for an unexpected movement at the worst moment.

INDUSTRIAL EXAMPLES

Rigging signals cover all movements: hoist, lower, travel, stop, and emergency stop. A signal team that has not briefed the crane operator on a customised signal for final inch lowering may find the operator misinterpreting a hold signal as a lower command at the moment of landing.

RELATED TERMS

Signal Person | Communication Cue | Lift Plan | Load Landing | Exclusion Zone

HSF INDUSTRIAL HAND SAFETY ENCYCLOPEDIA · VOLUME 1

Final Reference Terms and Hand Safety Concepts

474 **Finger-as-Feeler** REFERENCE

DEFINITION

Finger-as-feeler is the unsafe use of a fingertip to test temperature, sharpness, movement, alignment, or fit by touch rather than using an instrument, tool, or safe inspection method.

WHY IT MATTERS

Using a finger to feel whether a surface is hot, whether an edge is sharp, whether a part is moving, or whether two faces are flush puts the most sensitive and exposed part of the hand directly into the hazard. The information gained is real but the price is fingertip injury at exactly the moment of discovery.

INDUSTRIAL EXAMPLES

Finger-as-feeler occurs when a worker touches a pipe to check temperature, slides a fingertip along a cut edge to check for burrs, places a finger on a shaft to check if it is rotating, or pushes a fingertip into a gap to feel whether two faces are aligned.

RELATED TERMS

Finger-as-Spacer | Blind Reach | Touch | Tactile Feedback | Fingertip

475 **Crush Line** REFERENCE

DEFINITION

A crush line is the specific contact surface where a moving or settling object will meet a fixed surface, support, or structure. The crush line defines exactly where fingers will be trapped if they remain in position.

WHY IT MATTERS

Naming the crush line in a task description is more useful than saying 'keep hands clear'. A worker who knows the load will settle onto a steel channel at a specific edge can visualise precisely where fingers must not be, rather than trying to interpret a general warning.

INDUSTRIAL EXAMPLES

The crush line on a mould box landing is the bottom edge of the box meeting the support frame. For a suspended pipe being lowered onto a saddle, the crush line is where the pipe surface contacts the saddle top. These specific points are where injuries happen, not some vague nearby zone.

RELATED TERMS

Pinch Point | Closing Gap | Load Landing | Finger-as-Spacer | Last-Inch Exposure

476 **Snap-Back** REFERENCE

DEFINITION

Snap-back is the sudden and violent recoil of a rope, wire, strap, chain, or cable when it breaks, releases, or loses tension under load. The recoiling material travels at high speed through the area where it was tensioned.

WHY IT MATTERS

Snap-back injures hands that are on the line, near the line, or in the release path. A rope that breaks under tension does not fall — it whips with the energy stored in its stretch. Workers who stand in the snap-back zone while tensioning, cutting, or releasing lines are in direct danger.

INDUSTRIAL EXAMPLES

Snap-back events occur when mooring lines part, wire rope slings break, tensioned straps are cut, synthetic slings are overloaded, and anchor lines are released. A safety exclusion zone around a tensioned line should always account for the full snap-back radius.

RELATED TERMS

Rebound Zone | Shock Load | Strap Cutting | Wire Rope Handling | Line of Fire

477 **Sudden Release** REFERENCE

DEFINITION

Sudden release is the unplanned rapid movement, ejection, or change in force that occurs when a stuck, pressurised, tensioned, compressed, or jammed component frees itself.

WHY IT MATTERS

Sudden release injures hands because the worker applying force anticipates continued resistance. When resistance disappears, the hand continues in the direction of force and strikes whatever is in the path. The faster the release, the less time there is to stop the hand.

INDUSTRIAL EXAMPLES

Sudden release occurs when a seized bolt breaks free, a stuck valve opens, a jammed pipe clears, a compressed fitting ejects, or a wedge drops out from under a load. A spanner hand that travels past the nut after sudden release commonly strikes a flange, steel frame, or adjacent surface.

RELATED TERMS

Tool Slip | Overtravel | Stored Energy Release | Rebound Zone | Snap-Back

478 **Reaction Torque** REFERENCE

DEFINITION

Reaction torque is the rotational force that acts on the body holding a powered tool when the tool applies torque to a fastener or component. The tool transmits its torque to the worker's hands and arms in the opposite direction.

WHY IT MATTERS

Reaction torque can twist the wrist, pull the hand into nearby steel, or overload grip on sudden changes in resistance. At high torque settings, a hand holding an impact wrench or torque multiplier may be violently rotated if the tool stalls or the fastener breaks.

INDUSTRIAL EXAMPLES

Reaction torque is significant with pneumatic impact wrenches, hydraulic torque tools, torque multipliers, and powered drilling equipment. Workers using high-torque tools brace against reaction force, but if the fastener suddenly frees or breaks, the reaction changes direction instantly.

RELATED TERMS

Pneumatic Tool | Pronation | Supination | Tool Control | Sudden Release

479 **Rebound Energy** REFERENCE

DEFINITION

Rebound energy is the force carried by a tool, bar, chisel, or workpiece when it bounces back after a missed or glancing impact. It moves in the direction opposite to the original strike.

WHY IT MATTERS

A hammer blow that glances off a chisel sends the hammer back toward the striking hand and the chisel toward the supporting hand. A pry bar that misses its bite rebounds toward the worker's body. Rebound energy is highest when the contact is brief and the tool or material is hard.

INDUSTRIAL EXAMPLES

Rebound energy injuries occur when a hammer glances off a punch, when a sledgehammer bounces off a hard steel surface, when a cold chisel is struck at an angle, or when a pry bar slips during a forceful lever attempt.

RELATED TERMS

Hammering | Chiselling | Rebound Zone | Struck-By Zone | Impact Injury

480 **Hose Whip** REFERENCE

DEFINITION

Hose whip is the violent, uncontrolled movement of a pressurised hose when a fitting fails, a coupling separates, or pressure is released suddenly. The free end of the hose travels rapidly in an unpredictable path.

WHY IT MATTERS

A whipping hose can strike hands, arms, and faces with enough force to cause lacerations, fractures, and contusions. Workers who are holding, guiding, or standing near a pressurised hose at the moment of failure have no time to move clear.

INDUSTRIAL EXAMPLES

Hose whip occurs when a pneumatic hose coupling fails during tool use, when a hydraulic hose burst occurs near the end fitting, when a steam hose ruptures, or when a pressurised water hose coupling is knocked loose. Hose whip restraints and proper coupling maintenance reduce the risk.

RELATED TERMS

Hose Handling | High-Pressure Fluid Leak | Stored Energy Release | Snap-Back | Pressure Zone

481 **Hand Clearance** REFERENCE

DEFINITION

Hand clearance is the physical space available around the hand during a task. It determines how much room the hand has to avoid contact with nearby hazards when applying force, releasing, or withdrawing.

WHY IT MATTERS

Insufficient hand clearance means that even a correct hand position can lead to injury when the tool slips, the part moves, or the hand has to be withdrawn quickly. Designing enough clearance around handles, fasteners, and access points is an engineering contribution to hand safety.

INDUSTRIAL EXAMPLES

Hand clearance is assessed when selecting spanner access to a flange bolt in a tight space, when designing machine handles, when planning valve handwheel positions, and when specifying lifting accessory connection heights above decks or platforms.

RELATED TERMS

Knuckle Clearance | Handle Design | Tool Control | Confined Space Hand Safety | Engineering Control

482 **Gap Width** REFERENCE

DEFINITION

Gap width is the measured distance between two surfaces at a potential pinch or crush point. It determines whether a finger, thumb, or hand can enter and whether it can be withdrawn if the gap closes.

WHY IT MATTERS

A gap wide enough for a finger to enter but not wide enough to allow withdrawal is an entrapment zone. Designing gaps either smaller than a fingertip or larger than a fist removes the entrapment possibility. Many machine guarding standards specify minimum and maximum gap widths for this reason.

INDUSTRIAL EXAMPLES

Gap width is measured at flange joints, machine guard openings, conveyor side clearances, press die sets, and roller entry points. A gap that can accept a finger but closes to half that width under load is a pinch point regardless of how slowly it closes.

RELATED TERMS

Pinch Point | Entrapment Zone | Closing Gap | Machine Guard | Engineering Control

483 **Safe Reach** REFERENCE

DEFINITION

Safe reach is the maximum distance a worker can extend a hand or arm to perform a task while keeping the body in a stable, balanced position and the hand within a safe zone.

WHY IT MATTERS

Overreaching puts the hand in positions where grip is weakened, control is reduced, and withdrawal is slow. A worker stretching to place a bolt, align a component, or clear a blockage beyond their comfortable reach may have the hand deeper into the hazard zone than they realise.

INDUSTRIAL EXAMPLES

Safe reach matters when accessing components above head height, reaching behind equipment, working from a ladder, or stretching across a machine bed. Task layout that places the work within safe reach prevents the overreach that leads to awkward grip and poor hand placement.

RELATED TERMS

Awkward Posture | Hand Placement | Blind Reach | Workstation Design | Range of Motion

484 **Isolation Certificate** REFERENCE

DEFINITION

An isolation certificate is a formal document confirming that a system, machine, or energy source has been isolated, locked, and tested as safe before work begins. It specifies what has been isolated, who performed the isolation, and who is authorised to work.

WHY IT MATTERS

An isolation certificate that does not list all energy sources relevant to hand entry leaves residual exposure. Hydraulic pressure, spring force, and gravity loads may remain after electrical isolation. Workers entering equipment trusting an incomplete certificate face unexpected movement.

INDUSTRIAL EXAMPLES

Isolation certificates are issued for conveyor maintenance, press cleaning, hydraulic system work, pipeline entry, and rotating equipment maintenance. The worker who will place hands inside the equipment should verify the isolation themselves rather than relying entirely on the certificate.

RELATED TERMS

Lockout/Tagout | Energy Isolation Check | Permit to Work | Residual Energy | Stored Energy Release

485 **Hot Work Permit** REFERENCE

DEFINITION

A hot work permit is a formal authorisation for work involving heat, sparks, or open flame, such as welding, grinding, cutting, or soldering, in areas where fire or explosion risk exists.

WHY IT MATTERS

Hot work permits protect hands indirectly by defining the preparation and controls before ignition sources are introduced. Workers starting grinding or welding without a permit may begin in an area with flammable residue, creating fire, explosion, or heat injury exposure beyond the direct tool hazard.

INDUSTRIAL EXAMPLES

Hot work permits are required before welding near fuel systems, grinding in paint shops, cutting in chemical areas, and working with torches near insulated pipelines. The permit defines the fire watch, the exclusion zone, the PPE required, and the cooling-down procedure after work.

RELATED TERMS

Permit to Work | Welding Hand Exposure | Hot Contact Zone | Thermal Glove | PPE Regulation

486 Dropped Object Prevention

REFERENCE

DEFINITION

Dropped object prevention is the set of controls applied to prevent tools, components, fasteners, and equipment from falling from height onto workers below. For hand safety, it protects workers from falling objects striking the hands.

WHY IT MATTERS

A dropped object striking the back of the hand can fracture metacarpals, split the nail bed, or crush the distal phalanx in a single event. Workers below a task who hold loads, guide rigging, or position components are directly in the dropped object path.

INDUSTRIAL EXAMPLES

Dropped object prevention includes tool lanyards, tethered equipment, tool bags, toe boards, nets, and exclusion zones under elevated work. A rigger receiving a load from height has both the load landing hazard and the dropped object hazard from any loose rigging hardware above.

RELATED TERMS

Falling Object Path | Struck-By Zone | Distal Phalanx | Exclusion Zone | Rigging Signal

487 Hand Safety Moment

REFERENCE

DEFINITION

A hand safety moment is a brief, focused discussion at the start of a meeting, shift, or task that highlights one specific hand hazard, injury pattern, or safe behaviour. It is typically two to five minutes long.

WHY IT MATTERS

A hand safety moment is most effective when it describes a real, specific event or near miss rather than a general reminder to wear gloves. A moment that shows a photograph of a fingertip injury at a flange gap and asks the crew what they would do differently is remembered longer than a general caution.

INDUSTRIAL EXAMPLES

Hand safety moments are used at the start of team meetings, shift handovers, contractor briefings, and site walks. An effective moment for a rigging crew might describe a specific tagline entanglement event, show the hand injury result, and ask the crew to name the control that would have prevented it.

RELATED TERMS

Toolbox Talk | Pre-Job Brief | Exposure Observation | Near Miss | Safety Culture

488 **Safety Stand-Down** REFERENCE

DEFINITION

A safety stand-down is a planned pause in all or part of an operation to address a serious safety concern, following a significant incident, or to reinforce critical safety practices across the workforce.

WHY IT MATTERS

A hand safety stand-down following a serious crush injury or amputation is most effective when it focuses on the specific exposure pathway rather than general hand safety. A stand-down that shows the task, the gap, the missing control, and the redesigned method gives workers something to act on.

INDUSTRIAL EXAMPLES

Stand-downs are called after fatalities, serious injuries, high-potential near misses, or when a pattern of similar events appears. A stand-down for hand injuries during crane landings would demonstrate the correct tagline method, the exclusion zone, and the communication cue sequence.

RELATED TERMS

Stop-Work Authority | Near Miss | Hand Safety Moment | Pre-Job Brief | Toolbox Talk

489 **Golden Rule** REFERENCE

DEFINITION

A golden rule is a non-negotiable safety requirement that applies at all times, regardless of time pressure, supervision, or convenience. Violation of a golden rule is treated as a serious disciplinary matter.

WHY IT MATTERS

A golden rule for hand safety, such as no hand under a suspended load or always use a drift pin for hole alignment, is only effective if it can actually be followed with the tools and methods available. A rule that workers must routinely break to complete their task creates a compliance gap rather than a safety control.

INDUSTRIAL EXAMPLES

Golden rules for hand safety might include no fingers in closing gaps, always use a push-pull tool to guide suspended loads, and always apply personal lockout before placing hands inside equipment. Each rule must be supported by the tools, procedures, and training that make it achievable.

RELATED TERMS

Critical Control | Hand Placement Rule | Stop-Work Authority | Safe System of Work | Compliance Gap

490 **Critical Task** REFERENCE

DEFINITION

A critical task is a work activity where a failure of the control or method could directly result in a serious or fatal hand injury. It requires documented controls, verified competence, and supervisory oversight.

WHY IT MATTERS

Not all hand-hazardous tasks are equally critical. Identifying which tasks carry the highest consequence for hand injury allows the programme to concentrate verification, supervision, and tooling investment where the potential outcome is most severe.

INDUSTRIAL EXAMPLES

Critical tasks for hand safety include crane load landing, press operation, machine maintenance under isolation, flange alignment on process systems, and clearing blockages from powered equipment. Each critical task has an assigned owner, a defined method, and a verification schedule.

RELATED TERMS

High-Risk Task | Critical Control | Performance Standard | Competent Person | Lift Plan

491 **High-Risk Task** REFERENCE

DEFINITION

A high-risk task is a work activity that creates elevated hand exposure due to the frequency of hand entries, the force levels involved, the proximity to moving parts, or the consequences of a control failure.

WHY IT MATTERS

High-risk tasks may not always lead to serious injury, but they create the conditions for one. A task with frequent, low-severity hand exposures may be lower priority than a less frequent task with a higher consequence. Both categories need their own targeted controls.

INDUSTRIAL EXAMPLES

High-risk tasks for hands include sheet metal handling, valve operation with cheater bars, grinding near the supporting hand, load landing without taglines, and clearing blockages from live conveyors. Each task is assessed for exposure frequency, force level, and injury potential.

RELATED TERMS

Critical Task | Risk Register | Exposure Count | Exposure Baseline | Task Redesign

492 **Hands-On Training** REFERENCE

DEFINITION

Hands-on training is instruction delivered through physical practice of the task or skill, not through classroom presentation alone. For hand safety, it includes practising safe hand placement, tool use, and handling method with the actual or representative equipment.

WHY IT MATTERS

Classroom training can describe a drift pin but hands-on training shows a worker how it feels to use one during hole matching under a supervisor's observation. Without the physical practice, the trained behaviour may not appear under real work conditions.

INDUSTRIAL EXAMPLES

Hands-on training for hand safety includes practising load landing with exclusion zones, using push-pull tools on a practice rig, performing lockout on the actual machine, and using a fingersaver during hammering practice. Transfer to the real task is measurable because the behaviour can be observed.

RELATED TERMS

Training Transfer | Toolbox Demonstration | Competency Framework | Simulation Training | Exposure Observation

493 **Simulation Training** REFERENCE

DEFINITION

Simulation training is the use of a replica, model, virtual environment, or representative scenario to teach a skill or procedure without the worker being exposed to the real hazard during learning.

WHY IT MATTERS

Simulation allows workers to make mistakes during training rather than during live work. A worker who practises a crane landing scenario in simulation can learn the correct tagline position, the exclusion zone, and the signal sequence before placing hands near an actual suspended load.

INDUSTRIAL EXAMPLES

Simulation training for hand safety includes tabletop exercises using scale models of lifted loads, virtual reality environments for machine maintenance, mocked-up flange alignment rigs for drift pin practice, and role-play of pre-job briefings for load landing tasks.

RELATED TERMS

Hands-On Training | Training Transfer | Toolbox Demonstration | Competency Framework | Critical Task

494 **Incident Command** REFERENCE

DEFINITION

Incident command is the structured management of a response to a serious workplace event, including a severe hand injury. It defines who is in charge, who communicates, what information is gathered, and how the scene is managed.

WHY IT MATTERS

A severe hand injury — amputation, degloving, or crush with vascular compromise — requires rapid, coordinated response. Without incident command, bystanders may improvise treatment, the injury site may be disturbed before investigation, and medical escalation may be delayed.

INDUSTRIAL EXAMPLES

Incident command for a hand injury involves: immediate first aid by a qualified person, preservation of amputated tissue if applicable, notification of emergency services, isolation of the work area, worker support, management notification, and scene preservation for investigation.

RELATED TERMS

First Aid Response · Golden Hour · Amputation Replantation · Hand Injury Investigation · Emergency Response

495 **Hand Injury Register** REFERENCE

DEFINITION

A hand injury register is a site or organisational record of all hand injuries, near misses, and high-potential events involving hands, including the task, location, injury type, treatment, and time off work.

WHY IT MATTERS

A register that records only lost-time injuries misses the majority of hand injury events and the patterns they contain. Including medical treatment cases, restricted work cases, and near misses gives a complete picture of which tasks, tools, and methods are generating hand contact events.

INDUSTRIAL EXAMPLES

A hand injury register for a fabrication site would record every hand injury regardless of severity, the task being performed, the tool or machine involved, the hand position at the time of injury, and the control that was absent or failed. Analysis of this data drives the next round of task reviews.

RELATED TERMS

Hand Injury Rate · Medical Treatment Case · Lost Time Injury · Root Cause Analysis · RIDDOR

496 **Hand Safety Culture** REFERENCE

DEFINITION

Hand safety culture is the shared values, beliefs, behaviours, and norms within an organisation regarding the protection of hands. It is visible in how workers and leaders talk about, respond to, and prioritise hand exposure at every level.

WHY IT MATTERS

A site with a strong hand safety culture stops work when fingers enter a closing gap, not after the injury. Workers speak up when a tool is missing, supervisors redesign tasks rather than blame individuals, and leaders investigate near misses as seriously as injuries. Culture makes systems work — or prevents them from being needed.

INDUSTRIAL EXAMPLES

Hand safety culture is observed in whether workers use drift pins without being asked, whether near misses are reported without fear, whether stopping work for a missing tool is accepted or penalised, and whether leadership spends time in the field identifying hand exposure rather than reviewing injury statistics.

RELATED TERMS

Safety Culture | Stop-Work Authority | Near Miss Culture | Behaviour | Hand Safety Programme

497 **Lessons Learned** REFERENCE

DEFINITION

Lessons learned is the process of capturing findings from incidents, near misses, audits, and observations and sharing them in a form that other workers, teams, and sites can use to prevent recurrence.

WHY IT MATTERS

A lesson that stays in an investigation report has not been learned. For hand safety, a lesson is learned when the specific task method has changed, the tool is now available, the SOP has been updated, and field verification confirms the new behaviour is in place.

INDUSTRIAL EXAMPLES

Lessons learned from a high-pressure injection injury would include the hose inspection method, the test procedure with hands kept away from fittings, the PPE required, and the first aid response for a pinhole injection wound. The lesson is shared with all sites using similar equipment.

RELATED TERMS

Post-Job Review | Near Miss | Hand Injury Investigation | Root Cause Analysis | Training Transfer

498 **Hand Safety First** REFERENCE

DEFINITION

Hand Safety First is the principle that protecting hands from injury takes priority over task speed, convenience, or production pressure. It reflects the recognition that hand injuries are largely preventable and that the tools, methods, and controls to prevent them are known.

WHY IT MATTERS

Hands are the most frequently injured part of the body in industrial work. They are also the most capable and irreplaceable tools a worker has. Every time a hand enters a closing gap without a drift pin, guides a load without a tagline, or brakes a rolling pipe without a chock, a preventable injury is one moment away. The principle is not a slogan — it is a commitment to doing the work differently.

INDUSTRIAL EXAMPLES

Hand Safety First is demonstrated when a crew pauses a lift to retrieve a missing tagline rather than guiding by hand, when a worker refuses to reach into moving equipment without isolation, when a supervisor redesigns a task rather than approving finger-as-spacer behaviour, and when a site measures exposure counts alongside injury rates.

RELATED TERMS

Safety Culture · Hand Safety Programme · Stop-Work Authority · No-Touch Handling · Hierarchy of Controls

S1 **Fingertip** SUPPLEMENTARY

DEFINITION

The fingertip is the end portion of a finger, comprising the distal phalanx, nail bed, fingernail, finger pad, skin, nerves, and blood vessels. It is the most distal and most exposed part of the hand.

WHY IT MATTERS

Fingertips are used for feeling, guiding, pressing, and positioning — placing them at the point of highest exposure during fine tasks. They are injured more frequently than any other part of the hand in industrial work. A fingertip crush can fracture the distal phalanx, destroy the nail bed, damage digital nerves, and cause long-term hypersensitivity or cold intolerance even when the injury initially appears minor.

INDUSTRIAL EXAMPLES

Fingertip injuries occur when aligning holes, placing washers, guiding suspended loads into final position, checking machined edges by touch, feeding material near a blade, or holding small components during drilling, pressing, or assembly.

RELATED TERMS

Distal Phalanx · Nail Bed · Finger Pad · Pinch Point · Crush Injury · Cold Intolerance · Hypersensitivity

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Supplementary Reference Terms

S2 **Dermatitis** SUPPLEMENTARY

DEFINITION

Dermatitis is inflammation of the skin caused by contact with irritants or allergens. In industrial hand safety, it most commonly appears as occupational contact dermatitis from repeated chemical, oil, cement, solvent, or wet-work exposure.

WHY IT MATTERS

Dermatitis damages the skin barrier that protects the hand from infection and chemical absorption. Cracked, inflamed skin allows chemicals and pathogens to penetrate more easily. Workers with dermatitis often remove gloves because they worsen discomfort, increasing the very exposure that caused the condition. Early signs are regularly dismissed as dry skin until the condition becomes chronic.

INDUSTRIAL EXAMPLES

Dermatitis develops in workers who repeatedly handle cutting fluids, cement, solvents, cleaning agents, epoxy resins, or wet materials without adequate skin protection. A maintenance worker degreasing parts daily or a welder's helper handling flux can develop occupational dermatitis if skin care and barrier protection are not managed.

RELATED TERMS

Chemical Burn | Chemical Contact Zone | COSHH | Glove Contamination | Skin | Chemical Permeation

S3 **Lockout/Tagout** SUPPLEMENTARY

DEFINITION

Lockout/Tagout (LOTO) is a safety procedure that ensures hazardous energy sources are isolated and rendered inoperative before maintenance, cleaning, or repair work begins. A lock prevents re-energisation; a tag communicates the isolation status.

WHY IT MATTERS

LOTO is the primary defence against unexpected machine start-up during maintenance. Without it, a worker's hands inside a conveyor, press, or rotating assembly have no protection if a remote operator, automatic control, or stored energy source moves the equipment. Personal locks applied by the worker who will place hands inside are more protective than shared or supervisor-applied locks.

INDUSTRIAL EXAMPLES

LOTO is applied before clearing conveyor jams, changing press tooling, cleaning inside mixers, and servicing any equipment where hands enter the machine envelope. A rigorous LOTO programme requires each worker to apply their own lock and verify zero energy by attempting to start the equipment before reaching in.

RELATED TERMS

Isolation Standard | Energy Isolation Check | Unexpected Start-Up | Permit to Work | Residual Energy

S4 **Residual Energy** SUPPLEMENTARY

DEFINITION

Residual energy is hazardous energy that remains in a system after the primary isolation has been applied. It may be gravitational, hydraulic, pneumatic, spring, thermal, or capacitive in nature.

WHY IT MATTERS

Residual energy causes many serious maintenance hand injuries because the worker trusts the lockout without verifying that all energy forms have been addressed. A machine that is electrically isolated may still have a pressurised hydraulic cylinder, a raised platform held by friction, a compressed spring, or a hot surface. Each form can move equipment or cause burns when the worker's hand enters.

INDUSTRIAL EXAMPLES

Residual energy examples include hydraulic pressure remaining in a cylinder after electrical isolation, a suspended counterweight held by a brake that may release, a spring-loaded guard that can snap shut, trapped compressed air in a pneumatic line, and thermal energy in a recently operated oven or heated bearing.

RELATED TERMS

Stored Energy Release | Energy Isolation Check | Lockout/Tagout | Unexpected Start-Up | Stored Energy Zone

S5 **Emergency Response** SUPPLEMENTARY

DEFINITION

Emergency response for hand injuries is the immediate, coordinated set of actions taken after a serious hand injury to control bleeding, preserve tissue, arrange transfer, and support the injured worker until definitive medical care is available.

WHY IT MATTERS

The quality of emergency response in the first minutes after a severe hand injury — amputation, degloving, crush with vascular compromise, or high-pressure injection — can affect whether tissue survives and whether replantation is possible. A site without a practised hand injury response protocol will improvise at the moment of highest stress.

INDUSTRIAL EXAMPLES

Emergency response for a finger amputation includes controlling bleeding with direct pressure, wrapping the amputated part in damp gauze inside a sealed bag placed on ice, keeping the worker calm and warm, and arranging urgent transfer with notification to the receiving hospital of a potential replantation case. For high-pressure injection, the response is urgent transfer — not incision at the entry site.

RELATED TERMS

First Aid Response | Golden Hour | Amputation Replantation | Hospital Transfer | Incident Command

S6 **Exposure Assessment** SUPPLEMENTARY

DEFINITION

Exposure assessment is the structured evaluation of how often, how long, and at what intensity hands enter hazardous zones during a specific task or work role. It quantifies exposure before injury occurs.

WHY IT MATTERS

An exposure assessment goes beyond identifying hazards — it measures the dose. A task where fingers enter a pinch zone twenty times per shift carries more risk than one where entry occurs twice, even if the hazard is identical. Assessment results drive decisions about task redesign, tool provision, and control priority.

INDUSTRIAL EXAMPLES

An exposure assessment for a load landing task would count hand entries into the crush zone per lift, measure how long hands remain in contact during final positioning, and record what proportion of lifts use a tagline versus direct hand guidance. The results determine whether the current method requires redesign.

RELATED TERMS

Exposure Baseline | Exposure Count | Exposure Observation | Risk Assessment Requirement | Leading Indicator

S7 **Glove Selection** SUPPLEMENTARY

DEFINITION

Glove selection is the process of matching a glove type, material, size, and performance rating to the specific hazards, task demands, and worker requirements of a job.

WHY IT MATTERS

Wrong glove selection is as dangerous as no glove. A cut-resistant glove used for chemical work may allow permeation. A thick thermal glove used for small-parts assembly may reduce dexterity enough to make workers remove it at the critical moment. Glove selection requires knowing the hazard type, contact duration, required dexterity, and the chemical or thermal environment.

INDUSTRIAL EXAMPLES

Glove selection for a maintenance shutdown would identify different requirements for each task: nitrile-coated for general handling, cut-resistant for sheet metal, chemical-rated for line breaking, thermal for hot components, and impact-rated for heavy rigging. A glove register formalises these selections so workers do not make uninformed choices under pressure.

RELATED TERMS

Glove Register | PPE Limitation | Cut-Resistant Glove | Chemical Glove | Glove Fit | EN 388 | ISO 21420

S8 **Incident Investigation** SUPPLEMENTARY

DEFINITION

Incident investigation is the systematic process of examining a hand injury, near miss, or dangerous occurrence to identify what happened, why it happened, what conditions allowed it, and what changes will prevent recurrence.

WHY IT MATTERS

An investigation that concludes with 'worker failed to keep hands clear' has not found a cause — it has restated the injury. A useful investigation asks why the task required the hand in that position, what tool or method was missing, what the procedure said, and what organisational factors allowed the exposure to continue. The output must change something in the work, not just in the report.

INDUSTRIAL EXAMPLES

A hand injury investigation for a fingertip crush during flange alignment would examine the SOP for hole matching, the availability of a drift pin, the pre-job brief content, the lighting at the workface, the time pressure at that stage of the shutdown, and whether the same method had been used previously without injury.

RELATED TERMS

Root Cause Analysis | Hand Injury Investigation | Near Miss | SOP Gap | Learning from Incidents

S9 **Lagging Indicator** SUPPLEMENTARY

DEFINITION

A lagging indicator is a safety performance measure that records what has already happened — typically injury counts, lost time rates, or medical treatment cases. It shows the outcome of past exposure rather than predicting future risk.

WHY IT MATTERS

Lagging indicators are necessary but insufficient for hand safety management. A site with zero hand injuries in a given month may still have hundreds of uncontrolled hand entries into crush, cut, and pinch zones every shift. Relying on lagging indicators alone means the programme is managed by counting injuries after they occur rather than preventing the exposures that cause them.

INDUSTRIAL EXAMPLES

Lagging indicators for hand safety include lost time injury rate, medical treatment case count, restricted work day rate, and number of reportable hand injuries. These are compared against leading indicators — exposure counts, near miss reports, and critical control verification rates — to give a complete performance picture.

RELATED TERMS

Leading Indicator | Hand Injury Rate | Lost Time Injury | Medical Treatment Case | Exposure Count

ALPHABETICAL INDEX