HSF LOADGRAB®

# THE LOADGRAB® GUIDE

*to Engineered Load Interaction*

## ENGINEER THE INTERFACE

*The engineered interface keeps the worker separated from the hazard while maintaining control of the load.*

# LOADGRAB®

*The Industrial Guide to Engineered Load Interaction*

*Engineering the Interface Between Workers and Loads*

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**LOADGRAB® — The Industrial Guide to Engineered Load Interaction**

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THE HSF DOCTRINE

# When there is no engineered interface, the worker **becomes the interface.**

THE FOUR FUNDAMENTAL INTERACTIONS

| | |
|---|---|
| **Lift** | The load must be raised without a designed attachment point |
| **Guide** | The load must be directed while suspended or in motion |
| **Control** | The load must be held steady during work performed on it |
| **Retrieve** | The load must be extracted with no clearance beneath it |

HSF LOAD GRAB®

INTERACT WITH LOADS. NOT HAZARDS.

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PART 1

# Why Workers Get Hurt Interacting With Loads

*When there is no engineered interface,*
*the worker becomes the interface.*

# Why Workers Get Hurt Interacting With Loads

## The Moment Nobody Plans For

Ask a maintenance engineer where hands get hurt and he will not mention machinery guards or electrical panels. He will describe a moment that looked completely routine.

A pipe being shifted. A motor being lowered into position. A roller being pulled clear of a conveyor frame. A steel plate being lifted from a stack.

Nobody planned for anything to go wrong. The load was not unusually heavy. The task had been done dozens of times before. And then, in a fraction of a second, the hand was in the wrong place.

This is the pattern. Not catastrophic failure. Not ignored warnings. A familiar task, performed without an engineered interface between the worker and the load.

## Loads Do Not Announce Themselves

Chemical hazards are labelled. Electrical hazards are marked. Confined spaces are permitted. But a steel roller sitting on a maintenance bench carries no warning. A conveyor idler waiting to be reinstalled looks completely inert. A suspended pump looks like it is under control.

The hazard in load interaction is invisible because it is not a property of the load itself. It is a property of the relationship between the worker and the load. When that relationship is unmanaged — when a worker's hands are the primary point of contact with an industrial component — the hazard exists whether or not anyone recognises it.

## How Hands Enter the Danger Zone

In every industry, in every plant, workers interact with loads using the same instinctive approach: they use their hands. Not because they are careless. Because

hands are the most available, most adaptable, most immediate tool at the point of the task.

A pipe has no handle. A valve has no lifting point. A steel plate offers no grip. So the worker creates one — with his fingers, his palm, the gap between a component and the floor. This is not a behaviour problem. It is a design problem. The question is never *why did the worker use his hands.* The question is *why was there no engineered interface.*

## Improvisation Becomes the Method

A temporary workaround often becomes the accepted method. A worker finds a place to grip. The task gets completed. The same hold is used again. Others observe it and copy it. Eventually, an improvised interaction becomes standard practice — not because it was evaluated, but because it worked often enough that no one questioned it.

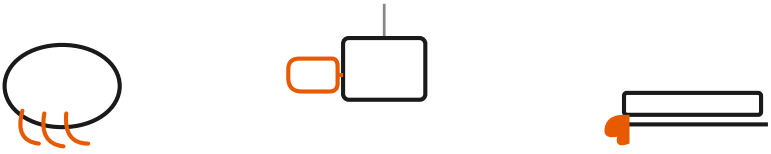
The absence of an incident is then treated as proof that the method is safe. But repetition does not validate an interface. It only repeats the exposure.

## The Three Exposure Zones

**The grip zone.** The worker must hold, carry or stabilise the load. Fingers curl underneath. Palms press against surfaces. The load shifts, rotates or drops — and the hand absorbs the consequence.

**The guide zone.** A suspended or moving load must be directed. The worker reaches toward it to push, pull or steady it. The load swings or contacts a fixed structure — with the worker's hand between them.

**The retrieval zone.** A component must be picked up from a surface, a rack or a floor. There is no clearance underneath. Fingers slide into the gap. The load rocks forward as it is lifted.




## Why Experience Does Not Protect

Experience may improve execution. It does not remove exposure built into the task. A worker who has lifted a conveyor roller fifty times knows exactly how it behaves. He also places his hands in exactly the same position every time. The fifty-first time, something is different — and the injury that experience was supposed to prevent happens anyway.

Exposure is structural. It exists in the task design, not in the worker's skill level.

## What Changes When the Interface Is Engineered

When a load has an engineered interaction point, three things change immediately. The worker's hands move away from the load surface. The point of force transfer shifts from skin and bone to a designed tool. And the consequence of an unexpected load movement is absorbed by the tool rather than the hand.

**WHEN THE LOAD PROVIDES NO DESIGNED INTERFACE,**
**THE WORKER IMPROVISES ONE.**

**WHEN THERE IS NO ENGINEERED INTERFACE,**
**THE WORKER BECOMES THE INTERFACE.**

PART 2

# The HSF Philosophy of Engineered Load Interaction

*When there is no engineered interface,*
*the worker becomes the interface.*

# The HSF Philosophy of Engineered Load Interaction

## Every Interaction Has Three Elements

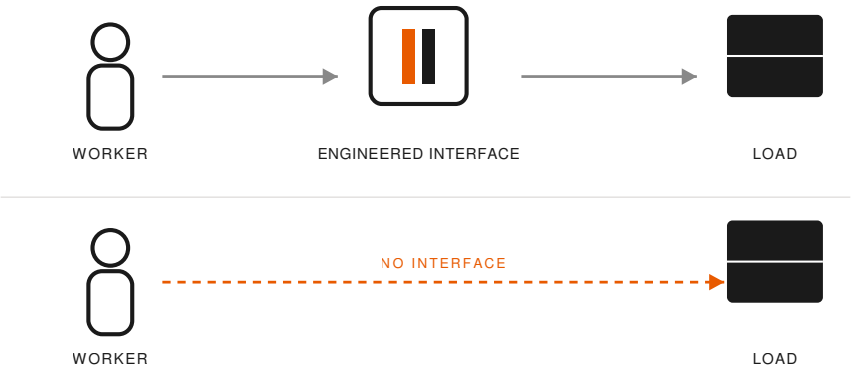
Every time a worker interacts with an industrial load, three things are present.

**The worker** — the person applying force, judgment and attention to the task.

**The load** — the component being Lifted, Guided, Controlled or Retrieved.

**The interface** — the point of contact between them.

In a well-engineered task, the interface is a tool. In an unengineered task, the interface is the worker's own hand. That single sentence defines the problem this guide exists to solve.




*When the interface is missing,* **the worker becomes the interface.**

## When There Is No Engineered Interface, the Worker Becomes the Interface

When there is no tool between the worker and the load, the worker's hands and body become responsible for transferring force, controlling movement and absorbing unexpected changes in the load. The hand that grips a steel pipe becomes a lifting device. The fingers that slide under a conveyor roller become a retrieval mechanism. The palm that pushes a suspended load becomes a guide tool. None of these are roles the human hand was designed to perform against industrial loads.

## The Interface Is Not a Safety Measure. It Is an Engineering Decision.

A safety measure is something added to a task to reduce the risk of an existing method. An engineered interface changes the method itself. An engineered interface does not have to be complex. It has to be deliberately selected and suited to the task. A simple textile sling is an engineered interface. A magnetic lifter is an engineered interface. A push/pull pole is an engineered interface.

## The Four Fundamental Interactions

**Lift.** The load must be raised. It has no handle, no lifting eye, no designed attachment point.

**Guide.** The load is suspended, moving or being positioned by another means. The worker must direct it.

**Control.** The load must be held in position or managed during work performed on or around it.

**Retrieve.** The load is on a surface, in a rack or in a confined location with no designed extraction point.

## Two Philosophies. One Portfolio.

The first is **interaction** — improving the quality of contact between the worker and the load by replacing an improvised hand grip with a deliberately designed tool. This is the LoadGrab® approach.

The second is **separation** — increasing the distance between the worker and the load to the point where direct contact is not required at all. This is the RiggerSafe® approach.

**LoadGrab® engineers the interaction. RiggerSafe® increases the separation.**

## A Note on Manual Handling Limits

The LoadGrab® Manual Lifting Slings change where the hands are — they do not change the weight being carried. All three slings are rated for manual handling only and must not be used as part of any mechanical lifting or rigging operation. For heavier components requiring mechanical assistance, the LoadGrab® contribution is the no-touch guidance and control interface during mechanical positioning — not the primary lift.

PART 3

# The Four Fundamental Interactions

*When there is no engineered interface,*
*the worker becomes the interface.*

# The Four Fundamental Interactions

*Understanding which interaction is in play — and where within it the hand is most exposed — is the first step toward specifying the right engineered interface.*

## LIFT

### WHAT THE WORKER IS TRYING TO ACHIEVE

The load must move upward. From a floor to a trolley. From a storage position to a working position. The load has weight, it may be awkward in shape, and it has no designed point at which a human hand can safely apply the force required to raise it.

### HOW HANDS BECOME INVOLVED

When a load has no handle, the grip becomes improvised. Fingers curl under the bottom edge. Palms press against flat surfaces. The hand is acting as the lifting attachment — the point at which all upward force is applied and through which the full consequence of any unexpected movement will travel.

### WHAT CAN CHANGE UNEXPECTEDLY

The load shifts its centre of gravity as it leaves the surface. A grip that held during the first few centimetres of travel fails as the lift progresses. At the moment of instability, the hand tightens — the moment at which a crush, a pinch or a strain is most likely to occur.

### WHAT AN ENGINEERED INTERFACE CHANGES

A lifting sling moves the point of force transfer from the worker's hand to a designed attachment. If the load shifts unexpectedly, the sling absorbs the change. The hand is not between the load and the consequence.

### APPLICABLE HSF SOLUTION

- HSF LoadGrab® Manual Lifting Slings — HSF-SH-075 WLL 100 kg / HSF-DH-100 WLL 100 kg / HSF-CV WLL 50 kg
- Within manual handling limits only. Not for mechanical lifting or rigging.

## GUIDE

### WHAT THE WORKER IS TRYING TO ACHIEVE

The load is already suspended or being positioned by mechanical means. The worker must direct it — align it with a mounting point, prevent it from contacting a structure, hold it steady while bolts are fitted.

### HOW HANDS BECOME INVOLVED

The load hangs from a crane, a chain block or a hoist. The worker reaches out and places both hands against the load surface to push, rotate or steady it. The hands are between a moving load and everything around it. The load may weigh several hundred kilograms. The force required to steady it is small. The consequence of being between that load and a fixed surface is not.

### WHAT CAN CHANGE UNEXPECTEDLY

A load that needs to be rotated often swings further than intended. The worker corrects it. It swings back. The correction and the swing arrive simultaneously. Both hands absorb the impact.

### WHAT AN ENGINEERED INTERFACE CHANGES

A no-touch load tool moves the worker's hands away from the load surface while maintaining directional control. For close-range guiding, LoadGrab® No-Touch Load Tools provide broad contact or magnetic attachment for ferrous loads. For extended-distance suspended load guidance, HSF RiggerSafe® increases the separation. LoadGrab® engineers the interaction. RiggerSafe® increases the separation.

**APPLICABLE HSF SOLUTION**

- HSF LoadGrab® No-Touch Load Tools — Push/Pull Tools · J Hook · T Hook · L Hook
- HSF LoadGrab® MagHead Push/Pull Tools — for ferrous loads
- HSF RiggerSafe® — for extended-reach suspended load guidance

# CONTROL

### WHAT THE WORKER IS TRYING TO ACHIEVE

Control is the interaction that most often goes unnamed. Holding a pipe steady while a second worker cuts it. Preventing a gearbox from rotating while a coupling is aligned. Steadying a motor while hold-down bolts are tightened. The load must not move — and the worker's hands are the mechanism preventing it.

### HOW HANDS BECOME INVOLVED

Control tasks are often described as 'just holding it.' This framing underestimates both the duration and the force involved. The hand doing the Controlling has no ability to anticipate when the other task will create a change in the load. A cut that goes through suddenly. A bolt that releases under torque. Each transfers unexpected force through the component to the hand.

### WHAT CAN CHANGE UNEXPECTEDLY

A worker steadying a shaft while it is being driven home with a mallet is Controlling the load. But the force event — the mallet strike — is not in their control. The vibration, rebound or movement that follows travels directly through the shaft to the hand.

### WHAT AN ENGINEERED INTERFACE CHANGES

A no-touch load tool repositions where the worker's hands are when force is applied. The hand is now at tool length from the surface. When the unexpected force event occurs, the tool deflects or absorbs it before it reaches the hand.

**APPLICABLE HSF SOLUTION**

- HSF LoadGrab® No-Touch Load Tools — Push/Pull Tools · J Hook · T Hook · L Hook
- HSF LoadGrab® MagHead Push/Pull Tools — positive magnetic attachment for ferrous surfaces

# RETRIEVE

### WHAT THE WORKER IS TRYING TO ACHIEVE

The load is on a surface with no clearance beneath it. It is in a rack. It is in a confined space. The worker must get a grip without a designed grip point, often without adequate visibility of the underside.

### HOW HANDS BECOME INVOLVED

The worker slides fingers under the edge of a steel plate to gain enough grip to lift it. The plate is heavier than expected and settles back. The fingers between the plate and the floor absorb the full weight. A ferrous component in a rack releases suddenly and the hands travel with it until they contact the rack structure.

### WHAT CAN CHANGE UNEXPECTEDLY

In Retrieve interactions, the unexpected event is almost always one of two things: the load is heavier or more resistant than expected, or it releases faster than expected. Both events place the hands at the point of maximum force change at the moment of maximum unpredictability.

### WHAT AN ENGINEERED INTERFACE CHANGES

Magnetic retrieval eliminates the need for fingers beneath the load entirely. A magnetic lifter applied to the upper surface provides a designed attachment point where none exists. The load is lifted from above — fingers never enter the space between the component and the surface it rests on.

**APPLICABLE HSF SOLUTION**

- HSF LoadGrab® Magnetic Load Lifters — HSF-LG-MHL · HSF-LG-001 · HSF-MG004 · HSF-MG005
- For non-ferrous components: Manual Lifting Slings positioned before lifting

PART 4

# The Interaction Library

*When there is no engineered interface,*
*the worker becomes the interface.*

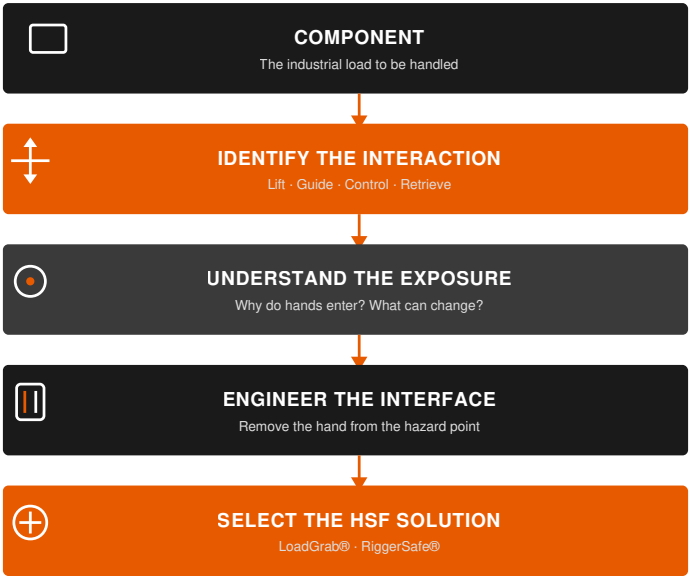
# The Interaction Library

## How to Use the Interaction Library

Rather than organising this guide by products, the Interaction Library is organised by the components workers interact with during maintenance, shutdown and construction activities. Each component is analysed using the same five-step framework:

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| **TYPICAL INTERACTION** | **WHY HANDS BECOME INVOLVED** | **WHAT CAN CHANGE UNEXPECTEDLY** | **ENGINEERED INTERFACE** | **APPLICABLE HSF SOLUTION** |
| What is the worker trying to accomplish? | Why do workers place hands at the hazard point? | What force transfer creates injury potential? | How can the interaction be redesigned? | Which LoadGrab® tool best matches? |

**Manual handling limits:** HSF-SH-075 and HSF-DH-100: 100 kg WLL; HSF-CV: 50 kg WLL. Manual handling only — not for mechanical lifting or rigging.


COMPONENT
The industrial load to be handled
IDENTIFY THE INTERACTION
Lift · Guide · Control · Retrieve
UNDERSTAND THE EXPOSURE
Why do hands enter? What can change?
ENGINEER THE INTERFACE
Remove the hand from the hazard point
SELECT THE HSF SOLUTION
LoadGrab® · RiggerSafe®

# CYLINDRICAL COMPONENTS

Pipes · Conveyor Idlers · Rollers · Shafts · Cylinders

Cylindrical components have no natural grip surface, rotate when force is applied at the wrong point, and concentrate the full weight at a narrow contact zone on the worker's hand.

**DIRECT HAND GRIP**
*Fingers underneath the cylinder*

**UNEXPECTED ROTATION**
*The component rolls in the grip*

**ENGINEERED INTERFACE**
*Sling beneath, hands on the handles*

*Round geometry creates unstable grip.* **The sling converts the load into a designed carrying interface.**

## PIPES

Lift · Retrieve

### TYPICAL INTERACTION

Pipes are among the most frequently handled components in maintenance and shutdown work — moved between storage and installation locations, lifted into position for welding or fitting. The fundamental interaction is a Lift from a surface, rack or pipe cradle without a designed carry point.

### WHY HANDS BECOME INVOLVED

A pipe presents a curved, smooth surface with no grip point. The worker wraps the fingers around the pipe body, or slides fingers beneath it and lifts from below. When lifted from a rack or floor, the fingers enter the space between the pipe and the surface before the pipe has left the ground. This is the point of maximum exposure.

### WHAT CAN CHANGE UNEXPECTEDLY

A pipe resting on a rack can roll when the grip is first applied. The direction of roll is not always predictable. When a pipe rolls during Lifting, the fingers underneath absorb the full weight at the moment of movement.

#### ENGINEERED INTERFACE

A lifting sling passed under the pipe converts the improvised grip into a designed attachment. For pipes being lifted from a surface, the sling is positioned first — before the pipe is lifted — so that fingers never enter the space between the pipe and the surface.

#### APPLICABLE HSF SOLUTION

- HSF LoadGrab® Manual Lifting Slings — Single Handle (HSF-SH-075) WLL 100 kg — for pipes within manual handling range
- HSF LoadGrab® Manual Lifting Slings — Double Handle (HSF-DH-100) WLL 100 kg — for longer pipe sections, two workers

## CONVEYOR IDLERS

Lift · Retrieve

#### TYPICAL INTERACTION

Conveyor idler replacement is one of the highest-frequency Lift and Retrieve interactions in process plants and bulk handling facilities. Most standard idlers weigh 5–25 kg, within the manual handling range.

#### WHY HANDS BECOME INVOLVED

An idler must be lifted clear of its mounting brackets close to the conveyor belt — belt above, frame to the sides. The grip is on a rotating surface: the idler shell is designed to spin freely on its bearings and may rotate under the grip if the bearing is worn.

#### WHAT CAN CHANGE UNEXPECTEDLY

An idler seized on its bearing will resist lifting and then release suddenly when the bearing breaks free. An idler that appears empty may retain water or process slurry, making it significantly heavier than expected.

#### ENGINEERED INTERFACE

A lifting sling passed under the idler shell before it is removed from the frame allows the idler to be lifted clear without the fingers in contact with the shell surface.

**APPLICABLE HSF SOLUTION**

- HSF LoadGrab® Manual Lifting Slings — Single Handle (HSF-SH-075) WLL 100 kg — suited to the weight range of most standard conveyor idlers

## ROLLERS

Lift

### TYPICAL INTERACTION

Industrial rollers — conveyor return rollers, guide rollers, feed rollers — are removed for replacement or refurbishment. The primary interaction is a Lift. Most rollers in the manually handled range fall within 5–80 kg.

### WHY HANDS BECOME INVOLVED

A roller presents the same Lift challenge as a pipe — a cylindrical surface with no grip point. Many rollers have journal ends smaller in diameter than the shell, creating an instinctive grip point far from the roller's centre of gravity. When two workers carry a long roller, the weight distribution is rarely equal.

### WHAT CAN CHANGE UNEXPECTEDLY

A roller being carried by the journal ends will pivot if one worker moves faster or changes grip height. During installation, the roller must be lowered into its mounting position with both ends simultaneously — a coordination task where the hand may be in the frame bracket zone when the roller seats.

### ENGINEERED INTERFACE

A lifting sling configured around the roller shell distributes the carry load across the shell and maintains the roller's balance, with hands clear of the bracket zone during lowering.

### APPLICABLE HSF SOLUTION

- HSF LoadGrab® Manual Lifting Slings — Single Handle (HSF-SH-075) WLL 100 kg — for single-worker roller carry
- HSF LoadGrab® Manual Lifting Slings — Double Handle (HSF-DH-100) WLL 100 kg — for long rollers requiring two-person carry

## SHAFTS

Lift · Control

### TYPICAL INTERACTION

Shafts are handled during equipment overhauls — removed from bearing housings, moved to a workshop, and reinstalled after service. The Lift interaction dominates during carry; a Control interaction follows during installation. The guidance below applies to shafts within the manual handling range; heavy shafts require mechanical lifting equipment.

### WHY HANDS BECOME INVOLVED

A shaft is a smooth, cylindrical component with no grip surface and no designed handling point. During installation, workers holding the shaft maintain a grip on the shaft body throughout the duration of the task being performed at the other end — a sustained Control interaction with no engineered hold point.

### WHAT CAN CHANGE UNEXPECTEDLY

A shaft being guided into a bearing housing must enter at a precise angle. If the angle is wrong, the shaft catches on the bore. The instinctive correction is to push further. If the shaft enters suddenly, it moves faster than the guiding hand. Any sudden force release during Control tasks transmits through the shaft to every hand in contact with it.

### ENGINEERED INTERFACE

For shafts within the manual handling range: a lifting sling during carry. For the Control phase regardless of shaft weight: a no-touch load tool applied to the shaft end provides directional control during bearing housing entry without the hand in the bore entry zone.

### APPLICABLE HSF SOLUTION

- HSF LoadGrab® Manual Lifting Slings — Single Handle (HSF-SH-075) WLL 100 kg — for carry phase, within manual handling range only
- HSF LoadGrab® No-Touch Load Tools — Push/Pull Tools — for shaft end guidance during bearing housing entry, regardless of shaft weight

## CYLINDERS

Retrieve · Lift

### TYPICAL INTERACTION

Hydraulic and pneumatic cylinders are removed and reinstalled during equipment maintenance across virtually every sector. The primary interaction is a Retrieve from a confined location, followed by a Lift during carry. Small bore cylinders may weigh 5–20 kg; larger cylinders require mechanical assistance.

### WHY HANDS BECOME INVOLVED

A cylinder body offers no grip point. The chrome-plated rod and polished body present surfaces specifically designed to be smooth. The worker grips the cylinder body, the port fittings, or the mounting brackets — none of which are designed to carry the cylinder's weight.

### WHAT CAN CHANGE UNEXPECTEDLY

A cylinder may have residual hydraulic or pneumatic pressure when its lines are disconnected. Residual fluid increases the weight unpredictably. A cylinder being extracted may bind on its mounting hardware and then release suddenly as the last fastener is freed.

### ENGINEERED INTERFACE

For cylinders within the manual handling range: a sling configured around the cylinder body, clear of the rod and port connections. For ferrous cylinders in confined extraction locations: a magnetic lifter provides Retrieve without requiring fingers beneath the component.

#### APPLICABLE HSF SOLUTION

- HSF LoadGrab® Manual Lifting Slings — Single Handle (HSF-SH-075) WLL 100 kg — for cylinders within manual handling range
- HSF LoadGrab® MagHead Lifter (HSF-LG-001) 550 lbs — 360°/180° articulation for ferrous cylinder Retrieve from confined locations

# ROTATING EQUIPMENT

Pumps · Motors · Gearboxes

Rotating equipment combines a Lift interaction during extraction with a Control or Guide interaction during mechanical installation. Weight ranges frequently exceed manual handling limits. For heavy rotating equipment, the LoadGrab® contribution is the no-touch guidance and control interface during mechanical positioning — not the primary lift.

## PUMPS

Lift · Guide · Control

### TYPICAL INTERACTION

Pump removal and installation is a core shutdown task. Pump weights range from small inline units of a few kilograms to large process pumps of several hundred kilograms. The Guide and Control exposure during mechanical installation is present regardless of pump weight.

### WHY HANDS BECOME INVOLVED

For pumps within the manual handling range: the pump body is gripped at the casing — a curved, irregular surface with no designed grip point. During mechanical installation of any pump: the worker places hands against the pump casing to apply directional force as the pump is lowered, with hands in the pinch zone between the pump and the base plate during final alignment.

### WHAT CAN CHANGE UNEXPECTEDLY

A pump being manually Lifted may be heavier than expected due to residual fluid. During mechanical installation, a pump being lowered onto studs may align on one stud and pivot — moving laterally and pinching the guiding hand between the pump casing and the base plate. This pinch hazard is present for any pump size during the mechanical positioning phase.

### ENGINEERED INTERFACE

For small pumps within the manual handling range: a sling using the pump's lifting eye, casing geometry or choke configuration. For all pumps during mechanical installation regardless of size: a no-touch load tool applied to the casing provides the Guide and Control interface.

**APPLICABLE HSF SOLUTION**

- HSF LoadGrab® Manual Lifting Slings — Choke Valve/Motor Lifter (HSF-CV) WLL 50 kg — for small pump bodies
- HSF LoadGrab® Manual Lifting Slings — Single Handle (HSF-SH-075) WLL 100 kg — for pumps with suitable attachment within 100 kg limit
- HSF LoadGrab® No-Touch Load Tools — Push/Pull Tools — for Guide and Control during mechanical installation, any pump size
- HSF LoadGrab® MagHead Push/Pull Tools — for ferrous pump casings requiring positive magnetic attachment

## MOTORS

Lift · Control

**TYPICAL INTERACTION**

Electric motors are removed and reinstalled during scheduled maintenance and bearing replacement. Small frame motors (typically up to approximately 100 kg) are within the manual handling range. Larger frame motors require mechanical assistance. The Control interaction during coupling alignment is relevant for any motor size.

**WHY HANDS BECOME INVOLVED**

Small motors are frequently carried by gripping the cooling fins — thin, sharp-edged aluminium or cast iron projections not designed as lifting surfaces. During alignment work on any motor: the worker pushes and pulls the motor body directly to achieve coupling alignment, against a surface that may be at temperature.

**WHAT CAN CHANGE UNEXPECTEDLY**

A motor being carried by the cooling fins will shift if the grip is not symmetrical about the centre of gravity, causing the fin edge to cut into the palm. During alignment, a motor may suddenly drop into a shim gap or catch on a mounting bolt. The worker's hands absorb the full deceleration load.

**ENGINEERED INTERFACE**

For small frame motors within the manual handling range: a lifting sling removes the need to grip cooling fins. For all motors during coupling alignment: a no-touch load tool applied to the motor frame or end bell provides the adjustment force without direct hand contact.

**APPLICABLE HSF SOLUTION**

- HSF LoadGrab® Manual Lifting Slings — Choke Valve/Motor Lifter (HSF-CV) WLL 50 kg — for small motor bodies
- HSF LoadGrab® Manual Lifting Slings — Single Handle (HSF-SH-075) WLL 100 kg — for small frame motors within 100 kg range
- HSF LoadGrab® No-Touch Load Tools — Push/Pull Tools — for coupling alignment and positioning, any motor size
- HSF LoadGrab® MagHead Push/Pull Tools — for ferrous motor casings during the alignment Control phase

## GEARBOXES

Control · Guide (mechanical lift required for most)

### TYPICAL INTERACTION

Most industrial gearboxes handled during maintenance exceed the manual handling range. The LoadGrab® primary contribution for gearboxes is the no-touch guidance and control interface during mechanical lifting and positioning.

### WHY HANDS BECOME INVOLVED

A gearbox body is an irregular casting. Workers frequently grip the input/output flanges — precision-machined surfaces not designed to carry the gearbox weight. During installation alignment, the worker pushes and pulls the gearbox housing directly, with both hands against a casting surface that may be at operating temperature.

### WHAT CAN CHANGE UNEXPECTEDLY

A gearbox retaining residual oil redistributes its centre of gravity unpredictably as the unit tilts. A gearbox coupled through a keyway or interference fit will release suddenly when the coupling breaks free. During alignment, a gearbox may suddenly drop into a shim stack.

### ENGINEERED INTERFACE

Lift phase: mechanical lifting equipment using the gearbox's designed lifting lugs is required for all but the smallest gearbox units. Control phase: a no-touch load tool applied to the housing surface provides lateral and rotational force without direct hand contact.

#### APPLICABLE HSF SOLUTION

- Mechanical lifting equipment using designed lifting lugs — primary Lift interface for most gearboxes
- HSF LoadGrab® No-Touch Load Tools — Push/Pull Tools — for shaft alignment Control during installation, all gearbox sizes
- HSF LoadGrab® MagHead Push/Pull Tools — for ferrous gearbox housings, positive magnetic attachment during Control phase
- HSF LoadGrab® Manual Lifting Slings — Single Handle (HSF-SH-075) WLL 100 kg — for small inline gearbox units only, within 100 kg range

## PROCESS COMPONENTS

Valves · Flanges and Spools

## VALVES

Lift · Control

#### TYPICAL INTERACTION

Valves are removed from pipework during maintenance and turnarounds, carried to a workshop, serviced, and reinstalled. The HSF-CV is specifically designed for 2" choke and chicksan valve handling. The Control interaction during reinstallation — the hand between the valve body and the mating flange during bolt-up — is present regardless of valve size.

#### WHY HANDS BECOME INVOLVED

A valve body has no designed carry point. The handwheel is an operating mechanism, not a lifting point. During reinstallation, the worker holds the valve body in position with one hand while starting bolts with the other — placing the hand between the valve body and the mating flange throughout the bolt-up phase.

#### WHAT CAN CHANGE UNEXPECTEDLY

A valve gripped at the handwheel will shift if the handwheel is not centred over the valve's centre of gravity. During bolt-up, a valve slipping as the first bolt is started will move toward the mating surface — compressing the worker's hand between the two flanges.

### ENGINEERED INTERFACE

For valves within the manual handling range: a sling provides the Lift carry interface. For reinstallation of any valve size: a no-touch hook tool holds the valve in position with the worker's hand clear of the pinch zone.

#### APPLICABLE HSF SOLUTION

- HSF LoadGrab® Manual Lifting Slings — Choke Valve/Motor Lifter (HSF-CV) WLL 50 kg — designed for 2" choke and chicksan valves
- HSF LoadGrab® Manual Lifting Slings — Single Handle (HSF-SH-075) WLL 100 kg — for other valve types within manual handling range
- HSF LoadGrab® No-Touch Load Tools — J Hook / T Hook — for holding and adjusting valve position during flange bolt-up

## FLANGES AND SPOOLS

Lift · Control

### TYPICAL INTERACTION

Pipe spools are carried to the installation point and held against mating flanges at both ends while bolts are started — a Lift interaction followed by a sustained Control interaction. The hand-in-pinch-zone exposure during bolt-up is present regardless of spool weight.

### WHY HANDS BECOME INVOLVED

During installation, the worker aligns the bolt holes by placing hands between the spool flange and the mating flange. Both hands are in the pinch zone between two heavy flanges throughout the alignment phase.

### WHAT CAN CHANGE UNEXPECTEDLY

A spool that appears aligned on one flange face may be misaligned on the other. A blank flange slipping while bolts are being started will pivot on the first engaged bolt, moving the free edge rapidly toward the mating surface.

### ENGINEERED INTERFACE

Lift: sling for light spools within the manual handling range. Control during bolt-up: a hook tool engaging the flange bolt hole provides directional force from outside the pinch zone, regardless of spool weight.

#### APPLICABLE HSF SOLUTION

- HSF LoadGrab® Manual Lifting Slings — Single Handle (HSF-SH-075) or Double Handle (HSF-DH-100) — for light spools within WLL limits
- HSF LoadGrab® No-Touch Load Tools — J Hook / L Hook — for holding and adjusting flange and spool position during bolt-up

## STRUCTURAL COMPONENTS

Steel Plates · Structural Sections · Gratings

Structural components present a flat geometry with no designed grip point and a characteristic Retrieve hazard: fingers sliding beneath a flat load resting on a surface.

**Retrieve from above — not from underneath.**

## STEEL PLATES

Retrieve · Lift · Control

### TYPICAL INTERACTION

Steel plates are handled across fabrication, construction, maintenance and structural repair work. The primary interaction is a Retrieve — picking up a flat plate from a surface with no clearance beneath it. The Retrieve hazard applies regardless of plate weight.

### WHY HANDS BECOME INVOLVED

A flat plate on a flat surface offers no grip. The worker tilts one edge upward to create clearance, slides fingers under the raised edge, and lifts from below — placing the fingers between the plate and the surface at the moment of maximum loading.

### WHAT CAN CHANGE UNEXPECTEDLY

A plate that has been tilted to create finger clearance will fall back to flat if the grip on the raised edge is insufficient — compressing the fingers between the plate face and the floor. A plate slipping during welding will move toward the surface the worker's hand is braced against.

### ENGINEERED INTERFACE

A magnetic lifter applied to the upper face of the plate provides Retrieve and Lift without fingers beneath the plate at any point. The load is lifted from above, eliminating the fundamental exposure of this interaction.

**APPLICABLE HSF SOLUTION**

- HSF LoadGrab® Magnetic Lifter IV (HSF-MG004) 550 lbs / 250 kg — D-Handle, lever engage. Primary tool for steel plate Retrieve and Lift
- HSF LoadGrab® Magnetic Lifter V (HSF-MG005) 550 lbs / 250 kg — V-Handle, switch magnet. For high-frequency plate handling
- HSF LoadGrab® MagHead Lifter (HSF-LG-001) 550 lbs / 250 kg — 360°/180° articulation for plates in confined locations
- HSF Magnetic Hand Lifter (HSF-LG-MHL) 65 lbs per magnet — for thin sheet metal, freshly cut plate or smaller ferrous items
- HSF LoadGrab® No-Touch Load Tools — Push/Pull Tools / L Hook — for Control during welding and fitting

## STRUCTURAL SECTIONS

Lift · Control

### TYPICAL INTERACTION

Structural sections — angle iron, channel, I-beam, flat bar, hollow section — are handled during construction, structural maintenance and fabrication. Light sections may be within the manual handling range; heavy sections require mechanical assistance. The Control interaction during installation is present regardless of section weight.

### WHY HANDS BECOME INVOLVED

A structural section is gripped at its cross-section profile — structural surfaces, not carry surfaces. During installation, the worker holds the section against existing structure while it is marked, clamped or welded — with the hand between the section being installed and the structure it is being connected to. During welding, the section conducts heat from the weld zone to the worker's hand progressively.

### WHAT CAN CHANGE UNEXPECTEDLY

A section rotating in the grip during carry may drop its lower edge onto the worker before the grip can be corrected. During welding, the progressive heat conduction is not always noticed until the section is dropped or released suddenly.

### ENGINEERED INTERFACE

For light sections within the manual handling range: a lifting sling configured through or around the section profile prevents rotation during carry. For all sections during the Control phase: a no-touch load tool removes the hand from the heat conduction zone and the pinch zone.

#### APPLICABLE HSF SOLUTION

- HSF LoadGrab® Manual Lifting Slings — Single Handle (HSF-SH-075) or Double Handle (HSF-DH-100) — for light sections within WLL limits
- HSF LoadGrab® No-Touch Load Tools — Push/Pull Tools — for Control during installation, regardless of section weight
- HSF LoadGrab® MagHead Push/Pull Tools — for ferrous sections where positive magnetic attachment during Control phase is preferred

## GRATINGS

Retrieve · Lift

#### TYPICAL INTERACTION

Steel gratings are removed and reinstalled during access maintenance, inspection work and platform modification. The primary interaction is a Retrieve — lifting a grating that sits flush with or below the frame surface with no clearance beneath it. In many facilities this is a high-frequency activity performed multiple times per shift. Cumulative exposure across the shift can be significant even when each individual Retrieve appears low-risk.

#### WHY HANDS BECOME INVOLVED

A grating resting in its frame has no clearance beneath it. The worker slides fingers through the mesh from above and grips the grating from within its structure — a confined geometry with the full weight of the grating bearing on the fingers at the point of lift.

#### WHAT CAN CHANGE UNEXPECTEDLY

A grating catching on a deformed frame support will resist lifting and then release suddenly — with the worker's hands gripping the mesh from within, accelerating upward with the grating. A grating misaligning on one edge during replacement will tip, dropping the unsupported edge rapidly.

#### ENGINEERED INTERFACE

A magnetic lifter applied to the upper surface of the grating provides Retrieve without fingers through the mesh at any point. For high-frequency tasks, the magnetic lifter

eliminates the finger-in-mesh exposure across every repetition — the cumulative benefit across a shift is significant.

**APPLICABLE HSF SOLUTION**

- HSF LoadGrab® Magnetic Lifter IV (HSF-MG004) 550 lbs / 250 kg — for standard steel grating Retrieve, D-Handle lever control
- HSF LoadGrab® Magnetic Lifter V (HSF-MG005) 550 lbs / 250 kg — for high-frequency grating tasks, quick switch-magnet operation
- HSF LoadGrab® MagHead Lifter (HSF-LG-001) 550 lbs / 250 kg — for gratings in confined frame locations
- HSF Magnetic Hand Lifter (HSF-LG-MHL) 65 lbs per magnet — for smaller grating sections or single-handed Retrieve in confined locations

PART 5

# The LoadGrab® Interface System

*When there is no engineered interface, the worker becomes the interface.*

# The LoadGrab® Interface System

*Each family exists because a specific category of fundamental interaction required a purpose-designed solution. The families are not interchangeable. They are complementary.*

**HSF LOADGRAB® INTERFACE SYSTEM**

**MANUAL LIFTING SLINGS — Interaction: Lift (within manual handling limits)**

HSF-SH-075 Single Handle WLL 100 kg | HSF-DH-100 Double Handle WLL 100 kg | HSF-CV Choke Valve/Motor Lifter WLL 50 kg

NOT for mechanical lifting or rigging operations.

**NO-TOUCH LOAD TOOLS — Interaction: Guide · Control**

Push/Pull Tools · J Hook · T Hook · L Hook (mechanical contact)
MagHead D-Handle · MagHead T-Handle · MagHead Extendable to 90" (magnetic contact, 550 lbs)

**MAGNETIC LOAD LIFTERS — Interaction: Retrieve · Lift (ferrous components)**

HSF-LG-MHL 65 lbs | HSF-LG-001 MagHead 550 lbs 360°/180° | HSF-MG004 Lifter IV 550 lbs | HSF-MG005 Lifter V 550 lbs

**HSF RIGGERSAFE® — Complementary extended-reach guidance system**

Guide (suspended loads, extended distance) · 21" · 42" · 50" · 72"

## LoadGrab® Manual Lifting Slings

**Designed lifting interfaces for industrial components without engineered carry points — within the manual handling range.**

Manual Lifting Slings change where the hands are. They do not change the weight being carried. All three are rated for manual handling only and must not be used in any mechanical lifting or rigging operation.

### Single Handle

HSF-SH-075 · WLL 100 kg

50mm webbing × 9000mm · Safety factor 10:1

For cylindrical and elongated components handled by a single worker. Primary applications: Pipes, Conveyor Idlers, Rollers, Shafts (light), Structural Sections (light).

### Double Handle

HSF-DH-100 · WLL 100 kg

50mm webbing × 1500mm · Safety factor 10:1

For components requiring two-person carry. Each worker holds one handle on either side of the load. Primary applications: Long Pipes, Long Rollers, Long Structural Sections, Pipe Spools (light).

### Choke Valve/Motor Lifter

HSF-CV · WLL 50 kg

25mm polyester webbing · Safety factor 10:1

Designed specifically for 2" choke valves, chicksan valves and small motor bodies. Primary applications: 2" Choke Valves, Chicksan Valves, Small Pump Bodies, Small Motor Bodies.

## LoadGrab® No-Touch Load Tools

**Apply force through the tool, not through the hand.**

No-Touch Load Tools are the LoadGrab® solution for Guide and Control interactions. The family comprises mechanical contact tools and magnetic contact tools (MagHead family).

### MECHANICAL CONTACT — PUSH/PULL TOOLS AND HOOKS

#### Push/Pull Tools

Fibre-reinforced poles

Interchangeable working heads

For pushing, pulling, steadying and Guiding loads at close to medium range. Serve Guide and Control interactions across the full range of components. Not limited to ferrous components.

#### J Hook

Precision single-point

Hook engagement

For single-point engagement — through a bolt hole, into a lifting eye or against a flange face. Preferred for flange alignment and valve installation where precise force application is required.

#### T Hook

Dual-engagement

Pull-resistant

For tasks where the load must be pulled toward the worker or rotated about a fixed point. Two engagement points prevent slippage during a pulling action.

#### L Hook

Angled reach

Confined location access

For reaching into confined locations to engage a load from below or the side where a straight tool cannot be positioned.

## MAGNETIC CONTACT — MAGHEAD PUSH/PULL TOOLS

MagHead tools attach magnetically to ferrous load surfaces, providing positive slip-resistant connection for Guide and Control. All MagHead Push/Pull Tools: magnetic capacity 550 lbs (250 kg).

### MagHead D-Handle

Fixed 36" · D-Handle

Magnetic capacity: 550 lbs

For close-range ferrous load guidance and control — steel plates, large ferrous assemblies, motor casings and gearbox housings during mechanical positioning.

### MagHead T-Handle

Fixed length · T-Handle

Magnetic capacity: 550 lbs

For short-range ferrous load guidance where a T-Handle provides better leverage and directional control.

### MagHead T-Handle Extendable

Up to 90" · Telescopic · T-Handle

Magnetic capacity: 550 lbs

For extended-reach guidance of ferrous suspended loads during crane or hoist operations. The magnetic head maintains positive connection to the ferrous load surface throughout the guidance arc.

## LoadGrab® Magnetic Load Lifters

**Lift ferrous components from above — not from underneath.**

Magnetic Load Lifters solve the most common Retrieve hazard: a ferrous component resting on a surface with no clearance beneath it. The lifter attaches to the upper surface and lifts from above. Fingers never enter the space between the component and the surface it rests on.

Model selection is based on component weight, surface condition and available contact area. A painted, corroded or uneven surface reduces effective holding force.

### Magnetic Hand Lifter

HSF-LG-MHL · 65 lbs per magnet

Switch magnet · Compact hand tool · 2-inch diameter base

For small ferrous components, thin sheet metal and freshly cut or heated metal. The compact base allows access in confined locations. Particularly suited to fabrication shops where small ferrous parts are handled repeatedly.

### MagHead Lifter

HSF-LG-001 · 550 lbs (250 kg)

3-function locking pin · 360° rotation · 180° pivot

The most versatile tool in the Magnetic Load Lifters family. The 360° rotation and 180° pivot allow engagement from any approach angle. Also functions as a pull tool for moving ferrous components horizontally.

### Magnetic Lifter IV

HSF-MG004 · 550 lbs (250 kg)

Manual lever engage/disengage · Ergonomic D-Handle · Alloy steel

For steel plate Retrieve and Lift, grating removal, and medium to heavy ferrous component handling. Manual lever engage/disengage gives precise control over attachment and release.

### Magnetic Lifter V

HSF-MG005 · 550 lbs (250 kg)

Switch magnet · Ergonomic V-Handle · Alloy steel

For high-frequency ferrous component handling where quick switch-magnet operation reduces cycle time. Suited to tasks where the lifter is applied and released many times per shift.

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## HSF RiggerSafe® — Complementary Extended-Reach Guidance System

**Guide suspended loads from outside the movement zone.**

RiggerSafe® is not a LoadGrab® family. It is a specialist HSF brand for suspended load guidance — a distinct discipline with its own operational context, user group and safety requirements.

Where LoadGrab® No-Touch Load Tools engineer the interaction at close to medium range, RiggerSafe® tools are designed to remove the worker from the load's movement zone entirely.

**LoadGrab® engineers the interaction. RiggerSafe® increases the separation.**

RiggerSafe® extended-reach guidance tools are available in 21", 42", 50" and 72" lengths. For specification and application guidance, refer to the HSF RiggerSafe® Guidebook.

FINAL CHAPTER

# Engineer the Interface

*The only outcome this guide has been working toward.*

# Engineer the Interface

Not every hazard can be eliminated. Not every load can be automated. Not every component can be given a designed lifting point. Industrial maintenance, shutdown and construction work is inherently variable. The tasks are performed under time pressure by workers whose skill and experience is real but whose exposure is structural — built into the task design rather than into the worker's behaviour.

## The Only Question That Matters

When a worker approaches a load in an industrial environment, there is one question that determines whether the interaction is engineered or not.

**What is between this worker's hands and this load?**

If the answer is nothing — if the worker's hands are the primary point of contact — the exposure exists. It exists regardless of the worker's experience, the weight of the load, or the number of times the task has been performed without incident before.

If the answer is a tool — a sling, a magnetic lifter, a push/pull pole, a hook — then the interaction has been engineered. The hands are operating the tool. The exposure at the hazard point has been eliminated or significantly reduced.

## What Engineering the Interface Means in Practice

**For a Lift interaction:** what sling configuration would carry this component without fingers beneath it? Is the component within the manual handling range?

**For a Guide interaction:** what tool would allow this load to be directed without hands against the surface? Is the load ferrous — would a MagHead tool provide more positive contact?

**For a Control interaction:** what tool would allow this component to be steadied without hands in the force transfer zone?

**For a Retrieve interaction:** is the component ferrous? If so, a magnetic lifter applied from above eliminates finger exposure entirely.

### The Improvement That Compounds

A single engineered interaction reduces a single exposure. But when a maintenance team adopts the interface principle — when the question *what is between my hands and this load* becomes the standard question asked before every manual interaction — the improvement compounds across every task, every shift, every shutdown.

Experience still matters. Skill still matters. Judgment still matters. But they are applied at the level of operating the tool — not at the level of absorbing whatever the load does next.

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**The worker should never be the interface.**

**Engineer the interface.**

*Interact with loads. Not hazards.*

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HSF

# LOAD N GRAB®

INTERACT WITH LOADS. NOT HAZARDS.

INTERACT WITH LOADS. NOT HAZARDS.

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Manual Lifting Slings · HSF-SH-075 · HSF-DH-100 · HSF-CV

No-Touch Load Tools · Push/Pull · J/T/L Hooks · MagHead Tools

Magnetic Load Lifters · HSF-LG-MHL · HSF-LG-001 · HSF-MG004 · HSF-MG005

HSF RiggerSafe® · Extended-Reach Suspended Load Guidance

***When there is no engineered interface, the worker becomes the interface.***

Hand Safety First® · A PSC Hand Safety Brand · handsafetyfirst.in