



QUALITY MANUALS | FIRST EDITION

IAF INDUSTRIAL HSE AND ERGONOMICS MANUAL

Safe die changes and
ergonomic automotive workplaces

STABLE RELEASE

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Press isolation and SMED operating controls
Workstation design and exposure management
Exoskeleton assessment and authorized use

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Publication identity and use

IAF Industrial HSE and Ergonomics Manual

This manual defines how automotive plants control hazardous die changes, design ergonomic workstations and authorize exoskeleton use. Site leaders, engineers, supervisors and workers use it to establish safe tasks, verify protective measures and record operating release.

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Reading and applying requirements

“Shall” identifies a requirement when adopted by a site, programme or agreement. “Should” identifies a recommendation. An example is illustrative; it is not a machine setting, test acceptance limit or completed operating record. Annex worksheets may be reproduced for controlled internal use.

Controlled implementation

Stable Release identifies the completed publication text. Site approval, process validation, competence authorization and equipment release are recorded when performed. A missing safety limit, test criterion or release authority prevents activation of the affected operation. Mandatory law, product requirements and validated equipment instructions remain applicable.

Relationship to IAF recognition

Use of this manual does not by itself confer membership, Corporate Recognised status, accreditation, certification or a licence to use IAF marks. Those decisions follow the applicable IAF guides, independent evaluation and recorded scope.

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Using the annexes

Enter actual values, evidence references, names and dates in the worksheets. A blank, unsigned or illustrative record is not proof of completion. Retain the record with its governing instruction and revision.

1 Purpose scope and operating principles

1.1 This manual applies to automotive press shops, die maintenance, welding, paint support, assembly, intralogistics and associated contractor work. It controls industrial health, safety and environment activities, abbreviated HSE, with particular requirements for safe die changes, ergonomic station design and wearable exoskeletons. Site management shall identify the equipment, people, shifts and work locations within its adopted scope.

1.2 The required outcome is a task that can be performed safely and consistently by the intended workforce, with verified equipment condition and a documented release. Production targets, quick changeover objectives and delivery pressure shall not override isolation, lifting, guarding or health restrictions. Every person may stop an apparently unsafe task and request assessment without retaliation.

1.3 Single minute exchange of die, abbreviated SMED, separates work requiring a stopped machine from preparation that can safely occur outside the operating hazard zone. The term describes an improvement method; it does not impose a mandatory changeover duration. A task remains internal stop required work until engineering has demonstrated a safe alternative.

1.4 This manual establishes programme requirements rather than universal machine settings or personal exposure limits. Each site shall supply validated equipment instructions, local operating limits and competent approvals before work begins. A blank field in a safety critical instruction is a release blocker, not permission for the operator to select a value.

1.5 Apply the same protective expectations to employees, temporary workers, trainees and contractors. Include foreseeable cleaning, jam clearing, breakdown recovery and shift handover. Instructions shall be available at the point of use in language and form that workers understand, with practical demonstration where reading alone cannot establish competence.

2 Accountability and site adoption

2.1 The site director shall appoint an accountable HSE lead and allocate time, equipment and budget for risk reduction. Engineering owns machine safeguarding and station design; maintenance owns verified equipment condition; production owns task execution and staffing. Quality confirms product acceptance independently of safety release. One signature shall not silently substitute for another discipline where both decisions are needed.

2.2 A competent press specialist shall approve die change instructions and the boundaries of setup modes. A lifting planner shall approve nonroutine lifts. An ergonomics practitioner shall assess task demands and station trials. Occupational health shall determine confidential individual work restrictions. The supervisor shall check that assigned people hold the authorization required for the particular task and equipment.

2.3 Workers and their representatives shall contribute practical knowledge of awkward reaches, difficult releases, unexpected motion and workarounds. Consultation shall include the least experienced users, different body sizes and all affected shifts. A suggestion or concern shall receive an owner, an assessment and feedback; reporting a symptom shall not automatically trigger blame or loss of employment opportunity.

2.4 Site adoption shall document scope, applicable obligations, equipment inventory, authority matrix, critical control register, emergency interfaces and training plan. Annex A records implementation evidence and actual approval. Production shall not start an affected operation while a critical gap remains open; a temporary control requires documented technical acceptance and an expiry date.

2.5 IAF technical committees may develop guidance and review programme evidence within their assigned remit. This manual does not change federation governance or grant a site statutory authority. Membership and Corporate Recognised decisions remain subject to the IAF Membership Guide and applicable evaluation arrangements, separate from local employer responsibilities.

3 Hazard assessment and control selection

3.1 Assess each task by observing normal operation and foreseeable deviations, including setup, cleaning, transport, recovery and decommissioning. Identify who can be harmed, the energy or exposure involved, credible consequences and existing barriers. Evaluate combined hazards such as a heavy die on a sloping route, oily floors beneath a suspended load or an exoskeleton near an automatic transfer.

3.2 Prefer removal of the hazard and engineered separation before relying on instructions, job rotation or personal protective equipment. Examples include automatic die positioning with guarded access, mechanical lifting assistance, adjustable fixtures and local extraction. Administrative controls shall support the physical design; they shall not be presented as equivalent to an absent guard or unsupported ram.

3.3 The site shall define a consistent severity and likelihood method and explain its rating scale. A low numerical risk score cannot excuse a missing critical control where a credible fatal or permanently disabling event remains possible. Identify critical barriers explicitly, name their verification method and set the action for failure before authorizing the task.

3.4 Review assessments when equipment, tooling, layout, material, speed, staffing, work duration or protective equipment changes. Also review after an incident, near miss, unexpected symptom or recurring workaround. A production trial shall have its own controlled boundary, observation plan and stop criteria; it is not a reason to suspend the existing safeguards.

3.5 Retain the assessment, worker consultation, alternative controls considered, residual risk decision and evidence of successful verification. Annex A provides a record structure. The approving person shall have the relevant competence and authority; commercial urgency alone is not an acceptable justification for accepting a serious unresolved hazard.

4 Work authorization and critical controls

4.1 Before a hazardous task, the supervisor shall verify the approved instruction, competent team, equipment identity, work boundary and emergency arrangements. The required control set depends on the task and may include group energy isolation, a lift plan, a confined space permit or a hot work permit. An unrelated permit shall not be used as a general authorization for every activity.

4.2 Critical controls for die changes include protection against unexpected motion, rated support against gravity, verified lifting capacity, exclusion from suspended loads, correct die retention and functional safeguarding before trial strokes. The task instruction shall identify observable evidence for each control. A status light, verbal assurance or production screen alone shall not establish a safe energy state.

4.3 The task leader shall conduct a short briefing covering sequence, individual roles, stop signal, pinch points, simultaneous work and handover. Everyone shall know who may command movement and who may remove an isolation device. A change in crew, scope or equipment condition requires reassessment before the next hazardous step.

4.4 Where several permits or contractors interact, the coordinating supervisor shall prevent incompatible activities. Lifting over an occupied maintenance area, hot work beside solvent handling and powered testing during mechanical entry are examples requiring segregation or resequencing. Record the shared boundary and the authority that releases it.

4.5 On any failed critical check, stop, secure the area and inform the responsible technical lead. Record the failed condition and prevent inadvertent restart. Resume only after correction and re-verification of the affected controls; closing a maintenance ticket without a functional check does not constitute operating release.

5 Equipment and task information

5.1 Maintain an equipment file for each press, die cart, bolster, crane, lifting device, manipulator and exoskeleton. Identify the asset, manufacturer, model, configuration, rated capability, control software where relevant, inspection requirements and authorized uses. Keep current drawings of isolation points and load paths available to the people planning and performing the work.

5.2 The die register shall include unique identity, verified mass, centre of gravity, lifting points, attachment limitations, overall dimensions, support surfaces, storage orientation and compatible press or cart combinations. Record detachable components and potential changes in balance. Do not estimate die mass from appearance or assume that a previous lifting arrangement remains suitable after modification.

5.3 A task specification shall state start condition, end condition, personnel, tools, material, hazards, sequence, verification and abnormal response. Photographs or sketches used in local instructions shall show the actual configuration. Identify which parameters are fixed by engineering and which adjustments an authorized operator may make within an approved range.

5.4 Record machinery control modes and the safeguards active in each mode. A local control, reset, jog button or hold to run device does not inherently make access safe. Identify residual motion, stored pressure, spring force and control system behaviour following power loss or restoration.

5.5 Document conflicts or missing information before use. The engineering owner shall resolve them through a controlled revision, inspection or supplier clarification. Obsolete drawings, unlabelled tooling, unreadable capacity plates and undocumented modifications shall trigger a hold on the affected operation until their significance is assessed.

6 SMED planning and task separation

6.1 Map a complete changeover from the last accepted part of the outgoing run to the first accepted part of the incoming run. Record preparation, shutdown, energy control, die removal, installation, setup verification and quality confirmation separately. Improvement shall target wasted motion and avoidable waiting while preserving every required safety and quality check.

6.2 Classify each element as external preparation, internal stop required work or controlled powered setup. External preparation is permitted only where people and equipment remain outside the operating hazard boundary and cannot interfere with production. Work inside guards, beneath a ram or on an energized connection shall not be reclassified merely to improve the changeover metric.

6.3 Prepare standard kits, inspected clamps, connectors, tools, spare fasteners and the next die in a designated staging area. Check identity and completeness before the planned stop. Engineering may improve locating features and connector design to reduce handling; every changed interface shall retain the required strength, retention and error prevention capability.

6.4 Sequence parallel tasks only where their work zones and energy dependencies are demonstrably independent. The task leader shall coordinate the common stop and movement authority. Two people working faster in the same pinch zone is not an acceptable parallelization strategy, and a shared isolation boundary shall remain effective until everyone is clear.

6.5 Track safe preparation completion, changeover duration and first pass product acceptance together. Report interrupted or abnormal changes rather than deleting them from the data. Any suggestion to remove a check shall undergo risk assessment and validation before the standard sequence is changed.

7 External preparation before shutdown

The changeover leader shall complete the following preparation while maintaining separation from the operating press. Use Annex B to record readiness and unresolved items.

Step / owner	Required action and evidence
1 Planner	Confirm production order, press identity, incoming and outgoing die identities, material and latest work instruction. Confirm the task team and the planned window.
2 Tooling lead	Inspect the incoming die in the designated safe area. Verify mass, lifting points, retention features, condition and compatible storage supports. Hold unidentified or damaged tooling.
3 Maintenance	Prepare inspected clamps, rated lifting accessories, test equipment and required consumables. Confirm inspection status and availability of replacement safety critical parts.
4 Logistics	Clear and inspect the transport route, transfer interface and receiving location. Separate pedestrians and prevent other deliveries from entering the planned movement zone.
5 Supervisor	Check permits, isolation arrangements, group lock equipment and communications. Confirm that external preparation creates no access into the live machinery hazard zone.
6 Task team	Brief sequence and stop signals. Record readiness; if a critical item is missing, delay the hazardous work and obtain the required resource before shutdown handover.

Acceptance requires correct tooling, a clear route, serviceable equipment and an authorized team. Preparation time may run concurrently with production only while the assessed separation remains effective. Any intrusion or changed condition stops that activity immediately.

8 Energy isolation and safe access

Only authorized personnel may isolate and verify the press and connected equipment. The machine specific instruction governs the exact points, methods and discharge sequence; Annex C records their execution.

Step / owner	Required action and evidence
1 Task leader	Notify affected people, stop production normally and identify every energy source and shared dependency, including feeders, transfers, die cushions and auxiliary systems.
2 Isolator	Disconnect and secure the identified electrical, pneumatic, hydraulic, mechanical and other sources using the approved isolation devices. Control remote and automatic restart paths.
3 Specialist	Release or restrain stored energy using the approved method. Address accumulators, capacitors, springs, suspended mass, flywheels and trapped pressure; do not improvise discharge.
4 Team members	Apply personal protection through the approved individual or group lock system. Each exposed person shall be accounted for before access; control contractor participation explicitly.
5 Verifier	Verify the safe state at the defined points with suitable methods. Electrical testing requires an authorized electrical person and correctly rated proven equipment. Return controls to safe positions.
6 Task leader	Confirm rated gravity supports and all entry conditions before access. Record results, time and personnel. If the state cannot be verified, keep access prohibited and escalate.

An emergency stop, open control circuit or software inhibit is not energy isolation. Keep isolation effective throughout exposure. Shift changes and personnel changes require a controlled transfer that never leaves the work unprotected. Use the formal exceptional lock removal process only when its prerequisites are satisfied.

9 Ram support and stored mechanical energy

9.1 Engineering shall define the required mechanical support for each press and task involving exposure beneath or between moving elements. Supports shall be designed, rated, identified and inspected for the specific load and configuration. Hydraulic pressure, a brake or a raised position indication alone shall not be the sole protection against a descending ram or moving bolster.

9.2 Install supports only through a sequence that keeps personnel outside the unsupported danger zone. The procedure shall specify the positioning method, seating surfaces, number and arrangement of supports, load transfer and confirmation. A person shall not enter the hazard to place a support unless a separate validated protective method already prevents hazardous movement.

9.3 Assess energy in die springs, gas springs, cushions, counterbalances, clamping systems and tensioned components. Releasing one connection can transfer force elsewhere. Tool maintenance involving stored internal energy shall use a dedicated disassembly instruction and suitable fixtures; loosening fasteners to discover whether energy remains is prohibited.

9.4 Protect support locations against unintended removal, impact or displacement during adjacent work. Keep people clear of load transfer and check that the assembly cannot rotate, slide or settle. Any uncertainty concerning support condition, load rating or contact geometry shall stop entry and require engineering assessment.

9.5 Remove supports only after personnel, tools and loose parts are clear and the approved restoration sequence permits removal. Account for every support and protective device. Record abnormal movement, damaged seating surfaces or deformation and quarantine affected equipment until examined by a competent person.

10 Lifting and die transport controls

10.1 The lift plan shall match verified die mass, centre of gravity, lifting points, travel path and final landing position. Determine the capacity of the complete arrangement, including crane or hoist, accessories, attachment points, cart, floor and support. Sling angle, configuration and dynamic effects can reduce usable capacity; an individual component rating is not the capacity of the whole system.

10.2 A competent person shall inspect accessories before use and confirm their identification and examination status. Use only approved attachment points and compatible fasteners. Do not wrap slings around unverified projections, use a clamp as an improvised lifting point or lift a die with loose components unsecured.

10.3 Establish an exclusion zone and a single movement command with a universally understood stop signal. No person shall stand under a suspended load or place a body part between the load and a fixed object. Use approved positioning aids from a safe location where required; hands shall not be used to arrest a moving die.

10.4 Die carts and powered bolsters shall have confirmed load ratings, stable support and compatible transfer heights. Control gaps, slopes, wheel restraint, docking and route crossings. The receiving support shall be ready before movement starts. An automatic cart still requires protection against collision, trapping and unintended motion.

10.5 Suspend the lift when communications fail, visibility is inadequate, the load behaves unexpectedly or the route changes. Lower or secure the load through the planned safe response where feasible. Record nonroutine lifts and any abnormal condition in Annex D; routine repetition does not remove the need for pre-use checks.

11 Die removal and installation

Perform this sequence only after verified energy control, rated support and lifting readiness. The approved die and press instructions determine the detailed order of clamp, support and connection handling.

Step / owner	Required action and evidence
1 Tool setter	Confirm the die identity and safe state with the task leader. Inspect access, support and the outgoing die condition before touching retention or service connections.
2 Authorized team	Secure detachable items and deal with pressure, fluid and electrical connections using their specific instructions. Label interfaces and contain residual fluids without creating slip hazards.
3 Lift team	Establish the approved load support before releasing retention. Remove clamps in the engineered order while maintaining die stability and keeping hands outside pinch points.
4 Movement lead	Move the outgoing die along the controlled route to its approved stand. Land it stably, verify support and release lifting equipment only after the load is secure.
5 Tool setter	Position the incoming die using approved locators and assistance. Verify seating, alignment, clearance and compatible clamping locations before applying retention.
6 Verifier	Confirm the specified clamp configuration and tightening evidence, reconnect approved services and account for tools. Record completion and hand over for controlled setup verification.

Do not correct a jam by entering an uncontrolled pinch zone or increasing force beyond the approved method. An unstable die, damaged locating feature or incorrect connection requires a hold and technical decision. Installation completion is not authorization for a trial stroke.

12 Connections retention and error prevention

12.1 Engineering shall specify the number, location, condition and tightening method for die retention. Record required torque or other verified clamping parameters in the machine specific instruction. Use suitable calibrated tools where measurement determines acceptance. Generic torque values from a different fastener, surface condition or clamp arrangement shall not be substituted.

12.2 Inspect mating surfaces, threads, clamps, wedges and locating features before assembly. Contamination, wear, damaged threads or incorrect stack height can reduce retention even where a tightening value appears correct. A witness mark can help reveal movement but does not establish that the original clamp force was adequate.

12.3 Identify pneumatic, hydraulic, lubrication, cooling, sensor and electrical interfaces so that incompatible connections cannot be confused. Prefer keyed or otherwise error preventing arrangements where feasible. Verify connection engagement, seal condition and strain relief; use only an approved safe method for leak detection, never a hand searching for a pressurized leak.

12.4 Sensors and die protection settings shall match the installed tool and product. Confirm the correct programme version and access authorization. Changing a threshold to suppress a nuisance alarm requires diagnosis and controlled approval; it shall not be used to make an unresolved mechanical condition appear acceptable.

12.5 The verifier shall record actual results and the status of deviations before powered setup. Where a second check is specified for a critical connection or retention point, it shall be a real examination by the named competent person. Copying the first person's tick marks is not independent verification.

13 Controlled setup and safeguarding verification

Powered setup is a separate authorized phase. Restore only the energy required by the approved test plan after all people are clear, all tools are accounted for and the necessary safeguards are established.

Step / owner	Required action and evidence
1 Task leader	Close the mechanical work phase and reconcile personnel, locks and supports through the approved restoration procedure. Maintain restrictions on adjacent equipment as required.
2 Press specialist	Select the validated setup configuration and verify permitted controls, access restrictions and speed or motion limits. Do not assume jog or slow motion makes contact safe.
3 Safeguard verifier	Check guards, interlocks, protective devices, reset behaviour and emergency stop functions using approved test methods and test pieces. Never use a person as the test object.
4 Authorized setter	Perform the prescribed controlled trial sequence from the protected operating position. Keep everyone clear of the die space and observe for abnormal motion, contact or leakage.
5 Quality and tooling	Inspect trial parts and relevant die conditions. Adjust only within the authorized range; any physical intervention requiring access returns to the applicable isolation procedure.
6 Release authority	Record functional results and unresolved issues. Release to production only when safeguarding, machine condition and product acceptance all satisfy their defined criteria.

A failed guard or protective function prevents production. Reset shall not cause unintended restart, and clearing an alarm shall not bypass its underlying cause. Record the actual test method and result rather than only “checked”.

14 Production restart and shift handover

14.1 The restart record shall identify the press, die, product, instruction revision, completion of safety checks and first accepted product. Production and quality releases serve different purposes and shall both be completed where required. A satisfactory part does not demonstrate that safeguarding or clamping is safe.

14.2 Before normal operation, restore the specified production mode, remove temporary test equipment and confirm that access controls are effective. Verify feeder and transfer coordination, lubrication and die protection status. Notify adjacent teams that production is restarting through the agreed communication method.

14.3 The operator shall observe the initial production period for unexpected vibration, sound, movement, leakage, product defects or repeated alarms. Site instructions shall define the checks and escalation thresholds for the equipment. A supervisor shall not direct continued running where a critical safety condition is uncertain.

14.4 At shift handover, communicate the installed die, current programme, completed checks, restricted conditions, open defects and pending work. Identify any group isolation still in force and transfer responsibility without a gap. The incoming team shall acknowledge the actual condition; a general shift log entry is insufficient for an unresolved hazardous task.

14.5 After a stoppage or adjustment, determine which release checks must be repeated. A disturbance of a guard, clamp, sensor or control setting shall trigger verification of the affected function before further production. Keep the release evidence with the changeover record so later incidents or quality escapes can be traced to the actual configuration.

15 Abnormal conditions and maintenance intervention

15.1 Stop the affected operation for unexpected motion, failed protective devices, unstable tooling, hydraulic injection risk, unexplained pressure, damaged lifting equipment or a person entering the exclusion zone. The first priority is securing people and preventing further hazardous motion. Report and mark the equipment condition before troubleshooting.

15.2 Jam clearing shall have an approved method based on the location and stored energy involved. If the standard operator method does not work, isolate and escalate rather than increasing force or reaching through a guard. A recurring jam is a process defect requiring correction, not an informal addition to the operator's routine.

15.3 Fault diagnosis with energy present requires a specific justified method, competent personnel, defined boundary and protective arrangements. It shall not become a general exemption from isolation. Reaching into a danger zone while another person holds a stop button is prohibited unless the entire method is part of an engineered, validated safe system.

15.4 Temporary repairs and deviations shall state scope, technical basis, compensating measures, authorized users and expiry. They shall not disable a required protective function without an independently engineered equivalent control and formal acceptance. The site shall prohibit operation where residual risk cannot be controlled adequately.

15.5 After maintenance, verify the repaired function and any affected safeguards, settings or adjacent systems. Remove obsolete temporary instructions and update the equipment history. Follow the IAF corrective action process for repeated faults and verify that recurrence has been prevented under normal operating conditions.

16 Ergonomic workstation design

16.1 Design the station around the task and intended workforce before selecting tools or fixing the takt time. Assess reach, posture, force, repetition, contact stress, visibility, access and work duration together. Include the least favourable product variants, replenishment activities, rework and cleaning rather than evaluating only an ideal demonstration cycle.

16.2 Provide adjustment in working height, fixture angle, seat or standing support and component presentation where task variation requires it. Frequently used items shall be accessible without repeated extreme reach or twisting. Place heavy or awkward items where mechanical assistance and stable handling are practical. An average body dimension alone cannot represent the whole user population.

16.3 Use representative users to trial the station with actual clothing, gloves, tools and expected component variation. Verify clearance for knees, feet, elbows and escape, and account for left and right handed work where relevant. Document the supported adjustment range and any task restrictions rather than claiming universal fit.

16.4 Fixtures shall support the part securely without forcing the worker to hold it against tool reaction. Provide suitable lighting without glare, clear visual access and intuitive control placement. Avoid sharp edges and pressure points; floor mats or foot supports shall not create instability, vehicle conflict or a trip hazard.

16.5 Engineering and production shall accept the station only after the ergonomic assessment, worker trial and product quality checks are complete. Record remaining actions, adjustment instructions and verification evidence in Annex E. Review the station after real production exposure and whenever product mix, rate or staffing changes.

17 Manual handling and material presentation

17.1 Evaluate the complete handling task: mass, dimensions, grip, centre of gravity, reach distance, lift height, asymmetry, frequency, travel route and recovery time. A single mass limit does not define safety for every lift. Prefer eliminating the lift or providing a suitable lifting or positioning aid before relying on lifting technique training.

17.2 Present components close to their point of use in stable containers with accessible openings. Avoid deep bins that require the worker to lean into them as stock decreases. Use tilt, lift, flow or replenishment arrangements validated for the component and users, while controlling pinch points and unexpected container movement.

17.3 Assess push and pull forces under actual floor, wheel and load conditions. Inspect wheels, brakes and handles and prevent overloading. A cart that moves easily when empty may be unsuitable at maximum load or on a slope. Coordinate pedestrian routes with powered trucks and automated mobile equipment.

17.4 Where team handling remains necessary, define the team size, command, hand positions, route and landing method. Team lifting does not simply multiply an individual capacity and is unsuitable where the load cannot be controlled consistently. Stop if a person loses grip, visibility or a stable stance.

17.5 Reassess after a packaging change, heavier variant, new rack or altered delivery frequency. Record measured forces and task conditions where they influence acceptance. Workers shall report discomfort and difficult handling promptly, and supervisors shall arrange assessment without requiring an injury to occur first.

18 Tools force and repetitive work

18.1 Select tools for the required task, grip, reaction force, vibration, balance and duration. Use suspension, torque reaction arms or fixtures where they reduce load without obstructing the worker or escape. The tool and support arrangement shall be assessed together; an overhead balancer can introduce rebound, snagging or collision hazards.

18.2 Position tool access to avoid sustained wrist deviation, shoulder elevation and excessive reach. Verify trigger force and suitability for gloved use. A tool shall not be modified by removing guards, adding an improvised handle or disabling a protective feature to improve comfort; seek an engineered replacement or approved design change.

18.3 Measure the actual work cycle, including short repeated actions and force peaks that an average cycle time may conceal. Consider the same muscle groups being loaded by adjacent tasks. Job rotation shall change the exposure meaningfully and provide recovery; rotating between equally demanding stations is not an adequate control.

18.4 Maintain cutting edges, fasteners, sockets and reaction devices so that wear does not progressively increase force or risk of sudden release. Define inspection and replacement criteria. Keep defective tools out of service and provide a usable replacement rather than expecting workers to compensate with extra effort.

18.5 Validate improvements using a combination of observed posture, task force, worker feedback, quality and sustained performance. A faster cycle or lower reported discomfort alone is not proof of acceptable risk. Record both benefits and new hazards and confirm that the revised method remains suitable across the intended shift.

19 Noise vibration heat and chemical exposure

19.1 The site shall maintain an exposure inventory covering noise, hand and whole body vibration, heat, airborne contaminants, skin contact and relevant combinations. Prioritize high exposure tasks for competent measurement under representative conditions. Define locally applicable action and exposure limits in controlled site schedules without substituting a generic value from this manual.

19.2 Reduce noise and vibration at source through process selection, isolation, enclosure, maintenance and reduced transmission. Hearing protection and work duration controls shall supplement engineering measures where needed. Confirm that protective equipment does not obscure alarms, verbal warnings or the safe use of other equipment.

19.3 Assess heat from ovens, foundry operations, protective clothing and exoskeleton contact surfaces. Provide appropriate environmental controls, acclimatization arrangements, access to drinking water, recovery opportunities and recognition of heat illness. Stop work and obtain medical help for confusion, collapse or other serious symptoms; productivity targets shall not delay assistance.

19.4 Control welding fumes, paint chemicals, dusts, metalworking fluids and cleaning agents through suitable substitution, enclosure and extraction. Inspect capture performance and housekeeping. Respiratory protection requires a defined selection, fit, maintenance and training programme; an ordinary mask shall not be treated as suitable for an unknown hazardous atmosphere.

19.5 Occupational health shall determine surveillance needs and preserve medical confidentiality. Supervisors receive fitness restrictions and necessary protective actions, not unrestricted medical details. Link adverse exposure findings to engineering correction, remeasurement and worker communication, and retain records under the controlled retention schedule.

20 Work organization fatigue and participation

20.1 Plan staffing, breaks and work rotation around physical and cognitive demands, shift pattern, overtime and environmental conditions. Account for training, replenishment and recovery in the work standard. A nominal takt time that requires sustained unsafe exertion or routine skipped breaks shall be redesigned.

20.2 Supervisors shall recognize fatigue indicators such as repeated errors, reduced attention, unusual slowing or reported exhaustion. Arrange a safe pause and assessment without encouraging concealment. Where a person is unfit for a safety critical task, provide a safe alternative or remove the exposure through the site's health and employment procedures.

20.3 Workers shall have a practical route to report discomfort, pressure points, near misses and ineffective controls. Offer confidential channels where appropriate. Reports shall be reviewed for patterns by station, shift and task; low reporting numbers shall not be interpreted automatically as evidence of good ergonomic performance.

20.4 Include temporary workers and contractors in consultation and training. Confirm language comprehension and practical ability before assigning independent work. Supervisors shall not assume that prior experience on a different press, lifting system or exoskeleton proves competence on the current configuration.

20.5 Review work design after a staffing change, accelerated rate, new shift pattern or prolonged overtime. A change that increases cumulative exposure requires the same risk review as a physical equipment change. Document decisions and feedback to the affected workforce so the adopted controls are understood and usable.

21 Exoskeleton selection and use boundaries

21.1 An industrial exoskeleton is a wearable assistance device, passive or powered, selected for a defined task. It shall be considered only after evaluating elimination, workstation redesign and mechanical assistance. It does not automatically constitute personal protective equipment, fall protection, electrical insulation or medical treatment, and shall not be described as such without a valid specific basis.

21.2 The assessment shall match device type and assistance characteristics to the task, posture, movement and intended users. Evaluate load transfer to other body areas, balance, restricted motion, pressure, heat, skin contact, fatigue and interference with tools. A reduction in one muscle demand can coexist with increased demand or risk elsewhere.

21.3 Check compatibility with guarding, moving conveyors, robots, ladders, vehicles, confined access, welding, chemicals and high voltage work. Snagging and entrapment hazards require explicit evaluation. Use shall remain prohibited in an unassessed task or environment, including a new product variant that changes movement or clearance.

21.4 Occupational health shall conduct any necessary individual suitability assessment with informed participation and confidential handling of information. Device fit shall accommodate the actual person and clothing. Provide an equivalent safe work arrangement where a person cannot use the device; do not pressure workers to accept pain, unsuitable fit or disclosure of unnecessary medical information.

21.5 Wearing an exoskeleton shall not increase an authorized lifting limit, justify a faster takt or replace required engineering controls. Any proposed task change requires a fresh assessment independent of assumed assistance. Procurement shall require instructions, maintenance support, hygiene arrangements, emergency removal and a controlled trial before routine deployment.

22 Exoskeleton trial and acceptance

Use a staged trial led by ergonomics, HSE and production with worker participation. Annex F records the task specific acceptance evidence. Do not begin the trial on an uncontrolled production hazard.

Step / owner	Required action and evidence
1 Trial owner	Define the device and task, users, expected benefit, baseline exposure measures and acceptance criteria. Identify alternatives considered and the boundaries excluded from the trial.
2 Health and fit	Confirm individual suitability through the proper confidential route. Fit and adjust the device with trained assistance; verify movement, contact pressure and protective equipment compatibility.
3 Trainer	Demonstrate donning, adjustment, safe task movement, malfunction response and rapid removal. Confirm unaided understanding and any required buddy support before loaded work.
4 Trial team	Begin in a separated controlled setting, then progress only on satisfactory evidence. Observe reach, balance, snagging, fatigue, heat and effects on product quality across representative cycles.
5 Ergonomics lead	Compare baseline and assisted conditions without changing load or rate to bias the result. Record discomfort and adverse effects as well as performance; stop on defined symptoms or hazards.
6 Site authority	Approve only the demonstrated task, users, settings and duration conditions. Record restrictions, follow-up review and withdrawal criteria. Unresolved significant risk prevents deployment.

A successful demonstration by one person is not approval for every user or workstation. Expansion to another task or device configuration requires review. The worker may stop a trial immediately for pain, dizziness, instability, numbness, heat distress or loss of safe movement.

23 Exoskeleton daily operation and removal

Only trained and authorized users may wear the approved device for its released task. Follow the manufacturer's device specific method and the local task restrictions; Annex G provides the daily record.

Step / owner	Required action and evidence
1 User	Confirm device identity, task authorization and personal readiness. Inspect structure, straps, joints, fasteners and powered components for damage, contamination or overdue service.
2 User and fitter	Don and adjust in a safe designated area. Check fit, range of motion, secure closures and compatibility with clothing and protective equipment. Do not improvise padding or attachments.
3 Supervisor	Confirm station clearance, assistance settings and planned exposure duration. Ensure the device cannot snag machinery or obstruct emergency escape and that removal assistance is available if required.
4 User	Perform only the approved task and retain normal handling limits. Stop for pain, altered sensation, imbalance, unexpected resistance, overheating or a malfunction; report the condition immediately.
5 User or trained helper	Move to safety if able and remove through the practiced method. For entrapment or powered failure, stop hazardous equipment and summon the designated team; do not pull against trapped parts.
6 Custodian	Clean, inspect and store or charge in the approved location. Record defects and use history. Quarantine a defective device and obtain authorized repair before further issue.

Emergency escape takes priority over protecting the device. A release buckle, power switch or loss of assistance can behave differently by model; the local instruction shall specify the demonstrated response. No user shall continue simply to complete a shift when a stop criterion has occurred.

24 Inspection maintenance and device hygiene

24.1 Create a maintenance schedule based on equipment instructions, usage, environment and observed degradation. Include presses, die carts, supports, lifting accessories, ergonomic fixtures and exoskeletons. Identify safety critical items whose overdue inspection or failed condition prevents use. Maintenance completion shall include verification of function, not only replacement of a part.

24.2 Exoskeleton records shall identify the device, assigned users where needed, service history, inspected components and approved configuration. Inspect joints, attachment points, wear surfaces, straps and adjustments. A device dropped, overloaded, contaminated or involved in an incident shall be held for assessment even if it appears usable.

24.3 Cleaning shall use compatible products and methods that do not degrade straps, seals, sensors or structural materials. Shared contact surfaces require a hygiene process and drying before reissue. Separate individual comfort items where appropriate. Do not immerse or heat dry a device unless its specific instructions permit that method.

24.4 For powered devices, control charger compatibility, battery condition, charging location and damaged battery response. A swollen, leaking, unusually hot or damaged battery shall not be charged or returned to service. Apply the IAF Industrial Incident Response and EV Battery Safety Manual where a battery hazard is suspected.

24.5 Software, assistance settings, replacement parts and structural modifications shall be controlled changes. Reassess fit and task suitability after a material change. The custodian shall maintain clear serviceable, restricted and quarantined status so a defective unit cannot return to circulation through a different shift or storage location.

25 Competence authorization and contractors

25.1 The competence matrix shall distinguish general awareness, task performance, specialist assessment and release authority. Press operators, tool setters, isolators, electrical testers, lifting planners, signallers, ergonomics assessors and exoskeleton fitters need different evidence. Training attendance alone does not establish permission to perform every role.

25.2 Practical assessment shall use the actual or representative equipment and test normal work, stop decisions and abnormal response. Assess recognition of stored energy, exclusion boundaries and failed checks. Record assessor, equipment scope, result, restrictions and review trigger. A person who cannot demonstrate a critical control shall receive further training before authorization.

25.3 Refresher needs shall follow risk, experience, absence, incidents and changes in equipment or procedures. Supervisors shall review active authorizations before assignment. A new press control system, die transfer arrangement or exoskeleton model can require additional competence even where the broad task title remains unchanged.

25.4 Contractor onboarding shall verify relevant competence, equipment inspection and understanding of site isolation and emergency rules. Define the person coordinating concurrent activities. Contractors shall receive the actual hazard information needed for the task and shall not be expected to infer local energy connections from experience elsewhere.

25.5 Retain competence evidence under the IAF Documents and Records Guide with appropriate access. Publish only operational authorization and restrictions needed for safe assignment. Medical details and personal assessments shall remain separately protected under the IAF Data Protection and Privacy Policy.

26 Performance monitoring and assurance

26.1 Monitor the effectiveness of critical controls and ergonomic improvements using leading and outcome measures. Useful leading measures include verified isolation audits, overdue safety maintenance, completed station reviews and closed exposure actions. Injury and absence measures provide additional information but shall not replace direct checking of the controls that prevent harm.

26.2 Measure changeover performance with safety and quality outcomes. Define the start and end events and record abnormal stoppages consistently. For example, a changeover from 09:00 last accepted part to 09:42 first accepted part is 42 minutes; if 12 minutes were waiting for a verified tool, record that cause rather than deleting it from elapsed time.

26.3 Define each metric's numerator, denominator, data owner and period. If 48 of 50 scheduled critical inspections were completed on time, completion is 96 percent; the two missed checks still require assessment of operating restrictions. An aggregate percentage shall not conceal a single missing barrier on a high consequence task.

26.4 Audit observations shall include real task execution across shifts, not only document review. Trace a completed die change to its isolation, lift and restart evidence. Compare the installed station and exoskeleton settings with the released configuration. Sample abnormal interventions because they often reveal controls that routine observations miss.

26.5 Management shall review recurring defects, exposure trends, worker feedback and corrective action effectiveness. Annex H supports this review. Avoid incentives that reward silence or pressure people to report no incidents. Escalate a repeated critical control failure even where no injury has occurred.

27 Incident learning and corrective action

27.1 Provide immediate aid and activate the emergency plan when needed, then secure the scene against further harm. Preserve evidence only when doing so does not delay rescue or create exposure. Notify the appropriate site authorities and follow applicable reporting obligations. Use the IAF incident manual for fire, battery and electrical emergency coordination.

27.2 Investigations shall examine the task, equipment state, design, instructions, staffing, communication and organizational pressures. Interview affected people respectfully and distinguish observation from inference. Do not end the analysis at “operator error” where the system permitted or encouraged an unsafe action.

27.3 For a failed isolation or unexpected movement, preserve control records, maintenance history and the actual configuration. For an ergonomic or exoskeleton event, record task duration, fit, settings, symptoms and relevant exposure conditions while protecting medical privacy. Do not recreate a hazardous event on a person to demonstrate the failure.

27.4 Corrective actions shall address the cause and include an owner, due date, interim protection and verification method. Test engineering changes before restoring use and update instructions and training. A completed purchase order or training session is not sufficient evidence that the original hazard has been controlled.

27.5 Share lessons with affected sites and IAF functions using appropriate confidentiality. Verify sustained effectiveness under representative operating conditions and reopen the action if the problem returns. The IAF Whistleblowing, Appeals and Complaints, and Conflict of Interest policies govern related reporting and impartial review.

28 Document control and implementation review

28.1 Control local procedures, permits, equipment files and records through the IAF Documents and Records Guide. Identify owner, revision, approval, effective date, distribution and retention class. Remove obsolete point of use copies and preserve superseded versions where needed to interpret historical work or an investigation.

28.2 This manual interfaces with IAF-QM-001 for quality management, IAF-MAN-LMS-001 for lean production, IAF-MAN-GAA-001 for advanced assembly, IAF-MAN-SCL-001 for intralogistics and IAF-MAN-IRB-001 for emergency response. Local procedures shall resolve shared boundaries, especially isolation, automated transport and battery powered devices.

28.3 The site director shall review implementation at planned intervals and after significant change. Review scope, unresolved critical gaps, competence, resources, incident lessons and worker consultation. Record decisions and actual completion evidence in Annex A. A federation publication date does not substitute for the site's operational adoption decision.

28.4 Revision proposals shall identify the affected requirement, reason, technical assessment and transition needs. The competent IAF authority controls publication under the Constitution and document control arrangements. Sites shall assess the impact, update their local instructions and inform affected personnel before the revised operation becomes effective.

28.5 Annexes A to H are reproducible working templates. Complete them with real names, equipment identities, measured results and evidence references; blank or illustrative entries are not records of compliance. Retention shall follow applicable obligations and the approved schedule, with protected holds for investigations and controlled disposal after authorization.

Annex A Site adoption and critical control register

Use one controlled adoption record per site or clearly defined operating scope. Attach the detailed assessments and record actual evidence references; do not mark an item complete solely because a procedure exists.

Field	Entry to complete
Identity	Site / department: _____ Scope and equipment list: _____
Authority	Accountable director: _____ HSE lead: _____ Approval date: _____
Operating basis	Local obligations register: _____ Instruction register and revision: _____
Competence	Task authorization matrix and contractor interfaces: _____
Emergency interface	Incident plan, rescue arrangements and briefing evidence: _____

Critical control assessment

Control	Evidence and release decision
Energy and gravity	Isolation map, verification method, support design and test evidence: _____
Lifting and movement	Load data, route, accessories and exclusion verification: _____
Guarding and restart	Functional checks and authorized setup mode evidence: _____
Ergonomics and devices	Station assessment, worker trial and exoskeleton restrictions: _____
Open gaps	Risk / interim protection / owner / due date / operating restriction: _____

Decision: adopt for stated scope / hold affected operations / restricted implementation. Record justification, approving names, signatures and next review date. A critical gap requires correction or a documented adequate control before exposure begins.

Annex B Safe SMED changeover checklist

Record one changeover with linked detailed isolation and lifting records. Status choices are Pass, Hold or Not applicable with a stated reason. A Hold on a critical item prevents progression.

Record field	Entry to complete
Job identity	Date / shift / press / order: _____
Tool identity	Outgoing die: _____ Incoming die and revision: _____
Team and timing	Leader and team: _____ Last accepted part time: _____

Checkpoint	Result and evidence
External preparation	Correct die, kits, inspected accessories and staging route confirmed: _____
Brief and boundary	Roles, stop signal, simultaneous work and exclusion zone confirmed: _____
Safe access	Isolation record and rated mechanical support verified: _____
Removal and landing	Load support, connection control and stable storage confirmed: _____
Installation	Locators, retention, specified tightening and services verified: _____
Controlled trials	Safeguards, setup configuration and trial evidence accepted: _____
Production release	Safety release: _____ Quality release: _____
Timing and learning	First accepted part time: _____ Delay causes and actions: _____

Closeout shall identify any deviation and the authority accepting it. Record elapsed changeover time from the two accepted part events. Do not exclude time spent restoring a necessary safety control from the reported event history.

Annex C Energy isolation and restoration record

This worksheet records execution of an approved machine specific isolation instruction. It does not define the isolation points or replace specialist electrical testing and stored energy procedures.

Identification	Entry to complete
Task and asset	Work order / press / connected equipment: _____
Instruction	Isolation instruction and revision: _____ Task leader: _____
Personnel	Exposed persons / group lock register / contractor lead: _____

Source or stage	Isolation evidence
Electrical	Source and device IDs / lock IDs / authorized verifier / test result: _____
Fluid energy	Pneumatic and hydraulic sources / retained pressure controls / result: _____
Mechanical energy	Gravity supports / springs / flywheel / movement restraint / result: _____
Other dependencies	Feeders / transfers / thermal or shared systems / result: _____
Access authorization	All points verified / time / leader and team acknowledgment: _____
Handover	Incoming and outgoing responsible persons / continuity confirmed: _____
Restoration	People and tools clear / lock reconciliation / support removal sequence: _____
Functional release	Test instruction / results / release authority / date and time: _____

If a point cannot be verified, record Hold and prohibit access. Record any exceptional lock removal separately with the authorized process and evidence that the affected person is protected. No unchecked box may be interpreted as a safe condition.

Annex D Die lift and transport planning record

Use for a new or changed lift and for routine lifts where the approved plan requires a job record. The competent planner shall establish the calculations and equipment ratings before execution.

Planning field	Entry to complete
Load identity	Die ID / configuration / verified mass / centre of gravity: _____
Attachment	Approved lifting points / detachable items secured / drawing: _____
Capacity basis	Crane, accessories, sling geometry, cart, floor and stand capacity: _____
Route and landing	Path / crossings / slopes / transfer height / stable receiving support: _____
People and signals	Lift leader / operator / signaller / agreed stop signal: _____
Exclusion	Barrier arrangement / pedestrian diversion / adjacent work controls: _____
Inspection	Accessory identities and status / pre-use findings: _____
Abnormal response	Loss of communication / load instability / route obstruction action: _____
Authorization	Plan approval / briefing / execution date / supervisor verification: _____

Execution and closeout

Record actual load movement, observed deviations, final stable landing and release of accessories. Any unexpected rotation, contact, slipping or damaged lifting point requires a stop and competent assessment before repetition. Attach measurements and calculations rather than substituting an unsupported “capacity adequate” statement.

Annex E Ergonomic station assessment

Assess the real production task with representative users and variants. Keep personal medical information outside this station record. Attach measured values and the chosen assessment method where needed.

Assessment field	Entry to complete
Task conditions	Station / product variants / cycle / shifts / duration: _____
User coverage	Representative body sizes, experience and clothing considered: _____
Posture and reach	Observed positions / reach frequency / adjustability / clearances: _____
Force and handling	Mass, grip, tool reaction, push or pull forces and assistance: _____
Repetition and recovery	Cycle exposures / muscle groups / rotation / breaks: _____
Environment	Lighting / vibration / noise / heat / floor / chemical exposure: _____
Proposed controls	Elimination or design changes / remaining administrative controls: _____
Trial evidence	Before and after measures / worker feedback / quality impact: _____
Acceptance	Residual risk / restrictions / owner / approval / follow-up date: _____

Example decision logic: if a fixture reduces shoulder reach but creates a trapping point at its adjustment mechanism, do not release the station until that new hazard is controlled. Record both the ergonomic benefit and the safeguarding result. Confirm that adjustment instructions are usable at the point of work.

Annex F Exoskeleton task trial record

Approve a device for a defined task and user group only after a staged assessment. A commercial demonstration or device purchase is not task acceptance.

Trial field	Entry to complete
Device and scope	Model / serial / configuration / task / excluded activities: _____
Alternatives	Station redesign and lifting assistance considered: _____
Individual readiness	Suitability confirmation reference / trained fitter / fit result: _____
Baseline	Task load and rate / posture / force / discomfort / duration: _____
Compatibility	PPE / guards / snagging / vehicles / escape / emergency removal: _____
Assisted condition	Same task comparison / assistance setting / observed benefits: _____
Adverse effects	Pressure / heat / balance / restricted motion / transferred load: _____
Stop criteria	Symptoms, device faults and task hazards requiring withdrawal: _____
Release and review	Approved users, task and restrictions / signatures / review date: _____

Keep the worker's detailed medical assessment confidential. Record the operational suitability outcome only. Do not increase load or rate during the comparison. Any subsequent expansion of task, user population or device configuration shall be assessed before authorization.

Annex G Exoskeleton daily issue and defect record

Complete at issue, after use and whenever a defect or symptom occurs. This record supports traceability and does not replace the model specific inspection and removal instruction.

Daily field	Entry to complete
Identity	Date / shift / device serial / user / approved task: _____
Pre-use inspection	Structure / straps / joints / fasteners / cleanliness / service status: _____
Fit and settings	Fitter if required / adjustment / clothing compatibility / movement: _____
Readiness	Task clearance / emergency removal / user readiness confirmed: _____
Use period	Start and finish / breaks / actual task variation: _____
Stop or symptom	Time / observed condition / action / occupational health referral if needed: _____
Post-use condition	Cleaning / drying / battery status / damage inspection: _____
Disposition	Serviceable / restricted / quarantined / custodian signature: _____

Defect closure

Defect ID: _____ Repair authority: _____ Work performed: _____ Functional and fit verification: _____ Release date and signature: _____. A device marked quarantined shall remain segregated until the authorized release is recorded. Remove obsolete status labels when the current status is formally changed.

Annex H Assurance and management review worksheet

Review the defined reporting period using evidence from every affected shift. Percentages support decisions but do not override a failed critical control.

Measure	Definition and review entry
Critical inspections	Completed on time / due $\times$ 100. Result and overdue assets: _____
Safe changeovers	Changes with complete safety and quality release / total changes $\times$ 100: _____
Ergonomic actions	Open high priority actions / completed actions / effectiveness evidence: _____
Device experience	Users and hours / discomfort reports / defects / withdrawals: _____
Task observations	Isolation, lifting, setup and abnormal work samples / findings: _____
Competence	Expired or restricted authorizations / reassessment actions: _____

Decisions and follow-up

Record the most significant uncontrolled risk, resources needed, responsible owner and due date. Confirm whether an operating restriction is required. Capture worker feedback and the decision communicated to them. The review chair shall approve the action list and assign a date for effectiveness checking.

Illustrative arithmetic: 48 timely inspections out of 50 due gives 96 percent. A 42 minute changeover with 12 minutes waiting contains 30 minutes of other elapsed work, but its reported end to end duration remains 42 minutes. Neither figure is an approved target or a completed site record.