Industrial Robot Application & Robot Cell

Pre-Commissioning Integration Checklist

Purpose:
This checklist shall be completed **before commissioning** to verify that the robot application and robot cell have been **integrated safely**, that **reasonably foreseeable hazards** have been addressed, and that the system is ready for **validation and user handover**.

This checklist does **not replace** a formal risk assessment but serves as a **required integration verification step**.

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1. System Configuration and Scope Verification

☐ Robot application configuration matches approved design documentation
☐ Robot cell layout reflects the final, installed condition
☐ All integrated equipment (robots, fixtures, end-effectors, tooling, auxiliary axes) is installed as specified
☐ Changes made during installation have been **documented and reviewed**
☐ Application scope matches intended use (no undocumented tasks or modes)

Integrator Verification:
☐ No undocumented configuration changes remain

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2. Mechanical Integrity and Materials

☐ Structural components withstand expected **static and dynamic loads**
☐ Load-bearing elements verified for worst-case conditions
☐ End-effectors and fixtures securely mounted
☐ No exposed **unnecessary sharp edges, corners, or hazardous projections**
☐ Residual sharp features reduced as far as reasonably practicable
☐ Materials suitable for environmental and operational conditions

Integrator Verification:
☐ Mechanical hazards are eliminated or guarded

3. Guarding and Access Control

☐ Fixed guards installed where access to hazardous motion is possible
☐ Movable guards are **interlocked** with hazardous motion
☐ Guards intended for routine service remain attached when removed
☐ Hazardous mechanisms (shafts, gears, belts, linkages) are inaccessible
☐ Residual rupture or disintegration risks are **contained**

Integrator Verification:
☐ Guards prevent access during operation, setup, and maintenance

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4. Operating Space, Task Zones, and Layout

☐ Maximum space and operating space clearly defined
☐ Overlapping operating spaces evaluated
☐ Task zones for operators identified and protected
☐ Shared or adjacent robot applications evaluated for interaction
☐ Access paths through safeguarded spaces evaluated

Integrator Verification:
☐ Layout supports all lifecycle tasks safely

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5. Power Loss, Restart, and Position Holding

☐ Loss of power does **not result in hazardous motion**
☐ Position holding prevents dropping, drifting, or rotation
☐ Position holding withstands static overload conditions
☐ Power restoration does **not cause automatic restart**
☐ Unexpected start-up is prevented

Integrator Verification:
☐ Power failure and recovery behavior validated

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6. Hazardous Energy Control and Isolation

☐ All energy sources identified (electrical, pneumatic, hydraulic, vacuum, gravity, stored energy)
☐ Isolation devices provided for each energy type
☐ Isolation devices lockable in the **de-energized position**
☐ Isolation devices clearly labeled
☐ Span-of-control marked at each isolation point
☐ Stored energy (springs, accumulators, counterbalances) controlled or restrained

Integrator Verification:
☐ No uncontrolled release of hazardous energy is possible

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7. Additional Axes and Coordinated Motion

☐ Additional axes evaluated for speed, force, and motion hazards
☐ Speed differentials between axes addressed
☐ Safeguarding or safety functions implemented for coordinated motion
☐ Reduced-speed requirements applied where required
☐ Other axes cannot actuate when one axis exceeds reduced speed

Integrator Verification:
☐ Multi-axis hazards controlled

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8. Electrical, Pneumatic, and Hydraulic Interfaces

☐ Electrical parts comply with applicable standards
☐ Pneumatic and hydraulic systems comply with applicable standards
☐ Connectors prevent erroneous or cross-connection
☐ Where prevention is not practicable, connectors are clearly labeled
☐ Hoses, cables, and lines routed to prevent damage and entanglement

Integrator Verification:
☐ Utility interfaces do not introduce foreseeable hazards

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9. TCP and Payload Configuration

☐ Tool Center Point (TCP) correctly entered and verified
☐ Payload settings correctly entered and verified
☐ Payload reflects end-effector and workpiece mass
☐ Incorrect TCP or payload entry cannot create hazardous behavior

Integrator Verification:
☐ Motion behavior matches intended geometry and load

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10. Hazardous Substances and Environmental Controls

☐ Hazardous substances eliminated where practicable
☐ Where not eliminated, substances are contained or evacuated
☐ Ventilation, filtration, or treatment systems functional
☐ Controls effective during normal operation and foreseeable faults

Integrator Verification:
☐ Exposure risks are controlled

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11. Temperature and Fire Risks

☐ Accessible surface temperatures within safe limits
☐ Fire or overheating risks evaluated
☐ Fire prevention or mitigation measures implemented
☐ Required safety functions implemented where necessary

Integrator Verification:
☐ Thermal hazards controlled

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12. Cybersecurity and Control Integrity

☐ Cybersecurity threat assessment completed
☐ Unauthorized access to control systems prevented
☐ Default credentials removed or secured

☐ Safety configuration protected from unauthorized modification
☐ Network interfaces evaluated for safety impact

Integrator Verification:
☐ Cybersecurity does not compromise functional safety

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13. Integration With Other Machinery

☐ Associated machinery evaluated under applicable standards
☐ Safety-related control interfaces validated
☐ Integrated Manufacturing Systems (if present) do not bypass safety functions
☐ Safety signals exchanged via approved interfaces

Integrator Verification:
☐ Integrated interfaces preserve safety integrity

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14. Documentation and Handover Readiness

☐ Risk assessment updated to reflect final installation
☐ Safeguarding and safety functions documented
☐ Residual risks identified and communicated to the user
☐ Information for use prepared (limits, constraints, maintenance conditions)
☐ Changes during integration recorded

Integrator Pre-Commissioning Declaration

☐ I confirm that the robot application and robot cell have been integrated in accordance with applicable safety requirements. All reasonably foreseeable hazards have been addressed, and the system is ready for commissioning and validation.

Integrator Name: _____
Company: _____
Date: _____
Signature: _____
