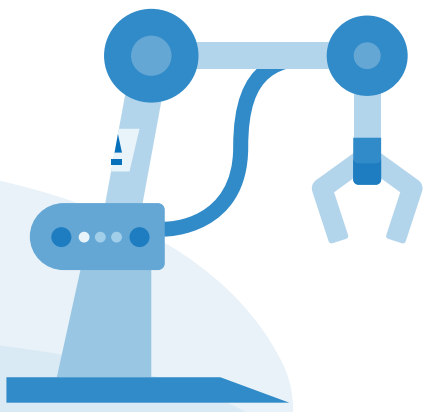


TÜV Rheinland Robotic Cell Compliance Roadmap

Critical Considerations for Robotic Cell Design

How does your cell stack up? Do you fully comply with the requirements of ANSI/RIA R15.06 Part 2, CSA Z434 Part 2 & EN ISO 10218-2?

Failure to consider these elements can cause severe safety risks, delays to market, product redesign, higher costs and long-term reputation damage.



RISK ASSESSMENT

- Was a risk assessment performed throughout the design and assembly of the robot cell?
- Does the risk assessment follow RIA TR R15.306, ANSI B11.0 or ISO 12100?
- Does the risk assessment take into consideration all the limits of the machinery?
- Does the risk assessment consider all hazards and all hazardous tasks?
- Was the risk estimated appropriately before safety measures were applied?
- Was the hierarchy of risk reduction (Elimination, Substitution, Administrative Controls) followed?
- Was the risk re-evaluated after reduction measures were applied? Was the risk sufficiently low?
- If a safety related control system was used for risk reduction, was a performance level (PL) or safety integrity level (SIL) required? Was this requirement met?



EMERGENCY STOP FUNCTION

- Does each control station capable of initiating motion have a manually initiated emergency stop?
- Does the stop function comply with IEC 60204-1 and ISO 13850?



SAFETY-RELATED CONTROL SYSTEM PERFORMANCE (HARDWARE/SOFTWARE)

- Do all safety related control systems meet at least PLd CAT 3 or SIL 2? If lower, was this justified by a risk assessment?
- Has an assessment of each safety interlock circuit been done in accordance with ISO 13849-1 and/or IEC 62061?



SAFEGUARDING

- Do safety distances over and through mechanical guarding meet the requirements in ISO 13857?
- Do the minimum distances from interlocking guards and other trip devices (laser scanners, light curtains, safety cameras, etc.) meet the requirements in ISO 13855?
- Do fixed and moveable guards meet the requirements of ISO 14120? Do their minimum distances from any hazard meet the relevant requirements of ISO 13857?
- Do the interlocking devices associated with moveable guards meet the requirements of ISO 14119?



INFORMATION FOR USE

Does the information for use contain all of the following information?

- Handling
- Installation and commissioning
- Information for commissioning test or initial start-up procedure
- System information
- Use of the system
- Maintenance
- De-commissioning
- Emergency situations
- Robot specific information



VERIFICATION AND VALIDATION

- Was a verification and validation of the design of the robot system performed to show compliance with ANSI/RIA R15.06 Part 2, CAN/CSA Z434 Part 2 & EN/ISO 10218-2?
- Is the document available in the information for use?



HAZARDOUS ENERGY

- Has the robot cell been evaluated and either listed or labelled in accordance with NFPA 79 and/or IEC 60204-1?
- Does the robot cell comply with ISO 4413 and ISO 4414 as applicable?



LIMITING ROBOT MOTION

- Was the restricted space of the robot made smaller than the safeguarded space?
- If the motion of the robot is limited by means integral to the robot (safety-rated soft axis and space limiting) is this safety rated and does it meet PLd CAT 3 or SIL 2? Are the programmed limits available in the information for use?
- If the perimeter guard is the limiting device, do the results of the risk assessment determine the requirements for the design, strength and deflection for that guard?



COLLABORATIVE ROBOT OPERATION

- Does the risk assessment consider all collaborative tasks and potential contact situations?
- Is one or more of the 4 safety features (safety-rated monitored stop, hand guiding, speed and separation monitoring, power and force limiting) utilized properly and validated?
- If power and force limiting is used as a method of protection, was an assessment conducted against the criteria in ISO/TS 15066 or RIA/TR 15.606 with the evaluation procedure outlined in RIA/TR 15.806?

Need additional information to create a compliance roadmap for your robotic cells? Contact TÜV Rheinland and our experts can help your team build a comprehensive compliance plan.

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