



5 MINUTE GUIDE

Collaborative Robotics



Applications



Pick & Place



Harsh Environments



Assembly Line

Benefits



Boost Productivity



Improve Quality



Reduce Costs

Standards to Know



United States
ANSI RIA R15.06
UL 1740
OSHA



Canada
CAN/CSA Z434



International
ISO 10218, Parts 1 and 2
ISO/TS 15066
ISO 13849-1
IEC 62061

Safety Considerations



Risk Assessment: ISO/TS 15066

- Limit criteria - mechanical loading (transient and quasi-static contact)



Functional Safety

- Safety rated, fail safe, functional safety
- Applied to control system
- Functions: protective stops, slow speed, limited force and person detection



Construction Evaluation

- Electrical (fire and shock)
- Mechanical safety and endurance (moving parts, pressure, and batteries)
- UL 1740, EN 60204-1 and NFPA 7
- Safety function & abnormal conditions



Workspace Evaluation

- Intended environment
- Temperature
- Altitude
- Humidity
- EMC



Cybersecurity

- Sensors, smart technologies, cameras
- Cobot connectivity — IIoT, ERP, WMS
- Networked control systems—monitor and manage efficiency, automation, and maintenance of cobots

Power and Force Limited (PFL) Robots

The most popular type of cobots today are PFL robots, which have either quasi-static or transient contact between an operator and part of a robot system. Make sure you know the difference!

	Quasi-static Contact	Transient Contact
Contact, Risk, Hazard	Operator body part can be clamped between a moving part of a robot system and another fixed / moving part of the robot cell	Operator body part is not clamped and can recoil or retract from the moving part of the robot system
Safety Considerations	Contact force and pressure	Inertia of the robot (and workpiece), contacted body part, and relative mass
Risk Reduction		
• Speed limits	✓	✓
• Physical Characteristics	✓	✓
• Design Characteristics	✓	
• Redesign of Work Area	✓	



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