

| Number | Short Description | Threat | Vulnerability | Measures | Impact | Probability | Proposed Approach |
|----------|----------------------------------------|------------------------------------------------|--------------------------------------------------------------|------------------------------------------------------|----------|-------------|------------------------------------------------------------------------|
| | Machine | | | | | | |
| MS-1.001 | Dangerous voltages | Parts may become energized | Wires/cables are loose | Never work under power | High | Low | Have specialized people work on it |
| MS-1.002 | Collisions | Collisions between robot and objects or people | Insufficient safety sensors or shielding around the robot | Install light curtains or enclosure around the robot | High | Moderate | Place screens around the workplace with light curtains for entrances |
| MS-1.003 | Crushing hazards | Crushing hazards with moving parts | Insufficient shielding of moving parts | Use of shields, safe working distance | High | Moderate | Place physical shielding and conduct periodic inspections |
| MS-1.004 | Speed | High speeds can cause parts to come loose | Incorrect setting causes excessive speed | Add speed control to a specific zone | High | Moderate | Lower speed when interacting with humans |
| MS-1.005 | Software | Software errors may cause unexpected movements | Software is not fully tested for safety | Regular software updates and testing | High | Low | Frequently perform software testing and updates |
| MS-1.006 | External influences (Moisture or dust) | Failures due to moisture or dust | Moisture can damage electronics, dust can block moving parts | Use of enclosures and maintenance planning | Moderate | Moderate | Regular maintenance and cleaning, install in a conditioned environment |
| MS-1.007 | Hardware failure | Unexpected component failure | Components may wear out or malfunction | Preventive maintenance, diagnostic systems | High | Low | Regular maintenance and timely replacement of worn-out parts |
| MS-1.008 | Overloading on cobots | Cobot gets overloaded and malfunctions | Objects are too heavy or incorrect workload calculation | Set maximum load, force limits | Moderate | Low | Monitor and control workload limits |
| MS-1.009 | Maintenance access | Accidents during maintenance work | No lockout during maintenance | Use of lock-out/tag-out systems | High | Moderate | Implement lockout systems and safety procedures |

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| | Personal | | | | | | |
| PR-2.001 | Inexperience | Can be dangerous when no supervisor is present | Lack of training/guidance | Always work under the supervision of a mentor | High | High | Have students complete assignments to broaden their knowledge under supervision |
| PR-2.002 | Illness and absence | Team members can be absent for an indefinite period | Project timeline and quality may be jeopardized | Make plans with buffer time and take over tasks when necessary | Moderate | High | Reassign tasks as needed and account for buffer time in the planning |
| PR-2.003 | Communication errors | Miscommunication between team members | The final project may differ from the original plan | Write down everything discussed and reflect on it | Moderate | Moderate | Use checklists/rubrics and take minutes of all meetings and key decisions |
| PR-2.004 | Incorrect operation | Errors during robot/cobot operation | Poor training or unclear materials | Train students under mentor supervision | High | Moderate | Create good interfaces and assignments and perform periodic evaluations |

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| | Other | | | | | | |
| OR-3.001 | Availability of resources | Lack of access to necessary resources for completing the task | Scope change or waiting for materials can cause time pressure | List and order all necessary items in advance | Moderate | Moderate | Inventory management and ensure fast delivery when needed |
| OR-3.002 | Change in scope | A (large) part of the project needs to be completely adjusted | Time pressure | Assess whether the change has serious consequences | Moderate | High | Always have changes reviewed by multiple people |
| OR-3.003 | Time pressure | Working faster can compromise safety and quality | Can lead to errors | Clear planning with realistic deadlines | Low | High | Weekly meetings with updates, and ask for help when needed |