

FMEA: FANUC ROBOT

| Component | Functional Requirement | Functional Failure | Failure Mechanism | Failure Code | Severity | Occurance | Detection | RPN | Recommendation | Tasked By & Due Date | Task Status | |
|--|---|-----------------------------------|---|--|-------------------------------------|-----------|-----------|---|--|--|--|--|
| | | | | | | | | | | | | |
| (R) Robot Unit | 1. Gripper to Move/Pick part from A to B | A. Gripper not working properly | 1. Gripper excessively worn | R1A1 | 4 | 5 | 6 | 120 | Based on statistical analysis, change Gripper quarterly. | | | |
| | | | 2. Gripper excessively damaged | R1A2 | 5 | 6 | 7 | 210 | Add Gripper inspection to weekly visual cell check sheet | | | |
| | | | 3. Gripper misaligned | R1A3 | 4 | 6 | 6 | 144 | Add Gripper inspection to weekly visual cell check sheet | | | |
| | | | 4. Air leak causing gripper malfunction | R1A4 | 4 | 4 | 3 | 48 | Perform Ultrasonci leak detection on robotic cell monthly | | | |
| | 2. Robot Body to support part transport from A to B | A. Structural failure | 1. Bolts are loose | R2A1 | 4 | 5 | 3 | 60 | Add robot sturcture inspection to weekly visual cell check sheet | | | |
| | | | 2. Robot body is fractured | R2A2 | 4 | 5 | 3 | 60 | Add robot sturcture inspection to weekly visual cell check sheet | | | |
| | | B. Electrical failure | 1. Electrical wiring are loose | R2B1 | 4 | 5 | 7 | 140 | Add robot wiring inspection to weekly visual cell check sheet | | | |
| | | | 2. Electrical wiring connectors damaged | R2B2 | 4 | 5 | 7 | 140 | Add robot wiring inspection to weekly visual cell check sheet | | | |
| | | | 3. Electrical cable track is loose | R2B3 | 3 | 5 | 6 | 90 | Add robot wiring inspection to weekly visual cell check sheet | | | |
| | | | 3. Robot Body to move part | A. Failure to accurate position/transport part | 1. Servo motor not working properly | R3A1 | 5 | 4 | 7 | 140 | Add servo motor to critical spare list & stock | |
| | 2. Robot joint is damaged | R3A2 | | | 4 | 5 | 7 | 140 | Peform greasing PM yearly; perform grease analysis yearly | | | |
| | 3. Robot joint seal damage | R3A3 | | | 7 | 4 | 7 | 196 | perform greasing PM yearly | | | |
| | B. Programing error | 1. Program code is not up-to-date | | R3B1 | 4 | 4 | 3 | 48 | Create PM to back-up robot program | | | |
| | | C. Hardware damage | | 1. Hardware malfunction | R3C1 | 5 | 4 | 4 | 80 | Add robot sturcture inspection to weekly visual cell check sheet | | |
| | 2. Overheating causing damage | | | R3C2 | 4 | 5 | 4 | 80 | Perform IR-Thermography scan on robot cell | | | |
| | 1. Backup Battery dies/damaged | | | R3D1 | 5 | 5 | 6 | 150 | Create PM to replace back-up battery every year | | | |
| | 4. Robot Control Unit | A. Programing error | | 1. Program code is not up-to-date | R4A1 | 4 | 2 | 3 | 24 | Create PM to back-up robot program | | |
| | | | | B. Hardware damage | 1. Hardware malfunction | R4B1 | 4 | 3 | 3 | 36 | Add robot sturcture inspection to weekly visual cell check sheet | |
| | | 2. Overheating causing damage | | | R4B2 | 4 | 3 | 4 | 48 | Perform IR-Thermography scan on robot cell | | |
| | | C. Backup Battery damaged | 1. Backup Battery dies/damaged | | | 5 | 5 | 6 | 150 | Create PM to replace back-up battery every year | | |
| | 5. Robot Power Supplies | A. Electrical source failure | 1. Power source malfunction | R5A1 | 3 | 4 | 3 | 36 | Create PM to inspect power panels quarterly | | | |
| | | | 2. Main switch gear damaged/malfunction | R5A2 | 4 | 5 | 5 | 100 | | | | |
| | | B. Electrical failure | 1. Electrical wiring are loose | R5B1 | 5 | 5 | 4 | 100 | | | | |
| | | | 2. Electrical cable track is loose | R5B2 | 5 | 5 | 4 | 100 | | | | |
| 3. Electrical cable connectors are loose | | | R5B3 | 4 | 3 | 4 | 48 | | | | | |
| 6. Accessories: Sensors | A. Sensors malfunction/damaged | 1. Sensor loose cable | R6A1 | 4 | 4 | 3 | 48 | Add sensor position inspection to weekly visualy cell check sheet | | | | |
| | | 2. Sensor damaged | R6A2 | 4 | 4 | 3 | 48 | Add sensor to critical spare list & stock | | | | |
| | B. Sensor misalignment | 1. Sensor not in position | R7B1 | 4 | 7 | 3 | 84 | Add sensor position inspection to weekly visualy cell check sheet | | | | |

| RPN Legend | RPN Range |
|--------------------|------------|
| No Action Required | 1 - 75 |
| Action Recommended | 76 - 125 |
| Action Required | 126 - 1000 |

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