**Collaborative Robotics Programming Technician**

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| Function Areas | Specific Tasks |
| 1. **Install Robot**
 | Connect robot mechanically | Connect robot electronically | Connect robot pneumatically | Reteach points | Install a program | Verify safety functionality (wiring, response, checklist) |  |
| 1. **Move Robot**
 | Determine disassembly needs | Determine rigging requirements for movement (per manufacturer’s manual) | Secure robot for shipping (build pallet, etc., when necessary) | Connect robot mechanically | Connect robot electronically | Connect robot pneumatically | Reteach points |
|  | Verify safety functionality |  |  |  |  |  |  |
| 1. **Maintain Robot**
 | Consult manufacturer’s manual for preventive maintenance checks and services | Save current program prior to conducting new operations | Disassemble robot | Grease points | Change seals on pneumatic tooling | Replace filters | Replace Belts |
|  | Replace joints | Recalibrate robot | Monitor & toggle I/O | Reteach points | Maintain a current backup | Perform recovery operations from backups | Verify safety functionality |
| 1. **Troubleshoot robot operations**
 | Follow the steps/logic to determine problem | Determine the root cause (mechanical, electrical, pneumatic, etc.) | Communicate with operator | Change machine modes (auto/manual) | Run robot at variable speeds to identify mechanical issues | Manipulate machine in manual mode | Start, stop, and clear errors |
|  | Locate a bad sensor | Determine sensor trouble | Recover from a crash | Trace and correct faults in area scanners, light curtains, and load cells | Verify safety functionality |  |  |
| 1. **Identify Program Feasibility**
 | Identify robot’s capabilities & limitations | Identify controller’s capabilities & limitations | Conduct risk assessment | Identify quality control requirements | Interact with other areas/departments | Identify mechanical system features |  |
| 1. **Write Code**
 | Save current program prior to conducting additional operations | Define/flow chart the process | Define I/O | Inputs fault messaging & recovery codes into the program | Define standard program modes/ mode control | Comment and label code (label early, label often)*(as important as saving backups)* | Implement standard program modes |
|  | Read current program code and determine how to modify if needed | Develop/program safety logic | Verify the quality of the programming through physical check or quality control personnel | Debug programming | Ensure the programming will meet or improve production requirements | Program data reporting requirements | Communicate with field bus devices (Ethernet, IP, DeviceNet, Profibus, etc.) |
|  | Interact with end of arm tooling and other interconnected automation equipment | Verify safety functionality |  |  |  |  |  |
| 1. **Perform Maintenance Functions**
 | Maintain firmware | Generate backups | Perform recovery operations using backups | Follow/adhere to company specific standards and requirements |  |  |  |

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|  | Occupational Task Analysis Panel Members |  |

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| Maintenance Supervisor | Core Tech |
| Robotics Field Service Engineer | Cross Robotics & Machine Automation |
| Controls EngineerControls EngineerPresidentControls ManagerSales Support Engineer | Brooks Machine & Design, Inc.Brooks Machine & Design, Inc.Mertek SolutionsMertek SolutionsSCHUNK |
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| **Analysis Facilitator:** | Jay Jackson |
| **Analysis Coordinator:** | Rachel Haskins |
| **Analysis Recorder:** | HollyAnn Nye Rogers |

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| Collaborative Robotics Programming Technician | **A robotics programming technician is a collaborative robotics technician who programs a robotic cell to be collaborative and to meet specific safety standards.** |

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| Knowledge | Control CircuitsIndustrial/Mechanical MaintenanceBasic PhysicsRead a SchematicBasic Electrical WiringPneumatic Principles and SchematicsGearing (Mechanical)Basic Automation Products (core components)Basic Tools (i.e., multimeter)Safety Standards and Robotic Industry Association (RIA) StandardsCartesian Coordinates and Frames Ability to Use Google | Arc Flash SuitsLinear Devices (screws, belt drives, drives, rack and pinion)How Machine Runs in AutoAdvanced Programming LogicProgramming Languages (C++, Ladder, Function Block, Structured Text)Data Types and Structures (floating points)Advanced Data NetworkingAdvanced Motors and EncodersServo Drives and Amplifiers Real Time Data Exchange |

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| Skills | Basic Wiring (including soldering)Mechanical SkillsAbility to Read a MultimeterProblem-Solving Skill Basic Computer Skills | Soft Skills* Customer Interaction
* Communication

Advanced Machine/Device CommunicationTyping/Keyboarding |

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| Equipment | ScrewdriversAllen Wrenches (SAE & Metric)Needle-Nose PliersDigital MultimeterWire StrippersLockout/Tagout KitTorque WrenchSafety GlassesEar Plugs USB DrivesCables (Ethernet, Serial, USB) | Box CutterAdjustable WrenchesSoldering KitRubber MalletCell Phone CameraFlashlightLaptop with a Windows Pro edition and Good Text Editor (i.e., Go Pad, UltraEdit, Notepad++)Converters and CablesWireshark |

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| Instruction Equipment(needed by the college) | LaptopSimulation Software (Robot Studio, Yumi)Light Curtains and Area ScannerSafety Hardware FencingEnd-of-Arm Tooling Options (grippers, vacuum cups, magnets)Wiring Cabinet with Electrical TerminalBlocks, HMI, PLC, Vision/CameraAir Supply (compressor) | 3D PrinterSafety RelaysTool ChangersCompliance Device (tool on the robot arm)Push Buttons and Switches/RelaysStack LightSimulation Software That Can Be Run Without Actual Jardware (Allen Bradley, Parker Motion, Code Assist) Wireshark |

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**Occupational TASK ANALYSIS**

### Developed by

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**Corporate and Business Solutions**

**Robotics Awake**

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**March 9, 2018**