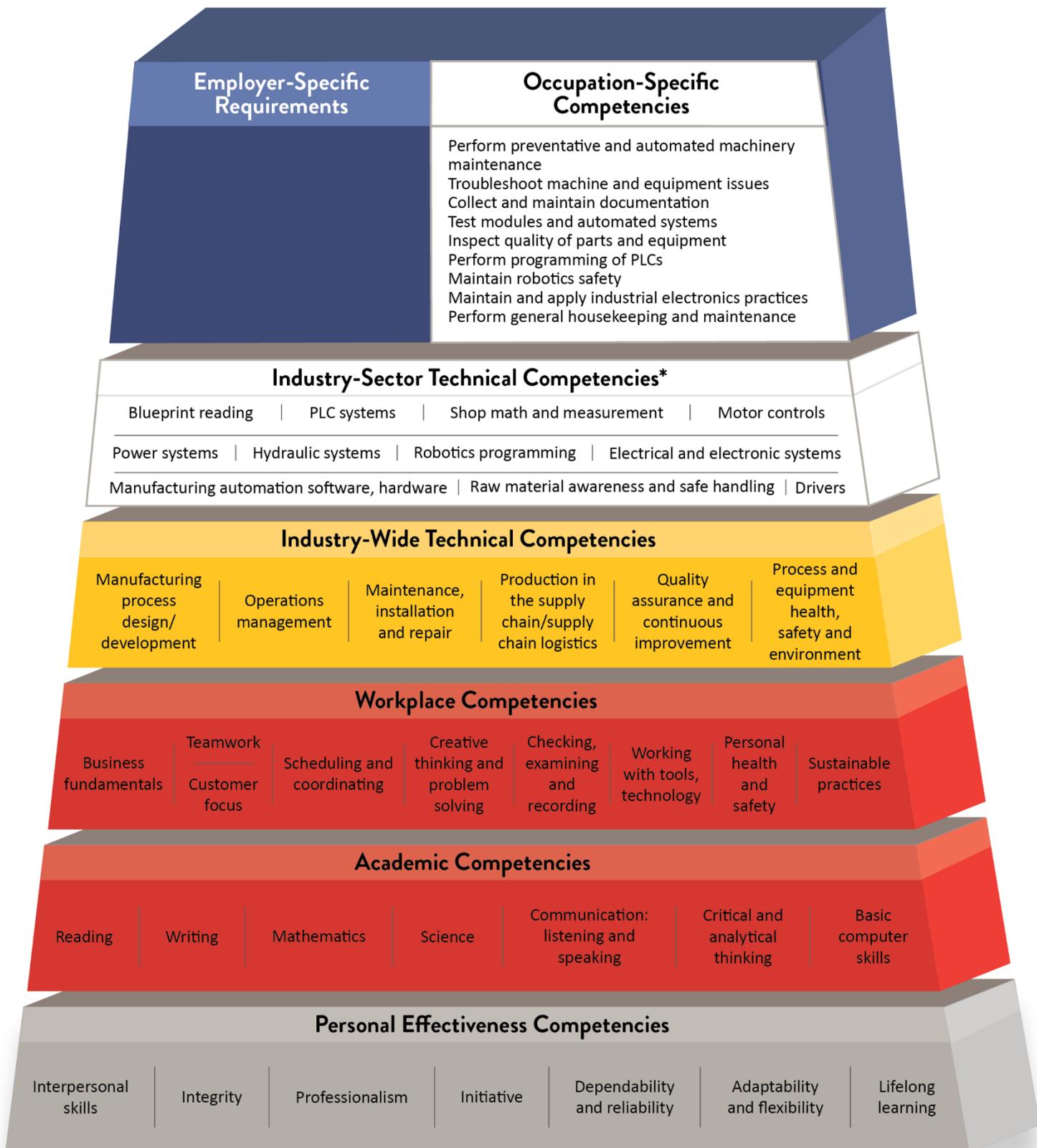


Minnesota Dual-Training Pipeline

Competency Model for Advanced Manufacturing

Occupation: Robotics Operator



Based on: Advanced Manufacturing Competency Model, Employment and Training Administration, United States Department of Labor, February 2025. For more detailed information about competency model creation and sources, visit dli.mn.gov/business/workforce/advanced-manufacturing.



Competency Model for Robotics Operator

Robotics operator – This position is responsible for providing general robotic and automation oversight and support for manufacturing operations. The individual will run the automated equipment while leading some programming and other necessary steps to set up the machine. Also, robotics operators perform general machine oversight and basic work cell installation and updates. Lastly, robotics operators are responsible for routine and preventative maintenance of automated equipment.

*Pipeline recommends the Industry-Sector Technical Competencies as formal training opportunities (provided through related instruction) and the Occupation-Specific Competencies as on-the-job (OJT) training opportunities.

Industry-Sector Technical Competencies

Related Instruction for dual training means the organized and systematic form of education resulting in the enhancement of skills and competencies related to the dual trainee's current or intended occupation.

- **Blueprint reading** – Knowledge in reading and understanding industrial prints.
- **PLC systems** – Understanding of the functions of programmable logic controller (PLC) systems to achieve desired outcomes.
- **Shop math and measurement** – Understanding of basic math including linear measurement, metrics, and algebra.
- **Motor controls** – Understanding of industrial motor control principles including how they are installed, maintained and how to do very basic repairs.
- **Power systems** – Understanding of principles of electricity through both its effect and needs for product development, implementation, and production.
- **Hydraulic systems** – Understanding of how hydraulic systems function and their applications and integration with PLCs.
- **Robotics programming** – Understand the basic ways to program the robot through offline, supervisory control and data acquisition (SCADA), human machine interface (HMI), and vision programming for example.

- **Electrical and electronic systems** – Knowledge of how to safely operate, do very basic repair, and understand electrical and electronic systems.
- **Manufacturing automation software/hardware** – Knowledge of basics of PLC programming, CAD/ CAM software, how to use robotics software and hardware and how robotics and automation factor into overall manufacturing design and production processes.
- **Raw material awareness and safe handling** – Understanding of the different raw materials possibly involved in production and how certain machine settings, temperatures, etc. can potentially impact different materials.
- **Drivers** – Understanding of the components and applications of drivers to achieve desired outcomes.

Occupation-Specific Competencies

On-the-Job Training is hands-on instruction completed at work to learn the core competencies necessary to succeed in an occupation. Common types of OJT include job shadowing, mentorship, cohort-based training, assignment-based project evaluation and discussion-based training.

- **Perform preventative and automated machinery maintenance** – Knowledge of how to practice industry approved procedures to oversee and do preventative maintenance on automated and robotics-based machinery and equipment.
- **Troubleshoot machine and equipment issues** – Knowledge of how to strategically think through what may be causing quality defects as well as machine / equipment issues and quickly brainstorm and implement approaches to address these concerns.
- **Collect and maintain documentation** – Understanding of how to maintain a record of procedures which represent work processes.
- **Test modules and automated systems** – Know how to test runs of modules and assembled automated systems.
- **Inspect quality of parts and equipment** – Understanding of how to check assembled parts to ensure that the robot / automated equipment is making things according to plan.
- **Perform programming of PLC's** – Demonstrate PLC programming including digital and industrial field buses.
- **Maintain robotics safety** – Understand how to interact, operate, and function around the robotics/ automated equipment in a manner that ensures the robot does not cause injury to oneself or others.

- **Maintain and apply industrial electronics practices** – Know the basic principles and applications of equipment, tools and processes that involve electrical production equipment in the manufacturing setting.
- **Perform general housekeeping and maintenance** – Understanding of how to maintain tools and automation-based machinery with basic cleaning and maintenance procedures.
- Updated December 2025