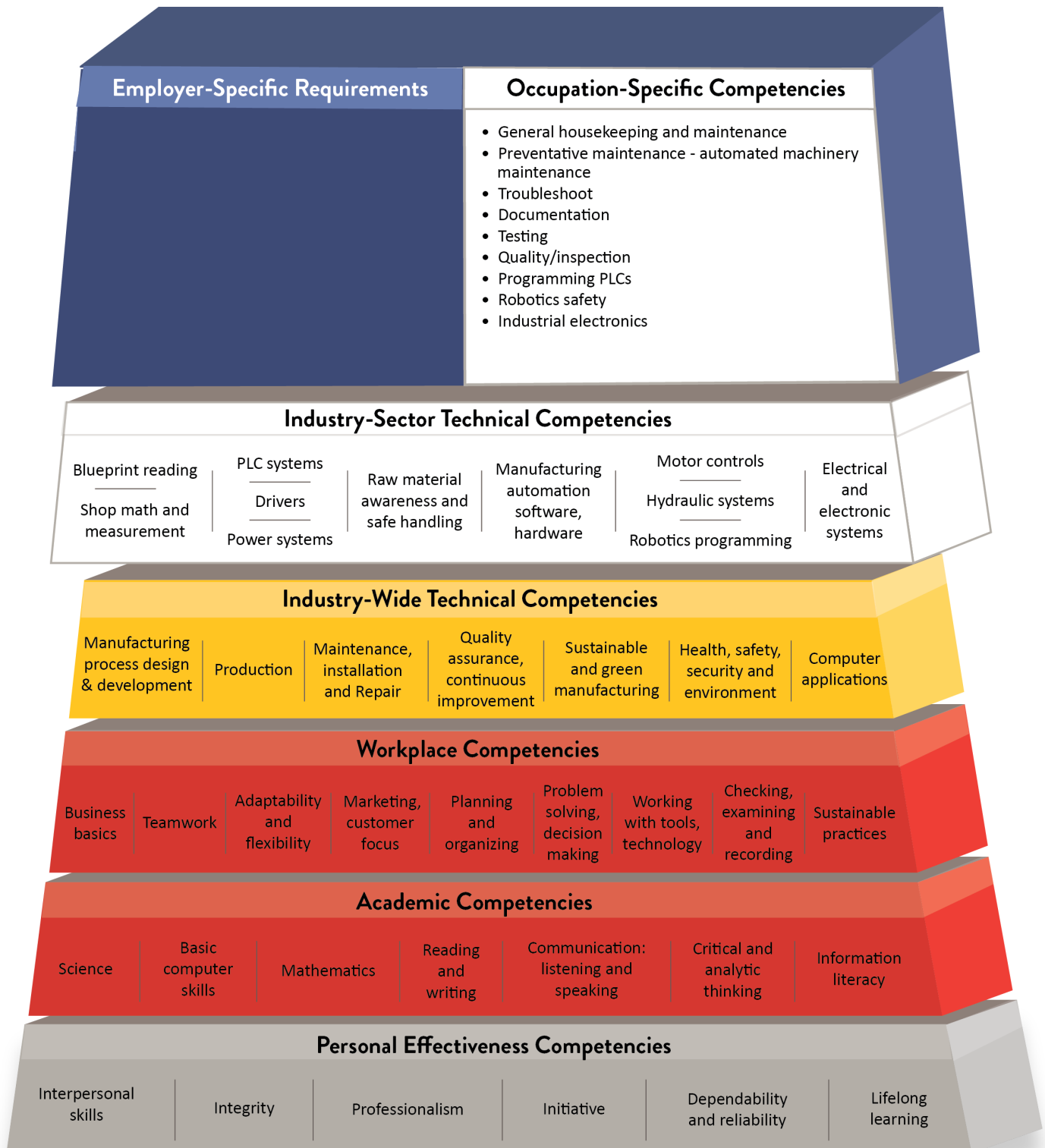


# Minnesota Dual-Training Pipeline

## Competency Model for Advanced Manufacturing

### Occupation: Robotics Operator



Based on: Advanced Manufacturing Competency Model Employment and Training Administration, United States Department of Labor, April 2010.

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



## 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.

### 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.
- **Shop math and measurement** – Understanding of basic math including linear measurement, metrics, and algebra.
- **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.
- **Power systems** – Understanding of principles of electricity through both its effect and needs for product development, implementation, and production.
- **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.
- **PLC systems** – Understanding of the functions of PLC systems to achieve desired outcomes.
- **Motor controls** – Understanding of industrial motor control principles including how they are installed, maintained and how to do very basic repairs.
- **Hydraulic systems** – Understanding of how hydraulic systems function and their applications and integration with PLCs.
- **Drivers** – Understanding of the components and applications of drivers to achieve desired outcomes.
- **Electrical and electronic systems** – Knowledge of how to safely operate, do very basic repair, and understand electrical and electronic systems.

- **Robotics programming** – Understand the basic ways to program the robot through offline, SCADA, human machine interface (HMI), and vision programming for example.

## Occupation-Specific Competencies

**On-the-Job Training (OJT)** 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.

- **Preventative maintenance - 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** – 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.
- **Documentation** – Understanding of how to maintain a record of procedures which represent work processes.
- **Testing** – Know how to test runs of modules and assembled automated systems.
- **Quality / inspection** – Understanding of how to check assembled parts to ensure that the robot / automated equipment is making things according to plan.
- **Programming PLC's** – Demonstrate PLC programming including digital and industrial field buses.
- **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.
- **Industrial electronics** – Know the basic principles and applications of equipment, tools and processes that involve electrical production equipment in the manufacturing setting.
- **General housekeeping and maintenance** – Understanding of how to maintain tools and automation-based machinery with basic cleaning and maintenance procedures.

Updated February 2025