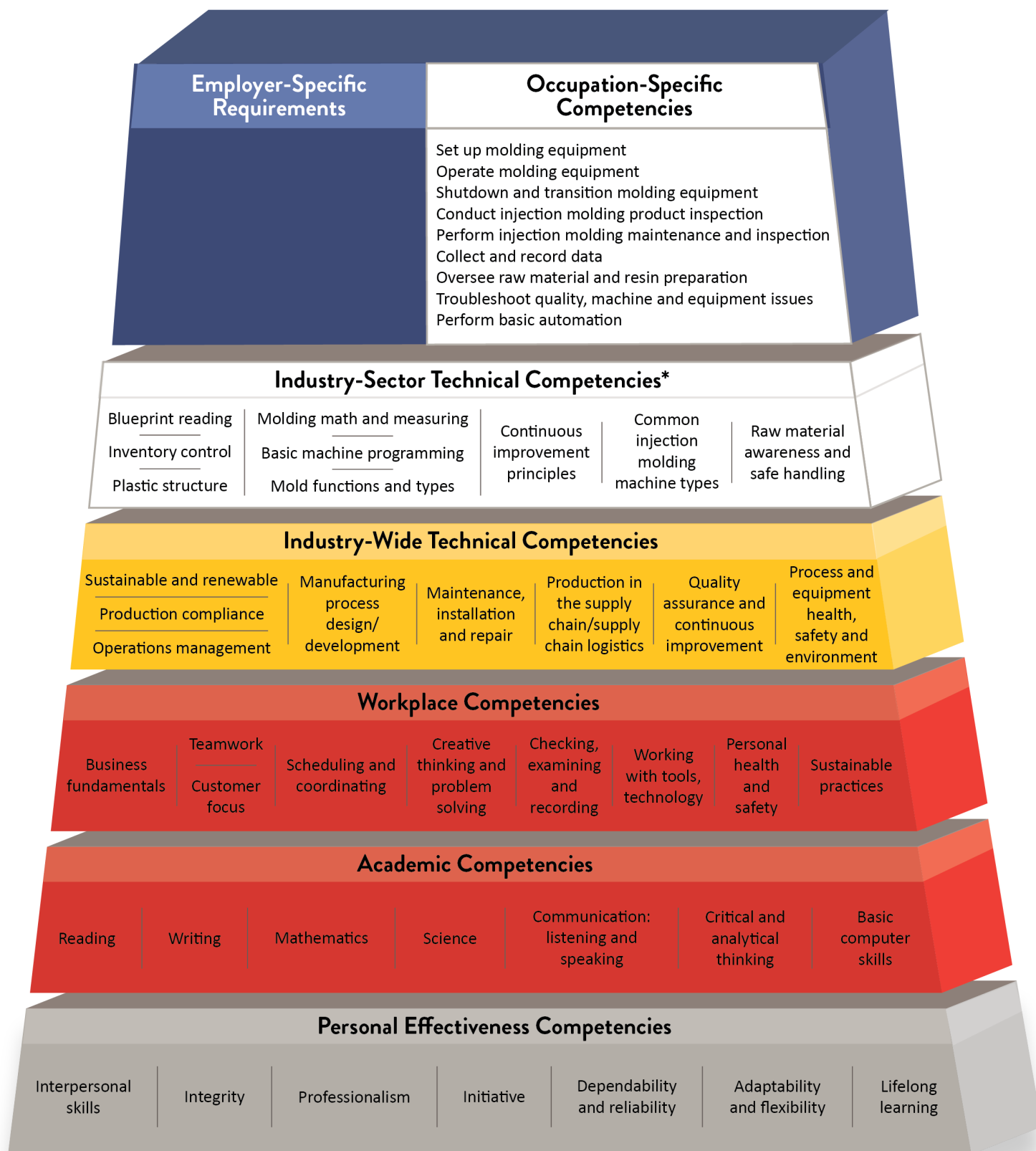


Minnesota Dual-Training Pipeline

Competency Model for Advanced Manufacturing

Occupation: Injection Molding Technician



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 Injection Molding Technician

Injection Molding Technician – This position is responsible for overseeing the operation of injection molding machines to guarantee that the parts produced are up to the standards set by the company and the customer. The Injection Molding Technician knows how to set up the molds, troubleshoots problems in production, makes corrections, ensures quality controls and ensures that the product readily removes from the molds. Injection Molding Technician also knows how to ensure safe operation throughout the entire set up, operation, shut down and any subsequent waste removal processes.

*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** – Develop the skills necessary to interpret working drawings common to the molding field.
- **Molding math and measuring** – Knowledge to apply basic math skills, make accurate measurements and use measuring tools regarding various aspects of the molding process.
- **Inventory control** – Training in how to manage stock materials as well as track and purchase necessary items in order to seamlessly support the overall manufacturing process.
- **Mold functions and types** – Know how molds typically allow chilled water to flow through plastic, how to do cooling of the plastic and the extraction of the plastic part from the mold. Also, have general understanding of operation of the common types of molds such as two-plate molds, three-plate molds, cold runner terminology and runnerless molds.
- **Common injection molding machine types** – General understanding of the operation and properties associated with using electric injection molding machines such as servo motor drive systems, ball screw drive mechanism, precision of molding machines and hydraulic pressure vs. plastic pressure-based machinery.

- **Continuous improvement principles** – Understands how to look for ways to minimize and reduce process wastes, to notice and correct machine abnormalities, to maintain records and to adapt to process changes such as cycle times, set-ups and tooling.
- **Raw material awareness and safe handling** – General understanding of the different raw materials possibly involved in injection molding and how certain machine settings, temperatures, etc. can potentially impact different materials and plastics. Know how to safely remove excess materials as well as how to manage any environmental concerns with material removal.
- **Plastic structure** – Understanding of the basic types of plastic structures such as thermoplastic, thermoset, copolymer and blends.
- **Basic machine programming** – Understand how to do basic programming and automation functions for assembly machines.

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.

- **Set up molding equipment** – Ability to select correct tools and materials, perform mechanical set-up according to company standards and equipment specifications, tests and validates set-up before going to full production.
- **Operate molding equipment** – Ability to operate injection molding equipment during production cycle, knowing how to monitor quality, document processes and adjustments, monitor machine settings and safely operate machinery during entire production cycle.
- **Shutdown and transition molding equipment** – Knowledgeable in how to safely and effectively shut down injection machining to maintain tooling and lessen time necessary to transition to new production set-up while disassembling equipment and components if necessary.
- **Conduct injection molding product inspection** – Demonstrate how to identify defects, confirm product is up to customer molding standards, and use appropriate tools to accomplish mold inspections.
- **Perform injection mold maintenance and inspection** – Know how to properly care for, store, operate and do routine maintenance to individual molds.
- **Collect and record data** – Know how to regularly maintain records of materials used, products made and timing for set-up, operation cycle time and change over to new/different product(s).

- **Oversee raw material/resin preparation** – Know the technical aspects of raw material/ resin handling and how to properly dry and feed the material throughout the manufacturing process.
- **Troubleshoot quality, machine and equipment Issues** - Know 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.
- **Perform basic automation** – Understand how to operate equipment and oversee tasks that are automated with machinery and/or robotics such as axis robotics and sprue pickers for example.

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