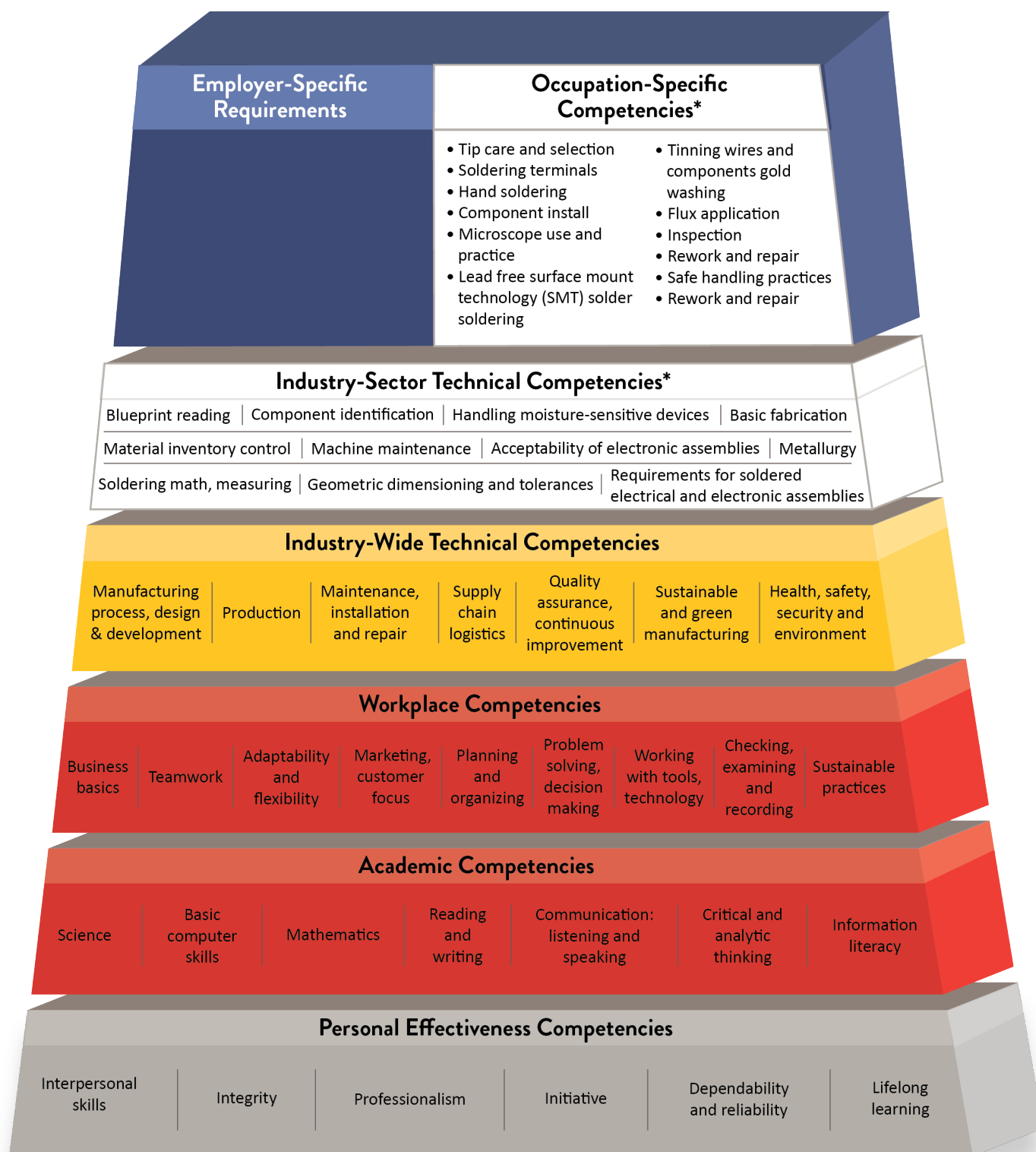


# Minnesota Dual-Training Pipeline

## Competency Model for Advanced Manufacturing

### Occupation: Solderer



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 Solderer

**Solderer** – An individual who is responsible for the proper mechanical and electrical assembling of metals and various components together with various hand soldering procedures to help create a product within a manufacturing environment.

### 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** – Know how to read and understand work instructions and technical documents. Develop the skills necessary to interpret drawings common to electronics manufacturing. Basic understanding of orthographic projection drawings and interpreting specified information and symbols.
- **Component identification** – Ability to identify electronic components and to interpret and understand markings, values and how they impact the product throughout assembly stages.
- **Requirements for soldered electrical and electronic assemblies** – Understand properties of solder materials and processes in conducting electricity. Focus on understanding criteria for materials, methods and verification of quality soldered joints and defects.
- **Handling moisture sensitive devices** – Know how to properly identify and handle electronic components susceptible to damage from exposure to moisture.
- **Acceptability of electronic assemblies** – Understand how to identify product acceptance criteria for consumer and high reliability printed wiring assemblies.
- **Soldering math and measuring** – Ability to apply basic math skills, make accurate measurements and use measuring tools regarding various aspects of the soldering process.
- **Material inventory control** – Knowledgeable of how to manage stock materials as well as track and purchase necessary items to support the manufacturing process.
- **Machine maintenance** – Understand how to complete appropriate and thorough maintenance procedures to keep soldering tools and equipment running safely and reliably.

- **Geometric dimensioning and tolerances** – Knowledge of the symbolic way that specific tolerances on blueprint drawings are shown and how these tolerances impact the manufactured part.
- **Basic fabrication** – Understanding of component fabrication by cutting, altering, and shaping of other materials using different tools, techniques, and processes prior to soldering.
- **Metallurgy** – Ability to select the appropriate soldering process for a particular application, choose or adjust solder iron parameters and techniques to optimize soldering properties and avoid solder defects.

## 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.

- **Tip care and selection** – Knowledgeable on how to properly maintain soldering tips and extend tip life by proper tip size selection for appropriate application.
- **Soldering terminals** – Understand the details required for soldering wires to electronic terminals.
- **Hand soldering** – Know how to safely conduct tin lead and lead-free hand soldering.
- **Component installation** – Understand common techniques for hand soldering surface mount components using a hand soldering iron.
- **Microscope use and practice** – Ability to routinely utilize a microscope to ensure that soldering is done exactly at points that it should be on the given part.
- **Lead free surface mount technology (SMT) soldering** – Ability to conduct lead free soldering application in surface mount processes.
- **Tinning wires/components gold washing** – Demonstrate how to remove and reapply gold finish on variety materials using the correct procedures. Practice safe working procedures for handling the equipment and tools in the tinning process.
- **Flux application** – Understand proper use and chemistry types for specified application.
- **Inspection** – Demonstrate how to identify soldering defects, confirm product is up to customer standards, and use appropriate tools to accomplish solder joint inspections.

- **Safe handling practices** - Knowledgeable of how to safely work with materials that get very hot and can cause burns to skin. Understand best practices to stay safe in the occupation.
- **Rework and repair** – Refine solder joints after inspection without compromising the integrity of the main part component and solder joint.

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