

AUTOMATED MANUFACTURING TECHNOLOGY BLUEPRINT

This Blueprint contains the subject matter content of this Skill Connect Assessment. This Blueprint does **NOT** contain the information one would need to fully prepare for a SkillsUSA Championships contest. Please refer to the *SkillsUSA Championships Technical Standards* CD-ROM for the current year or purchase and download the relevant "Contest Singles." Both are available through www.skillsusa.org > Shop > Educational Materials Catalog.

Standards and Competencies

Perform mathematical and measurement calculations used in automated manufacturing situations

- Measure work pieces to the nearest .001 inch
- Calculate CNC speed and feeds
- Calculate stock utilization and setup
- Calculate tolerances
- Calculate various variables to estimate costs and material usage written evaluation

Design, sketch and plan machine work to U.S. National CAD Standards

- Transfer information from provided drawing to CAD drawing
- Create CAD file for manufacturing using standard CAD terminology and standard practice
- Initiate manufacturing documentation process
- Generate a process plan
- Plot a CAD file
- Export a CAD file
- Process Engineering Change Orders (ECO)
- Repeat steps as necessary to accommodate ECO

Create a toolpath (CAM file) and the CNC code to related duty tasks of the National Institute for Metalworking Skills (NIMS) Duties and Standards for Machining Skills, Level I

- Create process plan (job plan)
- Read-in CAD export file
- Create toolpath
- Verify toolpath
- Create CNC code
- Send CNC code to machine tool
- Process Engineering Change Orders (ECO)
- Repeat steps as necessary to accommodate ECO

Perform CNC machining functions given a scenario to the related duty tasks of the National Institute for Metalworking Skills (NIMS) Duties and Standards for Machining Skills, Level I

- Verify CNC file existence
- Verify toolpath
- Set up fixture(s) and tooling on machine
- Set up part(s) on mill
- Set all offsets and tooling
- Adjust machine speeds and feeds as needed
- Complete an in-process quality assurance process
- Perform tool changes
- Perform multiple machining operations in one setup
- Demonstrate proficiency in using a CNC machine tool and produce part(s)

- Use Total Quality Management practices to verify process and part
- Process Engineering Change Orders (ECO)
- Repeat steps as necessary to accommodate ECO

Perform and inspect part(s) using a Total Quality Management process

- Verify part(s) to provided standards
- Verify part(s) to ECO standards
- Document process of verification and inspection

Demonstrate safety practices in a working situation to the related duty tasks of the National Institute for Metalworking Skills (NIMS) Duties and Standards for Machining Skills-Level I

- Carry out assigned responsibilities while adhering to safe practices in accordance with OSHA requirements and guidelines
- Document safety activities as require
- Demonstrate safety procedures in running and programming a CNC machine tool

Produce welds using a Gas Tungsten Arc Welding (GTAW process to AWS QC10 standards

- Solve various solutions to the process that is involved in quoting a job in a rapid prototyping environment

Demonstrate professional development skills in a simulated customer-service or employment situation. Examples may include:

- Job interview
- Customer service scenario
- Communications
- Decision making, problem solving and/or critical thinking

Committee Identified Academic Skills

The SkillsUSA national technical committee has identified that the following academic skills are embedded in the automated manufacturing technology training program and assessment:

Math Skills

- Use fractions to solve practical problems
- Use proportions and ratios to solve practical problems
- Use scientific notation
- Solve single variable algebraic expressions
- Solve multiple variable algebraic expressions
- Measure angles
- Find surface area and perimeter of two-dimensional objects
- Find volume and surface area of three- dimensional objects
- Construct three-dimensional models
- Apply Pythagorean Theorem
- Solve problems using proportions, formulas and functions
- Find slope of a line
- Solve practical problems involving complementary, supplementary and congruent angles
- Solve problems involving symmetry and transformation

Science Skills

Use knowledge of physical properties (shape, density, solubility, odor, melting point, boiling point, color)

Language Arts Skills

- Provide information in conversations and in group discussions

- Demonstrate comprehension of a variety of informational texts
- Organize and synthesize information for use in written and oral presentations
- Demonstrate knowledge of appropriate reference materials

Connections to National Standards

State-level academic curriculum specialists identified the following connections to national academic standards.

Math Standards

- Numbers and operations
- Geometry
- Measurement
- Data analysis and probability
- Problem solving
- Communication
- Connections
- Representation

Source: NCTM Principles and Standards for School Mathematics. To view high school standards, visit: standards.nctm.org/document/chapter7/index.htm. Select “Standards” from menu.

Science Standards

Understands the structure and properties of matter
Understands the sources and properties of energy
Understands the nature of scientific inquiry

Source: McREL compendium of national science standards. To view and search the compendium, visit: www.mcrel.org/standards-benchmarks/.

Language Arts Standards

Students apply a wide range of strategies to comprehend, interpret, evaluate and appreciate texts. They draw on their prior experience, their interactions with other readers and writers, their knowledge of word meaning and of other texts, their word identification strategies, and their understanding of textual features (e.g., sound-letter correspondence, sentence structure, context, graphics)

Students adjust their use of spoken, written, and visual language (e.g., conventions, style, vocabulary) to communicate effectively with a variety of audiences and for different purposes

Students apply knowledge of language structure, language conventions (e.g., spelling and punctuation), media techniques, figurative language and genre to create, critique, and discuss print and nonprint texts

Students use a variety of technological and information resources (e.g., libraries, databases, computer networks, video) to gather and synthesize information and to create and communicate knowledge

Students participate as knowledgeable, reflective, creative and critical members of a variety of literacy communities

Students use spoken, written and visual language to accomplish their own purposes (e.g., for learning, enjoyment, persuasion, and the exchange of information)

Source: IRA/NCTE Standards for the English Language Arts. To view the standards, visit: www.readwritethink.org/standards/index.html.