

Machining 1

Exam Information	Description
Exam number 580 Items 50 National Career Cluster Advanced Manufacturing Certification available Yes	The Machining 1 industry certification exam assesses technical knowledge and skills related to planning and manufacturing projects using machine lathes, mills, drill presses, and other equipment in safe working conditions to promote the manufacturing industries.

Exam Blueprint and Performance Skills

Standard	Percentage of exam score
1. Personal Development	2%
2. Workplace Readiness	2%
3. Safe Practices and Procedures	15%
4. Mathematical Concepts	15%
5. Engineering Documents	9%
6. Measurement Inspections	11%
7. Manufacturing Materials and Processes	15%
8. Grinding Machines and Bandsaws	8%
9. Metal Lathes	23%

*Includes performance skill evaluation

Standard 1 - Personal Development (2% of exam score)

Candidates will participate in personal and leadership development activities through SkillsUSA or another appropriate career and technical student organization

Objective 1 Candidates will use communication skills to effectively communicate with others.

1. Understand when it is appropriate to listen and to speak.
2. Understand and follow verbal and written instructions for classroom and laboratory activities.

Objective 2 Candidates will effectively use teamwork to respectfully work with others.

1. Identify and understand different roles in working with a team.

Objective 3 Candidates will use critical thinking and problem-solving skills.

1. Good Documentation (don't scribble)
2. Develop a solution to address the problem
3. Record Keeping

Objective 4 Candidates will be dependable, reliable, steady, trustworthy, and consistent in performance and behavior.

1. Set and meet goals on attendance and punctuality.
2. Personal Hygiene
3. Prioritize, plan, and manage work to complete assignments and projects on time.

Standard 2 - Workplace Readiness (2%)

Candidates will participate in workplace readiness activities.

Objective 1 Candidates will demonstrate employability skills.

1. Use a career search network to find career choices.
2. Write a resume including a list of demonstrated skills.
3. Write a letter of application.
4. Complete a job application.
5. Participate in an actual or simulated job interview.

Standard 3 - Safe Practices and Procedures (15%)

Candidates will be able to understand safe practices and professional machine shop procedures.

Objective 1 Follow safety manuals and all safety regulations and requirements.

Objective 2 Use PPE (personal protective equipment) and protective shields.

1. Wear PPE as recommended by OSHA, UOSHA, and the Utah State Risk Management Office.
2. Maintain and use appropriate protective guards and equipment on machinery.

Objective 3 Follow safe operating procedures for hand and power machine tools..

1. Identify and understand safe machine operating procedures.
2. Demonstrate safe machine operations at all times.

Objective 4 Maintain a clean and safe work environment.

1. Keep work areas clean.
2. Clean machine and hand tools when work is completed.
3. Put tools away when work is finished.
4. Keep aisles clear of equipment and materials.
5. Perform preventive maintenance as required.
6. Understand chemical hazards and the use of Safety Data Sheets (MSDS).
7. Basics of 5S standard (sort, sustain, standardize, shine, set in order).

Objective 5 Each candidate should earn a score of 100% on a required safety exam relating to general shop safety and each machine tool he/she will be operating.

Standard 4 - Mathematical Concepts (15%)

Candidates will be able to apply mathematical concepts.

Objective 1 Perform basic arithmetic functions.

1. Add, subtract, multiply, and divide whole numbers.
2. Add, subtract, multiply, and divide fractions.
3. Add, subtract, multiply, and divide decimals.

Objective 2 Convert fractions to decimal equivalents.

1. Convert fractions to decimal equivalents.
2. Convert decimal values to nearest fraction equivalent.
3. Use Decimal Equivalent Chart for conversions.

Objective 3 Calculate speeds and feeds for machining.

1. Given appropriate reference materials, calculate RPM for various metals and tools.

Standard 5 - Engineering Documents (9%)

Candidates will be able to interpret engineering drawings and control documents.

Objective 1 Identify basic layout of drawings.

1. Identify types of lines within a drawing.

Objective 2 Identify basic types of drawings.

1. Identify orthographic views.
2. Identify positions of views (top, front, side, and auxiliary).
3. Identify and describe the purpose of orthographic (three views) drawings.
4. Recognize out-of-date blueprints and know appropriate related procedures.

Standard 6 - Measurement Inspections (11%)

Candidates will be able to properly measure and inspect parts according to drawing and document specifications.

Objective 1 Select proper measurement tools as they best relate to part characteristics and specified accuracy.

1. Discuss how measurement tool selection can contribute to part accuracy/inaccuracy.
2. Demonstrate proper use and care of precision measuring tools.

Objective 2 Apply proper measuring techniques.

1. Discuss factors affecting accurate measurement (dirt, temperature, improper measuring, tool calibration, burrs, etc.).
2. Demonstrate how to check basic calibration of various precision instruments.

Objective 3 Accurately perform measurements with hand-held instruments.

1. Read a micrometer to .001".
2. Read a steel rule.
3. Read a dial/digital caliper to .001".
4. Thread measurements using wire gage, go/no go gage, and a mating part
5. Read and use Dial Indicators to an accuracy of .001"

Standard 7 - Manufacturing Materials and Processes (15%)

Candidates will be able to understand planning, use hand tools, and recognize different manufacturing materials and processes.

Objective 1 Prepare and plan for machining operations.

1. Read and interpret blueprints.
2. Plan machining operations

Objective 2 Demonstrate proper use of hand tools

1. Select the most appropriate hand file and properly demonstrate its use.

2. Correctly identify and use.
3. Identify common hand tools and describe and perform their basic applications.

Objective 3 Identify common materials and explain basic properties.

1. Describe the general characteristics of carbon steels, tool steels, stainless steels, structural steels, cast irons, aluminum, and other commonly used metals.

Standard 8 - Grinding Machines and Bandsaws (8%)

Candidates will be able to understand and demonstrate the proper use of bench grinding machines and bandsaws.

Objective 1 Demonstrate proper use of grinding (abrasive) machines.

1. Demonstrate the proper use and care of bench and pedestal grinders.
2. Demonstrate the proper selection and usage of PPE while operating grinding machines.

Objective 2 Demonstrate proper use of bandsaws.

1. Demonstrate the proper use and care of bandsaws.
2. Demonstrate the ability to select appropriate speeds and feeds for the bandsaw.

Standard 9 - Metal Lathes (23%)

Candidates will be able to understand and demonstrate the use of conventional lathes.

Objective 2 Learn basic first aid skills

1. Demonstrate the proper cleaning, lubrication, and care of the conventional lathe.
2. Identify common parts and demonstrate the proper use of basic controls and adjustments on the conventional lathe.
3. Identify and demonstrate the proper installation and application of standard tools and tool holders for the conventional lathe.
4. Identify common chucks and demonstrate proper selection and use of those chucks.
5. Demonstrate the ability to dial in a workpiece within .001" TIR
6. Demonstrate the proper procedure for facing a part within .005" TIR
7. Demonstrate the proper setup and procedure for drilling a hole on the conventional lathe.
8. Demonstrate the proper setup and procedure for boring on the conventional lathe.
9. Demonstrate proper setup and technique for tapping a hole on a conventional lathe.
10. Demonstrate proper setup and procedure for turning a diameter with an accuracy of .001".
11. Demonstrate proper setup and procedure for turning a 90 degree shoulder.
12. Demonstrate the proper setup and procedure for cutting chamfers and or tapers using the compound rest.
13. Demonstrate proper setup and procedure for single point cutting of threads.
14. Demonstrate the proper procedure for grinding a High Speed Steel cutter.

Performance Skills Evaluation

Exam name: Machining 1

Candidate Name: _____

Performance assessments may be completed and evaluated any time before the certification is issued. The following performance skills can be used in connection with the associated standards and exam. The evaluator will function as the subject matter expert to determine if the candidate meets the skills requirements with a Yes/No for passing.

Performance Skills

- Use PPE - personal protective equipment.
- Maintain a clean and safe work environment.
- Each candidate should earn a score of 100% on a required safety exam relating to general shop safety and
- each machine tool he/she will be operating
- Convert fractions to decimal equivalents as needed.
- Calculate speeds and feeds for machining.
- Identify basic layout of drawings.
- Identify basic types of drawings.
- Select proper measurement tools as they best relate to part characteristics and specified accuracy.
- Apply proper measuring techniques for accuracy based off the blueprint specifications.
- Accurately perform measurements with hand-held instruments.
- Demonstrate proper use of hand tools.
- Demonstrate proper use of grinding (abrasive) machines.
- Demonstrate proper use of band saws.
- Demonstrate proper use of conventional lathes.
- Demonstrate the ability to use the Machinery Handbook as a reference for technical information related to turning and drilling.

Pass:

Evaluator Name:

Date:
