

Machining 2

Exam Information	Description
Exam number 582 Items 52 National Career Cluster Advanced Manufacturing Certification available Yes	The Machining 2 industry certification exam assesses technical knowledge and skills in planning and manufacturing projects using machine lathes, mills, drill presses, and other equipment under safe working conditions to promote the manufacturing industries.

Exam Blueprint and Performance Skills

Standard	Percentage of exam score
1. Workplace Readiness	11%
2. Engineering Documents	17%
3. Measuring InspectionsMeasuring Inspections	17%
4. Manufacturing Materials and Processes	24%
5. Milling Machines	31%

Standard 1 - Workplace Readiness (11% of exam score)

Candidates will participate in work-place readiness activities.

Objective 1 Perform basic trigonometric functions

1. Solve for unknown sides.
2. Solve for unknown angles.
3. Calculate bolt hole patterns.

Objective 2 Calculate speeds and feeds for machining.

1. Given appropriate reference materials, calculate RPM for various metals and tools.
2. Given appropriate reference materials, calculate the proper feed for various metals, tools, and depths of cut.

Objective 3 Locate basic machining points from a Datum Point.

1. Identify points using the Cartesian coordinate system.

Objective 4 Use PPE (personal protective equipment).

1. Use PPE - Personal Protective Equipment.
2. Maintain and use appropriate protective guards and equipment on machinery.

Standard 2 - Engineering Documents (17%)

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

Objective 1 List the purpose of each type of drawing.

1. Identify and describe the purpose of orthographic (three views) drawings.

Objective 2 Practice geometric dimensioning and tolerancing (GD&T) methodology.

1. Describe the purpose of GD&T.
2. Understand and demonstrate the use of basic GD&T symbols and functions.

Standard 3 - Measuring Inspections (17%)

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

Objective 1 Apply proper measuring techniques.

1. Discuss factors affecting accurate measurement (dirt, temperature, improper measuring, tool

2. calibration, burrs, etc.)
3. Demonstrate the proper care and use of the surface plate.
4. Use surface plate accessories correctly (side bar, gage blocks, etc.).

Objective 2 Accurately perform measurements.

1. If provided a calibrated micrometer, designed to read in .0001", consistently take at least four (4)
2. different readings within the designed accuracy of the tool and numerically write each dimension.
3. Measure features of a machined part using a height gage and accurately document those
4. measurements.
5. Measure a hole diameter with a telescope gage and a calibrated micrometer of appropriate size and accurately document the measurement.
6. Measure features of a machined part using a calibrated caliper, within .001" accuracy and document the measurements correctly.
7. Measure a part for squareness. In at least 4 places within a .002 tolerance
8. Measure all part dimensions for accuracy within the specified tolerance range acceptable on print
9. specifications

Standard 4 - Manufacturing Materials and Processes (24%)

Candidates will be able to understand project 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. Calculate proper speeds, feeds and depth of roughing and finish cuts for various applications.
3. Plan machining operations
4. Plan for machine-ability and control chip formation.

Objective 2 Identify and demonstrate proper use of deburring tools.

1. Proper care and use of deburring tools
2. Select the most appropriate hand file and properly demonstrate its use.
3. Correctly identify and use abrasives.

Objective 3 Identify common materials and explain basic properties.

1. Discuss the classification systems for metals.
2. Describe general characteristics for carbon steels, tool steels, stainless steels, structural steels, cast irons, aluminum, and other commonly used metals.

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).

Standard 5 - Milling Machines (31%)

Candidates will be able to understand and demonstrate the use of milling machines.

Objective 1 Demonstrate proper use of a vertical milling machine.

1. Demonstrate the proper setup, operation, care, cleaning, and lubrication of the vertical milling machine.
2. Correctly identify common cutters and explain their basic applications.
3. Properly dial in the vertical milling machine head within .001" TIR.
4. Properly locate a Datum point in regards to drawing specifications
5. Identify the common work-holding devices.
6. Dial in a milling machine vise to within .001" TIR.
7. Properly set up the Milling Machine and demonstrate the use of an edge finder. Locate a point with- in .001".
8. Demonstrate proper procedure for dialing in on a pin or a hole to within .001" TIR.
9. Accurately calculate speeds and feeds for a milling machine operation.
10. Demonstrate proper setup and procedure for squaring a part.
11. Demonstrate the proper setup and procedure for hole work.
12. Demonstrate proper setup and procedure for using an offset boring head to bore a hole.
13. Demonstrate the proper setup and procedure for milling a slot or pocket.
14. Differentiate between conventional milling and climb milling.
15. Demonstrate the ability to use the Machinery Handbook as a reference for technical information related to milling.

Performance Skills Evaluation

Exam name: Machining 2

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.
- Perform basic trigonometric functions.
- Calculate speeds and feeds for machining.
- Locate basic machining points from a Datum Point.
- Practice geometric dimensioning and tolerancing (GD&T) methodology.
- Accurately perform measurements with hand-held instruments.
- Accurately perform measurements on a surface plate.
- Demonstrate proper use of hand tools.
- Identify common materials and explain basic properties.
- Demonstrate proper use of a vertical milling machine

Pass:

Evaluator Name:

Date:
