Machining 2

Exam Information

Exam number
582

Items
52

Points
54

Prerequisites
Machining 1

Recommended course length
One semester

National Career Cluster
Agriculture, Food, & Natural Resources
Manufacturing

Performance standards
Included (Optional)

Certificate available
Yes

Description

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

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

Standard 1

Student 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 1 Performance Evaluation included below (Optional)

Standard 2

Students 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 2 Performance Evaluation included below (Optional)

Standard 3

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

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 rang acceptable on print
9. specifications

Standard 3 Performance Evaluation included below (Optional)

Standard 4

Students 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 (SDS).
7. Keep storage rooms well organized and free of clutter.

Standard 4 Performance Evaluation included below (Optional)

Standard 5

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

Standard 5 Performance Evaluation included below (Optional)

Machining 2

Performance assessments may be completed and evaluated at any time during the course. The following performance skills are to be used in connection with the associated standards and exam. To pass the performance standard the student must attain a performance standard average of 8 or higher on the rating scale. Students may be encouraged to repeat the objectives until they average 8 or higher.

Student's Name: _____

Class: _____

Performance standards rating scale

0	Limited skills	2	→	4	Moderate skills	6	→	8	High skills	10

Performance Skills **Score:**

- Use PPE - personal protective equipment.
- Maintain a clean and safe work environment.
- Each student 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 ith 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.

Performance standard average score:

Evaluator Name: _____

Evaluator Title: _____

Evaluator Signature: _____

Date: _____