Massachusetts Technical Teacher Testing Program
Advanced Manufacturing Technology Content Outline

Written and Performance Exam General Overview

- The intent of this exam is to assess your ability to teach the skills found in the Massachusetts Technical Education Framework.
- This exam is aligned to the frameworks which can be accessed here.
- Many questions and tasks require a synthesis of knowledge based on experience in the field and may not be found in any book.
- Candidates are encouraged to prepare for their exam by reviewing textbooks and reference material which has been listed as part of this exam outline. These resources can be found using online search tools, online vendors, and websites.
- Contact the Technical Teacher Testing Office if you need further assistance in locating resources listed in the exam outline.
- Use this exam outline and the Massachusetts Technical Education Framework to focus your preparation for the exam.

Written Exam

- Number of Questions: 100
- Administration Time: 3 hours
- Administration Method: Remote Proctoring Online Session

Written Exam Content Coverage

7% ***Health and Safety***

5% ***Quality Control***

5% ***Material Sciences***

3% ***Blueprints***

5% ***Machining Operations***

5% ***Power Saw, Finishing, and Grinding Processes***

10% ***Lathe Processes***

5% ***Milling Processes***

5% ***CAD***

35% ***CNC Programming and Operations***

5% ***Advanced Manufacturing (Robotics)***

10% ***Machine Tool Technology-Related Mathematics***

Written Exam Reference Materials (Reference Current Edition)

- **Machinery's Handbook** (Industrial Press)
- **Technology of Machine Tools** by J.E. St. Amand, S.F. Krar, and J.W. Oswald (McGraw-Hill)
- **Blueprint Reading for Machine Trades** by David Taylor (Delmar Publishers)
- **Familiar Problems in Mechanical Drawing** by T.E. French and C.L. Svenson (McGraw-Hill)
- **Trigonometry Tables and Handy References for Engineers** (https://www.carrlane.com/Portals/0/PDFs/Trig_Book_Revised_20150204_forweb.pdf)
- **CNC Training Mill Program** by HAAS Automation

Materials Needed for the Written Exam

- A four-function calculator is included in the online testing system. No other calculators are permitted.
- Scrap paper and pencil/pen are permitted.

Written Exam Sample Items

Each question on the exam consists of one incomplete sentence or question followed by four choices. Some items reference an image or diagram. A few sample items are included below; the correct answer is designated with an asterisk (*).

If a person comes in contact with a live electrical wire, the first thing to do is to:

a. immediately separate the person from the wire.
*b. shut off the power source.
c. cover person with fire blanket.
d. go for help.

The included angle of an Unified National Form threading tool is:

a. 14 ½°
b. 30°
c. 59°
*d. 60°

Performance Exam

- Administration Time: 5 hours
- Administration Method: Onsite at an approved Teacher Testing Location

Performance Exam Content Coverage

23% ***Milling Operations-Length-Width-Holes-& Slots***

- Set up and adjust specified feeds and speeds.
- Set up vise and other devices for holding regular and irregular shapes.
- Mill to specified tolerances.
- Accurately use and demonstrate measurement practices.

37% ***Lathe Operation-Lengths-Diameters-Thread-Chamfers & Concentricity***

- Set up and operate the engine lathe for basic external operations such as facing, grooving, turning, and threading.
- Use various speeds and feeds.
- Accurately use and demonstrate measurement practices.

34% ***CNC Mill and Drill***

- Use the Cartesian Coordinate System to Manually Program the CNC Milling Part.
- Accurately create profile according to supplied drawing.
- Accurately locate all holes and grooves to designated depths.
- Accurately locate and position drill holes.

6% ***Safety***

- Identify and apply OSHA safety regulations that apply to specific tasks.
- Identify and demonstrate personal, shop and job site safety.
- Demonstrate safe dress and use of PPE.
- Demonstrate ergonomic body mechanics.
- Demonstrate safe use of equipment.
- Demonstrate industry standard workplace cleaning procedures.

Materials Required for the Performance Exam (Candidate Must Supply)

- Face mask (cotton face covering or respirator which fully cover the nose and mouth)
- OSHA-Approved Eye Protection
- Disposable Gloves
- Industry-Approved Work Clothes and Boots/Shoes

Recommended Tool/Equipment List (Will be Available at the Exam Site but Candidates May Bring Personal Tools)

- Calculator
- 6” Scale (Steel Rule)
- 0-1 Micrometer
- 1-2 Micrometer
- 6” Caliper
- Last Word or Best Type Indicator

Note: All lathe tools will be provided. They will be indexable carbide for turning and threading. Indexable carbide fly tools will be provided. All other milling tools will be HSS. Candidate may bring any other personal tools that he/she feels will assist in successfully completing the exam. No books or notes will be allowed. Cell phones are prohibited during the exam administration.

Trade Standard for the Machine Trades

Work pieces must fall within the specific parameters of geometric shape, actual size, and surface finish that has been predetermined by the blueprint, drawing, or verbal directions.

Included is the safe operation and care of tools and equipment used in the manufacture of work pieces according to industry and OSHA safety standards.

Safety concerns in the Machine Trade include all OSHA requirements. The individual must be concerned with both his/her safety as well as the safety of everyone in the exam site.

Onsite Performance Exam Requirements

- Candidate must practice social distancing and wear the appropriate face covering that covers the nose and mouth while at the exam site.
- Testing sites may have individual requirements based on location and the current guidance from the Center for Disease Control and Prevention (CDC).

Performance Exam Reference Materials (Reference Current Edition)

If you are presently teaching, use the resources at your school to prepare for this exam. If you are still in the trade, use the internet for additional resources (e.g., YouTube).

- **Mill Operator's Manual 96-800**0 by HAAS Automation
- **Safety Orientation** by NCCER (Pearson Prentice Hall) www.crafttraining.com
- **OSHA Regulations** www.osha.gov
    - 1910.1200 - Hazard Communication
    - 1910 Subpart I - Personal Protective Equipment