



STATE OF NEW YORK  
DEPARTMENT OF LABOR

APPENDIX A

DRAFTER (MECHANICAL)

D.O.T. CODE 007.281-010

O\*NET CODE 22514D

This training outline is a minimum standard in terms of Work Processes and Related Instruction which are required to achieve skilled worker status. It is recognized that rapid technological and regulatory changes will frequently result in the need for mastery of additional on-the-job or theoretical instruction.

WORK PROCESSES

|   | <u>Approximate Hours</u> |
|---|--------------------------|
| A. <u>Tools, Equipment and Work Aids</u>  | 1000                     |
| 1. Using and caring for: drafting table, triangle, T-square, rulers, drawing instruments, inking tools, templates, lettering guides, compass. |                          |
| 2. Using and caring for drafting machine.   |                          |
| 3. CAD: Using and caring for computer-aided drafting terminal, mouse and/or stylus and digitizing tablet.                                     |                          |
| 4. Understanding and using sketches, rough drawings, tracing paper, pictorial drawings.   |                          |
| 5. Understanding and using handbooks, technical specifications, catalogs and reference library materials, CAD manuals and tutorials.          |                          |
| 6. Using and caring for plotters, printers, mylar.  |                          |
| 7. Documenting procedures; files; setting up project directories.   |                          |
| B. <u>Blueprint Reading</u>   | 500                      |
| 1. Reading standard blueprints.   |                          |
| 2. Reading orthographic projections.  |                          |
| 3. Reading geometric constructions.   |                          |
| 4. Reading auxiliary views.   |                          |
| 5. Reading sectional views.   |                          |
| 6. Understanding dimensioning procedures.   |                          |
| 7. Reading fastener and hardware blueprints.  |                          |
| 8. Reading gear blueprints  |                          |
| 9. Reading detailed layout and assembly blueprints.   |                          |
| 10. Reading welding symbols.  |                          |

Drafter (Mechanical) – Continued

Approximate Hours

C. Drafting Basics

2000

1. Drawing three-dimensional objects and lettering freehand.
2. Board drafting multiple view assemblies, subassemblies, and layout drawings.
3. Understanding basics of manufacture, repair, and alteration of machines and equipment.
4. Inking lines, symbols, and letters on pencil drawings; Roman Simplex and Complex.
5. Determining sequence of work and method of presentation.
6. Drafting detailed drawings of machine parts and mechanical devices.
7. Reviewing rough sketches and checking engineering specifications; mark-ups, and check-plots.
8. Changing drawings using tracing paper, overlays, CAD systems.
9. Drawing fasteners and hardware.
10. Drafting sectional views, auxiliary views, orthographic projections, and geometric constructions.

D. Making Calculations

800

1. Understanding metric system.
2. Compiling tolerances and dimensions.
3. Checking dimensions and materials to be used; assigning numbers to materials list.
4. Calculating weights, volumes and stress factors.
5. Consulting engineering handbooks and product catalogs.
6. Calculating other materials needed, such as fasteners; projecting amounts required.
7. Determining scale.
8. Examining details of completed drawings; performing quality control.
9. Familiarization with ISO 9000 standards. (Optional)

E. Mechanical Drafting

3000

1. Understanding general mechanical and engineering principles and practices.
2. Using knowledge of machine manufacturing processes and materials.
3. Identifying tolerances and dimensions.
4. Using standard industrial specifications.

Drafter (Mechanical) – Continued

Approximate Hours

|    |  |       |
|----|--|-------|
| E. | <u>Mechanical Drafting – Continued</u>   |       |
|    | 5. Drafting assembly drawings and reduced scale assembly drawings from layout drawings.  |       |
|    | 6. Drafting complete detail parts drawings from assembly drawings detailing shape, dimensions, tolerances, finishes, materials and heat treatment. |       |
|    | 7. Drafting standard mechanical devices such as platens, frames, bases, hydraulic cylinders using technical references and handbooks.              |       |
|    | 8. Drafting machine presentation drawings.   |       |
|    | 9. Drawing machine sheet metal developments.   |       |
|    | 10. Drafting geometric dimensions and tolerances; sectional drawings.  |       |
|    | 11. Using basic knowledge of metallurgy to select appropriate schedule of materials.   |       |
|    | 12. Drafting mechanical jigs and fixtures.   |       |
|    | 13. Modifying drawings after conferring with engineers, production staff or customers; assisting in solving engineering problems.                  |       |
| F. | <u>CAD and Numerical Control (Optional)*</u>   | 700   |
|    | 1. Editing commands.   |       |
|    | 2. Construction commands; object modification.   |       |
|    | 3. Exclusive features.   |       |
|    | 4. Advanced tasks.   |       |
|    |  | <hr/> |
|    | Total Hours  | 8000  |

\*If optional work process is not selected, these hours should be devoted to further mastery of the other required work processes.

*Apprenticeship work processes are applicable only to training curricula for apprentices in approved programs. Apprenticeship work processes have no impact on classification determinations under Article 8 or 9 of the Labor Law. For guidance regarding classification for purposes of Article 8 or 9 of the Labor Law, please refer to <http://www.labor.state.ny.us/workerprotection/publicwork/PDFs/Article8FAQS.pdf>.*

APPENDIX B  
DRAFTER (MECHANICAL)  
RELATED INSTRUCTION

Safety

Fundamentals – Fire, Electrical, Right-to-Know (Hazardous Communications),  
OSHA, Emergency Procedure

Trade Safety

Drafting Room: VDT Precautions, Ergonomic Furnishings, and Keyboards

Manufacturing Floor, and Machine Shop Safety

First Aid (minimum 6.5 hours every 3 years)

CPR (optional and renewable yearly)

Lead Safety

Blueprint Fundamentals

Reading, Interpreting and Procedures

Blueprint Production

Drawing and Sketching

Orthographic Projection

Geometric Constructions

Sectional Views and Auxiliary

Dimensioning Procedures

Fasteners and Hardware

Gears

Layout and Assembly Drawings

Welding Symbols

Quality Control Processes

ISO 9,000 Standards (Optional)

Mathematics

Fundamentals

Algebra

Geometric Construction

Trigonometry

Calculus Basics

Metric System

Use of Engineering Handbooks, Reference Tables

Trade Applications

Calculating Reduced Scales

Calculating Weights

Calculating Tolerances

Calculating Stress Factors

Trade Theory

Tools, Machine and Equipment

Materials

Terminology

Drafting Department Practice and Operation

Handbooks, Catalogs and Reference Material

Production Shop Layout and Operation

Mechanical and Machine Processes

## Drafter (Mechanical) Related Instruction – Continued

### Trade Theory – Continued

- Work Sequences

- Methods of Presentation

  - Geometric Construction

  - Orthographic Projecting

  - Auxiliary Views

  - Sectional Views

  - Machine Presentation Drawing

- Lettering and Tracing

- Detailing, Welding Symbols

- Layout and Assembly Drawings, Working Drawings

- Designing Introduction to Computer Assisted Design/Drafting Systems

- Visualizing Multiple Perspective Drawings

- Conceptualizing Inside Complex Processes

### Trade Science

- Principles of Tools, Machines and Equipment

- Physical Properties of Materials

- Metallurgy

- Heat Treatment of Metals

- Strength of Materials

- Mechanics

- Engineering Problem Solving Techniques

- Machine Design

- Dimensioning Procedures (Geometric & Tolerancing)

- Machine Manufacturing Processes and Materials

- Numerical Control Drafting

- Jigs and Fixtures

### Computer Aided Drafting (CAD) (Optional)

- Review of Basics

- Drawing Set Up Commands and Data Entry Methods

- Developing the Shape and Drawing Description

- Developing Dimension and Scale Description

- File Management

- Editing Commands

- Construction Commands and Object Modification

- Exclusive Features

- Advanced Tasks

### Industrial and Labor Relations

- History and Background (6 hours, 1<sup>st</sup> year)

- Current Laws and Practices (14 hours, 2<sup>nd</sup> year)

- Communications: Management, Customer, Engineering, Machining and Production

- Problem Solving, Group Team Problem Solving

### American with Disabilities Act Overview

Sexual Harassment Preventing Training (minimum 3 hours)

Other Related Courses as necessary or required by employer

144 Hours of Related Instruction are required for each Apprentice for each year.