DRAFTER (MECHANICAL)

APPENDIX A

O*NET CODE 17-3013.00

This training outline is a minimum standard for Work Processes and Related Instruction. Changes in technology and regulations may result in the need for additional on-the-job or classroom training.

WORK PROCESSES

Approximate Hours

A. Tools, Equipment and Work Aids **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. Blueprint Reading **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.

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 engineeringprinciples and practices.
2. Using knowledge of machine manufacturing processes and materials.

3. Identifying tolerances and dimensions.
4. Using standard industrial specifications.
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. CAD nad Numerical Control (Optional)* 700

1. Editing commands.
2. Construction commands; object modification.
3. Exclusive features.
4. Advanced tasks

Approximate 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 https://dol.ny.gov/public-work-and-prevailing-wage

DRAFTER (MECHANICAL)

APPENDIX B

RELATED INSTRUCTION

Safety

1. Fundamentals – Fire, Electrical, Right-to-Know (Hazardous Communications), OSHA, Emergency Procedure
2. Trade Safety
    a. Drafting Room: VDT Precautions, Ergonomic Furnishings, and Keyboards
    b. Manufacturing Floor, and Machine Shop Safety
    c. Lead Safety
    d. First Aid (minimum 6.5 hours every 3 years)
    e. CPR (optional and renewable yearly)
3. Sexual Harassment Prevention Training – must comply with Section 201-g of the Labor Law

Blueprint Fundamentals

1. Reading, Interpreting and Procedures
2. Blueprint Production
3. Drawing and Sketching
4. Orthographic Projection
5. Geometric Constructions
6. Sectional Views and Auxiliary
7. Dimensioning Procedures
8. Fasteners and Hardware
9. Gears
10. Layout and Assembly Drawings
11. Welding Symbols

Quality Control Processes

1. ISO 9,000 Standards (Optional)

Mathematics

2. Fundamentals
3. Algebra

4. Geometric Construction
5. Trigonometry
6. Calculus Basics
7. Metric System
8. Use of Engineering Handbooks, Reference Tables
9. Trade Applications
    a. Calculating Reduced Scales
    b. Calculating Weights
    c. Calculating Tolerances
    d. Calculating Stress Factors

Trade Theory

1. Tools, Machine and Equipment
2. Materials
3. Terminology
4. Drafting Department Practice and Operation
5. Handbooks, Catalogs and Reference Material
6. Production Shop Layout and Operation
7. Mechanical and Machine Processes
8. Work Sequences
9. Methods of Presentation
    a. Geometric Construction
    b. Orthographic Projecting
    c. Auxiliary Views
    d. Sectional Views
    e. Machine Presentation Drawing
10. Lettering and Tracing
11. Detailing, Welding Symbols
12. Layout and Assembly Drawings, Working Drawings
13. Designing Introduction to Computer Assisted Design/Drafting Systems
14. Visualizing Multiple Perspective Drawings
15. Conceptualizing Inside Complex Processes

Trade Science

1. Principles of Tools, Machines and Equipment
2. Physical Properties of Materials
3. Metallurgy
4. Heat Treatment of Metals
5. Strength of Materials
6. Mechanics
7. Engineering Problem Solving Techniques
8. Machine Design
9. Dimensioning Procedures (Geometric & Tolerancing)
10. Machine Manufacturing Processes and Materials
11. Numerical Control Drafting
12. Jigs and Fixtures

Computer Aided Drafting (CAD) (Optional)

1. Review of Basics
2. Drawing Set Up Commands and Data Entry Methods
3. Developing the Shape and Drawing Description
4. Developing Dimension and Scale Description
5. File Management
6. Editing Commands
7. Construction Commands and Object Modification
8. Exclusive Features
9. Advanced Tasks

Industrial and Labor Relations

1. History and Background (6 hours, 1st year)
2. Current Laws and Practices (14 hours, 2nd year)
3. Communications: Management, Customer, Engineering, Machining and Production
4. Problem Solving, Group Team Problem Solving

American with Disabilities Act Overview

Other Related Courses as necessary or required by employer

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

Appendix B topics are approved by New York State Education Department.