DESIGN DRAFTER
(ELECTRICAL-MECHANICAL-HYDRAULIC)

APPENDIX A

O*NET CODE 17-3012.01

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. Basic Drafting Concepts and Sketching **1,500**

1. Lettering and format, drawing methods, bill of materials, wire lists, free-hand sketching, dimensioning – decimal, metric
2. Drawings – release systems; production engineering and experimental drawings; types – assembly, schematics, proposal, detail, specification and source control, installation, layout production
3. Layouts – (Hydraulics) manifold, weight contouring, systems and linkages, seals; (Electronics) circuit boards, cabinet design, shielding, service, connectors, schematic diagrams, (logic, discrete components), interconnections (external of units)

B. Basic Detailing **1,500**

1. Materials selection, engineering notes; springs-materials, rate and modulus, loads, calculations; (Electronics) art copy-lettering, typesetting, creating art copy, panel, and chassis

C. Printed Circuit Boards (Electronics) Layout **2,000**

1. Single-sided, double-sided, and multi-layer; layout restrictions, master drawings; drawing layouts for symmetry, spacing circuit flow, placement of identification, assemblies
2. Wire routing drawings, cable assemblies, wiring harness, wire lists
3. Machining of circuit boards – drilling instructions, including hole spacing, sizing, material, and dimensioning

D. Hydraulic Layouts – Design Standards **2,000**

1. Body design and components – spools, bushings, surface finish and materials; design function – null edges and nulling conditions, dimensional control; materials, surface finish and clearances
2. Hydraulic schematics – systems, closed loop, open loop
3. Strength of materials – bolt tension (torque); hoop strength; bending vs. shear; stress risers

E. Machining and Machining Concepts **2,000**

1. Machining processes – lathe milling machine, grinders, electrical discharge machines, drilling, NC machining, point-to-point, and continuous path systems; hones and lapping

F. Fits and Tolerances **1,000**

1. Tolerance stackups
2. Geometrical positional and tolerancing
3. Fits and fit systems
4. Interchangeable null fits

Approximate Total Hours **10,000**

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

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APPENDIX B

RELATED INSTRUCTION

Mathematics

1. Geometry and Geometrical Construction
2. Trade Electronic Mathematics
3. Estimating and Specifications
4. Advanced Mathematics
5. Algebra
6. Trigonometry
7. Ratio and Proportion
8. Area
9. Mensuration
10. Advanced Calculations for Physical Properties and Conditions

Blueprint Reading

1. Basic and Advanced
2. Production
3. Assembly
4. Schematics for Hydraulics
5. Electronics
6. NC Machining Concepts

Trade Theory

1. (Drafting) Tools, Machines, and Equipment
2. Operations, Care and Maintenance
3. Terminology
4. NEMA Standards
5. Industrial Standards, Metallurgy
6. Strength of Materials
7. Hydraulics-Fluid Power and Fluid Mechanics
8. Electricity and Electronics AC and DC, Circuitry and Design of Systems

Trade Sciences

1. Machine Design
2. Analytical Mechanics
3. Physics (basic and second year)
4. Thermodynamics
5. Heat, Light, Sound, and Molecular Modulus Change
6. Principle of Machines, Tools, and Equipment

Safety

1. Fundamentals of Personal Machine, and Environmental - Trade Safety
2. First Aid (10 hours per year)
3. OSHA Standards
4. Sexual Harassment Prevention Training – must comply with section 201-g of the Labor Law

Industrial and Labor Relations

1. History and Background
2. Current Laws and Practices

Other Related Courses as Necessary

144 Hours of Related Instruction are Required for Each Apprentice for Each Year.

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