MODEL MAKER (RAPID PROTOTYPE TECHNICIAN)

Appendix A

O*NET CODE 51-4061.00

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. Introduction to Shop Processes	**100**
1. Caring for and using hand tools, machinery, and equipment	
2. Introduction to materials selections, handling, and stock cutting	
3. Basic shop orientation and safety procedures	
B. Operation of Hand Machines	**50**
1. Using bending and punching machines	
2. Using metal cutting shears	
3. Using hand and power tools as required for prototype or small part fabrication	
C. Operation of Lathe	**50**
1. Selection and mounting of tool bits or cutters	
2. Setting up and turning all types of material to desired tolerances	
3. Turning, facing, thread cutting, boring, knurling, drilling, reaming, and polishing	
D. Operation of Milling Machine/Manual	**50**
1. Selecting of cutters and staging of work	
2. Milling all types of metal, plastics, composites, etc.	
3. Developing feed and speed criteria	
4. Developing proficiency in digital read-out operation	
E. Operation of Drill Press	**20**
1. Selecting cutter; setting up	

2. Positioning work and clamping
3. Selecting speed and adjusting for depth
4. Simple drilling, reaming, spot facing, counter boring and counter sinking

F. Grinding (Surface, Cylindrical & Floor) 50

1. Selecting, mounting, truing, and using abrasive wheels
2. Internal, external, straight, angle and taper grinding
3. Grinding all materials to tolerances required
4. Sharpening tool bits, drills, small boring tools and fly cutters

G. Heat Treating 20

1. Heat treating, including annealing, normalizing, and material preparation

H. Sample Injection Mold Build & Press Operation50

1. Demonstrating an understanding of the principles of simple injection mold construction including draft angle, undercut, coring, cooling and press size constraints
2. Working to provide rapid tools while still producing acceptable molded parts
3. Exposure to E.D.M. electrode building and burning techniques
4. Demonstrating an understanding of injection press operation, including pressure, material selection, melt temperatures and press size parameters

I. RTV Mold Build/Casting 1,000

1. Evaluation of part for mold construction
2. Preparation of part for surface finish, shut offs and parting line set up
3. Fabrication of silicone molds, using venting/gating for best material flow
4. Becoming knowledgeable in the use of urethane casting techniques/RIM process
5. Acquiring a working knowledge of colorants and casting parts in color

J. Vacuum Forming **50**

1. Demonstrating a knowledge of the principles of vacuum forming
2. Demonstrating an understanding of the necessity of male vs. female tooling aids, deep draws, shrink, draft angles and vacuum hole positioning
3. Operation of vacuum form equipment

K. Bench Work **1,000**

1. Planning work as outlined on prints and CAD information, selecting materials, and laying out to close tolerances
2. Using precision measuring instruments such as digital micrometers, height gages and calipers, dial indicators, gage blocks, sine plates and surface plates
3. Filing, drilling, sawing, bending, polishing, and cutting stock
4. Tapping and threading
5. Becoming proficient in part priming and spray painting
6. Building and/or making modifications to patterns for fit, finish and dimension
7. Building Engineering models/samples to dimensional specifications
8. Building tracing masters providing male or female tooling aids as required
9. Preparing/fine tuning castings to provide working, close tolerance assemblies

L. 3D CAD/CNC **500**

1. Demonstrating a knowledge of basic Computer Aided Design
2. Becoming familiar with graphic presentations using computer assisted drafting techniques
3. Using programming techniques for direct solution of drafting/graphic problems
4. Acquiring thorough knowledge of 3D surface and solid model drafting
5. Applying milling machine principles
6. Developing a knowledge of machine control programming, including capability to use conversational and G-code language

M. Rapid Prototyping **5,060**

1. Demonstrating a comprehension of rapid prototyping techniques/equipment
2. Acquiring understanding of part finishing techniques including UV welding to produce large parts
3. Acquiring advanced understanding/application of machine software including manipulation of part location and attitude on the build platform to achieve maximum part quality and thru-put
4. Generating STL files for surface triangulation; also repairing/reconstructing part files that contain problem areas
5. Commanding a comprehensive understanding of 3D drafting and STL generating software's including the manipulation of part geometry and their application relative to the company's RP equipment

Approximate Total Hours **8,000**

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

Safety

1. Use of Personal Protective Equipment
2. Hazardous Communication, including MSDS
3. Hand tools Safety
4. Machine Tool Safety
5. Blood-borne Pathogens
6. First Aid – minimum of 6.5 hours every 3 years
7. Sexual Harassment Prevention Training – MUST comply with section 201-g of the Labor Law

Mathematics

1. Technical Mathematics

Drafting

1. Computer Graphics
   a. Basic
   b. Advanced
2. Introduction to Auto CAD

Trade Theory and Science

1. Manufacturing Processes
2. Introduction to Technical Physics
3. Machine Tools I, with lab
4. Machine Tools II, with lab
5. Numerical Control Programming

Computer Skills

1. Keyboarding (if needed)
2. Introduction to Word Processing (if needed)

Customer Service Skills (if available)

Industrial and Labor Relations (20 hours)

Additional Courses as Required

A minimum of 144 hours of Related Instruction is required for each apprentice for each year.

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