

WORK PROCESS SCHEDULE
APPENDIX A

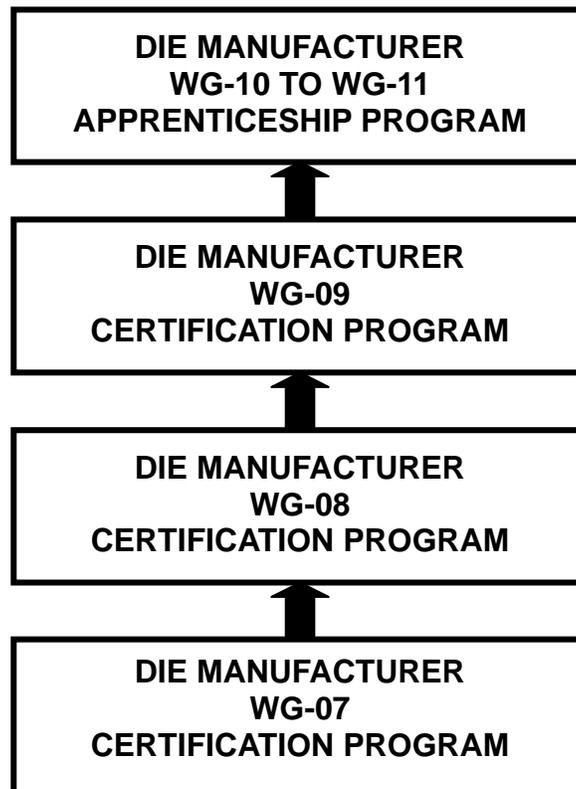
This Appendix is attached to and a part of these Standards for the following identified occupations.

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DIE MANUFACTURER CAREER LATTICE

The Die Manufacturer Career LATTICE is a strategic initiative unique to the United States Mint that will provide career growth and advancement opportunities for employees while enhancing the quality and maintain the high level of skill and competence required to manufacture dies to Treasury Department standards. The Die Manufacturer Career LATTICE will standardize die manufacturing processes and improve productivity through fostering flexibility by encouraging and rewarding employees for gaining skills associated with the die manufacturing process.

DIE MANUFACTURER CAREER LATTICE



The Die Manufacturer Career Lattice will serve as a catalyst for developing an optimal workforce and workplace culture by improving employee skills, empowering employees to take ownership of their own career development, and creating partnerships for promoting a more cohesive and effective work environment.

1. Only Die Manufacturing employees will participate in the **Die Manufacturer Apprenticeship Program**.
2. The **Die Manufacturer Career-Lattice** and Selection of Apprentices is based on the Code of Federal Regulations, Title 29, **CFR part 30.5**, Selection of Apprentices, Part (b) Selection methods; (3) Selection from pool of current employees; (i) Selection. The United States Mint may select apprentices from an eligibility pool of the workers already employed by the United States Mints at Philadelphia and Denver in a manner prescribed by a collective bargaining agreement (CBA) where such exists, or by the United States Mint's established promotion policy. The United States Mint shall establish goals and timetables for the selection of minority and female apprentices, unless the Mint concludes, in accordance with the provisions of 30.4 (d), (e), and that it does not have deficiencies in terms of underutilization of minorities and/or women (minority and non-minority) in the apprenticeship of journey worker crafts represented by the program.

**UNITED STATES MINT
DIE MANUFACTURER CERTIFICATION PROGRAM
WG-07 CERTIFICATION PROGRAM**



Able to perform competency without assistance.



Able to perform competency with some detailed instruction at the beginning of the assignment, and/or may have a question or two during the course of the assignment.



Needs additional training: Would benefit from added experience performing the competency.

	WG-07 CORE COMPETENCIES	
	DIE VAULT ATTENDENT	
1.	Computer Skills: DIS	
2.	Computer Skills: Oracle	
3.	Computer Skills: Microsoft Office	
4.	Die Identification	
5.	Die Manufacturer Process	
6.	Customer Production Recognition.	
7.	Inventory Management	
8.	General Machine Knowledge and Operation	
9.	Security Procedures for Dies: Issuing Dies	
10.	Security Procedures for Dies: Receiving Dies	
11.	Security Procedures for Dies: Die Destruction.	
	HUBBING PRESS OPERATOR	
12.	General Machine Knowledge and Operation	
13.	Measuring Tool Competencies	
14.	Computer Skills (Machine Operation)	
15.	Inspection of dies (Image and Size)	
16.	Basic Blueprint Reading	
	HARD AND SOFT CLEANERS	
17.	Inspection of dies (Image and Size)	
18.	Eye - Hand Coordination	

**UNITED STATES MINT
DIE MANUFACTURER CERTIFICATION PROGRAM
WG-07 CERTIFICATION PROGRAM (CONTINUED)**



Able to perform competency without assistance.



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Needs additional training: Would benefit from added experience performing the competency.

	WG-07 CORE COMPETENCIES	
	DIE SERIALIZER	
19.	General Machine Knowledge and Operation	
20.	Computer Skills (Machine Operation)	
21.	Inspection of dies (Image and Serial Number)	
	BUFFER-POLISHER/PROOF POLISHING	
22.	Light Industrial Finishing Operation	
23.	Hand/Eye Coordination.	
24.	Visual Inspection	
	GERBER POLISHING/LASER TEXTURING	
25.	Computer Skills	
26.	General Machine Knowledge and Operation	
27.	Visual Inspection	
	GENERAL COMPETENCIES	
28.	Oral Communication - Explains machine problems to mechanics. Understands verbal instructions.	
29.	Reading - Reads and understands log books and written turnovers from other shifts. Understands written instructions.	
30.	Writing - Fills out log books and writes turnovers to other shifts. Prepares die shipment documents, such as transportation requests. Understands and balances vault in/out sheets.	

**UNITED STATES MINT
DIE MANUFACTURER CERTIFICATION PROGRAM
WG-07 CERTIFICATION PROGRAM (CONTINUED)**



Able to perform competency without assistance.



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Needs additional training: Would benefit from added experience performing the competency.

	WG-07 CORE COMPETENCIES	
	GENERAL COMPETENCIES (CONTINUED)	
31.	Mathematic Skills - Proficient in basic arithmetic skills, such as addition, subtraction, multiplication and division of regular numbers, fractions and decimals	
32.	Attention to detail - Maintain 100% accuracy of die accountability in the die vault at all times. Die image recognition and detail is tantamount to hubbing and hard cleaning a usable die. Must be able to recognize discrepancies in die images	
33.	Teamwork - Gives input to other team members about any issues pertinent to the Die Division. Helps out when asked by other team members	
34.	Technology Applications - Use indicators to measure height and parallelism of dies. Experience in basic computer programs to complete die vault paperwork and navigate PC for die serialization. Knowledgeable about various hard cleaning tools and able to use appropriately	
35.	Safety and Security - Must be able to read and follow all safety and security guidelines and understand how and when to report discrepancies.	
36.	COMPLETED ALL WG-07 CORE COMPETENCIES	

**UNITED STATES MINT
DIE MANUFACTURER CERTIFICATION PROGRAM
WG-07 CERTIFICATION PROGRAM**

RELATED INSTRUCTION PROGRAM - YEAR ONE		
	COURSE TITLE	HOURS
1.	Die Manufacturer Safety Procedures and Practices	
2.	Computer Skills	
3.	Die Identification and the Die Manufacturer Process	
4.	Security Procedures for Dies	
5.	Hubbing Press Safety and Operation	
6.	Print Reading Skills: WG-07	
5.	Measuring Skills: WG-07	
7.	Die Inspection Skills	
8.	Fundamentals of Proof Polishing, Sandblasting and Laser Texturing	
9.	Fundamentals of Die Cleaning	
10.	Fundamentals of Serialization	
11.	Material Expediting Processes and Procedures	

**UNITED STATES MINT
DIE MANUFACTURER CERTIFICATION PROGRAM
WG-08 CERTIFICATION PROGRAM**



Able to perform competency without assistance.



Able to perform competency with some detailed instruction at the beginning of the assignment, and/or may have a question or two during the course of the assignment.



Needs additional training: Would benefit from added experience performing the competency.

	WG-08 PREREQUISITE COMPETENCIES	
	Applicants for the WG-08 Certification Program must be fully qualified as a WG-7 based on Certification Program criteria.	
	WG-08 CORE COMPETENCIES	
	NIMS MEASUREMENT, MATERIALS, & SAFETY LEVEL I CREDENTIAL	
1.	Identify and Demonstrate Usage of Machine Safety and Personal Protective Equipment	
2.	Demonstrate Compliance with Lock-out/Tag-out Procedures	
3.	Demonstrate Compliance with OSHA Requirements and Guidelines	
4.	Machine Operations and Material Handling	
5.	Hazardous Materials Handling & Storage, including EPA, Hazmat, and OSHA	
6.	Part Inspection	
7.	Perform the Inspection of Parts	
8.	Process Control	
9.	Process Adjustment – Single Part Production	
10.	Participation in Processes Improvement	
11.	Job Process Planning	
12.	General Housekeeping & Maintenance	
13.	Preventative Maintenance - Machine Tools	
14.	Tooling Maintenance	
	BLANKING CELL (Intermediate Level)	
15.	Computer Skills (Machine Operation)	
16.	General Machine Knowledge and Operation	
17.	Basic Blueprint Reading	
18.	Measuring Tool Competencies	

**UNITED STATES MINT
DIE MANUFACTURER CERTIFICATION PROGRAM
WG-08 CERTIFICATION PROGRAM (CONTINUED)**



Able to perform competency without assistance.



Able to perform competency with some detailed instruction at the beginning of the assignment, and/or may have a question or two during the course of the assignment.



Needs additional training: Would benefit from added experience performing the competency.

	WG-08 CORE COMPETENCIES	
	CNC LATHE (Intermediate Level)	
19.	Computer Skills (Machine Operation)	
20.	General Machine Knowledge and Operation	
21.	Basic Blueprint Reading	
22.	Measuring Tool Competencies	
	GENERAL COMPETENCIES	
23.	Oral Communication - Explain machine problems and understand verbal instruction	
24.	Reading - Read and understand log books and written turnovers from other shifts. Understand written instructions. Understand die blueprints	
25.	Writing - Fill out log books and write turnovers to other shifts	
26.	Mathematic Skills - Proficient in basic arithmetic skills, such as addition, subtraction, multiplication and division of regular numbers, fractions and decimals. Must be able to understand machine numbers such as parameters and offsets and change them when needed	
27.	Attention to detail - Must be 100% certain of machine operations because of the danger involved in running a machine tool	
28.	Teamwork - Give input to other team members about any issues pertinent to the Die Division. Help out when asked by other team members	
29.	Technology Applications - Use indicators to measure height and parallelism of dies. Use micrometers to measure diameters of dies and other precision measuring tools as needed. Understand PC navigation to work through program and set-up pages on CNC equipment	
30.	Safety and Security - Must be able to read and follow all safety and security	
31.	Self-Management - Use standard methods and techniques based on individual's own initiative and observation to optimize equipment efficiency.	
32.	COMPLETED ALL WG-08 CORE COMPETENCIES	

**UNITED STATES MINT
DIE MANUFACTURER CERTIFICATION PROGRAM
WG-08 CERTIFICATION PROGRAM**

RELATED INSTRUCTION PROGRAM - YEAR ONE		
	COURSE TITLE	HOURS
1.	Blanking Cell Safety and Operation	
2.	Print Reading Skills: WG-08	
3.	Measuring Skills: WG-08	
4.	NIMS Measurement, Materials, & Safety	
5.	CNC Lathe Safety and Operation	
6.	CNC Lathe Programming	
7.	NIMS CNC Turning Level I	
	Total Hours for the Year One	

**UNITED STATES MINT
DIE MANUFACTURER CERTIFICATION PROGRAM
WG-09 CERTIFICATION PROGRAM**



Able to perform competency without assistance.



Able to perform competency with some detailed instruction at the beginning of the assignment, and/or may have a question or two during the course of the assignment.



Needs additional training: Would benefit from added experience performing the competency.

	WG-09 PREREQUISITE COMPETENCIES	
	Applicants for the WG-09 Certification Program must be fully qualified as a WG-07 and WG-08 based on Certification Program criteria.	
	NIMS MEASUREMENT, MATERIALS, & SAFETY LEVEL I CREDENTIAL	
	WG-09 CORE COMPETENCIES	
	NIMS CHUCKING LEVEL I	
1.	Turning Operations: Chucking	
	BLANKING CELL (Proficient)	
2.	Operational Experience to include Troubleshooting	
	CNC LATHE (Proficient)	
3.	Operational Experience to include Troubleshooting	
	GRINDING (Intermediate)	
4.	Computer Skills (Machine Operation)	
5.	General Machine Knowledge and Operation	
6.	Basic Blueprint Reading	
7.	Measuring Tool Competencies	
	HEAT TREAT (Intermediate)	
8.	Heat Treat Course for Beginners	
9.	Furnace Operation and Maintenance	
10.	Die Preparation for Furnaces	
11.	Die Preparation for Grinding	
12.	Hardness Testing	
13.	Sand Blast - Machine Operation and Maintenance	

**UNITED STATES MINT
DIE MANUFACTURER CERTIFICATION PROGRAM
WG-09 CERTIFICATION PROGRAM (CONTINUED)**



Able to perform competency without assistance.



Able to perform competency with some detailed instruction at the beginning of the assignment, and/or may have a question or two during the course of the assignment.



Needs additional training: Would benefit from added experience performing the competency.

	WG-09 CORE COMPETENCIES	
	GENERAL COMPETENCIES	
14.	Oral Communication - Use technical terms to clearly describe potential problems to mechanics. Understand verbal instruction.	
15.	Reading - Read and understand log books and written turnovers from other shifts. Understand written instructions. Understand die blueprints. Read specialized training	
16.	Writing - Fill out log books and write turnovers to other shifts.	
17.	Mathematic Skills - Proficient in basic arithmetic skills, such as addition, subtraction, multiplication and division of regular numbers, fractions and decimals. Must be able to understand machine numbers such as parameters and offsets and change them when needed.	
18.	Attention to detail - Must be 100% certain of machine operations because of the danger involved in running a machine tool	
19.	Teamwork - Solicit input from team members to solve a problem and consider different perspectives and opinions. Help out when asked by other team members.	
20.	Technology Applications - Use indicators to measure height and parallelism of dies. Use micrometers to measure diameters of dies and other precision measuring tools as needed. Must understand PC navigation to work through program and set up pages on CNC equipment. Must have background of heat treating operations	
21.	Safety and Security - Must be able to read and follow all safety and security guidelines and understand how and when to report discrepancies	
22.	Self-Management - Take own initiative to exercise problem solving techniques to increase utilization of equipment. Independently identify and utilize the tools and machines most appropriate to complete the assignment	
23.	Teaching Others - Explain technical operations to lower grade employees and supports continuous learning.	
24.	COMPLETED ALL WG-09 CORE COMPETENCIES	

**UNITED STATES MINT
DIE MANUFACTURER CERTIFICATION PROGRAM
WG 09 CERTIFICATION PROGRAM**

RELATED INSTRUCTION PROGRAM		
	COURSE TITLE	HOURS
1.	Industrial Mathematics I	
2.	Print Reading	
3.	Machine Tool Processes I (Turning Operations: Chucking)	
4.	Machine Tool Processes II (Turning Operations: Chucking)	
5.	NIMS Turning Operations: Chucking Level I	
6.	CNC Machine Tool Processes I	
7.	CNC Lathe Programming, Set-up and Operation	
8.	NIMS CNC Turning Level II	
9.	Metals and Metallurgy at the United States Mint	
10.	Heat Treatment and Metallurgy at the United States Mint	
	Total Hours for the WG-09 CERTIFICATION PROGRAM	

WORK PROCESS SCHEDULE
DIE MANUFACTURER REGISTERED APPRENTICESHIP PROGRAM
DIE MANUFACTURER WG – 10
(Existing Title: Tool and Die Maker)
O*NET-SOC CODE: 51-4111.00 RAPID CODE: 0586R-CL



Able to perform competency without assistance.



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Needs additional training: Would benefit from added experience performing the competency.

	WG-10 PREREQUISITE COMPETENCIES	APPROXIMATE HOURS
	Applicants for the WG-10 to WG-11 Apprenticeship Program must be fully qualified as a WG-07, WG-08, and WG-09 based on Certification Program criteria.	
	NIMS MEASUREMENT, MATERIALS, & SAFETY LEVEL I CREDENTIAL	
	NIMS TURNING OPERATIONS: CHUCKING LEVEL I	
	NIMS CNC TURNING LEVEL I & LEVEL II	
	WG-10 CORE COMPETENCIES	
	NIMS JOB PLANNING, BENCHWORK, AND LAYOUT LEVEL I	80
1.	Manual Operations: Layout	
2.	Manual Operations: Bench work	
3.	Sawing	
4.	Job Process Planning	
	NIMS DRILL PRESS SKILLS LEVEL I	80
5.	Drilling Operations	
	NIMS MILLING LEVEL I	100
6.	Milling: Square Up a Block	
7.	Manual Milling: Vertical and Horizontal	
	NIMS CNC TURNING LEVEL I	180
8.	CNC Programming – Turning	
9.	CNC: Write a Simple CNC Turning Program and Review Tool Path	
10.	CNC: Operate a CNC Lathe	
	NIMS CNC TURNING LEVEL II	180
11.	CNC: Operate a CNC Lathe	

**WORK PROCESS SCHEDULE
DIE MANUFACTURER WG – 10
(Existing Title: Tool and Die Maker)**

O*NET-SOC CODE: 51-4111.00 RAPID CODE: 0586R-CL (CONTINUED)

12.	CNC: Turning Centers	
	NIMS CNC TURNING LEVEL III	180
13.	CNC: Advanced Manual Programming	
14.	Use Manufacturing Modeling Software to Create Programs	
	GRINDER (Proficient)	520
15.	Operational Experience to include Troubleshooting	
16.	Programming Experience	
17.	Vision Programming Experience	
	MANUFACTURE COLLARS & SEGMENTS	1040
18.	CNC Lathe Programming Class	
19.	Heat Treat - Shrink Fit Training	
20.	Manual I.D/O.D. Grinder - General Machine Knowledge and Operation	
21.	Surface Grinding - General Machine Knowledge and Operation	
22.	EDM - EDM Theory Class	
23.	EDM - General Machine Knowledge and Operation	
24.	Laser - Laser Theory Class	
25.	Laser Computer Programming	
26.	Laser - General Machine Knowledge and Operation	
	MANUFACTURE TOOLING	1640
27.	Operational Experience to include Troubleshooting	
	GENERAL COMPETENCIES	
28.	Oral Communication - Understand potential problems from lower grade employees Understand verbal instructions. Suggest possible improvements, in technical terms, to leaders and supervision	*
29.	Reading - Has passed a Blueprint Reading Course. Understand written instructions Read specialized training material and apply the information to on-the-job learning.	*
30.	Writing - Prepare complete, technical responses to supervisory and managerial inquiries and questions	*

**WORK PROCESS SCHEDULE
DIE MANUFACTURER REGISTERED APPRENTICESHIP PROGRAM
DIE MANUFACTURER WG – 10
(Existing Title: Tool and Die Maker)**

O*NET-SOC CODE: 51-4111.00 RAPID CODE: 0586R-CL (CONTINUED)

31.	Mathematical Skills - Has passed a College Level General Mathematics Course. Experienced in Geometry and Trigonometry	*
32.	Attention to detail - Must be 100% certain of all machine operations because of the danger involved in running a machine tool. Must fully understand the process of making die collars	*
33.	Teamwork - Encourages and facilitate group cohesion and teamwork. Cooperate within and across workgroups, as needed, to achieve goals	*
34.	Technology Application - Incorporate the latest machining technology and practices into die manufacturing	*
35.	Safety and Security - Must be able to read and follow all safety/security guidelines and understand how and when to report discrepancies	*
36.	Self-Management - Take own initiative to exercise problem solving techniques to increase utilization of equipment in the Die Division. Independently identifies and utilize the tools and machines most appropriate to complete the assignment	*
37.	Teaching Others - Provide comprehensive and highly technical guidance to Die Division personnel	*
38.	Flexibility - Respond quickly to the introduction of new tools and equipment by learning the complexities of them and sharing this knowledge with other team members.	*
	GENERAL COMPETENCIES (CONTINUED)	
39.	Decision Making - Recommend alternative approaches to solve technical problems to team leaders and supervision	*
40.	Leadership - Encourages the use of new tools and methods to improve team accomplishments and meet production goals. Enlist team members to explore and identify barriers for meeting team production goals. Actively support the Mint's goals, strategies, and directives regardless of personal opinion, and motivates others to participate and work towards Mint's objectives. Challenge the process, inspire a shared vision, and enable others to act by setting an example for others to follow	*
41.	COMPLETED ALL WG-10 CORE COMPETENCIES	
42.	ISSUE INTERIM CREDENTIAL FOR WG-10	
	TOTAL HOURS	4000

*Qualified in MCAP WG-07 through WG-09 certification program, WG-10 related instruction courses, and through coaching while performing WG-10 Mint specific Operating Procedures.

**RELATED INSTRUCTION OUTLINE
DIE MANUFACTURER APPRENTICESHIP PROGRAM
DIE MANUFACTURER WG – 10
(Existing Title: Tool and Die Maker)**

O*NET-SOC CODE: 51-4111.00 RAPID CODE: 0586R-CL (CONTINUED)

RELATED INSTRUCTION PROGRAM - YEAR ONE - FALL SEMESTER		
	COURSE TITLE	HOURS
1.	Industrial Safety and Health (OSHA VPP)	48
2.	Machine Tool Processes I (NIMS Job Planning, Bench work, and Layout Level I)	72
	Total Hours for the Year One Fall Semester	120

RELATED INSTRUCTION PROGRAM - YEAR ONE - SPRING SEMESTER		
	COURSE TITLE	HOURS
3.	Machine Tool Processes II (NIMS Drill Press Skills Level I)	72
	Total Hours for the Year One Spring Semester	72

RELATED INSTRUCTION PROGRAM - YEAR TWO - FALL SEMESTER		
	COURSE TITLE	HOURS
4.	Machine Tool Processes III (NIMS Turning Between Centers Level I)	72
	Total Hours for the Year Two Fall Semester	72

RELATED INSTRUCTION PROGRAM - YEAR TWO - SPRING SEMESTER		
	COURSE TITLE	HOURS
5.	Geometric Dimensioning and Tolerance	36
	Total Hours for the Year Two Spring Semester	36
	Total Hours of Related Instruction for WG-10 Requirements	300

WORK PROCESS SCHEDULE
DIE MANUFACTURER REGISTERED APPRENTICESHIP PROGRAM
DIE MANUFACTURER WG – 11
(Existing Title: Tool and Die Maker)
O*NET-SOC CODE: 51-4111.00 RAPID CODE: 0586R-CL



Able to perform competency without assistance.



Able to perform competency with some detailed instruction at the beginning of the assignment, and/or may have a question or two during the course of the assignment.



Needs additional training: Would benefit from added experience performing the competency.

	WG-11 PREREQUISITE COMPETENCIES	APPROXIMATE HOURS
	Apprentices progressing to the WG-11 Level in the Apprenticeship Program must be fully qualified as a WG-07, WG-08, WG-09, and WG-10 based on Certification Program criteria.	
	NIMS MEASUREMENT, MATERIALS, & SAFETY LEVEL I CREDENTIAL	
	NIMS TURNING OPERATIONS: CHUCKING LEVEL I	
	NIMS TURNING BETWEEN CENTERS LEVEL I	
	NIMS JOB PLANNING, BENCHWORK, AND LAYOUT LEVEL I	
	NIMS DRILL PRESS SKILLS LEVEL I	
	NIMS MILLING LEVEL I	
	NIMS CNC TURNING LEVEL I	
	NIMS CNC TURNING LEVEL II	
	NIMS CNC TURNING LEVEL III	
	WG-11 CORE COMPETENCIES	
	MANUFACTURES PARTS	4000
1.	CNC Programming	
2.	Geometric Dimensioning & Tolerance	
3.	Operational Experience to include Troubleshooting	
	GENERAL COMPETENCIES	
4.	Oral Communication - Understand potential problems from lower grade employees. Understand verbal instructions. Suggest possible improvements, in technical terms, to leaders and supervision	*
5.	Reading - Has passed a Blueprint Reading Course. Understand written instructions. Read specialized training materials and apply the information to on-the-job learning	*

WORK PROCESS SCHEDULE
DIE MANUFACTURER REGISTERED APPRENTICESHIP PROGRAM
DIE MANUFACTURER WG – 11
(Existing Title: Tool and Die Maker)
O*NET-SOC CODE: 51-4111.00 RAPID CODE: 0586R-CL (CONTINUED)

WG-11 CORE COMPETENCIES		APPROXIMATE HOURS
6.	Writing - Prepare complete, technical responses to supervisory and managerial inquiries and questions	
7.	Mathematical Skills - Has passed a College Level General Mathematics Course. Experienced in Geometry and Trigonometry	*
8.	Attention to detail - Must be 100% certain of all machine operations because of the danger involved in running a machine tool. Must fully understand the process of making die collars	*
9.	Teamwork - Encourage and facilitate group cohesion and teamwork. Cooperate within and across workgroups, as needed, to achieve goals	*
10.	Technology Application - Incorporate the latest machining technology and practices into die manufacturing	*
11.	Safety and Security - Must be able to read and follow all safety/security guidelines and understand how and when to report discrepancies	*
12.	Self-Management - Take own initiative to exercise problem solving techniques to increase utilization of equipment in the Die Division. Independently identify and utilize the tools and machines most appropriate to complete the assignment	*
13.	Teaching Others - Provide comprehensive and highly technical guidance to Die Division personnel	*
14.	Flexibility - Responds quickly to the introduction of new tools and equipment by learning the complexities of them and sharing this knowledge with other team members	*
15.	Decision Making - Recommend alternative approaches to solve technical problems to team leaders and supervision	*
16.	Leadership - Encourage the use of new tools and methods to improve team accomplishments and meet production goals. Enlist team members to explore and identify barriers for meeting team production goals. Actively support the Mint's goals, strategies, and directives regardless of personal opinion, and motivates others to participate and work towards Mint's objectives. Challenge the process, inspire a shared vision, and enable others to act by setting an example for others to follow	*
17.	COMPLETED ALL WG-11 CORE COMPETENCIES	
18.	ISSUE CERTIFICATE OF COMPLETION OF APPRENTICESHIP	
	TOTAL HOURS	4000

**RELATED INSTRUCTION OUTLINE
DIE MANUFACTURER APPRENTICESHIP PROGRAM
DIE MANUFACTURER WG – 11
(Existing Title: Tool and Die Maker)
WG-11 REQUIREMENTS**

O*NET-SOC CODE: 51-4111.00 RAPID CODE: 0586R-CL (CONTINUED)

RELATED INSTRUCTION PROGRAM - YEAR THREE - FALL SEMESTER		
	COURSE TITLE	HOURS
1.	Machine Tool Processes IV (NIMS Milling Level I)	72
	Total Hours for the Year Three Fall Semester	72

RELATED INSTRUCTION PROGRAM - YEAR THREE - SPRING SEMESTER		
	COURSE TITLE	HOURS
2.	Industrial Mathematics II	36
	Total Hours for the Year Three Spring Semester	36

RELATED INSTRUCTION PROGRAM - YEAR FOUR - FALL SEMESTER		
	COURSE TITLE	HOURS
3.	Machine Tool Processes V (NIMS CNC Turning Level III)	72
4.	Metals and Metallurgy at the United States Mint	36
	Total Hours for the Year Four Fall Semester	108

RELATED INSTRUCTION PROGRAM - YEAR FOUR - SPRING SEMESTER		
	COURSE TITLE	HOURS
5.	Heat Treatment and Metallurgy at the United States Mint	36
6.	Soft Skills Training	40
	Total Hours for the Year Four Spring Semester	76

	Total Hours of Related Instruction for WG-11 Requirements	292
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6 Hours per Week for 12 Weeks = 72 Hours per Semester

3 Hours per Week for 12 Weeks = 36 Hours per Semester

NIMS CREDENTIAL: Level I CNC Turning

1. CNC Programming - Turning

Duty: Using the principles of Cartesian coordinates develop a program for the manufacture of a simple part.

Performance Standard: Given a computer and a basic CNC software program, and a blueprint for part comparison, apply the principles of two-dimensional coordinate planes in the development of a simple program for the production of the part on a CNC lathe or CNC turning center.

PERFORMANCE OBJECTIVES: (What an apprentice must know and/or do to perform the work competently).

- a. The apprentice will be able to describe the functions and use of basic G and M codes.
- b. The apprentice will be able to identify coordinates on a blueprint with respect to an origin.
- c. The apprentice will be able to implement linear interpolation into a program to cut straight lines between two points.
- d. The apprentice will be able to implement circular interpolation into a program to cut true arcs and circles, using I & J (arc vector) and R (radius value) methods.
- e. The apprentice will be able to write a program using the appropriate format for a particular machine control, and work from a process plan to get guidance for sequences, steps, procedures, machining parameters, etc., that will be used.

2. CNC: Write a Simple CNC Turning Program and Review Tool Path

Duty: Using a computer and editor software write simple CNC programs using M and G codes from the *Machinery's Handbook*. Simple programs are single plane, cutter centerline, linear and circular interpolation, and single cutter, with no canned cycles as specified on the print.

Performance Standard: Given a part print with the tool path shown, and the computer with editor software; write a program including speeds and feeds, to drive a cutting tool through a continuous path following the geometry of a part requiring the development of a linear interpolation tool path as well as circular interpolation. Store the program on computer media.

PERFORMANCE OBJECTIVES: (What an apprentice must know and/or do to perform the work competently).

- a. The apprentice will be able to describe the functions and use of basic G and M codes.
- b. The apprentice will be able to identify coordinates on a blueprint with respect to an origin.

- c. The apprentice will be able to calculate and implement speeds and feeds for proper tool life and surface finish.
- d. The apprentice will be able to implement linear interpolation into a program to cut straight lines between two points.
- e. The apprentice will be able to implement circular interpolation into a program to cut true arcs and circles, using the I & J (arc vector), and R (radius value) methods.
- f. The apprentice will be able to write a program using the appropriate format for a particular machine control, and work from a process plan to get guidance for sequences, steps, procedures, machining parameters, etc., that will be used.

3. Level I CNC: Operate a CNC Lathe

Duty: Operate a CNC Lathe

Performance Standard: Given a CNC lathe, create a qualified CNC program, set-up and operate the lathe, change tool values as necessary, replace and qualify tooling as necessary.

NIMS CREDENTIAL: Level II CNC Turning

4. Level II CNC: Operate a CNC Lathe

Duty: Operate a CNC Lathe

Performance Standard: Given a CNC lathe, create a qualified CNC program, set-up and operate the lathe, change tool values as necessary, replace and qualify tooling as necessary.

PERFORMANCE OBJECTIVES: (What an apprentice must know and/or do to perform the work competently).

- a. The apprentice will be able to describe the functions and use of basic G and M codes.
- b. The apprentice will be able to identify coordinates on a blueprint with respect to an origin.
- c. The apprentice will be able to calculate and implement speeds and feeds for proper tool life and surface finish.
- d. The apprentice will be able to write a program using the appropriate format for a particular machine control, and work from a process plan to get guidance for sequences, steps, procedures, machining parameters, etc., that will be used.
- e. The apprentice will be able to install and qualify the required tooling for the program.
- f. The apprentice will be able to mount, locate, and set the origin of the work piece on a CNC lathe.

- g. The apprentice will be able to load a program, create a CNC-link, or enter a program via control keyboard into a CNC lathe control.
- h. The apprentice will be able to safely execute a program for its first run (debugging).

NIMS CREDENTIAL: Level III CNC Turning

5. CNC: Advanced Manual Programming

Duty: Using a computer and editor, write sophisticated programs. Sophisticated programs will contain various combinations of change of plane, canned cycles, will employ multiple tools, cutter offsets, linear, circular, and helical interpolation as well as requiring the matching of surfaces along lines and points of tangency in 3 axis. All results will be stored on computer media.

Performance Standard: Given a blueprint and a process plan, write a program to drive a collection of tooling through the tool paths needed to produce the part shown on the blueprint. The program will require change of tools, change of planes, use of canned cycles, and tool offsets. Use a computer to write and store the program.

PERFORMANCE OBJECTIVES: (What an apprentice must know and/or do to perform the work competently).

- a. The apprentice will be able to identify coordinates with respect to an origin.
- b. The apprentice will be able to calculate and implement speeds and feeds for proper tool life and surface finish.
- c. The apprentice will be able to write a program using the appropriate format for a particular machine control, and work from a process plan to get guidance for sequences, steps, procedures, machining parameters, etc., that will be used.
- d. The apprentice will be able to implement circular interpolation into a program to cut true arcs and circles, using the I & J (arc vector), and R (radius value) methods.
- e. The apprentice will be able to implement automatic cutter radius compensation.
- f. The apprentice will be able to change and perform machining on different work planes.
- g. The apprentice will be able to program helical interpolation.
- h. The apprentice will be able to form and solve triangular constructions on a blueprint to find missing coordinates.

6. Use Manufacturing Modeling Software to Create Programs

DUTY: Create programs using a manufacturing modeling software package.

Performance Standard: Given a blueprint, use a graphics-based software package to develop a program to drive a collection of tooling through the tool paths needed to produce the part shown on the blueprint. The program will require change of tools, change of planes, use of "canned cycles." and tool offsets.

PERFORMANCE OBJECTIVES: (What an apprentice must know and/or do to perform the work competently).

- a. The apprentice will be able to identify coordinates with respect to an origin.
- b. The apprentice will be able to calculate and implement speeds and feeds for proper tool life and surface finish.
- c. The apprentice will be able to identify and use menus, and icons used in the software package.
- d. The apprentice will be able to draw basic geometric shapes and constructions.
- e. The apprentice will be able to edit basic geometric shapes and constructions.
- f. The apprentice will be able to create tool paths for contour milling, pocketing, drilling, and tapping.
- g. The apprentice will be able to post-process tool paths into programs.

7. Job Execution: **CNC Turning Centers**

DUTY: Set-up and operate turning centers.

Performance Standard: Set-up the tooling and work piece. Qualify the work piece to the control. Prepare tools or load tools into tool magazine as required, qualify the tools to the control with respect to the work, match their identity to the program. Establish initial tool values or offsets. The part specified should have at least two diameters within $\pm .001$, one UNC external thread, one UNF external thread, an appropriate taper at each end of the part, and require an end-for-end swap.

UNITED STATES MINT
DIE MANUFACTURER APPRENTICESHIP PROGRAM
WG-10 to WG-11 APPRENTICESHIP PROGRAM
APPRENTICESHIP WAGE SCHEDULE
DIE MANUFACTURER WG-11
(Existing Title: Tool and Die Maker)
O*NET-SOC CODE: 51-4111.00 RAPIDS CODE: 0586R-CL

	TIME FRAME	WG GRADE	WG STEP	WG RATE	PERCENT OF JOURNEYWORKERS HOURLY RATE
1.	0-26 Weeks	10	1	\$23.11	86.00 % of Journeyworkers Hourly Rate
2.	27-104 Weeks	10	2	\$24.07	89.56 % of Journeyworkers Hourly Rate
3.	105-208 Weeks	11	2	\$25.01	93.23 % of Journeyworkers Hourly Rate

The journeyworker hourly rate as of January 4, 2009 was \$25.99, the 3rd step of a WG Grade 11

Note: "Wage grade hourly rates are subject to change per annual cost of living adjustment (COLA) determinations.