APPENDIX A.4

CORE COMPETENCY REQUIREMENTS

NIMS CERTIFIED TOOL AND DIE MAKER

I. Tool and Die Maker Skill Level: Basic Competencies

I. Core Competency Assessment: Tool and Die Maker Basic Competencies

Duty Area	Task	Date Completed	Supervisor Signature
A	*Inspect Materials, Die Components, Features & Details*		
A1	Measure size of raw materials		
A16	Verify calibration of measurement devices		
A17	Convert measurements (English metric)		
B	*Plan Job & Set-up Workstation*		
B17	Verify availability of tryout material		
C	*Set Up Equipment & Machine Components and Details*		
C1	Move and stage material and parts for machining (CNC/non-CNC)		
C3	Drill/tap holes		
C4	Countersink/counter bore holes		
C11	Scribe location lines and profiles		
C17	Rough cut/saw tool steel and details		
C20	Make shims		
C22	Remove burr from machined parts		
D	*Assemble Tools & Die*		
D12	Grind/deburr & mount parallels		
D23	Check for sharp edges on non-cutting tools		
	Preventative/Routine Maintenance		
	Shop Protocols		

II. Core Competency Assessment: Tool and Die Maker Intermediate Competencies

Duty Area	Task	Date Completed	Supervisor Signature
A	*Inspect Materials, Die Components, Features & Details*		
A2	Measure diameters (ID/OD)		
A3	Measure GD&T		
A4	Determine hardness of surfaces		
A5	Measure point-to-point distances		
A6	Measure radius/radii		
A7	Measure angles		
A9	Measure material thinning of production part		
A10	Calculate unknown dimensions		
A11	Measure burr height of production part		
A13	Check surface finish		
A14	Check surface for defects and flaws		
A15	Identify material by type (includes spark test)		
A18	Locate centerlines		
A19	Check fit & form using gagging		
A20	Measure threads		
B	*Plan Job and Set Up Workstation*		
B1	Review and verify prints and drawings		
B2	Obtain and stage raw materials		
B3	Verify bill of materials		
B4	Prioritize & schedule work flow/progression		
B5	Determine availability of materials & equipment		
B6	Obtain & stage die pre-manufactured components		

Duty Area	Task	Date Completed	Supervisor Signature
B	*Plan Job and Set-up Workstation*		
B7	Determine grinding and heat treating allowances		
B8	Sketch/highlight critical processing information & specs		
B9	Determine machining requirements & processes		
B11	Verify/assess shut height specifications		
B12	Verify/assess tonnage requirements		
B13	Verify/assess feedline		
B14	Check safety devices for function		
B15	Identify & determine availability of perishable tooling		
B18	Determine resources to adhere to die building and tryout times		
B19	Determine lubrication requirements & plumbing standards		
B20	Assess part & scrap ejection methods		
C	*Set-up Equipment & Machine Components & Details*		
C2	Polish parts		
C5	Bore/ream holes		
C7	Schedule heat treatments		
C8	Grind edges & flats		
C9	Grind OD		
C12	Square block		
C13	Thread diameters (ID/OD)		
C14	Mill slots, pockets & keyways (2-D milling)		
C15	Turn diameters (chucked CNC or non-CNC)		
C18	Lap/hone holes		
C21	Inspect machined work pieces for quality & compliance		

II. Core Competency Assessment: Tool and Die Maker Intermediate Competencies (cont.)

Duty Area	Task	Date Completed	Supervisor Signature
D	*Assemble Tools & Die(T/D)*		
D1	Check punch to die clearance		
D7	Install & set pressure devices or systems		
D8	Install stripping & holding devices		
D10	Mount/adjust CAMs or sliding components		
D11	Verify/adjust slug clearance		
D15	Install & set quick die change components (quick setup)		
D16	Install/check slug/scrap removal & part ejection devices		
D17	Install part ejection devices		
D20	Align upper & lower die assembly		
D21	Check/adjust material feed & level on the bench		
D22	Install/make guide components		
D24	Identify and mark first strip (edge) stop		
D25	Verify presence of or install balances & levelers		
D26	Set blocks		
E	*Conduct Tryouts & Develop T/D*		
E1	Set-up press for dry run and/or tryouts		
E2	Conduct dry run		
E4	Adjust/replace or relocate sensors		
E9	Adjust or rework tooling		
E10	Adjust pressures (holding & stripping)		
E11	Adjust/reset ejection devices or systems		
E12	Feed/run strip to start point (first stop)		
E13	Jog strip through stations		
E15	Apply die lubrication/forming lubes		
E16	Verify feed progression & pilot release		

II. Core Competency Assessment: Tool and Die Maker Intermediate Competencies (cont.)

Duty Area	Task	Date Completed	Supervisor Signature
E	*Conduct Tryouts & Develop Tools/Die*		
E18	Check/adjust shut height & set blocks		
E20	Conduct “run at rate”		
E21	Inspect tryout parts for quality & conformance (read strip)		
E22	Submit tryout parts for final inspections (validate part)		
G	*Manage/Coordinate Projects*		
G2	Participate & contribute in continuous improvement efforts		
G3	Participate & contribute in die preventive maintenance efforts and activities		
G5	Monitor & adhere to project milestones & timelines (project reports)		
G6	Communicate with management & engineering regarding project resources & schedules		
G7	Update/track prints for required die design changes		
G8	Monitor/report use of materials & resource		
G9	Monitor/apply 5S’s and lean manufacturing applications		
	Interpret CAD/CAM Drawings		
	Demonstrate a basic understanding of wire EDM		
	Demonstrate a basic understanding of EDM		

III. TOOL AND DIE MAKER SKILL LEVEL: ADVANCED COMPETENCIES

III. Core Competency Assessment: Tool and Die Maker Advanced Competencies

Duty Area	Task	Date Completed	Supervisor Signature
A	*Inspect Materials, Die Components, Features & Details*		
A8	Measure circle grinds		
A12	Identify material properties		
B	*Plan Job & Set-up Work Station*		
B10	Determine coating & finishing requirements		
B16	Order/obtain & make special tooling		
C	*Set-up Equipment & Machine Components & Details*		
C6	Grind holes (jig)		
C10	Grind forms (contours)		
C16	Turn between centers		
C19	Grind graphite electrodes		
D	*Assemble Tools & Die*		
D2	Mount & check details for fit and function		
D3	Mount & align punching tools		
D4	Mount & align forming tools & components		
D5	Install & fit cutting tools & components		
D6	Install & align drawing tools & components		
D9	Establish & set die timing		
D13	Mount/align in-die assembly & hardware		
D14	Mount/align in-die tapping heads		
D18	Install QC sensors & electronics		
D19	Install die protection sensors & devices		

III. Core Competency Assessment: Tool and Die Maker : Advanced Competencies (cont.)

Duty Area	Task	Date Completed	Supervisor Signature
E	*Conduct Tryouts & Develop Tools/Die*		
E3	Conduct tryout(s) (first to finish)		
E5	Check for interference & adjust clearance		
E6	Adjust/reset timing		
E7	Rework/replace forms & draws		
E8	Adjust draw beads		
E14	Set/adjust pilot release		
E17	Develop blank/trim profiles		
E19	Analyze, solve & correct formability problems		
F	*Trouble Shoot Tool & Die Problems (10 Examples)*		
F1	Find out why strip is mis-feeding		
F2	Respond to a slug pulling situation		
F3	Determine why galling has occurred		
F4	Find out why material is wrinkling or splitting		
F5	Find out why part dimensions are varying or out of control		
F6	Isolate the cause of why strip is not feeding straight into or through die		
F7	Determine why tool steel is chipping or showing premature wear		
F8	Determine why die components are breaking		
F9	Find out why scrap or materials is accumulating in the die		
F10	Isolate the cause of why a sensor has shut down the press		
G	*Manage/Coordinate Projects*		
G1	Participate in design & strip review meetings		
G4	Train co-workers & apprentices		

Required NIMS Credentials

In order to demonstrate proficiency in all of the competencies listed in this appendix, the apprentice will have completed all of the following NIMS Credentials.

Name of Credential	Date Completed	Supervisor Signature
Measurement, Materials and Safety		
Job Planning, Benchwork and Layout		
Drill Press Skills		
One of the Following Two		
Manual Milling Skills I CNC Milling: Programming Set-up and Operations I		
One of the Following Three		
Turning Operations: Turning Between Centers I Turning Operations: Turning Chucking Skills CNC Turning: Programming Set-up and Operations		
One of the Following Two		
Manual Milling Skills II CNC Milling Skills II		
One of the Following Three		
Turning II—Chucking Turning II—Between Centers CNC Turning Skills II		
All of the Following Three		
Grinding Skills I		
Surface Grinding Skills		
Cylindrical Grinding Skills		
Both of the Following		
Die making Level II		
Die making Level III		
The Following Are Optional		
EDM—Plunge (Optional)		
EDM—2-Axis Wire (Optional)		