

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 |
|-----------|--|----------------|----------------------|
| <i>A</i> | <i>Inspect Materials, Die Components, Features & Details</i> | | |
| A1 | Measure size of raw materials | | |
| A16 | Verify calibration of measurement devices | | |
| A17 | Convert measurements (English metric) | | |
| <i>B</i> | <i>Plan Job & Set-up Workstation</i> | | |
| B17 | Verify availability of tryout material | | |
| <i>C</i> | <i>Set Up Equipment & Machine Components and Details</i> | | |
| 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 | | |
| <i>D</i> | <i>Assemble Tools & Die</i> | | |
| D12 | Grind/deburr & mount parallels | | |
| D23 | Check for sharp edges on non-cutting tools | | |
| | Preventative/Routine Maintenance | | |
| | Shop Protocols | | |

II. TOOL AND DIE MAKER SKILL LEVEL: INTERMEDIATE COMPETENCIES

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

| Duty Area | Task | Date Completed | Supervisor Signature |
|-----------|--|----------------|----------------------|
| <i>A</i> | <i>Inspect Materials, Die Components, Features & Details</i> | | |
| 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 gaging | | |
| A20 | Measure threads | | |
| <i>B</i> | <i>Plan Job and Set Up Workstation</i> | | |
| 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 | | |

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

| Duty Area | Task | Date Completed | Supervisor Signature |
|-----------|--|----------------|----------------------|
| <i>B</i> | <i>Plan Job and Set-up Workstation</i> | | |
| 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 | | |
| <i>C</i> | <i>Set-up Equipment & Machine Components & Details</i> | | |
| 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 |
|-----------|--|----------------|----------------------|
| <i>D</i> | <i>Assemble Tools & Die(T/D)</i> | | |
| 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 | | |
| <i>E</i> | <i>Conduct Tryouts & Develop T/D</i> | | |
| 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 |
|-----------|---|----------------|----------------------|
| <i>E</i> | <i>Conduct Tryouts & Develop Tools/Die</i> | | |
| 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) | | |
| <i>G</i> | <i>Manage/Coordinate Projects</i> | | |
| 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 |
|-----------|--|----------------|----------------------|
| <i>A</i> | <i>Inspect Materials, Die Components, Features & Details</i> | | |
| A8 | Measure circle grinds | | |
| A12 | Identify material properties | | |
| <i>B</i> | <i>Plan Job & Set-up Work Station</i> | | |
| B10 | Determine coating & finishing requirements | | |
| B16 | Order/obtain & make special tooling | | |
| <i>C</i> | <i>Set-up Equipment & Machine Components & Details</i> | | |
| C6 | Grind holes (jig) | | |
| C10 | Grind forms (contours) | | |
| C16 | Turn between centers | | |
| C19 | Grind graphite electrodes | | |
| <i>D</i> | <i>Assemble Tools & Die</i> | | |
| 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 |
|-----------|--|----------------|----------------------|
| <i>E</i> | <i>Conduct Tryouts & Develop Tools/Die</i> | | |
| 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 | | |
| <i>F</i> | <i>Trouble Shoot Tool & Die Problems (10 Examples)</i> | | |
| 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 | | |
| <i>G</i> | <i>Manage/Coordinate Projects</i> | | |
| G1 | Participate in design & strip review meetings | | |
| G4 | Train co-workers & apprentices | | |

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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) | | |