



DIEMAKING CREDENTIALING PROGRAM

LEVEL III CREDENTIALING ACHIEVEMENT RECORD (CAR)

and

Official Performance Assessment CHECKLISTs (Skill Checks)

Please print

NAME:	NIMS Reg. No.	Job Title:
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Site Name & Address:	NIMS Site No. or Phone Number
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STATUS:	<i>Non-Completer</i> 0	<i>Candidate has Successfully Completed all NIMS Performance Requirements in the Following Credentialing Area:</i>
	Reason:	<p align="center">Duties & Standards for Diemaking Skills Level III</p> <p>Date Started: _____ Date Completed: _____</p>

Directions

This *Credentialing Achievement Record, Level III (CAR)* is the official training/performance document and personal skills portfolio for the above named NIMS credentialing candidate. The CAR is used by the trainer/supervisor and candidate as a record (or log book) of individual on-the-job performance. The CAR is the *vehicle* that will allow eligible candidates to take the NIMS written credentialing examination(s). Supervisors, trainers, and candidates should take care of this record and be sure that it is accurate, kept up to date, filled out correctly, and properly stored. All information recorded in the *CAR* should be considered **CONFIDENTIAL**.

The CAR opens with list of Critical Work Activities (or Work History & Competency Statements) that must be acknowledged and documented. However, actual performance is assessed two ways: **1)** by fulfilling these general competency and historical statements and **2)** by an examiner administering the *Skill Checks* (or performance assessments). Skill Checks are clearly marked with the title - **CAR SKILL CHECK**. Candidate performance is documented by a on the Examiner's CHECKLIST. All Skill Checks must be co-signed and dated by the trainer/supervisor and candidate. Critical Work Activity sign-offs also must be co-initialed by the trainer/supervisor or manager and candidate then dated. If a particular Skill Check element or standard does not apply at your facility, check-off the Not Applicable (*NA*) box and continue. Skill Checks may require the candidate to perform work a bit differently than your normal procedure or learn how to do something that may not be part of their typical day-to-day responsibilities. However, you may only check-off *NA* if the process-standard does not apply because the equipment or tooling is not available or the diemaking process itself does not require this activity. The final section is the *Affidavit of Successful Performance* that must be completed, signed and dated upon completion of the CAR and sent to NIMS.



DIEMAKING CREDENTIALING PROGRAM

LEVEL III CREDENTIALING ACHIEVEMENT RECORD (CAR)

NOTE: Candidates should possess those skills and abilities as set forth in the *Duties and Standards for Diemaking Skills*, Level II. In addition, candidates must have intermediate machining skills prior to attempting this CAR. These machining and benchwork skills and standards include:

Machining - NIMS Level II Machining Standards

- **Turning - Between Centers**
- **Turning - Chucking**
- **Milling - Precision Locations**
- **Grinding - Flats and Angles**
- **Cylindrical Grinding**
- **EDM - Plunge EDM**
- **EDM - 2-Axis Wire EDM**
- **CNC Milling** - CNC work is required for a Level III Diemaking Credential.
- **CNC Turning** - CNC work is required for a Level III Diemaking Credential.

For information about these standards and credentialing programs, log onto www.nims-skills.org or contact:

The National Institute for Metalworking Skills

10565 Fairfax Boulevard, Suite 203
Fairfax, VA 22030
(703) 352-4971
(703) 352-4991 fax

LEVEL III SKILL STANDARDS, DUTY AREAS 1-5

Critical Work Activities	Date Completed	Supervisor Initials	Trainer Initials	Trainee Initials
Diemaking Level III Work History & Competency Statements		or		
Candidate successfully completed all required safety training/courses as specified by the facility or required by OSHA. Candidate has working knowledge of applicable OSHA and ANSI regulations and guidelines.				
Candidate met the attendance policy of the facility for the last 12 consecutive months.				
Candidate has no company documented safety violations within the last 12 consecutive months.				
Candidate has no disciplinary reports or reprimands within the last 12 consecutive months.				

Continued on next page



LEVEL III SKILL STANDARDS, DUTY AREAS 1-5

Critical Work Activities	Date Completed	Supervisor Initials	Trainer Initials	Trainee Initials
Diemaking Level III				
Candidate has demonstrated the ability to maintain a safe, clean and orderly work area in compliance with housekeeping policies and has no reported violations for a period of 12 consecutive months.				
Candidate has demonstrated appropriate social skills and organizational qualities when working with others and contributed to group efforts with ideas and positive feedback in the performance of major duties.				
Candidate can verify that the die design/die building plan and work schedule will meet customer quality standards, timelines and production requirements (as per machinability, capability and engineering feasibility reports).				
Candidate demonstrated ability determining what work needs to be done, scheduling the work, communicating with the assembly team, and recording step-by-step changes while maintaining an accurate and current record of those changes.				
Candidate can layout details for manual machining (milling, turning, drilling, etc.) and toolroom operations and can perform those required machining and benchwork duties to die design/print specifications and tolerances.				
Candidate can prepare details for CNC milling & turning, (or CNC Machining Center or EMD/wire burn operations) and can perform CNC operations to print specifications (includes: CNC setup, basic programming, editing, protocol validation, equipment operations & workpiece inspections).				
Candidate demonstrated knowledge of CNC processors, programming codes, sequences & cycles, tooling & work holders, offsets, and workpiece coordinate calculations.				
Candidate can complete final sizing after heat-treating and understood the types, purpose and effect of heat treating. Candidate can perform a hardness test (e.g., Rockwell).				
Candidate can mount appropriate steels, pads and nitrogen units needed for trim lines and forming. Candidate can assemble a die and dry run the die to stop blocks.				
Candidate can install nitrogen cylinders, die springs, nitrogen manifold and sensors then confirm the development process.				

Continued on next page



LEVEL III SKILL STANDARDS, DUTY AREAS 1-5

Critical Work Activities	Date Completed	Supervisor Initials	Trainer Initials	Trainee Initials
Diemaking Level III				
Candidate can assist with die and press setup for first tryout and run (or monitor) first part samples (SPC as required).				
Candidate can conduct a first tryout make final adjustments to die-set as determined from that tryout.				
Candidate can develop/rework draws and forms to eliminate tears, wrinkles and spring-back. Candidate can redevelop trim lines or radii and establish proper size and configuration of the blank, part or feature.				
Candidate can spot form steels and form pads to achieve the specified surface finish, tolerance and station timing. Candidate can mount remaining die details or components to the die set for final assembly and test for function.				
Candidate can setup die in press for final tryout, perform final tryout, and make necessary adjustments to meet part quality and production requirements.				
Candidate can confirm the production readiness of the die and verify the correct operation of the die.				
Candidate can perform or monitor the production runoff, review results and document changes (if any) made to the original die design or Process Plan.				
Candidate demonstrated professionalism when organizing, guiding and monitoring the activities of team members (diemakers, grinders, machinists, setup, apprentices, etc.) to assure that the die will produce parts to customer standards.				
Candidate demonstrated ability to foster learning and the development of others using workable advice, instruction and coaching. Candidate can delegate and direct the activities of others that are in the best interests of the company and its customers.				
Candidate demonstrated expert ability to efficiently gather and organize information/data while noticing cause-and-effect relationships, trends and/or discrepancies in order to make a rational and objective decision prior to taking action.				



CAR SKILL CHECK 1 of 2 – Sections 1, 2 and 3

Candidate:	Date:	200
Examiner:	(For examiner use only)	
	Results:	Pass <input type="checkbox"/> Yes <input type="checkbox"/> No
	Date:	

Duty Area(s)

Job Planning & Management, CNC Machining & Benchwork and Die Assembly & Tryout

Performance Conditions

Settings: In office or tooling library, at workbench, in machining room & toolroom and at tryout press for dry run. Candidate will determine the required processes to complete the die on time, organize and guide die building activities, perform selected machining/toolroom operations, schedule and lead die assembly work, and document dry run tryout findings.

Safety Equipment:

- PPE when on shop floor (based on equipment and process requirements).

Tools, Equipment & Materials:

- Assorted Hand Tools
- Bill of Materials/Stocklist
- Calibrations Standards
- Cleaning, Cutting/Tapping & Lubrication Agents/Devices
- Flies, Stones, Hone, Emory Cloth & Reamers, etc.
- Lathe (CNC) w/ Accessories & Attachments (or CNC Turning Center)
- Layout Ink/Layout Dye/Bluing
- Materials Handling Requirements
- Mill (CNC) w/ Accessories & Attachments (or CNC Machining Center)
- MSDS Documents
- Prints/CAD Drawings and Data (for part, die(s), tooling & die details)
- Raw Material Specifications
- Shims/Shim Stock
- Surface Grinder w/ Accessories & Attachments (includes wheel, diamond dresser, wheel balancer, counterweights & demagnetizer)
- Surface Plate (clean)
- Surface Finish Comparison Charts

Tools, Equipment & Materials:

- Tooling Library/Database
- Tryout Press and Stock
- Work Order/PO/Job Packet (includes die design)

Measuring Instruments:

- Angle Plate
- Checking Fixtures
- Dial Indicator
- Die Light
- Gauge Blocks
- Hand Held Precision Measuring Instruments (various calipers, micrometers, rules, scales, etc.)
- Height & Depth Gauges w/ Indicator
- Optical Comparator (or CMM)
- Pin, Plug, Go & No-go Gauges
- Protractor w/ Blade
- Radius Gauges
- Sine Plate/Sine Bar
- Surface Gauges
- Squares (various)
- Thread Gauges



Attainment Standards

1. 100% of all applicable procedural steps and *Process-Product Standards* (Work Elements), without assistance and within company-specific time limit, following all safety, environmental and plant procedures.
2. 100% conformance with all Final Product Standards, QC and Process Plan/print specifications, GD&T criteria, OSHA/EPA requirements, ANSI standards, ISO/QS-TS fits & limits, and plant-specific performance standards..

Candidate Directions

The referenced documents, tools, equipment, materials and supplies may be used to determine the required processes to complete the die on time, organize and schedule die building activities, perform selected machining/toolroom operations, guide and lead die assembly work, and document dry run results and findings. All safety and plant procedures must be followed. The examiner will evaluate both the *process* used while the work is being done and the final result (or **product**) after the jobs have been completed. Work Element Process Steps should be performed in the logical sequence, and all work elements must meet the standards for successful completion.

The Skill Check you are about to take is a hands-on performance assessment designed to test your ability by practical demonstration. This assessment will enable you to verify your experience and show your competency by completing practical job tasks or Process Steps (called Work Elements). The Skill Check will cover areas that you should know and problems you should be able to solve. If you need any additional materials or experience any problems with the equipment during the assessment, notify the examiner immediately.


Examiner Instructions

For successful completion of this Skill Check, the candidate must demonstrate the ability to successfully complete the Work Elements, unassisted and to standards under controlled assessment conditions. All work must be completed to the standards of performance as interpreted by the shop, plant or facility. Every attempt has been made to sequence Process Steps – Work Elements (or performance jobs) in a logical order. However, individual Work Elements or Process Steps should be administered in segments and in any order as determined by the plant, facility or trainer. This is an on-going assessment process and will take some time to complete. All work must be completed to the standards of performance as interpreted by the shop, plant or facility.

Before administering the Skill Check or any portion thereof:

- ◆ Be sure all equipment, tools, materials and supplies (inventories) are available, verified for safety and functionality, and are applicable to the process or work activity to be demonstrated.
- ◆ Read/review the skill check directions with the candidate. Allow trainee the opportunity to review the *Examiner's Checklist* prior to administration. The examiner may answer any questions about the assessment process.

Do not provide assistance during the Skill Check. Monitor work in-progress and evaluate for **Process-Product Standard**. Assess the completed Skill Check for conformance with **Final Product Standards**. Mark *NA* if a *Process-Product Standard* is not appropriate or not applicable at your facility.

 **Stop** the Skill Check immediately if the candidate violates a safety/environmental regulation or procedure or if there is any possibility of personal injury or damage to equipment.

Before assessment, the examiner may discuss appropriate safety and loss issues (*i.e., Lockout-Tagout/zero energy requirements, HAZMAT handling and use, personal protection and permitting, pinch and sharp points, compressed air/fluid/gas, high/residual voltage/pressure, E-Stops/critical alarms, etc.*).

When the candidate indicates that he/she has completed a job task/project on the Skill Check or when maximum time allowed has run out, assess any Final Product Standards and complete all appropriate comments and signature sections after the entire Skill Check has been completed.

 **Checklist**

Scoring Procedures: Observe the candidate's performance for each Process Step (Work Element) and mark on the *Examiner's CHECKLIST* whether or not the *Process-Product Standards* were attained (*Do not rely on your memory*). *Process-Product Standards* are to be marked as each Work Element (or Process Step) is being performed. Final Product Standards are checked-off after the Skill Check has been completed.

(C) Critical. Failure to meet the standard will result in immediate Skill Check termination.

Note: The evaluator will terminate the assessment and schedule the individual for further training.



Examiner's CHECKLIST – CAR SKILL CHECK 1
Job Planning, CNC Machining & Benchwork

Section One: Job Planning

Process Steps	Process-Product Standards	✓	✗	
Work Element	[Unit Standards of Performance]	Yes	No	NA
1. Review Part Print & Confirm That Design Reflects Proper Process Type of Die (Check One) <input type="checkbox"/> Single Hit <input type="checkbox"/> Compound Progressive <input type="checkbox"/> Sensored <input type="checkbox"/> Non-Sensored <input type="checkbox"/> Transfer Deep Draw <input type="checkbox"/> Single Deep-Draw <input type="checkbox"/> Double Deep Draw <input type="checkbox"/> Reverse Deep-Draw <input type="checkbox"/> Other: _____	<ul style="list-style-type: none"> • Candidate knowledgeable of print or CAD drawing views/projections, symbols & lines, scales, tolerancing systems & reference points. • Candidate able to visualize finished product based on die design, part print and customer information. • Candidate demonstrated knowledge of die stations and the locations, positions & functions of die components (tooling, details, sensors). (C) • Candidate demonstrated knowledge of the types, properties & characteristics of needed materials (ferrous, non-ferrous & non metallic). • Candidate assessed the suitability and feasibility of all required die making materials. • Candidate demonstrated ability to identify matching processes that determine finish. • Candidate identified lubricants/fluids and coatings/clads necessary for die making and determined the safe handling of these materials (MSDS apply where applicable). • Candidate determined component heat treating and/or raw material annealing requirements prior to establishing machining/toolroom protocol. (C) • Candidate determined die-to-press relationships necessary to make the part (press type, process, tonnage/load, shut height, etc.). • Candidate developed an initial inspection plan for machining & toolroom operations. (C) • Candidate demonstrated ability to match inspection equipment calibrations to specified tolerance requirements. • Candidate kept an accurate and legible record of step-by-step changes to the die design. (C) 	θ	θ	θ
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		θ	θ	θ

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Section One: Job Planning *Continued*

Process Steps	Process-Product Standards			
Work Element	[Unit Standards of Performance]	Yes	No	NA
2. Organize Diemaking Activities to Complete Die In Allotted Time	<ul style="list-style-type: none"> • Candidate understood die design specifications, timelines, costs & process application(s). • Candidate reviewed stocklist/Bill of Materials and initiated the process to obtain materials (i.e., raw material, supplier details, etc.). • Candidate obtained/completed necessary work orders, routing sheets and/or purchase orders. • Candidate re-checked all critical attributes, features, dimensions and tolerances. (C) • Candidate re-checked metallurgy of materials, finishes or coatings, hardware and any non-metallic materials or items. • Candidate determined layout tools, dimensions & reference points. (C) • Candidate identified machining requirements (milling, turning, grinding, wire burning/EDM, duplicating, etc.) and machinability specifications and tolerances. (C) • Process Plan or flow chart and schedules were developed for diemaking activities with critical milestone dates. (C) • Machining room & toolroom personnel were identified for various diemaking operations (includes machinists, grinders, assemblers, material handlers, apprentices, etc.). • Outside contractors and suppliers identified for applicable diemaking materials and/or operations. • Candidate communicated raw material specifications, lubrication requirements and inspection plan criteria to machine/toolroom. • Communicated CNC and/or non-CNC machining operations and schedule. • Communicated EDM, welding, wire burning, grinding and other operations and timelines. • Communicated heat-treating, coating and surface finish requirements and timelines. • Records, reports and prints properly stored, routed and controlled to ISO/TS standards. 	θ	θ	θ

Section Two of this Skill Check begins on the next page



Section Two: CNC Machining & Benchwork

NOTE: If Candidate is NIMS certified and has received a Level III Machining Credential in CNC Milling, these Work Element Sections do NOT have to be completed. Please provide a copy of the Credential when submitting the CAR.

The Level III Diemaking candidate is required to perform two (2) different CNC milling jobs on at least two (2) different types of materials (i.e., tool steel, mild steel, non-ferric, stainless, etc.). Each job must include a minimum of at least 3 different milling operations (i.e., drilling, tapping, boring, face milling, etc.).

CNC Milling Work Element, Job Number ONE: (Check the one application used for this Work Element)

- Application required the candidate to manually calculate and program coordinates without the use of CAD/CAM software, conversational control or a programmable calculator and mill parts on a CNC machine.
- Application required the candidate to render the part for the assigned job using CAD software, import part geometry in a CAM software system, and make a part/detail on a CNC machine.
- Application required parts/details to be made on a CNC machine, but allowed for the part geometry to be imported by the candidate from an outside source or created/edited by the candidate on a CAD/CNC system.

This CNC milling operation included the following: (Check at least 3 operations used for this Work Element)

- | | | | |
|---|---------------------------------------|--|--|
| <input type="checkbox"/> Drilling | <input type="checkbox"/> Boring | <input type="checkbox"/> Tapping | <input type="checkbox"/> Face Milling |
| <input type="checkbox"/> Reaming | <input type="checkbox"/> Slot Milling | <input type="checkbox"/> Counter Milling | <input type="checkbox"/> Dove-Tail or T-Slot |
| <input type="checkbox"/> Woodruff Milling | <input type="checkbox"/> Chamfering | <input type="checkbox"/> Pocket Milling | <input type="checkbox"/> Thread Milling |

Process Steps	Process-Product Standards	Yes	No	NA
Work Element	[Unit Standards of Performance]			
1. Setup CNC Mill and Machine a Part, Detail or Tool to Print Specifications	(CAD) Successfully created milling part geometry using CAD software, imported from outside sources, or utilized conversational control to establish part geometry.	0	0	
Check Type of Material(s) Used:	Indicate which method was used (if applicable):			
<input type="checkbox"/> Non-Ferric	• Created on CAD	0	0	
<input type="checkbox"/> Tool Steel	• Imported from outside sources	0	0	
<input type="checkbox"/> Stainless Steel	• Conversational Controls.	0	0	
<input type="checkbox"/> Plastic	(CAM) Created a functional CNC Milling program, imported any CAD print(s) into CAM software and incorporated at least 3 different tools.	0	0	0
<input type="checkbox"/> Mild Steel	Transferred any CNC milling program(s) into CNC milling controller.	0	0	0
<input type="checkbox"/> Carbon	(Manual) Candidate successfully wrote a CNC milling program using the following criteria:	0	0	0
<input type="checkbox"/> Cast Iron	• Manually programmed (No CAD/CAM or C-controls)	0	0	0
<input type="checkbox"/> Other _____	• Calculated coordinates without using a programmable calculator	0	0	0
	• Program consisted of a minimum of 3 procedures (operations) for milling.	0	0	

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Continued

Process Steps	Process-Product Standards			
Work Element	[Unit Standards of Performance]	Yes	No	NA
Setup CNC Mill & Machine a Part, Detail or Tool to Print Specifications <i>Continued</i>	<ul style="list-style-type: none"> • Candidate properly selected & set up tools for tool holders and mounted tools in correct holding devices. 	θ	θ	θ
	<ul style="list-style-type: none"> • Candidate correctly input offsets into control. 	θ	θ	θ
	<ul style="list-style-type: none"> • Candidate selected and indicated proper work holding devices. 	θ	θ	θ
	<ul style="list-style-type: none"> • Candidate successfully established and input work coordinates (programmed part zero/PRZ). 	θ	θ	θ
	<ul style="list-style-type: none"> • Candidate tested program (dry run simulation) and debugged/edited program as needed. 	θ	θ	θ
	<ul style="list-style-type: none"> • Candidate powered machine and made first part without incident. 	θ	θ	θ
	<ul style="list-style-type: none"> • Candidate demonstrated ability inspecting the part to print specifications and GD&T criteria. 	θ	θ	θ
	<ul style="list-style-type: none"> • Part brought into compliance. Program edited to optimize performance. 	θ	θ	θ
	<ul style="list-style-type: none"> • Data recorded/documented per process plan requirements or facility practices. 	θ	θ	θ
	<ul style="list-style-type: none"> • Candidate demonstrated ability to make multiple parts to print or die building specifications. 	θ	θ	θ
	<ul style="list-style-type: none"> • Parts produced met diemaking time schedule (timelines) and all quality requirements. 	θ	θ	θ
	<ul style="list-style-type: none"> • Equipment was returned to an appropriate condition and settings. Area left clean. 	θ	θ	θ
	<ul style="list-style-type: none"> • Candidate demonstrated safe work practices. 	θ	θ	θ

Work Element, CNC Milling Job 2 begins on next page



CNC Milling Work Element, Job Number TWO: (Check a different application used for this Work Element)

Application required the candidate to manually calculate and program coordinates without the use of CAD/CAM software, conversational control or a programmable calculator and mill parts on a CNC machine.

Application required the candidate to render the part for the assigned job using CAD software, import part geometry in a CAM software system, and make a part/detail on a CNC machine.



Application required parts/details to be made on a CNC machine, but allowed for the part geometry to be imported by the candidate from an outside source or created/edited by the candidate on a CAD/CNC system.

This CNC milling operation included the following procedures: (Check at least **3** operations used for this Work Element)

- | | | | |
|---|---------------------------------------|--|--|
| <input type="checkbox"/> Drilling | <input type="checkbox"/> Boring | <input type="checkbox"/> Tapping | <input type="checkbox"/> Face Milling |
| <input type="checkbox"/> Reaming | <input type="checkbox"/> Slot Milling | <input type="checkbox"/> Counter Milling | <input type="checkbox"/> Dove-Tail or T-Slot |
| <input type="checkbox"/> Woodruff Milling | <input type="checkbox"/> Chamfering | <input type="checkbox"/> Pocket Milling | <input type="checkbox"/> Thread Milling |

Process Steps	Process-Product Standards			
Work Element	[Unit Standards of Performance]	Yes	No	NA
1a. Setup CNC Mill and Machine a Part, Detail or Tool to Print Specifications	(CAD) Successfully created milling part geometry using CAD software, imported from outside sources, or utilized conversational control to establish part geometry.	0	0	
Check Type of Material(s) Used for This Job:	Indicate which method was used (if applicable):			
<input type="checkbox"/> Non-Ferric	• Created on CAD	0	0	
<input type="checkbox"/> Tool Steel	• Imported from outside sources	0	0	
<input type="checkbox"/> Stainless Steel	• Conversational Controls.	0	0	
<input type="checkbox"/> Plastic	(CAM) Created a functional CNC Milling program, imported any CAD print(s) into CAM software and incorporated at least 3 different tools.	0	0	0
<input type="checkbox"/> Mild Steel	Transferred any CNC milling program(s) into CNC milling controller.	0	0	0
<input type="checkbox"/> Carbon	(Manual) Candidate successfully wrote a CNC milling program using the following criteria:	0	0	0
<input type="checkbox"/> Cast Iron	• Manually programmed (No CAD/CAM or C-controls)	0	0	0
<input type="checkbox"/> Other _____	• Calculated coordinates without using a programmable calculator	0	0	0
	• Program consisted of a minimum of 3 procedures (operations) for milling.	0	0	0

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Process Steps	Process-Product Standards			
Work Element	[Unit Standards of Performance]	Yes	No	NA
Setup CNC Mill & Machine a Part, Detail or Tool to Print Specifications <i>Continued</i>	<ul style="list-style-type: none"> • Candidate properly selected & set up tools for tool holders and mounted tooling in correct holding devices. 	θ	θ	θ
	<ul style="list-style-type: none"> • Candidate correctly input offsets into control. 	θ	θ	θ
	<ul style="list-style-type: none"> • Candidate selected and indicated proper work holding devices. 	θ	θ	θ
	<ul style="list-style-type: none"> • Candidate successfully established and input work coordinates (programmed part zero/PRZ). 	θ	θ	θ
	<ul style="list-style-type: none"> • Candidate tested program (dry run simulation) and debugged/edited as needed. 	θ	θ	θ
	<ul style="list-style-type: none"> • Candidate powered machine and made first part without incident. 	θ	θ	θ
	<ul style="list-style-type: none"> • Candidate demonstrated ability inspecting the part to print specifications and GD&T criteria. 	θ	θ	θ
	<ul style="list-style-type: none"> • Part brought into compliance. Program edited to optimize performance. 	θ	θ	θ
	<ul style="list-style-type: none"> • Data recorded/documented per process plan requirements or facility practices. 	θ	θ	θ
	<ul style="list-style-type: none"> • Candidate demonstrated ability to make multiple parts to print or die building specifications. 	θ	θ	θ
	<ul style="list-style-type: none"> • Parts produced met diemaking time schedule (timelines) and all quality requirements. 	θ	θ	θ
	<ul style="list-style-type: none"> • Equipment was returned to an appropriate condition and settings. Area left clean. 	θ	θ	θ
	<ul style="list-style-type: none"> • Candidate demonstrated safe work practices. 	θ	θ	θ

End of CNC Milling Work Elements



Section Two: CNC Machining & Benchwork *Continued*

NOTE: If Candidate is NIMS certified and has received a Level III Machining Credential in CNC Turning, these Work Elements (turning jobs) do NOT have to be completed. Please provide a copy of the Credential when submitting the CAR.

The Level III Diemaking candidate is required to perform two (2) different CNC Turing jobs on at least two (2) different types of materials (i.e., tool steel, mild steel, non-ferric, stainless, etc.). Each job must include a minimum of at least 3 different machining/turning operations (i.e., between-centers, single point threading, drilling, tapping, knurling, etc.).

CNC Turning Work Element, Job Number ONE: (Check the one application used for this Work Element)

- Application required the candidate to manually calculate and program coordinates without the use of CAD/CAM software, conversational control or a programmable calculator and make parts on a CNC turning machine (or lathe).
- Application required the candidate to render the part for the assigned job using CAD software, import part geometry in a CAM software system, and make parts/details on a CNC machine.
- Application required parts/details to be made on a CNC machine, but allowed for the part geometry to be imported by the candidate from an outside source or created/edited by the candidate on a CAD/CNC system.

This CNC turning operation included the following procedures: (Check at least 3 used for this Work Element)

- | | | | |
|--|--|---|-----------------------------------|
| <input type="checkbox"/> Drilling | <input type="checkbox"/> Boring | <input type="checkbox"/> Tapping | <input type="checkbox"/> Knurling |
| <input type="checkbox"/> Reaming | <input type="checkbox"/> Single Point Threading ID | <input type="checkbox"/> Single Point Threading OD | <input type="checkbox"/> Turning |
| <input type="checkbox"/> Grooving | <input type="checkbox"/> Tapers | <input type="checkbox"/> Contouring | <input type="checkbox"/> Facing |
| <input type="checkbox"/> Turning Between Centers | | <input type="checkbox"/> Turning Center w/ Live Tooling | |

Process Steps	Process-Product Standards	Yes	No	NA
Work Element	[Unit Standards of Performance]	Yes	No	NA
2. Setup CNC Machine & Make/Turn a Part, Workpiece, Detail or Tool to Print Specifications Check Type of Material(s) Used for This Job: <input type="checkbox"/> Non-Ferric <input type="checkbox"/> Tool Steel <input type="checkbox"/> Stainless Steel <input type="checkbox"/> Plastic <input type="checkbox"/> Mild Steel <input type="checkbox"/> Carbon <input type="checkbox"/> Cast Iron <input type="checkbox"/> Other _____	(CAD) Successfully created turning part geometry using CAD, imported from outside sources, or utilized conversational control to establish part geometry. Indicate which method was used (if applicable):	θ	θ	
	• Created on CAD	θ	θ	
	• Imported from outside sources	θ	θ	
	• Conversational Controls.	θ	θ	
	(CAM) Created a functional CNC Turning program, imported any CAD print(s) into CAM software and incorporated at least 3 different tools.	θ	θ	θ
Transferred any CNC turning program(s) into CNC turning controller.	θ	θ	θ	
(Manual) Candidate successfully wrote a CNC turning program using the following criteria:	θ	θ	θ	
• Manually programmed using ISO G & M codes (No CAD/CAM)	θ	θ	θ	
• Calculated coordinates without using a programmable calculator	θ	θ	θ	
• Program consisted of a minimum of 3 procedures (different operations) for turning.	θ	θ		

Continued



Process Steps	Process-Product Standards			
Work Element	[Unit Standards of Performance]	Yes	No	NA
Setup CNC Machine & Make/Turn a Part, Workpiece, Detail or Tool to Print Specifications <i>Continued</i>	<ul style="list-style-type: none"> • Candidate properly selected & set up tools for tool holders and mounted tooling in correct holding devices. • Candidate correctly transferred offsets into control. • Candidate indicated proper work holding devices and found work offsets. • Candidate tested program (by dry run or simulation) and debugged/edited as needed. • Candidate powered machine and made first part without incident. • Candidate demonstrated ability inspecting the part to print specifications and GD&T criteria. • Part brought into compliance. Program edited to optimize performance. • Data recorded/documented per process plan requirements or facility practices. • Candidate demonstrated ability to make multiple parts to print or die building specifications. • Parts produced met diemaking time schedule (timelines) and all quality requirements. • Equipment was returned to an appropriate condition and settings. Area left clean. • Candidate demonstrated safe work practices. • Tools and attachments were returned to their proper storage locations. • Equipment was returned to an appropriate condition and settings. 	<p>θ</p> <p>θ</p> <p>θ</p> <p>θ</p> <p>θ</p> <p>θ</p> <p>θ</p> <p>θ</p> <p>θ</p> <p>θ</p> <p>θ</p> <p>θ</p> <p>θ</p> <p>θ</p> <p>θ</p> <p>θ</p> <p>θ</p> <p>θ</p> <p>θ</p>	<p>θ</p> <p>θ</p> <p>θ</p> <p>θ</p> <p>θ</p> <p>θ</p> <p>θ</p> <p>θ</p> <p>θ</p> <p>θ</p> <p>θ</p> <p>θ</p> <p>θ</p> <p>θ</p> <p>θ</p> <p>θ</p> <p>θ</p> <p>θ</p> <p>θ</p>	<p>θ</p> <p>θ</p> <p>θ</p> <p>θ</p> <p>θ</p> <p>θ</p> <p>θ</p> <p>θ</p> <p>θ</p> <p>θ</p> <p>θ</p> <p>θ</p> <p>θ</p> <p>θ</p> <p>θ</p> <p>θ</p> <p>θ</p> <p>θ</p> <p>θ</p>

Work Element, CNC Turning Job 2 begins on next page



CNC Turning Work Element, Job TWO: (Check the other application used for this Work Element)

- Application required the candidate to manually calculate and program coordinates without the use of CAD/CAM software, conversational control or a programmable calculator and make parts on a CNC turning machine (lathe).
- Application required the candidate to render the part for the assigned job using CAD software, import part geometry in a CAM software system, and make parts/details on a CNC machine.
- Application required parts/details to be made on a CNC machine, but allowed for the part geometry to be imported by the candidate from an outside source or created/edited by the candidate on a CAD/CNC system.

This CNC turning operation included the following procedures: (Check at least 3 used for this Work Element)

- | | | | |
|--|--|---|-----------------------------------|
| <input type="checkbox"/> Drilling | <input type="checkbox"/> Boring | <input type="checkbox"/> Tapping | <input type="checkbox"/> Knurling |
| <input type="checkbox"/> Reaming | <input type="checkbox"/> Single Point Threading ID | <input type="checkbox"/> Single Point Threading OD | <input type="checkbox"/> Turning |
| <input type="checkbox"/> Grooving | <input type="checkbox"/> Tapers | <input type="checkbox"/> Contouring | <input type="checkbox"/> Facing |
| <input type="checkbox"/> Turning Between Centers | | <input type="checkbox"/> Turning Center w/ Live Tooling | |

Process Steps	Process-Product Standards	👍	👎	NA
Work Element	[Unit Standards of Performance]	Yes	No	NA
2a. Setup CNC Machine & Make/Turn a Part, Workpiece, Detail or Tool to Print Specifications Check Type of Material(s) Used for This Job: <input type="checkbox"/> Non-Ferric <input type="checkbox"/> Tool Steel <input type="checkbox"/> Stainless Steel <input type="checkbox"/> Plastic <input type="checkbox"/> Mild Steel <input type="checkbox"/> Carbon <input type="checkbox"/> Cast Iron <input type="checkbox"/> Other _____	(CAD) Successfully created turning part geometry using CAD, imported from outside sources, or utilized conversational control to establish part geometry. Indicate which method was used (if applicable):	0	0	
	<ul style="list-style-type: none"> • Created on CAD • Imported from outside sources • Conversational Controls. 	0	0	
	(CAM) Created a functional CNC Turning program, imported any CAD print(s) into CAM software and incorporated at least 3 different tools.	0	0	0
	Transferred any CNC turning program(s) into CNC turning controller.	0	0	0
	(Manual) Candidate successfully wrote a CNC turning program using the following criteria:	0	0	0
<ul style="list-style-type: none"> • Manually programmed using ISO G & M codes (No CAD/CAM) • Calculated coordinates without using a programmable calculator • Program consisted of a minimum of 3 procedures for turning. 	0	0	0	

Continued on next page

Continued

Process Steps	Process-Product Standards	☺	☹	
Work Element	[Unit Standards of Performance]	Yes	No	NA
Setup CNC Machine & Make/Turn a Part, Workpiece, Detail or Tool to Print Specifications <i>Continued</i>	<ul style="list-style-type: none"> • Candidate properly selected & set up tools for tool holders and mounted tools in correct holding devices. • Candidate correctly transferred offsets into control. • Candidate indicated proper work holding devices and found work offsets. • Candidate tested program (by dry run or simulation) and debugged/edited as needed. • Candidate powered machine and made first part without incident. • Candidate demonstrated ability inspecting the part to print specifications and GD&T criteria. • Part brought into compliance. Program edited to optimize performance. • Data recorded/documented per process plan requirements or facility practices. • Candidate demonstrated ability to make multiple parts to print or die building specifications. • Parts produced met diemaking time schedule (timelines) and all quality requirements. • Equipment was returned to an appropriate condition and settings. Area left clean. • Candidate demonstrated safe work practices. • Tools and attachments were returned to their proper storage locations. • Equipment was returned to an appropriate condition and settings. 	θ	θ	θ

End of CNC Turing Work Elements



Section Two: Machining & Benchwork *Continued*

NOTE: If Candidate is NIMS certified and has received a Level II Machining Credential in Grinding Flats & Angles, or Cylindrical Grinding or has received a *Diemaking Level II* credential, this Work Element Section does NOT have to be completed. Please provide a copy of the Credential when submitting the CAR.

Process Steps	Process-Product Standards			
Work Element	[Unit Standards of Performance]	Yes	No	NA
3. Setup Grinder, Mount, Balance & Dress Wheel, and Surface Grind Flats and Angles After Heat Treat	<ul style="list-style-type: none"> Part matched print requirements and specifications. (C) Required part or print selected should include the following specifications & minimum tolerances: <ul style="list-style-type: none"> ± .0005 on all decimals unless otherwise specified on print. Slot depth/width: ± .001 or less Square within .001 over 4" or .0001 over 1" Angles: ± 15' Radii: ± .001 or less Surface finish of 32 mircoinches or finer. 	θ	θ	
	<ul style="list-style-type: none"> Correct wheel securely mounted to clean hub then mounted to surface grinder. (C) 	θ	θ	θ
	<ul style="list-style-type: none"> Wheel dressed and face of wheel "trued." 	θ	θ	θ
	<ul style="list-style-type: none"> All wheel positions correctly balanced. (C) 	θ	θ	θ
	<ul style="list-style-type: none"> Wheel re-dressed (if necessary), parallel & perpendicular to magnetic check. 	θ	θ	θ
	<ul style="list-style-type: none"> Workpiece(s) properly setup and mounted to grinding fixture/chuck. (C) 	θ	θ	θ
	<ul style="list-style-type: none"> Grinding solution at proper level. (C) 	θ	θ	θ
	<ul style="list-style-type: none"> Candidate demonstrated even grinding passes and rhythm. Wheel re-dressed as necessary. 	θ	θ	θ
	<ul style="list-style-type: none"> Candidate monitored grinding sound and solution flow. 	θ	θ	θ
	<ul style="list-style-type: none"> No edge damage, chatter and/or burning. 	θ	θ	θ
	<ul style="list-style-type: none"> No milling marks found on ground surfaces. 	θ	θ	θ
	<ul style="list-style-type: none"> Flat, radii and angled surfaces finished to process plan or print specifications. 	θ	θ	θ
	<ul style="list-style-type: none"> Workpiece demagnetized (will not pull slugs) and clean (no residue, solution, fine-dust or burrs present). 	θ	θ	θ
	<ul style="list-style-type: none"> Grinder shut down and cleaned after job (spindle in safe position). 	θ	θ	θ
<ul style="list-style-type: none"> Workbench clean, tools/materials put away, and all housekeeping, environmental and safety procedures were followed. 	θ	θ	θ	

Section Three of this Skill Check begins on next page

Section Three: Die Assembly

Process Steps	Process-Product Standards			
Work Element	[Unit Standards of Performance]	Yes	No	NA
1. Organize ,Schedule, Lead & Perform Die Assembly Activities (Includes Dry Run) Type of Die (Check One) <input type="checkbox"/> Single Hit <input type="checkbox"/> Compound Progressive <input type="checkbox"/> Sensored <input type="checkbox"/> Non-Sensored <input type="checkbox"/> Transfer Deep Draw <input type="checkbox"/> Single Deep-Draw <input type="checkbox"/> Double Deep Draw <input type="checkbox"/> Reverse Deep-Draw <input type="checkbox"/> Other: _____	<ul style="list-style-type: none"> • Die components/details checked against Bill of Materials & properly labeled (e.g., front/back, left/right, top/bottom). (C) • Identified & explained die stations and tooling types, functions & positions to assembly team. • Scheduled and initiated the sub-assembly of die details, the mounting of form steels/pads and assembly of die for dry-run. • Communicated the types and functions of fasteners/joiners and torque, adhesive, solder/brazing or welding requirements. • Communicated die sub-assembly requirements and specified clearances, fits and limits. Monitored sub-assembly operations • Checked and verified quality of sub-assembly. <ul style="list-style-type: none"> ○ Hole locations, types & clearances correct. ○ Details clean, smooth, demagnetized & showing no damage. ○ Sub-sections mounted and moving parts will travel without resistance or interference. ○ No missing features, parts or components. ○ Exposed edges smooth and wear surfaces cleaned, lubricated and safe to handle. • Die blocks & inserts successfully assembled, mounted and checked for fit & location. • Trim punches and/or perforating punches installed and properly oriented. • Monitored the mounting of all form steels, form pads, trim details & piercing stations and checked assembly for quality and compliance (including spot forming, C-sink and/or C-bore requirements where applicable). • Initial punch & tooling clearances established. • Nitrogen units installed (not filled). • Aligned/set clearance, fits and limits between upper details/form and lower details/die shoe. • Die setup in tryout press & dry-run to stop block(s). • Step-by-step changes accurately documented and record maintained for die development activities and first tryout. • Die assembly safety removed and transported to proper location of continued die assembly, adjustments and development. 	θ	θ	θ
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End of Skill Check One – Complete Final Product Standards



FINAL PRODUCT STANDARDS

[Overall Standards of Performance]

“Work is Done As Expected When:”

- a. Given a die to be made, candidate can review design to assure that the correct process and design were selected to make the part and compare the design to customer, quality and engineering standards to ensure part quality.
- b. Candidate can create a Process Plan with delegation of duties and project timelines showing critical milestone dates necessary to complete the die in the allotted time.
- c. Candidate can perform a variety of CNC operations, precision grinding, benchwork and die development activities to die design or print specifications.
- d. Given a die to be built with all the needed components and required sensors, candidate can perform die assembly duties, schedule the work and flow of others, and lead the diemaking team through the complete die assembly.
- e. Candidate can determine a part’s (or workpiece) compliance on critical dimensions and geometry using a variety of precision measuring instruments (hand-held devices, optical comparator or CMM, surface plate instruments, fixture gauges and attribute gauges, etc.). Candidate can verify the calibration of these devices and instruments.
- f. Candidate understands metalworking theories associated with job planning, die assembly and development (i.e., metallurgy, heat treating, forming pressures, nitrogen units, punch/draw radii, material flow and reactions to the process, etc.).
- g. All ISO/QS-TS/ANSI, safety/environmental and documentation procedures were followed.

COMMENTS

Candidate: _____

Examiner: _____

Signatures: _____ Date: _____

(Examiner/Supervisor)

_____ Date: _____

(Candidate/Trainee)

_____ Date: _____

(Monitor/Observer) – Optional



CAR SKILL CHECK 2 of 2 – Sections 4 and 5

Candidate:	Date:	200
Examiner:	(For examiner use only)	
	Results:	Pass <input type="checkbox"/> Yes <input type="checkbox"/> No
	Date:	

Duty Area(s) **Die Adjustments & Development and Final Tryout & Runoff**

Performance Conditions

Settings: At workbench, in machining room & toolroom and at tryout press for first tryout/final run. Candidate will develop die for first tryout, conduct first tryout, continue die development for final tryout, conduct final tryout, and assure production readiness of die/tool.

Safety Equipment:

- PPE when on shop floor (based on equipment and process requirements).

Tools, Equipment & Materials:

- Air Blow-Off of Vacuum
- Assorted Hand & Bench Tools
- Bill of Materials/Stocklist
- Calibrations Standards
- Cleaning & Lubrication Agents/Devices
- Die Building/Process Plan
- Eye Loupe/Magnifying Glass
- Files, Scrapers, Stones, Hones, Routers, Emory Cloth etc.
- Layout Ink/Dye/Bluing
- Materials Handling Requirements
- Machine Room & Toolroom Equipment (CNC Milling/turning and grinding, joining, benchwork, etc.)
- Mirror
- MSDS Documents
- Pilot Hole Positioning Tools
- Prints/CAD Drawings and Data (for part, die(s), tooling & die details)
- Raw Material Specifications
- Shims/Shim Stock
- Surface Plate (clean)
- Surface Finish Comparison Charts

Tools, Equipment & Materials:

- Tryout or Production Press and Stock
- Work Order/PO/Job Packet (includes die design)

Measuring Instruments:

- Checking Fixtures
- Dial Indicators
- Die Light
- Gauge Blocks
- Hand Held Precision Measuring Instruments (various calipers, micrometers, rules, scales, etc.)
- Height & Depth Gauges w/ Indicator
- Optical Comparator (or CMM)
- Pin, Plug, Go & No-go Gauges
- Radius Gauges
- Sine Plate/Sine Bar
- Surface Gauges
- Squares (various)
- Thread Gauges

Attainment Standards

1. 100% of all applicable procedural steps and *Process-Product Standards* (Work Elements), without assistance and within company-specific time limit, following all safety, environmental and plant procedures.
2. 100% conformance with all Final Product Standards, Quality Control and Process Plan/print and GD&T criteria, OHS/ANSI/ISO/TS requirements, and plant-specific documentation/recordkeeping practices.



Candidate Directions

The referenced documents, tools, equipment, materials and supplies may be used to develop die for first tryout, conduct first tryout, continue die development for final tryout, conduct final tryout, and assure production readiness of die/tool. All safety and plant procedures must be followed. The examiner will evaluate both the *process* used while the work is being done and the final result (or **product**) after the jobs have been completed. Work Element Process Steps should be performed in the logical sequence, and all work elements must meet the standards for successful completion.

The Skill Check you are about to take is a hands-on performance assessment designed to test your ability by practical demonstration. This assessment will enable you to verify your experience and show your competency by completing practical job tasks or projects (called Work Elements). The Skill Check will cover areas that you should know and problems you should be able to solve. If you need any additional materials or experience any problems with the equipment during the assessment, notify the examiner immediately.


Examiner Instructions

For successful completion of this Skill Check, the candidate must demonstrate the ability to successfully complete the Work Elements, unassisted and to standards under controlled assessment conditions. All work must be completed to the standards of performance as interpreted by the shop, plant or facility. Every attempt has been made to sequence Process Steps – Work Elements (or performance jobs) in a logical order. . However, individual Work Elements or Process Steps should be administered in segments and in any order as determined by the plant, facility or trainer. This is an on-going assessment process and will take some time to complete. All work must be completed to the standards of performance as interpreted by the shop, plant or facility.

Before administering the Skill Check or any portion thereof:

- ◆ Be sure all equipment, tools, materials and supplies (inventories) are available, verified for safety and functionality, and are applicable to the process or work activity to be demonstrated.
- ◆ Read/review the skill check directions with the candidate. Allow trainee the opportunity to review the *Examiner's Checklist* prior to administration. The examiner may answer any questions about the assessment process.

Do not provide assistance during the Skill Check. Monitor work in-progress and evaluate for **Process-Product Standard**. Assess the completed Skill Check for conformance with **Final Product Standards**. Mark *NA* if a *Process-Product Standard* is not appropriate or not applicable at your facility.

 **Stop** the Skill Check immediately if the candidate violates a safety/environmental regulation or procedure or if there is any possibility of personal injury or damage to equipment.

Before assessment, the examiner may discuss appropriate safety and loss issues (*i.e., Lockout-Tagout/zero energy requirements, HAZMAT handling and use, personal protection and permitting, pinch and sharp points, compressed air/fluid/gas, high/residual voltage/pressure, E-Stops/critical alarms, etc.*).

When the candidate indicates that he/she has completed a job task/project on the Skill Check or when maximum time allowed has run out, assess any Final Product Standards and then complete all appropriate comments and signature sections after the entire Skill Check has been completed.



Checklist

Scoring Procedures: Observe the candidate’s performance for each Process Step (Work Element) and mark on the *Examiner’s CHECKLIST* whether or not the *Process-Product Standards* were attained (*Do not rely on your memory*). *Process-Product Standards* are marked as the Work Element is being performed. *Final Product Standards* are checked after Skill Check has been completed.

(C) Critical. Failure to meet the standard will result in immediate Skill Check termination.

Note: The evaluator will terminate the assessment and schedule the individual for further training.

Examiner’s CHECKLIST – CAR SKILL CHECK 2

Die Adjustments & Development, Final Tryout & Runoff

Section Four: Die Development & Adjustments

Process Steps	Process-Product Standards	☑	☒	
Work Element	[Unit Standards of Performance]	Yes	No	NA
1. Perform Die Assembly & Development (Part development & Process improvements may be required)	<ul style="list-style-type: none"> • Die development needs acknowledged after dry run. Dry run assessed for effectiveness. 	θ	θ	θ
	<ul style="list-style-type: none"> • Tryout stock and lubrication evaluated for appropriateness and suitability. 	θ	θ	θ
	<ul style="list-style-type: none"> • Tryout press assessed pressure and tonnage/load capabilities. 	θ	θ	θ
	<ul style="list-style-type: none"> • Trim lines and/or radii re-developed as needed. 	θ	θ	θ
	<ul style="list-style-type: none"> • Forms/pads, tooling/punches and upper/lower steels adjusted or redeveloped as needed. 	θ	θ	θ
	<ul style="list-style-type: none"> • Die springs, chutes/parallels & nitrogen cylinders assembled and installed (nitrogen manifolds filled). (C) 	θ	θ	θ
	<ul style="list-style-type: none"> • In-die and on-die sensors bench tested for function, sensitivity, target range and reliability. 	θ	θ	θ
	<ul style="list-style-type: none"> • Sensors installed and set for clearance and sensitivity. 	θ	θ	θ
	<ul style="list-style-type: none"> • Remaining details & tools developed for fit, size, position, alignment and clearance. 	θ	θ	θ
	<ul style="list-style-type: none"> • Upper/lower details and die shoes/die blocks checked/adjusted for clearance & alignment. 	θ	θ	θ
	<ul style="list-style-type: none"> • Plumbing and passages checked for function. • Die weighed and readied for first tryout. 	θ	θ	θ
2. Setup Press & Die(s) for First Tryout Accuracy Level at least: .010" to .060 off stop block(s)	<ul style="list-style-type: none"> • Inspection plan & methods checked for completeness and verified for accuracy, tolerances and GD&T requirements. 	θ	θ	θ
	<ul style="list-style-type: none"> • Tools, materials, supplies, prints and QC instruments staged and job site. Precision measuring devices verified for calibration. 	θ	θ	θ
	<ul style="list-style-type: none"> • Die assembly safely staged at job site by tryout press. Die was not damaged during transport. 	θ	θ	θ
	<ul style="list-style-type: none"> • Die assembly properly installed on the bolster/ram. Candidate demonstrated ability operating shut height adjustment mechanism. 	θ	θ	θ
	<ul style="list-style-type: none"> • Die (upper/lower) securely clamped in place, shut height and knockout bar set, and air counterbalance determined. 	θ	θ	θ

Continued on next page

Section Four: Die Development & Adjustments *Continued*

Process Steps	Process-Product Standards	☺	☹	
Work Element	[Unit Standards of Performance]	Yes	No	NA
Setup Press & Die(s) for First Tryout <i>Continued</i>	• Press auxiliaries, input and/or output devices setup and trial stock ready for first tryout.	θ	θ	θ
	• Remaining accessories mounted to die set (e.g., scrap chutes, sensors, die-set ID, etc.).	θ	θ	θ
	• Candidate demonstrated knowledge press settings and material flow characteristics.	θ	θ	θ
3. Perform First Tryout & Correct Problems	• Press set up and verified for safety.	θ	θ	θ
	• Candidate conducted first tryout and made any in-process adjustments (i.e., load, timing blanking/forming pressures, shut height, cutting/punch clearances, interferences, etc.).	θ	θ	θ
	• Candidate monitored the material and lubrication reaction to the process (i.e., buckling, wrinkling, cracking, galling, spring-back, tool marks, fractures, etc.).	θ	θ	θ
	• Candidate monitored/managed waste, scrap and slug processes to meet production standards.	θ	θ	θ
	• Candidate demonstrated ability when measuring parts and performing quality control checks and evaluations.	θ	θ	θ
	• Candidate recognized problems as they occurred and able to link cause-and-effect relationships needed for problem solving, corrective actions or process improvement.	θ	θ	θ
	• Candidate documented first tryout and kept an accurate record of problems identified and corrective actions taken.	θ	θ	θ
	• Die assembly safely removed from press and readied for continued development and final tryout.	θ	θ	θ

Section 5 begin on next page

Section Five: Die Development & Final Tryout

Process Steps	Process-Product Standards	☺	☹	
Work Element	[Unit Standards of Performance]	Yes	No	NA
1. Prepare Die for Final Tryout (Die development required)	• Operating mechanisms adjusted, fine tuned and readied for final tryout.	θ	θ	θ
	• Remaining accessories or details installed, brought into conformance and verified for function.	θ	θ	θ
	• Guide/pilot pins, bushings, strippers, inserts, etc. brought into conformance and readied for final tryout.	θ	θ	θ
	• Tooling brought into conformance and re-verified for clearance (no interference).	θ	θ	θ
	• Die timing, progression and/or sequence adjusted and verified for final tryout.	θ	θ	θ
	• Sensors (in-die/on-die) tested and set for final tryout.	θ	θ	θ
	• Die plumbing and passages prepared for final tryout.	θ	θ	θ
	• Die spring assemblies checked for function and prepared for final tryout.	θ	θ	θ
	• Part/scrap ejection or removal devices verified for function and prepared for final tryout.	θ	θ	θ
	• Tooling, die details & components secured and properly fastened/joined.	θ	θ	θ
	• Upper & lower details/forms brought into proper alignment.	θ	θ	θ
	• Lubrication applied when and where applicable (e.g., bushings, spring washers, etc.).	θ	θ	θ
	• Die switches set/reset.	θ	θ	θ
	• Die ready for final tryout.	θ	θ	θ
2. Setup Die in Tryout Press	• Die safety transported and staged by tryout press without incident.	θ	θ	θ
	• Tryout stock checked and re-verified for appropriateness.	θ	θ	θ
	• Setup tools, inspection devices and prints staged at work site.	θ	θ	θ
	• Tryout press clean and work site organized (no clips, debris, oils and no parts, scrap, tools or documents from previous job).	θ	θ	θ
	• Die-set installed, aligned and secured in press (upper & lower).	θ	θ	θ
	• Press/press-line set up and tested for function (lubrication, timing, speed/feed, shut height, pressures, counterbalance, etc.).	θ	θ	θ

Section Five: Die Development & Final Tryout *Continued*

Process Steps	Process-Product Standards	☺	☹	
Work Element	[Unit Standards of Performance]	Yes	No	NA
3. Perform Final Tryout	• Candidate attentively monitored operations making in-process adjustment as needed.	θ	θ	θ
	• Quoted sample was run under production conditions.	θ	θ	θ
	• Sensors verified for accuracy and function.	θ	θ	θ
	• Parts inspected for quality and compliance (dimensional, GD&T/geometry, cosmetics, features & attributes).	θ	θ	θ
	• Stock feeding problems resolved.	θ	θ	θ
	• Slugs/scrap feel freely from die and down scrap chutes or between parallels.	θ	θ	θ
	• Parts freely ejected without damage, jamming, tool/cut marks, fractures, excessive burr or feature distortions.	θ	θ	θ
	• Process documentation completed noting problems, troubleshooting activities, rework needs, process adjustments and changes.	θ	θ	θ
4. Perform Corrective Actions that Assure Production Readiness of Die or Tool <small>(Continued die development may be required)</small>	• Tryout reports and capability studies reviewed with engineering and quality personnel.	θ	θ	θ
	• Die details, tooling and components brought into compliance.	θ	θ	θ
	• Die design updates/modifications, engineering changes or print revisions acknowledged and approved.	θ	θ	θ
	• Final die set up, production-run Process Plan and inspection plan developed and approved.	θ	θ	θ
	• Customer (internal or external) approvals obtained.	θ	θ	θ
	• Parts made will meet all part print requirements and customer specifications.	θ	θ	θ
	• Die was completed in a timely manner or to agreed timelines and schedules.	θ	θ	θ
	• Did the candidate participate in the Final Runoff (production-status)?	θ	θ	
• All documentation complete, accurate, controlled and archived.	θ	θ	θ	

End of Skill Check – Complete Final Product Standards



FINAL PRODUCT STANDARDS

[Overall Standards of Performance]

“Work is Done As Expected When:”

- a. Candidate can safely set up the die in tryout press and perform a first operating tryout and then conduct die development activities as required from first tryout.
- b. Candidate can troubleshoot forming, feeding, piercing and/or drawing problems. Candidate can panel spot die as required. Candidate can recommend any necessary adjustments and take approved actions.
- c. Candidate can finalize adjustments to operating mechanisms, install remaining accessories or components (including sensors), and confirm their operation for function and reliability.
- d. Candidate can determine schedule for final tryout, install the die in tryout press, conduct or monitor the final tryout for process and quality, and perform necessary corrective actions or continued die development to assure production readiness of die or tool.
- e. Candidate can assist in the runoff process at the customer’s facility or in-house if a customer facility runoff is not required and made any die or process adjustments at that time.
- f. Candidate accurately documents any changes, revisions or modifications to the die or die building plan and maintained a project record of those changes and activities.
- g. All ISO/QS-TS/ANSI, safety/environmental and recording procedures were followed.

COMMENTS

Candidate: _____

Examiner: _____

Signatures: _____ Date: _____
(Examiner/Supervisor)

_____ Date: _____
(Candidate/Trainee)

_____ Date: _____
(Monitor/Observer) – Optional



Affidavit of Successful Performance
NIMS Level III Diemaking Credentialing Program
◆ Credentialing Achievement Record ◆

Directions: This page is a compilation of all performance requirements for a Diemaking (Advanced) Level III Credential. This affidavit documents that the candidate has successfully completed all performance requirements; that is:

- The Work History & Competency Statements (Critical Work Activities report) have been met, and
- Both Skill Checks (performance assessments) have been completed and standards attained.

All parties involved in assuring that the documentation contained in this CAR is accurate, honest and complete must sign and date the affidavit. When this affidavit is complete, it should be sent in its entirety to NIMS at the indicated address.

✍ Please print

Candidate Name	NIMS Reg. No.	Date of Completion: 200
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The credentialing candidate named above has completed all necessary CAR requirements for NIMS Level III (OJT/performance) diemaking recognition.

Site Name & Address:	Site Number and/or Phone Number
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Indicate the Skill Checks administered, the date of successful performance for each Skill Check and the dates for each Work Element completed. Acknowledge that all applicable Critical Work Activities have been completed, co-initialed and dated.

NIMS Diemaking Level III	Completed Yes/No	Date Completed xx/xx/xx
Skill Check #1 – Job Planning, Machining & Benchwork	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Section One, Work Element 1: Review Part Print & Confirm Design Reflects Proper Process	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Section One, Work Element 2: Organize Diemaking Activities to Complete Die	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Section Two, Work Element 1: CNC Milling, Job One	<input type="checkbox"/> Yes <input type="checkbox"/> No *	
Milling operations included the following: <input type="checkbox"/> Drilling <input type="checkbox"/> Boring <input type="checkbox"/> Tapping <input type="checkbox"/> Face Milling <input type="checkbox"/> Reaming <input type="checkbox"/> Slot Milling <input type="checkbox"/> Counter Milling <input type="checkbox"/> Dove-Tail/T-Slot <input type="checkbox"/> Woodruff <input type="checkbox"/> Chamfering <input type="checkbox"/> Pocket Milling <input type="checkbox"/> Thread Milling Type of Raw Material Used: _____		
Section Two, Work Element 1a: CNC Milling, Job Two	<input type="checkbox"/> Yes <input type="checkbox"/> No *	
Milling operations included the following: <input type="checkbox"/> Drilling <input type="checkbox"/> Boring <input type="checkbox"/> Tapping <input type="checkbox"/> Face Milling <input type="checkbox"/> Reaming <input type="checkbox"/> Slot Milling <input type="checkbox"/> Counter Milling <input type="checkbox"/> Dove-Tail/T-Slot <input type="checkbox"/> Woodruff <input type="checkbox"/> Chamfering <input type="checkbox"/> Pocket Milling <input type="checkbox"/> Thread Milling Type of Raw Material Used: _____		
Section Two, Work Element 2: CNC Turning, Job One	<input type="checkbox"/> Yes <input type="checkbox"/> No *	
Turning operations included the following: <input type="checkbox"/> Drilling <input type="checkbox"/> Boring <input type="checkbox"/> Tapping <input type="checkbox"/> Knurling <input type="checkbox"/> Reaming <input type="checkbox"/> Single Point Threading ID <input type="checkbox"/> Single Point Threading OD <input type="checkbox"/> Turning <input type="checkbox"/> Grooving <input type="checkbox"/> Tapers <input type="checkbox"/> Contouring <input type="checkbox"/> Facing <input type="checkbox"/> Turning Between Centers <input type="checkbox"/> Turning Center w/ Live Tooling Type of Raw Material Used: _____		

Continued



NIMS <i>Diemaking Level III</i>	Completed	Date Completed
	Yes/No	xx/xx/xx
Skill Check #1 – Job Planning, Machining & Benchwork (Continued)		
Section Two, Work Element 2a: CNC Turning, Job Two	<input type="checkbox"/> Yes <input type="checkbox"/> No *	
Turning operations included the following: <input type="checkbox"/> Drilling <input type="checkbox"/> Boring <input type="checkbox"/> Tapping <input type="checkbox"/> Knurling <input type="checkbox"/> Reaming <input type="checkbox"/> Single Point Threading ID <input type="checkbox"/> Single Point Threading OD <input type="checkbox"/> Turning <input type="checkbox"/> Grooving <input type="checkbox"/> Tapers <input type="checkbox"/> Contouring <input type="checkbox"/> Facing <input type="checkbox"/> Turning Between Centers <input type="checkbox"/> Turning Center w/ Live Tooling Type of Raw Material Used: _____		
Section Two, Work Element 3: Setup Grinder and Grind Flats & Angles After Heat Treating	<input type="checkbox"/> Yes <input type="checkbox"/> No *	
Section Three, Work Element 1: Organize, Schedule & Perform Die Assembly & Dry Run	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Skill Check #2 – Die Adjustments, Die Development, Final Tryout & Runoff		
Section Four, Work Element 1: Perform Die Assembly & Development	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Section Four, Work Element 2: Setup Press & Die(s) for First Tryout	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Section Four, Work Element 3: Perform First Tryout & Correct Problems	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Section Five, Work Element 1: Prepare Die for Final Tryout	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Section Five, Work Element 2: Setup Die in Tryout Press	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Section Five, Work Element 3: Perform Final Tryout	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Section Five, Work Element 4: Perform Corrective Actions (Production readiness of die)	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Did the candidate participate in Final Runoff?	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Critical Work Activities: All Work History & Competency Statements have been completed, dated and co-initialed.	<input type="checkbox"/> Yes <input type="checkbox"/> No	

* NIMS certification may be substituted for this Work Element. Please acknowledge below and enclose a copy of the credential(s).

* If the candidate has received one or more applicable NIMS machining credentials or has a NIMS Level II Diemaking credential, please acknowledge below and provide a copy of the credential(s).

Name of Credential(s)	Level



We do hereby attest with our signatures that the candidate named on this Affidavit has successfully completed all necessary CAR requirements for NIMS Level III Diemaking and is hereby eligible to take the written exam for the NIMS Level III Diemaking Credential.

Site Coordinator or Department/Plant Manager *Signature*

_____/20_____
Date

Supervisor or Evaluator/Trainer *Signature*

_____/20_____
Date

Candidate *Signature*

_____/20_____
Date

COMMENTS:

Fax the completed *Affidavit of Successful Completion* to:

(703) 352-4991 fax

**The National Institute for Metalworking Skills
10565 Fairfax Boulevard, Suite 203
Fairfax, VA 22030
703.352.4971**