National Institute for Metalworking Skills, Inc.®

# Procedures Manual for

# NIMS Online Credentialing Program

## Machining Level I & II

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**National Institute for Metalworking Skills, Inc.®**
10565 Fairfax Boulevard, Suite 203
Fairfax, VA 22030
Office: 703-352-4971 | Fax: 703-352-4991
www.nims-skills.org

# Procedures Manual for Online Machining Credentials, Level I & Level II

## Section 1 Scope

1.1 NIMS
The National Institute for Metalworking Skills, Inc. NIMS is a nonprofit organization actively promoting a skilled workforce for the metalworking industry in the United States. NIMS develops skill standards as a means to support quality in training programs for preparing metalworkers. NIMS also sponsors a voluntary assessment program allowing workers, students, and trainees to certify their competencies against the skill standards and earn credentials that are recognized nationwide.

1.2 Program
The procedures governing the NIMS Machining Levels I and II credentialing program are provided in this manual. This credentialing program is based on the Duties and Standards for Machining Skills Level I originally, published in November 1994, and Duties and Standards for Machining Skills Level II, published in January 1995 and revised as approved by NIMS in January 2002.

1.3 Competency Basis
The credentials awarded through this program are based on performance evaluations and related theory exam results assessing an individual's competence in satisfying published standards. The different assessments are designed to measure competencies, meaning abilities to demonstrate knowledge skills in test situations and perform the job execution skills on appropriate machine tools.

1.4 Updating of Procedures
NIMS procedures are reviewed annually for purposes of correction, clarification, and extension. Candidates are advised to check for procedural changes, if any, each year. Changes are announced through the NIMS newsletter and on the NIMS web site ( http://www.nims-skills.org). Candidates also can call or write NIMS for information on procedural changes.

## Section 2 Who Can Earn NIMS Credentials?

2.1 Eligibility

Any person 18 years of age or older or who is enrolled in a formal structured metalworking program, who has acquired knowledge and performance capabilities requisite to the Level I or II may apply to demonstrate his or her competency and test against the Level I or II skill standards.

## Section 3 What Credentials are offered in Machining?

3.1 General Statement

Credentials are awarded for performance and knowledge skills demonstrated against the NIMS skill standards (see Section 1.2). Duties contained in the skill standards are clustered into complete job roles or modules, as can be viewed in the structures of the related theory exams are reported in Section 8. Thus, each credentialing module can consist of one or more duties performance on which is assessed through hands-on use of machine tools and a related theory, written using multiple choice questions.

NIM does not require that credentials be earned in any particular sequence. Applicants and their supervisor or training instructor will determine the sequence of credentialing.

3.2 Level I Credentials

The credentials that can be earned at Machining Level I:

**Basic Skills:**

1. Measurement, Materials and Safety: Topics include quality and inspection, process management and improvement, general maintenance, and industrial safety and environmental protection. Individuals must receive a passing score in each of the four topic areas to earn this NIMS credential.

2. Job Planning, Benchwork & Layout: Topics include job planning and management, benchwork, and Layout. Individuals must receive a passing score in each of the three topic areas to earn this NIMS credential.

**Machining Skills:**

**Level I**

1. Manual Milling
2. Drill Press Operations
3. Surface Grinding
4. Manual Turning- Chucking
5. Manual Turning- Between Centers

The related theory exam for Measurement, Materials, and Safety can be taken online at any time by registered applicants. The related theory exams for all other Level I credentials can be taken online only after the applicant has successfully met NIMS performance requirements for the credential(s) being sought. Performance requirements are detailed in See Section 6.

### 3.3 Level II Credentials

The credentials that can be earned at Machining Level II:

**Level II**

1. Surface Grinding
2. Cylindrical Grinding
3. Manual Turning
4. Manual Milling
5. CNC Milling Operations
6. CNC Lathe Operations
7. Drill Press Operations
8. Wire EDM Operations
9. Plunge EDM Operations

Performance requirements for each of the Level II Credentials, except drill press operations, involve a candidate making a part (s) according to NIMS specified prints, a review by the candidate's sponsor, and a third-party review by a NIMS recognized Metalworking Technical Evaluation Committee (MET-TEC) see Section 6.4).

Anyone seeking a Level II Drill Press Credential must already hold a Level I Credential in drilling or meet the Level I drilling performance requirement to qualify for the Level II related theory test.

### 3.4 Special Credentials

NIMS offer special credentials at each level of competency, as follows:

| | |
|---|---|
| 1. Level I | An individual successfully earning all Level I Credentials will be awarded a Credential of Special Merit in Level I skill in recognition of extraordinary achievement. |
| 2. Level II | An individual successfully earning all Level II credentials will be awarded a Credential of Special Merit in Level II skills in recognition of extraordinary |

achievement.

### 3.5 Candidacy

An applicant duly registered with the NIMS Online Credentialing Program becomes a candidate for a credential and thereby eligible to take the appropriate online Credentialing Exam (s) when a positive Performance Affidavit(s) in one or more credentialing areas is received by NIMS ( see Section 6).

## Section 4 Procedures for Earning NIMS Credentials

4.1 General Requirements

A credential is awarded when an individual successfully completes the requirements for a credential(s) for which the individual has applied. Such requirements include (1) a completed affidavit of the performance evaluation and (2) achieving a passing score on the required related online theory exam for the credential(s) being sought.

4.2 Procedures

Earning a NIMS credential is a three step process as follows:

1. Registration with NIMS ( see Section 5 )
2. Performance Evaluation ( see Section 6)
3. Related Theory Written Exam ( see Section 7)

## Section 5 Registration with NIMS

5.1 Registration

An individual must register his or her intent to earn one or more NIMS credentials by completing online Registration Form and paying the required 40.00 registration fee. The registration fee is a one time, non refundable charge. If you have previously registered with the NIMS Credentialing Program at any level, you do not need to pay the registration fee again.

Registration is not required prior to the performance evaluation.

Each applicant for a NIMS credential must have a sponsor from a current metalworking employer or a metalworking training provider (secondary vocational education program, adult training program, community college, four year college, an organized labor training program, or other proprietary training program). In Machining, the sponsor will usually be the applicant's instructor, supervisor, or employer. The sponsor serves as the liaison between the training program or company and NIMS. With respect to NIMS, the liaison role involves the processing of the required Performance Affidavit and other reports/forms required by NIMS in the credentialing process. The sponsor must complete the Sponsor Registration section of the NIMS Online Testing Center prior to the Candidate's Registration.

## Section 6 Performance Evaluations for Level I AND II Credentials

6.1 Performance Evaluations

Individuals who wish to earn a NIMS Credential must successfully meet NIMS performance requirements for the credential being sought in order to be eligible to take the corresponding online written exam. Performance evaluations are designed to provide evidence that the applicant can:

- Read and interpret part prints, including the requisite symbology;

- Follow written procedures;
- Perform the necessary machine operations accurately;
- Make a part(s) as required by the duty cluster in accordance with NIMS specifications,
- Observe shop safety rules and practices, and appropriate environmental handling and disposal practices at all times;
- Use appropriate measuring instruments.

For **Level I** credentials in machining, the requirements are summarized as follows:

| Credentialing Area | Performance Project | Related Theory Exam |
|---|---|---|
| Measurement, Materials & Safety | * | X |
| Job Planning, Benchwork & Layout | X** | X |
| Manual Milling | X | X*** |
| Manual Turning-Chucking | X | X*** |
| Manual Turning-Between Centers | X | X |
| Drill Press Operations | X | X |
| Surface Grinding | X | X |

* Measurement, Materials, and Safety does not require a performance evaluation; thus all registered applicants are eligible to take this exam.

** Performance evaluations for Job Planning, Benchwork & Layout require only a Sponsor's review and not a MET-TEC review. Only the Sponsor needs to complete and sign the performance Affidavit.

*** The same related theory exam applies to manual Turning-Chucking and Manual projects has been successfully completed. This is verified by the signed Affidavits from the MET-TEC review. The exam must be passed only once.

For **Level II** credentials in machining, the requirements are summarized as follows:

| Credentialing Area | Performance Project | Related Theory Exam |
|---|---|---|
| Surface Grinding Operation | X | X* |
| Cylindrical Grinding | X | X* |
| Manual Turning (includes between centers & chucking) | X | X |
| Manual Milling ( includes all Level II milling duties, ex. CNC) | X | X |
| Drill Press Operations | X*** | X |
| CNC Milling Operations | X | X |
| CNC Lathe Operations | X | X |
| EDM Operations-WIRE | X | X |
| EDM Operations-PLUNGE | X | X |

* The same related theory exam applies to each grinding area and must be passed only once.

** The Performance requirements for a Level II credential in Drill Press Operations is a Level I credential in Drill Press or Level I Drill Press performance requirement.

### 6.2 Sponsor's Evaluation

The Applicant's Sponsor, normally a work supervisor or training instructor, must attest to four conditions regarding the applicant's performance in satisfying the requirements for a credential:

- The applicant performed the required duties with very little, if any assistance;
- The applicant perform all of the job set up requirements, machine and work area cleaning, and normal preventative maintenance checks, as required for the applicable credential;
- At all times and though practice the applicant demonstrated a working understanding of shop safety procedures; and
- The applicant's performance in making the required part(s) met or exceeded NIMS specifications and tolerance as communicated on the part print and corresponding evaluation sheet. All specifications and tolerance called out on a print must be met.

Sponsors evaluate and attest to the applicant's performance by completing the sponsor's section of the Performance Affidavit. For Level I or Level II credentials, the sponsor then must send the Performance Affidavit, machine part print to the local MET-TEC for evaluation (see Section 6.4). Because part prints are periodically revised, a copy of the actual part print used to make the submitted part must accompany the Affidavit and machine part to the MET-TEC.

### 6.3 Sponsor's Advisory

If NIMS is advised or otherwise determines that a sponsor knowingly attests to an individual satisfying NIMS performance requirements for a particular credential when such individual in fact did not perform the required functions, NIMS can deny eligibility to the individual and disallow any future affidavits from the sponsor.

### 6.4 MET-TEC's Evaluation

An applicant's performance in machining the required part(s) for a particular Machining I or II credential must be evaluated by a local area committee referred to as a Metalworking Technical Evaluation Committee (MET-TEC). A MET-TEC is a committee of voluntary industry representatives serving as an agent of NIMS. The MET-TEC conducts the quality review requirement of the performance evaluation of applicants seeking Level I or Level II machining credentials. For further information about MET-TECs, request a copy of the Metalworking Technical Evaluation Committee Guidebook.

The applicant's sponsor must complete the sponsor's section of the Performance Affidavit before sending the Affidavit, machined part (s), and the part print(s) to the local MET-TEC. The MET-TEC will evaluate the part, measuring it against all specifications in the NIMS standards and prints. Upon completing its evaluation, the MET-TEC members will sign the Performance Affidavit, attesting to their findings.

If the MET-TEC evaluation is positive, meaning the part meets specifications, the affidavit, machined part, and part print will be returned to the applicant's sponsor. The sponsor must then send to NIMS the Performance Affidavit. NIMS will review the forms for completeness and required signatures. Upon completion, NIMS will approve the Candidate for online testing of the appropriate related theory credentialing exam.

### 6.6 Relation to ISO or QS.

If your organization currently is ISO or QS certified, or will be seeking such certification, the performance affidavits and letters of award of credentials provide an ideal mechanism to document training in your facility. As such, such documents should be included in your "control document "list.

## Section 7 Related Theory, Credentialing Exams

7.1 Related Theory Exams

A related theory or credentialing exam covers the related theory and knowledge skills needed to meet the requirements of a job duty cluster which defines a credentialing module. Credentialing or related theory exams have been written by workers and supervisors from machining companies, validated nationwide, and are graded against a preset passing score. Study Guides for Machining Level I are available at www.nims-skills.org.

### 7.2 Contents for Level I Exams

Level I Machining credentialing exams are organized around topics. The weighted importance of each topic is as follows:

| Credentialing Module and Components | Proportion of Exam |
|---|---|
| Measurement, Materials, and Safety | |
| Quality Control and Inspection | 31% |
| Process Adjustment and Improvement | 21 |
| General Maintenance and Housekeeping | 21 |
| Industrial Safety and Environmental Protection | 27 |
| Total, All Components | 100% |
| Job Planning, Benchwork, and Layout | |
| Job Planning | 56% |
| Benchwork | 20 |
| Layout | 24 |
| Total, All Components | 100% |
| Machine Specific Modules (applies to milling, turning, drill press, and grinding) | |
| Machine Usage | 65- 80% |
| Quality Control and Inspection; Process Improvement and Adjustment; General Maintenance; and Industrial Safety and Environmental Protection | 20- 35 |
| Total, All Components | 100% |

The "Measurement, Materials, and Safety" and the "Job Planning, Benchwork, and Layout" exams are each scored by section. This means that a candidate must achieve a passing mark in each section to pass the overall exam. In the machine specific exams, an overall score (not by section) is the basis for determining pass or fail.

### 7.3 Contents for Level II Exams

Level II Machining credentialing exams are organized around topics. The weighted importance of each topic is as follows:

| Credentialing Module and Components | Proportion of Exam |
|---|---|
| Grinding Operations | 8% |
| Job Process Planning | |
| Operations | 18 |
| Surface Grinding—Flats | 18 |
| Surface Grinding—Angles | 15 |
| Wheel Preparation & Balancing | 15 |
| Cylindrical Grinding | 5 |
| Capability Studies | |
| Maintenance | 12 |
| (Includes general housekeeping & maintenance, preventative maintenance, and tooling maintenance) | |
| Industrial Safety & Environmental Protection | 9 |
| (Includes machine operations & material, and Haz-Mat) | |
| Total, All Components | 100% |
| * This exam is used for both grinding operation credentials at Level II. | |
| Turning Operations | 8% |
| Job Process Planning | |
| Operations | 23 |
| Between Centers Taper Turning | 0 |
| Production | 35 |
| Chucking, O.D. & I.D. Tapers Using a Taper Attachment | 4 |
| Capability Studies | |
| Maintenance | 20 |
| (Includes general housekeeping & maintenance, preventative maintenance, and tooling maintenance) | |
| Industrial Safety & Environmental Protection | 10 |
| (Includes machine operations & material, and Haz-Mat) | |
| Total, All components | 100% |
| Turning Operations | 8% |
| Job Process Planning | |
| Operations | 23 |
| Between Centers Taper Turning | 0 |
| Production | 35 |
| Chucking, O.D. & I.D. Tapers Using a Taper Attachment | 4 |
| Capability Studies | |
| Maintenance | 20 |
| (Includes general housekeeping & maintenance, preventative maintenance, and tooling maintenance) | |
| Industrial Safety & Environmental Protection | 10 |
| (Includes machine operations & material, and Haz-Mat) | |
| Total, All components | 100% |

| | |
|---|---|
| Milling Operations | |
| Job Process Planning | 8% |
| Operations | |
| Square Up a Block | 15 |
| Precision Location of Holes | 16 |
| Cut a Keyseat | 8 |
| Cut a Deep Slot with a Staggertooth Cutter | 10 |
| Use Rotary Tables | 5 |
| Dividing Head Operations | 5 |
| Basic Horizontal Boring Mill Operations | 8 |
| Capability Studies | 4 |
| Maintenance | |
| (Includes general housekeeping & maintenance, preventative maintenance, and tooling maintenance) | 12 |
| Industrial Safety & Environmental Protection | 9 |
| (Includes machine operations & material, and Haz-Mat) | 100% |
| Total, All Components | |
| CNC Milling | |
| Job Process Planning | 8% |
| Operations | |
| Program Writing | 30 |
| Operate a CNC Mill | 32 |
| Capability Studies | 4 |
| Maintenance | |
| (Includes general housekeeping & maintenance, preventative maintenance, and tooling maintenance) | 16 |
| Industrial Safety & Environmental Protection | 19 |
| (Includes machine operations & Material, and Haz-Mat) | 100% |
| Total, All Components | |
| CNC Lathe Operations | |
| Job Process Planning | 8% |
| Operations | |
| Program Writing | 30 |
| Operate a CNC Lathe | 32 |
| Capability Studies | 4 |
| Maintenance | |
| (Includes general housekeeping & maintenance, preventative maintenance, and tooling maintenance) | 16 |
| Industrial Safety & Environmental Protection | 10 |
| (Includes machine operations & material, and Haz-Mat) | 100% |
| Total, All Components | |

| | |
|---|---|
| Drill Press Operations | |
| Job Process Planning | 10% |
| Operations | |
| Radial Drill | 28 |
| Machine Tool Power Tapping: Taper Reaming and Pipe Tapping | 27 |
| Capability Studies | 4 |
| Maintenance | |
| (Includes general housekeeping & maintenance, preventative maintenance, and tooling maintenance) | 22 |
| Industrial Safety & Environmental Protection | 9 |
| (Includes machine operations & material, and Haz-Mat) | 100% |
| Total, All Components | |
| EMD Operations | |
| Job Process Planning | 14% |
| EMD Wire (2 Axis) Operations | 44 |
| Capability Studies | 7 |
| Maintenance | |
| (Includes general housekeeping, preventative maintenance and tooling maintenance) | 27 |
| Industrial Safety & Environmental Protection | 8 |
| (Includes machine operations & material, and Haz-Mat) | 100% |
| Total, All Components | |

With all Level II machining exams, an overall score (not by section) is the basis for determining pass or fail.

### 7.5 Exam Proctor

The sponsor may select or nominate an individual to perform the duties of Exam Proctor for his or her organization. The exam proctor *cannot* be an Instructor in the training program or an instructor of the credentialing candidate. An exam proctor for a company usually is an instructor from a local college or secondary school but cannot be the candidate's trainer or immediate supervisor. NIMS will assist in the selection of an exam proctor, if necessary.

### 7.6 Exam Fee

An exam fee is required for each online credentialing exam for which an individual is eligible and registers to take. The fee for each Level I exam is $35.00; at Level II, each exam is $50.00. This fee is subject to change by action of the Board of Directors of NIMS. NIMS Accredited Training Programs receive a 20% discount of all exam fees.

### 7.7 Discounts for NIMS Accredited Programs

NIMS Accredited Training Programs as well as applicants for NIMS Accreditation receive a discount on exam fees for their students/trainees. The credentialing exam fee for NIMS Accredited Programs and applicants for NIMS Accreditation at Level I is $28.00; at Level II, this discounted exam fee is $40.00.

NIMS accredits training programs meeting or exceeding NIMS quality assurance requirements. Applicant programs must complete a Self Study, document all program features as required, and undergo a two day on-site quality audit of their training program. NIMS sets standards for program content; equipment, tooling, and measuring devices inventories; instructor qualifications;

administrative or management support; OSHA safety features; and participation by an advisory body. In addition, a program seeking NIMS Accreditation must evidence successful instruction by having students/trainees meet NIMS performance requirements and pass related theory exams for at least one credentialing module. Organizations interested in seeking program Accreditation should contact NIMS for more information.

The exam discount applies to programs already Accredited or in the NIMS Accreditation process at the time the candidate applies to take on or more related theory exams.

### 7.8 Time Limit for Credentialing Exams

The applicant must take the credentialing exam for which he or she is eligible within one (1) year of the successful completion of their Performance Affidavit. Failure to take the exam within this time period will invalidate the Performance Affidavit.

### 7.9 Exam Regulations and Materials

During an exam, the candidate must work independently, without assistance from the sponsor, other candidates, or the exam proctor. Applicants must be on time for their exam. Ninety minutes are allowed for a NIMS credentialing exam. Candidates should bring a valid photo ID, and a non programmable calculator to the exam for use in answering exam questions. The *Machinery's Handbook* or the *Student's Shop Reference Handbook* may be used for reference during the exam. No other reference materials are permissible during the exam.

### 7.10 Exam Retake Policy

In the event that an individual does not pass a related theory credentialing exam, he or she will be given two opportunities to retake the exam. If the first retake attempt is unsuccessful, the individual must wait six (6) months before scheduling the second retake. A fee of $35.00 is required for each retake attempt. Failure to pass a given credentialing exam within three (3) attempts will invalidate the individual's Performance Affidavit. If this occurs in Level II credentialing, the individual will be required to earn the corresponding Level I credential, if not already held, before becoming eligible to restart the Level II credentialing process.

## Section 8 Release of Test Results

### 8.1 Candidate Notification

Upon completing an online exam each Candidate will be advised of a pass or fail status. If a passing score has been achieved, the appropriate credential will be awarded.

### 8.2 Sponsor Notification

The Candidate's Sponsor is automatically notified by e-mail by the Online Testing Center of that Candidate's Exam results unless the Candidate has disabled the "notify sponsor" option upon registration.