



OFFICE FOR ASSESSMENT OF PROFESSIONAL AND
WORKPLACE LEARNING

ACADEMIC PROGRAM REVIEW

of

**The National Institute for
Metalworking Skills (NIMS)**

REVIEW DATE:
September 26, 2013

EFFECTIVE DATE:
September 2003 – September 2018

Table of Contents

Organization Profile.....	3-5
Academic Program Review Team Members	6
Index of Credentials/Credit Awards	7
Credential Information Sheet	8-11
Review Summary.....	12

Organizational Profile

The National Institute for Metalworking Skills (NIMS) was formed in 1995 by the metalworking trade associations to develop and maintain a globally competitive American workforce. NIMS sets skills standards for the industry, certifies individual skills against the standards, and accredits training programs that meet NIMS quality requirements.

NIMS operates under rigorous and highly disciplined processes as the only developer of American National Standards for the nation's metalworking industry accredited by the American National Standards Institute (ANSI).

NIMS certifies individual skills against the national standards. The NIMS credentialing program requires that the candidate meet both practical performance and theoretical knowledge requirements. Both the performance and knowledge examinations are industry-designed and industry-piloted. There are 52 distinct NIMS skill certifications.

Industry uses the credentials to recruit, hire, place and promote individual workers. Training programs use the credentials as performance measures of attainment, often incorporating the credentials as completion requirements. The credentials are often the basis for articulation among training programs.

NIMS Accredited Training Providers

Programs that meet or exceed NIMS quality standards may be accredited. Those programs may be in industry, education or a combination of both, or inter-firm programs.

- Educational training programs may be at the secondary or postsecondary level and may be private or public programs.
- Company training programs include formal training programs developed to train either entry-level workers or incumbent workers, or both.
- Inter-firm programs include those coordinated through trade associations, labor unions and other companies.

Accreditation involves a three-step process: registration of the program with NIMS, the completion of a self-study analysis and an on-site audit. There are also credentialing requirements.

- The Self-Study - Candidate programs rate themselves against NIMS quality measures in the areas of administrative support, instructional quality and capacity, curriculum, equipment and tooling, advisory council roles, safety and the integration of the national standards.

- The On-Site Audit - A three -person team comprised of industry and education personnel conduct an on-site review, verifying the self-study report and documentation. The team interviews administrative and corporate personnel, instructors, students/workers, advisory council members and industry leaders. The team also inspects the facility and equipment and analyzes safety practices.
- Credentials -Instructors must earn NIMS credentials in the modules that they instruct. Students/workers must have earned credentials in the modules for which accreditation is sought. These requirements are prior to accreditation.

The accreditation is for a five-year period and may be renewed subject to further review and audit as part of continuous improvement.

Credentialing Process

Certification candidates must register at the NIMS website. The registration must be approved by either NIMS staff member or a sponsor and then the candidate will be emailed a username and password to access the NIMS Online Testing Center.

After an individual takes a proctored online exam, he or she must complete a Performance Exam which includes a checklist of hands-on tasks required to machine a part from blueprint. When the candidate successfully completes the Performance Exam, the machined part will be evaluated by a third party MET-TEC that will forward a Performance Affidavit and/or an Affidavit of Completion to NIMS, forming a Credentialing Achievement Record. Upon successful completion of both exams, the respective credential is earned.

Multiple Credentials

The national NIMS standards are modular, thus permitting credentials based on specific metalworking processes and levels of competency. For example, there are 11 distinct credentials in Machining Level I. However, overall, there are 52 NIMS credentials covering the breadth of metalworking skills. The credentials enable the employer to assess candidates in those skills most applicable to the firm's needs and enable training institutions to measure program performance tailored to industry needs.

Advantages to Companies

Metalworking companies use the credentials as a basis for recruiting, hiring, placement and promotion. The guesswork is removed from the human resource process. Companies can advertise for specific NIMS credentialed skills, preferring or requiring certain credentials. For example, a North Carolina company requires two NIMS Level I machining credentials from all candidates. A Missouri company bases raises on NIMS credentials.

Basis for Apprenticeship Training

The NIMS credentials serve as the performance assessments in the recently developed National Competency-Based Apprenticeship System. The credentials demonstrate the earned competencies required within the new system.

Advantages to Education and Training Programs

Educational institutions use the NIMS credentials as performance measures and as the basis for articulation. For example, Pennsylvania requires all machining students to test for NIMS; U.S. Army machinist trainees earn NIMS credentials; and The Robert C. Byrd Institute requires students to possess a NIMS credential as a requirement for earning an Associate Degree in Manufacturing Technology. An ever-growing number of colleges and universities award credits to high school students and to company employees for NIMS credentials.

Advantages to the Workers, Trainees and Students

With NIMS performance measures, the candidates know clearly what is expected of them whether it is for graduation, hiring or advancement. The NIMS credential clearly demonstrates that the credential holder meets the industry benchmark for that competency.

The NIMS credential is the metalworking industry's only skills certificate that is based on national standards developed under procedures accredited by the American National Standards Institute. The NIMS credential is used by the industry to recruit, hire, place and promote. Firms use the credential to identify skilled candidates at all levels of employment. The NIMS credential is used by education and training institutions as performance benchmarks, often as part of graduation or degree requirements, and often as the basis for advanced credit.

Source of Official Student Records: NIMS, 10565 Fairfax Boulevard, Suite 203, Fairfax, VA 22030, (703) 352-4971; support@nims-skills.org. Source of Official Student Records: NIMS, 10565 Fairfax Boulevard, Suite 203, Fairfax, VA 22030, (703) 352-4971; support@nims-skills.org.

For further information about the review, contact: Office for Assessment of Professional and Workplace Learning, Thomas Edison State College, 101 West State Street; Trenton, New Jersey 08608-1176, (609) 633-6271; apr@tesc.edu.

THE NATIONAL INSTITUTE FOR METALWORKING SKILLS (NIMS)

September 26, 2013

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THE NATIONAL INSTITUTE FOR METALWORKING SKILLS (NIMS)

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INDEX OF CREDENTIALS/CREDIT AWARDS

Page #	Name of Credential	Effective Dates	Credit Recommendation/Award	
			Credits/ Level	Credit Subject Area
8.	Machining Level II Competencies:	September 2003- September 2018		
	1. Manual Milling Skills II		3 LD	Traditional Machining Operations
	2. Turning II (manual)			
	3. Drill Press Skills II			
	4. Grinding Skills II			
	5. CNC Milling Skills II		3 LD	Intermediate CNC Machining
	6. CNC Turning Skills II		2 LD	Electrical Discharge Machine Operations
	7. EDM – Wire			
	8. EDM - Plunge			
	If all 8 competencies are completed: a total of		8 LD	in the # credits & subject areas above

Key: LD = lower division associate/baccalaureate level

Credential Information Sheet

Course Title/Number: NIMS Credential – Machining Level II

Location: The company or training institution needs no prior relationship with NIMS for its employees or trainees to earn credentials. The credentials can be earned literally anywhere.

Note: Training providers for NIMS credentials are accredited through a centralized system that are required to meet or exceed NIMS National Standards for Metalworking Skills as determined by the American National Standards Institute (ANSI). Credit will be awarded based on the training and testing materials that were reviewed – if the training standards at any location/venue exceed those included in this review, credit will still be awarded based on this review of the training, exam materials and process.

Length: Typically 100 hours (includes instruction, machining time and testing)

Effective Date: September 2003 – September 2018

Course Description: Machining Level II is designed to meet journey-level requirements for on-the-job skills. Machining processes such as milling, turning, drill press, grinding, CNC Milling and CNC Turning and Electrical Discharge Machining (EDM) will be studied and developed using standards of geometric dimensioning and Tolerancing (GD&T). Skills such as traditional machine terminology, blueprint reading, speeds and feeds, uses of the Machinery Handbook and safety issues are also included. Students will perform intermediate level lathe, mill, and CNC operations, also write and troubleshoot computer numerical control programs. Students will demonstrate Nontraditional machining practices using Electrical Discharge Machinery (EDM).

Learning Outcomes: Upon successful completion of this course, the student will be able to:

1. Operate conventional machine shop equipment including mills, lathes, drill presses, grinding equipment, electric discharge machines, and various other supporting tools;
2. Understand how to "read" a blueprint, which is the roadmap to manufacturing a part;
3. Interpret GD&T control frames to manufacture mechanical parts to specifications;
4. Complete multi-fixture jobs to maintain part print concentricity;
5. Perform traditional cylindrical grinding;
6. Perform plunge and wire EDM operations using electric discharge equipment;
7. Understand basic electrical principles as it pertains to the EDM process.
8. Demonstrate intermediate level proficiency in the utilization of computer numerical controlled equipment. This includes the operation of and the setup of computer numerical controlled mills and lathes; and
9. Author and troubleshoot Computer Numerical Control programs.

Methodology:

There are nine projects within eight competency areas that the candidate must complete. Some skill areas encompass two or more performance requirements. Each skill credential offered by NIMS is based on a set of duties, which collectively approximate a complete role or job and form the major topics of the course.

Competency Areas in the Metalworking II credential include:

1. Manual Milling Skills II
2. Turning II (manual)
 - Write a detailed process plan that includes a quality plan for a part requiring milling, drilling, turning, or grinding. Produce an operation sheet detailing the process plan; identify all critical dimensions and required speeds and feeds. Provide sketches as needed.
 - Set up and perform between centers turning for straight and tapered turning by offsetting the tailstock.
3. Drill Press Skills II
 - Precision drilling, reaming and tapping to specific depths
4. Grinding Skills II
 - Set up and perform the finish surface grinding of flat surfaces at simple angles with respect to one another. Dress the wheel as necessary.
 - Set up and perform straight diameter, chamfers, and radii using cylindrical grinding techniques.
5. CNC Milling Skills II
 - Operate a CNC milling machine.
6. CNC Turning Skills II
 - Operate a CNC lathe.
7. EDM — Wire
 - Operate a 2 axis wire electric discharge machine.
8. EDM — Plunge
 - Produce an electrode and operate a plunge electric discharge machine.

Methods of instruction include:

1. Lecture
2. On the job Training
3. Practicum

NIMS does not set forth policy on program curriculum that includes duration. The performance is competency based, not time-based.

Assessment criteria: (For each of the eight competencies)

Online Theory Exam: 50% - NIMS – online tests vary. They are pass/fail tests. The student is allowed to retest, but they must pay again.

Performance Test: 50% - The machined part must be 100% within the tolerances listed on the blueprint. Upon completion of a machined part by the candidate, the sponsor must send the part to be validated by a MET-TEC that will measure and check the part against all specifications using the corresponding Performance Assessment Worksheet included for the part. If all specifications are within allowable tolerances, the MET-TEC completes the Performance Affidavit and forwards it to NIMS. If all of the specifications have not been met, then the candidate must make appropriate corrections or repeat the job. The performance test is pass/fail. NIMS standards require 100% conformance to all specifications.

The student must pass both the online theory exam and the performance test to be given a certificate for the respective competency.

A student transcript (or equivalent) of competencies is available from a qualifications system maintained by NIMS.

Students may present individual competency certificates or a transcript from the NIMS qualification system as evidence of completing either a portion of the competencies or completing all of the competencies.

The student must pass both the online theory exam and the performance test to be given a certificate for the respective competency.

The student is given a NIMS certificate for each competency completed.

A student transcript (or equivalent) of competencies is available from a qualifications system maintained by NIMS.

Students may present individual competency certificates or a transcript from the NIMS qualification system as evidence of completing either a portion of the competencies or completing all of the competencies.

Credit Recommendations:

Based upon student completion of NIMS Machining Level II competencies 1, 2, 3 and 4: In the lower division associate/baccalaureate degree category, 3 credits in **Traditional Machining Operations**.

Based upon student completion of NIMS Machining Level II competencies 5 and 6: In the lower division associate/baccalaureate degree category, 3 credits in **Intermediate CNC Machining**.

Based upon student completion of NIMS Machining Level II competencies 7 and 8:
In the lower division associate/baccalaureate degree category, 2 credits in
Electrical Discharge Machine Operations.

Note: Completion all 8 competencies is not necessary to receive a partial award of credit, as per the credit recommendation above.

Credit Rational:

The student has demonstrated intermediate level competencies in machining, metalworking operations, and computer numerical control operations. In the aggregate, enough academic content is evident in various areas to recommend credit. After a thorough review of the supporting materials available for the NIMS Machining Level II certification, the credit recommendation is made based on coverage of problem solving, blueprint reading, intermediate mill and lathe operations, tight tolerance manufacturing, electrical discharge machine operations, mathematical analysis, safety, equipment setup and utilization, and intermediate CNC programming and operations.

REVIEW SUMMARY

The team includes the following comment based on their review of this training:

The team of subject matter experts that evaluated the program commended the overall dedication to the quality of the learning that the participants receive during the credentialing process. The team also commended the administration of the credential, the dedication to best practices, and the commitment to employing stringent standards for oversight.

The team was impressed with the significant and extensive Geometric Dimensioning and Tolerancing (GD&T) required in Machining Level II.