FAST-TRACK TRAINING FOR HIGH-QUALITY MANUFACTURING JOBS
Contents of National Tools

✓ Executive Summary and Overview
✓ Curriculum
✓ College Marketing
✓ Employer Communications
✓ Student Brochure
✓ The Jobs Council’s Interim Report to the President
✓ Certification Program Contacts and Agreements
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In a just-released study by The Manufacturing Institute, over 80% of manufacturers report they cannot find people to fill their skilled production jobs. As a result, there are over half-a-million manufacturing jobs open right now. Responding to this talent crisis, and the need to create jobs in this country, The Manufacturing Institute worked with the President’s Jobs Council to tailor the national manufacturing certification system into a nationally replicable fast-track solution to deliver JUST IN TIME TALENT to small manufacturers. This accelerated program allows individuals to earn college credit and national industry certifications in 16 weeks, preparing them for immediate employment in high-quality manufacturing jobs and giving them a solid foundation to advance in higher education and careers.

This initiative, called RIGHT SKILLS NOW, is an acceleration of the NAM–Endorsed Manufacturing Skills Certification System, which includes nationally portable, industry-recognized certifications that are combined with for-credit education programs. These education pathways are directly aligned to career pathways in manufacturing, so students progressing through the programs earn college credit towards a degree, a national certification with labor market value, and the hands-on technical experience to be successful on the job from day 1. RIGHT SKILLS NOW fast-tracks and focuses career training in core employability and technical skills by “chunking” relevant curriculum that leads to interim credentials in critical machining skills. While the initial model focuses on machining skills, for which there is immediate demand, the program can accelerate skills development in other foundational skills areas for advanced manufacturing like production or welding.

RIGHT SKILLS NOW is now being deployed at two Minnesota colleges, Dunwoody College of Technology and South Central Community College. Other partners include ACT, the certifying body for the National Career Readiness Certificate – the foundational credential in the Skills Certification System – and the National Institute of Metalworking Skills (NIMS), the certifying body for the series of machining and metalworking credentials in the System. This accelerated program is delivering for employers and individuals the RIGHT SKILLS NOW.
**CONTEXT** Access to talented individuals with a high-quality education and advanced skills is critical to manufacturers’ capacity for innovation and business success. In recent studies, companies report they cannot find individuals with the skills required for today’s advanced manufacturing workplaces. And this challenge will only grow as the demographics of our workforce drive “Boomer” retirements and replacement requirements. The technology infusion and high productivity that dominate the advanced manufacturing landscape demand a smart, safe, and sustainable manufacturing workforce. This requires individuals with professionalism, applied science, technology, math, and engineering skills, as well as a holistic knowledge of manufacturing principles, which enable them to advance with the evolution of new business processes. The Manufacturing Institute responded by creating the National Association of Manufacturers (NAM)-Endorsed **Manufacturing Skills Certification System** to directly address the deficits in manufacturing education and training, which are limiting the pool of qualified candidates for high-quality manufacturing jobs.

The NAM-Endorsed **Manufacturing Skills Certification System** is a system of stackable credentials applicable to all sectors in the manufacturing industry. These nationally portable, industry-recognized credentials validate the skills and competencies needed to be productive and successful in entry-level positions in any manufacturing environment, and can be learned and earned in secondary and postsecondary education. The credentialing partners that comprise the Skills Certification System are ACT, the American Welding Society, the Manufacturing Skill Standards Council, the National Institute of Metalworking Skills, and the Society of Manufacturing Engineers.

The Skills Certification System is the benchmark standardized assessment of the critical workplace traits and occupational skills an individual needs to operate in the advanced manufacturing workplace driven by productivity and flexibility. It confirms both technical and non-technical skills, assuring that an individual has both the “book smarts” and the “street smarts” to function in a high-paced manufacturing environment. The result is a professional technical manufacturing workforce with valuable industry credentials, making companies more innovative, more competitive, and more marketable, and providing students and transitioning workers with both educational and career pathways to employment and advancement.

Implementation of the NAM-Endorsed Manufacturing Skills Certification System has proceeded with great success. Recently, however, as manufacturing leads the economy out of recession and jobs become available, many small manufacturers have immediate needs for skilled workers, particularly in the machining and metalworking fields.

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**Right Skills Now**

Careers in advanced manufacturing are high-quality, middle class jobs, and today’s manufacturing employees earn higher wages and receive more generous benefits than other working Americans.

On June 8, 2011, President Obama announced key steps towards building the educated and skilled workforce U.S. manufacturers need to successfully compete in the 21st century economy. Responding to President Obama’s call for employers and community colleges to work together to connect students with jobs, The Manufacturing Institute and the National Association of Manufacturers announced the goal of credentialing 500,000 workers with skills certifications aligned to manufacturers’ hiring needs, with the Manufacturing Skills Certification System as a national solution.
Right Skills Now for Manufacturing

Fast-Track Training for High-Quality Manufacturing Jobs
Facing the Reality of the 21st Century Manufacturing Workforce

Demographics: We face boomer retirements coupled with a shrinking pipeline.

Technological advances in modern manufacturing require more advanced skill sets.

Major deficits in our education system limit production of a high quality and quantity workforce.

High-skilled jobs grew by 12% between 2003 and 2010.
A Skills Mismatch Compromises U.S. Manufacturing Competitiveness and Employment

- **82.5%** of manufacturers report a moderate-to-serious shortage of skilled production workers, including machinists.
- **74%** of manufacturers report that this skills gap has negatively impacted their company’s ability to expand operations.
- **69%** of manufacturers expect the skills shortage in skilled production to worsen in the next 3-5 years.
- This skills gap has resulted in as many as 600,000 jobs going unfilled.
It’s really frustrating and continues to be a real issue for manufacturers like me when we hear the unemployment numbers but yet we cannot find people skilled to come to work for our companies. We are constantly interviewing and finding that the people we bring in do not have the math skills that are required to operate our equipment. We can buy all of the equipment we need but we cannot find the skilled labor we need to advance our companies.

--Darlene Miller, President, PERMAC Industries, Minneapolis, MN
Fast-Track to Jobs

- Providing workers and students with fast-track skills for employment
- Providing manufacturers just-in-time talent from the lab/classroom to the shopfloor
- Accelerating and expanding lifelong learning opportunities for a flexible, technical workforce
Gaining Skills for Today’s and Tomorrow’s Manufacturing

Academic, Personal, and Career Skills

Technical Skills

Nationally portable, industry-recognized credentials

• **Personal effectiveness:** _show up on time, ready for work_

• **Essential academic skills in reading, writing, math, and using and locating information:** _communicate effectively and interpret key instructions_

• **Workplace skills:** _work in teams and problem-solve_

Hands-on experience + practical application of:

- Safety
- Precision Measurement Tools and gages
- Quality Assurance
- Material Composition
- Engineering Drawings, Symbols & Notation
- CNC

Right Skills Now for Manufacturing
Fast track training

1 semester + internship
- Measurement, Materials and Safety
- Job Planning, Benchwork and Layout
- CNC Operator - Turning Level 1
- CNC Operator - Milling Level 1

Job!

- Transitioning Military
- Unemployed/underemployed
- Job seekers

Associate of Applied Science (Machine Tool Technology AAS)

2+2 Bachelor of Science
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“Right Skills Now”
for manufacturing

Fast track curriculum submitted by;

South Central College – Doug Laven
Dunwoody College of Technology – E.J. Daigle

Revised 9/28/2011
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RATIONAL

Doug Laven (South Central College) and E.J. Daigle (Dunwoody College of Technology) have spent the last 6 weeks collaborating with industry stakeholders, technical faculty from both schools and the “Right Skills Now” committee in an effort to develop curriculum that can be replicated between the (3) campuses served by Dunwoody College and South Central College. After much deliberation, we are submitting the attached curriculum that can then be replicated across the campuses and at the same time provide educational pathways into our AAS Degree Programs. Our hope is that upon the successful pilot of this program, we can then replicate it across the nation.

Curricular Goals

1. Provide high quality training that leads to immediate entry-level jobs.
2. Provide skilled personnel (Entry Level CNC Operators) to an industry that is in desperate need.
3. Provide educational pathways that allows students a lifetime of learning and exposure to the manufacturing field.

Educational Pathways

Right Skills Now Certificate
1 semester + internship
Measurement, Materials and Safety
Job Planning, Benchwork and Layout
CNC Turning Level 1
CNC Milling Level 1
Internship

Associate of Applied Science
Machining related discipline (additional 3 Semesters)
Semester 1: Credits Articulated from Right Skills Now Certificate
Semester 2: Intermediate Machine Tool courses
             Required A&S courses
Semester 3: Advanced Machine Tool courses
             Required A&S courses
Semester 4: Advanced Machine Tool courses
             Required A&S courses

2+2 Bachelor of Science
4 additional semesters
Semester 5: Dependent on program
Semester 6: Dependent on program
Semester 7: Dependent on program
Semester 8: Dependent on program
CURRICULAR CONCERNS

Differences in credits (yet similar in clock hours):

- Each school is required to obtain approval and accreditation by both the Minnesota Office of Higher Education and Regional Accrediting Agencies to offer financial aid eligible certificates and because of this every school has strict school guidelines they must adhere to in regards to contact hours per credit and certificate total credits.

    (A) Term lengths (quarter, semester, number of weeks) vary from school to school

    (B) Contact hours per credit varies from school to school

    (C) Cost per credit varies from school to school

- Although the model represents two different total credit loads the total contact hours were essentially the same, (SCC = 544 hours and Dunwoody = 558 hours).

See specific campus credit and contact hour details on page 5.

Internship:

- Appendix E includes a course syllabus for an instructor-driven internship that will last approximately 8 weeks and varies from 3-4 credits depending on campus.

Internship is credit-based and the student is charged tuition.
Credit will be issued for completion of the internship and course competencies will be developed and assessed as collaboration between student, instructor and employer. The experience will be limited to a paid internship with a minimum of 20 hours per week but not to exceed 40 hours per week. Students will not receive their certificate until completion of the required internship competencies. Students are encouraged to take additional courses towards AAS degree requirements while participating in the internship.
### Credits and Contact Hours

<table>
<thead>
<tr>
<th>South Central College</th>
<th>Lecture Credits (hrs)</th>
<th>Lab Credits (hrs)</th>
<th>Total Credits (hrs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measurement Materials &amp; Safety</td>
<td>1 (16)</td>
<td>2 (64)</td>
<td>3 (80)</td>
</tr>
<tr>
<td>Job Planning, Benchwork &amp; Layout</td>
<td>1 (16)</td>
<td>2 (64)</td>
<td>3 (80)</td>
</tr>
<tr>
<td>CNC Milling Level 1</td>
<td>2 (32)</td>
<td>3 (96)</td>
<td>5 (128)</td>
</tr>
<tr>
<td>CNC Turning Level 1</td>
<td>2 (32)</td>
<td>3 (96)</td>
<td>5 (128)</td>
</tr>
<tr>
<td>Internship</td>
<td></td>
<td>4 (128)</td>
<td></td>
</tr>
<tr>
<td><strong>Grand Total</strong></td>
<td><strong>6 (96)</strong></td>
<td><strong>14 (448)</strong></td>
<td><strong>20 (544)</strong></td>
</tr>
</tbody>
</table>

* The completion of this certificate is then articulated into South Central College’s Computer Integrated Machining AAS Degree in the following manner;

**Right Skills Now Certificate (16 credits) = Semester 1 of Computer Integrated Machining AAS (72 Credits)**

#### Semester 1 Courses (16 credits with 416 contact hours)

- CIM1115 Measurement Materials & Safety (3 cr)
- CIM1125 Job Planning, Benchwork & Layout (3 cr)
- CIM1135 CNC Milling Level 1 (5 cr)
- CIM1135 CNC Turning Level 1 (5 cr)
- CIM1145 Internship (4 cr)
STAGGERED ENROLLMENT

Because the certificate will be offered on three separate campuses it is possible to stagger the enrollment. This is especially true for the South Central campuses due to their physical proximity of each other. As far as the Dunwoody campus goes, the starts would mirror that of the SCC-Mankato campus. This is due to the fact that they line up well with other campus starts and still offer summer time for shop maintenance. Dunwoody and SCC-Mankato are nearly 100 miles apart and do not typically compete for students and therefore can have mirrored starts.

<table>
<thead>
<tr>
<th>South Central Mankato</th>
<th>South Central Fairbault</th>
<th>Dunwoody Minneapolis</th>
</tr>
</thead>
<tbody>
<tr>
<td>January: Spring startup</td>
<td>March: Mid Spring startup</td>
<td>January: Spring startup</td>
</tr>
<tr>
<td>May: Graduation</td>
<td>July: Graduation</td>
<td>May: Graduation</td>
</tr>
<tr>
<td>June: Internship</td>
<td>August: Internship</td>
<td>June: Internship</td>
</tr>
<tr>
<td>August: Fall startup</td>
<td>October: Mid Fall startup</td>
<td>August: Fall startup</td>
</tr>
<tr>
<td>December: Graduation</td>
<td>February: Graduation</td>
<td>December: Graduation</td>
</tr>
</tbody>
</table>

WEEKLY SCHEDULE

The program requires approximately 400 classroom contact hours to be completed in 16 weeks and a minimum of 8 weeks on a paid internship.

DAYTIME CLASSROOM SCHEDULE (26 CONTACT HOURS PER WEEK FOR 16 WEEKS)

<table>
<thead>
<tr>
<th>MONDAY</th>
<th>TUESDAY</th>
<th>WEDNESDAY</th>
<th>THURSDAY</th>
</tr>
</thead>
<tbody>
<tr>
<td>7:30AM-2:00PM</td>
<td>7:30AM-2:00PM</td>
<td>7:30AM-2:00PM</td>
<td>7:30AM-2:00PM</td>
</tr>
</tbody>
</table>

EVENING CLASSROOM SCHEDULE (26 CONTACT HOURS PER WEEK FOR 16 WEEKS)

<table>
<thead>
<tr>
<th>MONDAY</th>
<th>TUESDAY</th>
<th>WEDNESDAY</th>
<th>THURSDAY</th>
</tr>
</thead>
<tbody>
<tr>
<td>3:30PM-10:00PM</td>
<td>3:30PM-10:00PM</td>
<td>3:30PM-10:00PM</td>
<td>3:30PM-10:00PM</td>
</tr>
</tbody>
</table>
INDUSTRY STUDY

Dunwoody College and South Central College conducted a survey of manufacturing companies that have hired their graduates. The study was intended to determine which skills are absolutely necessary for someone to safely and accurately operate a CNC machine tool. The survey was sent out to the following companies and the survey and results are listed below.

**Dunwoody Survey Participants**
- Top Tool
- Tom Larson Custom Training
- Boston Scientific
- Iscar
- Entegris
- Performance Tool

**South Central Participants**
- New Ulm Precision
- K & G
- SPX-OTC
- Winegar
- Dotson
- MRG
- V-Tek

The directions sent to the companies on how to take the survey were as follows:

This survey is being conducted to determine industry needs in regard to entry level CNC operator training. Dunwoody College of Technology and South Central College are working together on an accelerated solution to meet increasing industry needs in this area. As you take the survey, please consider whether each skill is vital to the position of an entry level CNC operator. Please remember this survey is not aimed at the skills required for an entry-level machinist, but rather the skills necessary to feel comfortable hiring someone to operate your machine tools.

**Survey Findings:** Out of the 43 skills assessed on a scale of 1.0 to 3.0 (3.0 being the highest level of importance of mastery), 22 skills were found to be at or above 2.5 on our survey. These skills are aggregated in the “vital skill” category. This is not meant to discredit any of the other skills on the list. These may also require exposure during the program.

**Skills ≥ 2.5:**

**INTRO** Safety, MSDS and PPE
- INTRO Interpreting Engineering Drawings
- INTRO Use of Hand Tools
- INTRO Use of Measurement Tools
- INTRO Use of Shop Mathematics
- MANUAL Lathe Operation
- MANUAL Vertical Mill Operation
- MANUAL Speeds & Feeds
- MANUAL Drilling, Tapping, Threading & Ream
- MANUAL Tool Holding and Work Holding
- INSPECT Reading Calipers and Micrometers
- INSPECT Reading Depth and Height Gages

**CNC Tool and Work Holding (Lathe)**
- CNC Tool and Work Holding (Vert Mill)
- CNC Turning
- CNC Cutter compens. and Wear offsets
- CNC Speeds & Feeds
- CNC Tool offsets and Work offsets
- CNC Vertical Mill Setup/Operation
- CNC Canned Cycles
- CNC Milling
- CNC G&M Codes
## CNC Operator Overall Skill Importance

<table>
<thead>
<tr>
<th>Skill Category</th>
<th>Importance Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>CNC - Other machine tools; EDM, Swiss turning,</td>
<td></td>
</tr>
<tr>
<td>CNC - Tool and machine maintenance</td>
<td></td>
</tr>
<tr>
<td>CNC - Tool and Work Holding (Lathe)*</td>
<td></td>
</tr>
<tr>
<td>CNC - Tool and work holding (Vertical Mill)*</td>
<td></td>
</tr>
<tr>
<td>CNC - Turning (live tooling)*</td>
<td></td>
</tr>
<tr>
<td>CNC - Tapers</td>
<td></td>
</tr>
<tr>
<td>CNC - Turning</td>
<td></td>
</tr>
<tr>
<td>CNC - Conversational programming</td>
<td></td>
</tr>
<tr>
<td>CNC - CAD/CAM programming</td>
<td></td>
</tr>
<tr>
<td>CNC - Computer program entry (importing)</td>
<td></td>
</tr>
<tr>
<td>CNC - Manual program entry</td>
<td></td>
</tr>
<tr>
<td>CNC - Cutter compensation and Wear offsets</td>
<td></td>
</tr>
<tr>
<td>CNC - Speeds and feeds (specifically for CNC)</td>
<td></td>
</tr>
<tr>
<td>CNC - Tool Offsets/Work Offsets</td>
<td></td>
</tr>
<tr>
<td>CNC - 4th Axis*</td>
<td></td>
</tr>
<tr>
<td>CNC - Horizontal Pallet Operations*</td>
<td></td>
</tr>
<tr>
<td>CNC - Horizontal Mill Set up and operations**</td>
<td></td>
</tr>
<tr>
<td>CNC - Vertical Mill Set up and operation**</td>
<td></td>
</tr>
<tr>
<td>CNC - Canned Cycles*</td>
<td></td>
</tr>
<tr>
<td>CNC - Milling</td>
<td></td>
</tr>
<tr>
<td>CNC - G and M codes</td>
<td></td>
</tr>
<tr>
<td>INSPECT – Use of an optical comparator</td>
<td></td>
</tr>
<tr>
<td>INSPECT – Use of a microscope</td>
<td></td>
</tr>
<tr>
<td>INSPECT – CMM Measurements</td>
<td></td>
</tr>
<tr>
<td>INSPECT – Reading depth and height gages</td>
<td></td>
</tr>
<tr>
<td>INSPECT – Reading calipers and micrometers</td>
<td></td>
</tr>
<tr>
<td>MANUAL – Lathe operation</td>
<td></td>
</tr>
<tr>
<td>MANUAL – Vertical Mill operation</td>
<td></td>
</tr>
<tr>
<td>MANUAL – Tool holding and work holding</td>
<td></td>
</tr>
<tr>
<td>MANUAL – Drilling, tapping, threading and...</td>
<td></td>
</tr>
<tr>
<td>MANUAL – Use of a surface grinder</td>
<td></td>
</tr>
<tr>
<td>MANUAL – Use of a pedestal grinder</td>
<td></td>
</tr>
<tr>
<td>MANUAL – Use of a drill press</td>
<td></td>
</tr>
<tr>
<td>MANUAL – Use of a band saw</td>
<td></td>
</tr>
<tr>
<td>MANUAL – Speeds and feeds</td>
<td></td>
</tr>
<tr>
<td>MANUAL – Cutting fluids</td>
<td></td>
</tr>
<tr>
<td>MANUAL – Tool and machine maintenance</td>
<td></td>
</tr>
<tr>
<td>INTRO – Use of shop mathematics</td>
<td></td>
</tr>
<tr>
<td>INTRO – Use of measurement tools</td>
<td></td>
</tr>
<tr>
<td>INTRO – Use of hand tools (hammers,...)</td>
<td></td>
</tr>
<tr>
<td>INTRO – Material properties</td>
<td></td>
</tr>
<tr>
<td>INTRO – Interpreting engineering drawings</td>
<td></td>
</tr>
<tr>
<td>INTRO – Safety, MSDS and PPE</td>
<td></td>
</tr>
</tbody>
</table>
Measurement, Materials, and Safety
Course Outcome Summary

Course Information
Organization: South Central College/Dunwoody
Developers: Doug Laven, E.J. Daigle
Development Date: 8/16/2011
Course Number: In accordance with college policy
Potential Hours of Instruction: Determined by the college
Total Credits: Determined by the college

Description
This course provides an exploration of the basics in machining, raw materials, use of hand tools, safety and maintenance. Topics include an overview of measurement techniques, materials, safety, machine tool math, quality control and maintenance. Teamwork, critical thinking, and problem solving are emphasized. Hands-on experience and practical applications are included.

Types of Instruction
<table>
<thead>
<tr>
<th>Instruction Type</th>
<th>Contact Hours</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lecture</td>
<td>TBD</td>
<td>TBD</td>
</tr>
<tr>
<td>Lab</td>
<td>TBD</td>
<td>TBD</td>
</tr>
</tbody>
</table>

Recommended Textbooks


Exit Learning Outcomes
Core Abilities
A. Critical Thinking
B. Professionalism
C. Mechanical Aptitude: Determine the Proper Method/Equipment to Manufacture and Measure Characteristic of a Part
D. Technological Literacy
E. Recognize and Avoid Shop Hazards
Competencies

1. Explore Shop Floor Layout
   Learning Objectives
   a. Explain General Shop layout
   b. Differentiate Conventional Machinist, Programmer, CNC Machinist
   c. Apply Housekeeping Standard
   d. Demonstrate Mechanical Aptitude

2. Identify Safety
   Learning Objectives
   a. Explain Key Safety Terms
   b. Demonstrate Personal Protective Equipment (PPE)
   c. Apply Lockout/Tag-out
   d. Use Guards and Barriers
   e. Adapt Personal Protective Equipment (PPE)
   f. Acknowledge OSHA Guidelines

3. Explain Types of Machines
   Learning Objectives
   a. Demonstrate Safety Practices
   b. Explain Personal Protective Equipment (PPE)
   c. Apply Lockout/Tag-out procedure
   d. Use Guards and barriers

4. Apply Measurement Systems and Machine Tool Math
   Learning Objectives
   a. Explain the English System
   b. Explain the Metric System
   c. Apply Fractional Operations
   d. Use Basic Geometry, Trigonometry and Ratios
   e. Demonstrate Fractional/Decimal Conversions
   f. Recognize Tolerances on a Print
   g. Explain numbering they find on a print (Tenths, 150 millionths, etc)
   h. Articulate Numbering Systems found on Prints (Tenths, Millionths, etc)

5. Define Major Machine Tools
   Learning Objectives
   a. Explain Machine Differences
   b. Use Drill Press
   c. Demonstrate Sawing Machine
d. Differentiate Hand Tools
e. Identify Lathe, Mill and various “Axes”
f. Learn the names and to identify types of Drills, Mills, and Insert Tooling

6. **Utilize Semi-Precision Measurement Tools**
   **Learning Objectives**
   a. Explain Key Measurement Terms
   b. Demonstrate Calipers Use
   c. Use Adjustable Squares
   d. Apply Angular Measurements
   e. Demonstrate Fixed Gage Applications

7. **Utilize Precision Measurement Hand Tools**
   **Learning Objectives**
   a. Explain Precision Measurement
   b. Use Precision Fixed Gages
   c. Demonstrate Surface Plates
   d. Characterize Vernier Measuring tools
   e. Use Micrometers

8. **Learn Special Measurement Tools**
   **Learning Objectives**
   a. Identify Coordinate Measuring Machine
   b. Define Optical Comparator Operation
   c. Explain Toolmaker’s Microscope

9. **Apply Quality Assurance Planning**
   **Learning Objectives**
   a. Apply Quality Practices
   b. Compare Inspection and Preventative Processes
   c. Calculate Average, Standard Deviation, and Determine Capability Range (Average +/- 3 Standard Deviations)
   d. Develop Sampling Plan
   e. Create Inspection Plan
   f. Define Statistical Process Control (SPC)
   g. Define differences between Attributes and Variables (Surface Finish/Appearance vs. Measurable)

10. **Differentiate Raw Material Composition**
    **Learning Objectives**
    a. Explain Ferrous Metals
    b. Explain Nonferrous Metals
c. Define Tempering

d. Describe Heat Treatment Process

e. Characterize Hardness Scales and Test Variety of Specimens

11. **Adopt Maintenance Schedules**

   **Learning Objectives**
   
a. Communicate Lubrication Needs
   
b. Use Cutting Fluids
   
c. Demonstrate Measuring of Cutting Fluid Techniques
   
d. Explain Methods of Application

12. **Categorize Heat Treatment of Metals**

   **Learning Objectives**
   
a. Distinguish Direct, Surface and Case Hardening
   
b. Distinguish Tempering, Anodizing and Normalizing
   
c. Analyze Hardness Scales and Testing

13. **Communicate Knowledge**

   **Learning Objectives**
   
a. Take Detailed Notes
   
b. Ask Questions to Industry Representatives
   
c. Practice Problem-Solving and Manual Dexterity
   
d. Communicate with Team members
   
e. Identify and Properly name Shop Tools, Components, Supplies, and Equipment
Job Planning, Benchwork and Layout
Course Outcome Summary

Course Information

Organization: South Central College/Dunwoody
Developers: Doug Laven, E.J. Daigle
Development Date: 8/16/2011
Course Number: Determined by the college
Potential Hours of Instruction: Determined by the college
Total Credits: Determined by the college

Description
This course provides an exploration of the basics of hand tools, understanding drawings, manual machines and layout. Upon completion of this course the student will be able to interpret drawing information, describe basic symbols and notation and interpret basic GD&T feature control frames. Teamwork, critical thinking, and problem solving are emphasized. Hands-on experience and practical applications are included.

Types of Instruction

<table>
<thead>
<tr>
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Recommended Textbooks


Exit Learning Outcomes

Core Abilities
A. Critical Thinking
B. Professionalism
C. Mechanical Aptitude: Determine the Proper Method/Equipment to Manufacture and Measure Characteristic of a Part
D. Technological Literacy
E. Recognize and Avoid Shop Hazards
Competencies

1. **Access Drawings**
   Learning Objectives
   a. Explain Key Terms
   b. Utilize the Components of Engineering Drawings
   c. Create Title Block
   d. Describe Line Types

2. **Identify Basic Symbols and Notation**
   Learning Objectives
   a. Explain Fillet
   b. Interpret Rounds and Counter-bore
   c. Identify Drawing Nomenclature
   d. Use Symbols and Notation

3. **Determine Tolerances**
   Learning Objectives
   a. Explain Bilateral Tolerances
   b. Explain Unilateral Tolerances
   c. Acknowledge Limit Tolerances
   d. Apply Maximum Material Condition (MMC)
   e. Apply Tolerance Specifications

4. **Explain Types of Machines**
   Learning Objectives
   a. Adapt safety practices with Machines
   b. Demonstrate Basic Machine Maintenance
   c. Identify Tool and Blade Materials
   d. Develop an Understanding of Tool and Blade Characteristics

5. **Apply Classes of Fit**
   Learning Objectives
   a. Define Classes of Fit
   b. Demonstrate Allowances between Parts
   c. Describe Classifications of Fits
   d. Use Machinery Handbook

6. **Define Geometric Dimensioning and Tolerancing (GD&T)**
   Learning Objectives
   a. Explain GD&T
   b. Use Drawing to Define Datum
   c. Demonstrate the Use of a Feature Control Frame
   d. Identify Flatness, Circularity and Cylindricity.
   e. Define Profile and Location Tolerances
   f. Apply Run-out Tolerances
7. **Apply Layout Fundamentals**  
   **Learning Objectives**  
   a. Explain Key Layout Terms  
   b. Use Layout Fluid  
   c. Demonstrate Dye Remover Technique  
8. **Demonstrate Semi-Precision Layout**  
   **Learning Objectives**  
   a. Explain Semi-Precision Layout  
   b. Use Scribe  
   c. Demonstrate Layout with a Combination Set  
   d. Demonstrate Angle Layout with a Combination Set  
   e. Use Center Punches and Other Hand Tools  
9. **Demonstrate Precision Layout**  
   **Learning Objectives**  
   a. Use Height Gage  
   b. Demonstrate the Use of the Precision Angular  
   c. Demonstrate the Use of the Vernier Bevel Protractor  
   d. Use Sine Tools  
10. **Apply Proper Hand Tool Use**  
    **Learning Objectives**  
    a. Identify Shop Tools  
    b. Demonstrate Proper Tool Use  
    c. Demonstrate Safe Shop Practices  
11. **Demonstrate Clamping Methods**  
    **Learning Objectives**  
    a. Explain the Different Clamping Methods  
    b. Use C-Clamp  
    c. Use Parallel Clamp  
    d. Use Hinged Clamp  
12. **Exhibit Deburring Skills**  
    **Learning Objectives**  
    a. Explain File Classifications  
    b. Define the Basic Parts of a File  
    c. Select Proper File for Job  
    d. Demonstrate File Cleaning  
13. **Use Abrasives**  
    **Learning Objectives**  
    a. Explain Abrasives  
    b. Choose Abrasive Material  
    c. Demonstrate Deburring
14. **Apply Knowledge to Saws and Cutoff Machines**  
   **Learning Objectives**  
   a. Adapt Quality Terms  
   b. Compare Inspection and Preventative Processes  
   c. Calculate Speed and Feed  
   d. Develop Sampling Plan  
   e. Create Inspection Plan  
   f. Define Statistical Process Control (SPC)  
15. **Develop Workholding Skills**  
   **Learning Objectives**  
   a. Explain Ferrous Metals  
   b. Explain Nonferrous Metals  
   c. Define Tempering  
   d. Describe Heat Treatment Process  
   e. Characterize Hardness Scales and Testing  
16. **Use Drill Press**  
   **Learning Objectives**  
   a. Demonstrate Drilling Operations  
   b. Apply Countersinking, Spot-facing, and Counterboring Practices  
   c. Identify Various Tap Types and Tap Drill Selection  
   d. Demonstrate Tap Removal Techniques  
17. **Maintain Speeds and Feeds**  
   **Learning Objectives**  
   a. Perform Speed and Feed Operations  
   b. Demonstrate Lubrication  
   c. Use Cutting Fluids  
   d. Demonstrate Measuring of Cutting Fluid Techniques  
   e. Explain Methods of Application
CNC Milling Level 1
Course Outcome Summary

Course Information
Organization South Central College/Dunwoody
Developers Doug Laven, E.J. Daigle
Development Date 9/1/2011
Course Number In accordance with college policy
Potential Hours of Instruction Determined by the college
Total Credits Determined by the college

Description
This course provides the student an introduction to basic milling operations. Upon completion of this course the student will have an understanding of manual and CNC milling practices as well gain knowledge in tooling, machining practices and applied mathematics. Teamwork, critical thinking, and problem solving are emphasized. Hands-on experience and practical applications are included.

Types of Instruction

<table>
<thead>
<tr>
<th>Instruction Type</th>
<th>Contact Hours</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lecture</td>
<td>TBD</td>
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</tr>
<tr>
<td>Lab</td>
<td>TBD</td>
<td>TBD</td>
</tr>
</tbody>
</table>

Recommended Textbooks


Exit Learning Outcomes

Core Abilities
A. Critical Thinking
B. Professionalism
C. Mechanical Aptitude: Determine the Proper Method/Equipment to Manufacture and Measure Characteristic of a Part
D. Technological Literacy
E. Recognize and Avoid Shop Hazards
Competencies

1. **Demonstrate Shop Safety**
   Learning Objectives
   a. Explain Key Terms
   b. Demonstrate Proper Mill Power UP and Power Down Procedures
   c. Demonstrate Proper Lockout/Tag-out Procedures

2. **Identify CNC Milling Machine Types**
   Learning Objectives
   a. Identify and Explain Vertical and Horizontal Spindle Machines
   b. Describe the Machine Axes Used for Milling
   c. Explain Manufacturing Cell

3. **Identify Basic Components of a CNC Milling Machine**
   Learning Objectives
   b. Identify Work Envelope
   c. Identify Control Panel

4. **Use Work Holding Solutions**
   Learning Objectives
   a. Explain Workholding Techniques
   b. Demonstrate Various Workholding Applications
   c. Demonstrate Workpiece Clamping
   d. Use Machine Vices
   e. Apply Workholding Solutions with Chucks, Collet Closers and Indexing Fixtures

5. **Use Tool Holding Solutions**
   Learning Objectives
   a. Acknowledge Cutting Tool
   b. Identify Spindle Types
   c. Demonstrate Tool Attachment to Various Tool Holders

6. **Demonstrate Milling Machine Canned Operations**
   Learning Objectives
   a. Explain Canned Cycles
   b. Apply Holemaking Operations
   c. Demonstrate Peck Drilling Cycles
   d. Demonstrate Single-Pass Drilling

7. **Explore Indexing and Rotary Table Operations**
Learning Objectives
a. Define Parts of the Rotary Table
b. Perform Rotary Table Setup
c. Explain Indexing Head
d. Perform Indexing Head Setup

8. Demonstrate CNC Machining Basics
Learning Objectives
a. Demonstrate Face Milling
b. Demonstrate Squaring a Block
c. Demonstrate Slot Milling
d. Perform Keyseat Milling Operation

9. Describe the two major types of ATCs
Learning Objectives
a. Define Automatic Tool Changers
b. Identify Swing-Arm Type Tool Changer
c. Explain Carousel-Type Tool Changer

10. Utilize Coordinate Geometry
Learning Objectives
a. Explain the X, Y and Z Axes
b. Align Coordinate Positioning
c. Demonstrate Workpiece X, Y and Z Offsets
d. Calculate Tolerances

11. Identify Control System
Learning Objectives
a. Identify Types of CNC Control Panels
b. Demonstrate Soft Key Use
c. Analyze Control Panel Screen Function Labels
d. Explain MDI and Auto Modes

12. Explain Program Planning
Learning Objectives
a. Explain Part Overview
b. Identify Part Material Composition
c. Define Type of Motion for Milling Part
d. Calculate Tool-Change

13. Demonstrate Programming G and M Codes
Learning Objectives
a. Explain G and M Codes
b. Define Screen Display and Keyboard
c. Demonstrate Linear Interpolation for CNC Milling
d. Demonstrate Circular Interpolation for CNC Milling
e. Demonstrate Two-Dimensional CNC Milling

14. **Explain Offsets**
   
   **Learning Objectives**
   
   a. Interpret Work Offsets
   b. Explain Machine Origin and Workpiece Origin
c. Define Workshift
d. Calculate X, Y and Z Offset Settings

15. **Activate Homing Procedure**
   
   **Learning Objectives**
   
   a. Demonstrate Machine Power-Up
   b. Demonstrate Homing Procedure
c. Demonstrate Jog Operation
d. Activate Zero Return Operation

16. **Describe Coordinate Systems**
   
   **Learning Objectives**
   
   a. Acknowledge Machine Coordinate Move Operations on Control Panel
   b. Explain Work Coordinate System
c. Identify Cartesian Coordinate System

17. **Utilize Different Methods for Loading Programs**
   
   **Learning Objectives**
   
   a. Explain Program Entry
   b. Demonstrate Manual Typing of Program into the Control Panel
c. Demonstrate Uploading Program to the Mill from a PC
d. Demonstrate Downloading Program from a PC to the Mill
CNC Turning Level 1

Course Outcome Summary

Course Information

<table>
<thead>
<tr>
<th>Organization</th>
<th>South Central College/Dunwoody</th>
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<tbody>
<tr>
<td>Developers</td>
<td>Doug Laven, E.J. Daigle</td>
</tr>
<tr>
<td>Development Date</td>
<td>8/28/2011</td>
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<tr>
<td>Course Number</td>
<td>In accordance with college policy</td>
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<tr>
<td>Potential Hours of Instruction</td>
<td>Determined by the college</td>
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Description

This course provides the student an introduction to basic lathe operations. Upon completion of this course the student will have an understanding of manual and CNC lathe turning practices as well gain knowledge in tooling, machining practices and applied mathematics. Teamwork, critical thinking, and problem solving are emphasized. Hands-on experience and practical applications are included.

Types of Instruction

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Recommended Textbooks


Exit Learning Outcomes

Core Abilities

A. Critical Thinking
B. Professionalism
C. Mechanical Aptitude: Determine the Proper Method/Equipment to Manufacture and Measure Characteristic of a Part
D. Technological Literacy
E. Recognize and Avoid Shop Hazards

Competencies

1. Apply Shop Safety
   Learning Objectives
   a. Explain Key Terms
   b. Adapt Basic OSHA Requirements
   c. Demonstrate Proper Chip Handling
   d. Demonstrate Proper Lockout/Tag-out Procedures
   e. Clean Workstation

2. Identify Basic Components of a CNC Lathe
   Learning Objectives
   a. Identify and Explain the Carriage
   b. Identify and Explain the Spindle
   c. Identify and Explain the Headstock and Tailstock
   d. Identify and Explain the Bed and Ways
   e. Use Control Panel

3. Describe CNC Machine Modes
   Learning Objectives
   a. Analyze Manual Data Input (MDI)
   b. Identify the Jog Feature
   c. Acknowledge Feed Rate Override and Rapid Override Feature
   d. Demonstrate Machine Home Position Sequence

4. Use Workholding Solutions
   Learning Objectives
   a. Explain the Difference between Universal and Independent-type Chucks
   b. Demonstrate Various Chuck Applications
   c. Demonstrate Various Collet Applications
   d. Demonstrate Faceplates, Centers and Mandrels Applications
   e. Apply Workholding Solutions with Turning Operation

5. Explain Depth of Cut, Speed & Feed and Time Calculation
   Learning Objectives
   a. Explain Cutting Rates
   b. Identify Material
   c. Calculate Spindle RPM for Various Cutting Operations
   d. Calculate Machining Time
6. **Demonstrate Facing and Turning Operations**
   **Learning Objectives**
   a. Apply Facing Operation
   b. Apply Turning Operation
   c. Describe Basic Tool Geometry
   d. Use Filing and Polishing Methods

7. **Demonstrate Center Drilling**
   **Learning Objectives**
   a. Explain Reasons for Center Drilling
   b. Perform Center Drilling
   c. Use Spotting Drill
   d. Create a Hole using the Lathe
   e. Apply Reaming, Boring, Counter-boring and Countersinking Methods

8. **Learn Grooving, Cutoff and Knurling Operations**
   **Learning Objectives**
   a. Create Internal Shoulder
   b. Demonstrate Form Cutting
   c. Produce Parts using Grooving and Cutoff Methods
   d. Perform Knurling Operation

9. **Demonstrate Lathe Threading**
   **Learning Objectives**
   a. Define Thread Terminology
   b. Perform Calculations required for Thread Cutting
   c. Demonstrate Proper Setup for Cutting Threads
   d. Verify Thread Measurement and Classes of Fit

10. **Demonstrate Taper Turning**
    **Learning Objectives**
    a. Define a Taper
    b. Perform Taper Calculations
    c. Recognize Taper Per Inch (TPI) and Taper Per Foot (TPF)
    d. Demonstrate Setup Procedures for Taper Turning

11. **Identify CNC Lathe Components**
    **Learning Objectives**
    a. Identify Types of CNC Lathes
    b. Define Axes
    c. Analyze Programming Approach
d. Explain Lathe Features and Specifications

12. **Utilize Coordinate Geometry**
   Learning Objectives
   a. Explain Real Number System
   b. Explain Rectangular Coordinates
   c. Explain Point of Origin
   d. Explain Quadrants
   e. Define Axes and Planes

13. **Identify Control System**
   Learning Objectives
   a. Explain General Description of Operation Panel
   b. Define Screen Display and Keyboard
   c. Select Parameter Settings
   d. Explain System Memory and Defaults

14. **Acknowledge Part Drawing**
   Learning Objectives
   a. Interpret Part Drawing
   b. Review Title Block
   c. Explain Dimensioning
   d. Calculate Tolerances

15. **Explain Program Planning**
   Learning Objectives
   a. Define Part Complexity
   b. Choose Steps in Program Planning
   c. Demonstrate Programming

16. **Identify M & G Codes**
   Learning Objectives
   a. Analyze Coordinate Positioning
   b. Acknowledge Types of Motion
   c. Identify Various Interpolation
   d. Adapt Offset Commands
   e. Administer M-Codes

17. **Demonstrate Coordinate Positioning for CNC Turning**
   Learning Objectives
   a. Demonstrate Radial and Diametral Programming
   b. Demonstrate Linear and Circular Interpolation for CNC Turning
c. Demonstrate Non-Axis Motion Commands
d. Demonstrate Tool Nose Radius Compensation (TNRC) for CNC Turning

18. **Describe Canned Cycles for CNC Turning Applications**

**Learning Objectives**

a. Demonstrate Holemaking Canned Cycles
b. Apply Tapping Canned Cycles
c. Demonstrate Rough and Finish Turning Canned Cycles
Internship
Course Outcome Summary
Course Information
Organization South Central College/Dunwoody
Developers Doug Laven, E.J. Daigle
Development Date 9/19/2011
Course Number In accordance with college policy
Potential Hours of Instruction A minimum of 8 weeks
Total Credits Determined by the college

Description
This course is an eight week paid internship designed to facilitate learning in the manufacturing environment. Course competencies are developed and approved as a cooperative learning contract between employer, student and course instructor. Students are required to perform bi-weekly reports and a final presentation to present their individual learning competencies to the rest of their class. Instructors make at least two site visits during the eight week internship to assess progress.

Instruction Type Contact Hours Credits
Practicum/Internship TBD TBD

Textbooks
Internship Handbook – Developed by the college and Includes Learning Contract that must be approved prior to starting internship.

Exit Learning Outcomes
Core Abilities
A. Critical Thinking
B. Professionalism
C. Mechanical Aptitude: Determine the Proper Method/Equipment to Manufacture and Measure Characteristic of a Part
D. Technological Literacy
E. Recognize and Avoid Shop Hazards

Competencies
1. Demonstrate applicable shop safety standards
2. Operate CNC equipment to produce real-world product
3. Inspect parts for quality
4. Other competencies as laid out in learning contract
National Tools

✓ Executive Summary and Overview
✓ Curriculum
✓ College Marketing
✓ Employer Communications
✓ Student Brochure
✓ The Jobs Council’s Interim Report to the President
✓ Certification Program Contacts and Agreements
WE NEED the RIGHT SKILLS NOW

With high unemployment it's hard to believe that 80% of manufacturers report shortages in skilled labor. We need a fast-track talent innovation to ensure that we have the right people with the right skills in the right jobs — right now. We need the Right Skills Now for Manufacturing.
I HAVE the RIGHT SKILLS NOW

Manufacturers are hiring for great jobs working with high-tech equipment making products that make our world smarter, greener, and faster. How can I get the training I need to prove I have the right skills for the right jobs — right now? I need the Right Skills Now for Manufacturing.
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WE NEED the RIGHT SKILLS NOW

RIGHTSKILLSNOW.ORG
As our country struggles with high unemployment it’s hard to believe that 80% of manufacturers report moderate to serious shortages in skilled talent.

We need a fast-track talent innovation to ensure that manufacturers have the right people with the right skills in the right jobs — right now. That’s why the Manufacturing Institute, ACT, the National Institute of Metalworking Skills, and the President’s Job Council have created the Right Skills Now for Manufacturing — a rapid ready training program delivered through our community and technical colleges.

**A RAPID READY TRAINING PROGRAM**

Building on the success of the NAM-Endorsed Manufacturing Skills Certification System, the Right Skills Now program accelerates foundational employability and technical skills training from months to weeks — getting skilled talent to the shop floor even faster. This allows manufacturers to:

- **Reduce or eliminate time and effort wasted on unqualified or uninterested candidates**
- **Compare job candidates more equitably**
- **Validate whether a potential hire has both the book smarts and job skills needed for manufacturing jobs**
- **Reduce employee turnover**
- **Invest in a more qualified workforce to increase productivity and competitiveness**
- **Maintain consistent and regular HR practices through changing business climates**

**GET INVOLVED AT** [RIGHTSKILLSNOW.ORG](http://RIGHTSKILLSNOW.ORG)
NATIONAL CAREER READINESS CERTIFICATE (NCRC) FOCUSED ON:
Interpersonal Skills
Integrity
Professionalism
Initiative
Dependability & Reliability
Lifelong Learning
Science
Basic Computer Skills
Mathematics
Reading
Writing
Communication-Listening & Speaking
Critical & Analytical Thinking
Information Literacy
Business Fundamentals
Teamwork
Adaptability/Flexibility
Marketing & Customer Focus
Planning & Organizing
Problem Solving & Decision Making
Working With Tools & Technology
Checking, Examining & Recording
Sustainable Practices

TECHNICAL-MACHINING AND METALWORKING SKILLS FOCUSED ON:
Measurement, Materials & Safety
Job Planning, Benchwork & Layout
CNC Milling
CNC Turning
Get people with the **RIGHT SKILLS NOW** through fast-track training programs at:

**SOUTH CENTRAL COLLEGE**

Faribault Campus  
1225 Third Street SW  
Faribault, MN 55021

North Mankato Campus  
1920 Lee Boulevard  
North Mankato, MN 56003

**DUNWOODY COLLEGE OF TECHNOLOGY**

818 Dunwoody Boulevard  
Minneapolis, MN 55403

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RIGHTSKILLSNOW.ORG

I HAVE the RIGHT SKILLS NOW
ATTENTION JOB SEEKERS
Did you know that the average salary in manufacturing in Minnesota is $66,000 — 48% higher than other industries?

Manufacturers need people like you now to drive innovation on the plant floor and compete in the global marketplace. Each of these companies need individuals with street smarts and book smarts who can run high-tech machines and develop the complex products that make our world smarter, safer, greener, and faster. There are almost 8,000 manufacturers in Minnesota today and that number continues to grow. And they need YOU.

DO YOU HAVE THE RIGHT SKILLS?
The Right Skills Now rapid-ready training program for manufacturing puts you on a for-credit education and career pathway. Get credit for school and on-the-job training all while you work. You’ll also earn industry-recognized credentials that have immediate value in the workplace.

GET THE RIGHT SKILLS NOW
Join the movement for a better future with a career in manufacturing.

SOUTH CENTRAL COLLEGE

Faribault Campus
1225 Third Street SW
Faribault, MN 55021

North Mankato Campus
1920 Lee Boulevard
North Mankato, MN 56003

DUNWOODY COLLEGE OF TECHNOLOGY

818 Dunwoody Boulevard
Minneapolis, MN55403

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TAKING ACTION, BUILDING CONFIDENCE

FIVE COMMON-SENSE INITIATIVES TO BOOST JOBS AND COMPETITIVENESS

INTERIM REPORT

JOBS COUNCIL

THE WHITE HOUSE
WASHINGTON

PRESIDENT'S COUNCIL ON JOBS AND COMPETITIVENESS
In the 21st century global marketplace, a nation’s economy can only be as strong as the skills of its people. While the United States has traditionally enjoyed a competitive advantage thanks to the productivity of its overall workforce, a growing mismatch has emerged in key sectors between worker preparation and business needs. Among the dimensions of this skill gap:

- The McKinsey Global Institute estimates that the United States could be short as many as 1.5 million college graduates by 2020. The Georgetown University Center for Education and the Workforce's estimates is even more alarming: a 3 million shortfall by 2018. This could mean losing our current lead in areas that give us an edge in business and engineering innovation.

- While the United States currently has an edge in “Big Data” analytics—cutting-edge firms that harness the power of massive databases to derive new business applications and insights—we'll be short 1.5 million data savvy managers and 190,000 deep data analysts in the next five years according to the McKinsey Global Institute.

- As baby-boomer retirements loom, U.S. manufacturing faces a deficit of skilled workers, ranging from university-educated aerospace engineers to community college-trained precision machinists. Currently U.S. manufacturing is the most productive in the world. Who will fill the gap left by retiring baby boomers in this critical area?

- And the skills gap is not just at the level of rocket scientists and PhDs; the McKinsey Global Institute predicts an even larger 1.6 million shortage of workers with technical or vocational level training.

- We have a persistent unmet demand of 400,000 to 500,000 jobs openings in the healthcare industry, a higher rate than in other service industries, many of which could be filled by training workers in community colleges.

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**College Graduates by Specialization**

<table>
<thead>
<tr>
<th>Specialization</th>
<th>2020 Projections</th>
<th>Change</th>
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<tbody>
<tr>
<td>Business</td>
<td>11.5</td>
<td>1.7%</td>
</tr>
<tr>
<td>Social Science</td>
<td>10.6</td>
<td>1.2%</td>
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<tr>
<td>Science, Technology, Engineering and Math</td>
<td>9.3</td>
<td>0.8%</td>
</tr>
<tr>
<td>Education</td>
<td>8.1</td>
<td>0.4%</td>
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<tr>
<td>Humanities / Arts</td>
<td>8.0</td>
<td>1.7%</td>
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<tr>
<td>Health</td>
<td>4.5</td>
<td>4.3%</td>
</tr>
<tr>
<td>Other</td>
<td>4.5</td>
<td>3.3%</td>
</tr>
</tbody>
</table>

The skills mismatch will worsen over time as the number of graduates in science, technology and math continues its slow growth.


Bottom line: Analysis by the IMF and the Federal Reserve Bank of Minneapolis suggest the skills gap may account for one-quarter to one-third of today's unemployment rate. What the skills gap really means is that even in the current jobs crisis, jobs are going unfilled today partly because employers can't find workers with the appropriate skills. Meanwhile, the problems plaguing our K-12 education system—where U.S. schools depressingly rank in the middle to bottom of international comparisons—pose fundamental threats to our future prosperity.

The Council believes there is an urgent near-term agenda on talent that can help ease today’s jobs woes, and a broader long-term talent agenda to renew America’s competitiveness. In this interim report we focus on ways to accelerate
The skills gap may account for one-quarter to one-third of today’s unemployment rate.”

near-term progress through private sector-led initiatives. (America’s longer-term talent strategy will be discussed in our year-end report).

To help alleviate the near-term skills gap, the Council has organized consortia of private-sector leaders to launch nationally replicable programs to train workers in high-opportunity sectors quickly. We believe that once these initiatives prove that we can capture the jobs opportunity that is the flip side of today’s skills gaps, policymakers will be emboldened to expand these efforts. In addition, to further plug the near-term skills gap, the Council has already unveiled a business-led effort to boost the supply of engineers in the United States. And nearly the entire Council agrees on calling on Congress to open our shores to high-skilled immigrants who help build businesses that fuel growth and jobs. We discuss these actions and ideas in turn.

Advanced manufacturing training in Minnesota
A just-released study by the Manufacturing Institute reported that over 80% of manufacturers cannot find people to fill their skilled production jobs. As a result, there are over half-a-million manufacturing jobs open right now. Responding to this talent crisis, and the need to create jobs in this country, the Council worked with the Manufacturing Institute to tailor their national manufacturing certification system into a nationally replicable fast-track solution that can deliver “just in time” talent to small manufacturers. This accelerated program allows individuals to earn both national industry certifications and college credit in 16 weeks, preparing them for immediate employment in high-quality manufacturing jobs and giving them a solid foundation to advance in higher education and careers.

This Council-led initiative, called Right Skills Now, is an acceleration of the National Association of Manufacturers-endorsed Manufacturing Skills Certification System, which includes nationally portable, industry-recognized certifications that are combined with for-credit education programs. Right Skills Now fast tracks and focuses career training in core employability and technical skills by “chunking” relevant curriculum that leads to interim credentials in critical machining skills.

While the initial model focuses on machining skills, for which there is immediate demand, the program can accelerate skills development in other foundational skills areas for advanced manufacturing, like production or welding. By following the NAM-endorsed Manufacturing Skills Certification System, these education pathways are directly aligned to career pathways in manufacturing, allowing students progressing through the programs to earn college credit toward a degree, a national certification with labor market value, and the hands-on technical experience to be successful on the job from day one.

Right Skills Now is now being deployed at two Minnesota colleges, Dunwoody College of Technology and South Central Community College. Other partners include ACT, the certifying body for the National Career Readiness Certificate (the foundational credential in the Skills Certification System) and the National Institute of Metalworking Skills (NIMS), the certifying body for the series of machining and metalworking credentials in the System. In concert with Skills for America’s Future, the Council, through Right Skills Now, is leveraging the ongoing work of NAM and our other partners to help eliminate the skills gap for 500,000 manufacturing jobs in the next few years.

Healthcare workforce training in New York and California
Continuing growth in the healthcare sector nationally, along with the promise of high-wage, high-skill jobs, is drawing an increasing number of people to the field. New York’s example is typical. With nearly 12% of total state employment coming from health care and the sector’s growth expected to increase another 16% by 2018, health care will continue to be a major source of new jobs in New York.

However, as is the case nationally, a skills mismatch exists between those seeking employment and the positions employers are seeking to fill. This mismatch occurs at several levels as new graduates and experienced workers look to advance their careers and adjust to new healthcare service delivery models. As a result, positions that could be filled are currently sitting open. Nationally, there are roughly half a million job vacancies in healthcare, a 33% higher rate than in other service industries. The Council believes that proving that we can fix what causes this skills gap—an outmoded healthcare curriculum not suited to today’s needs, a mismatch between graduates and the work experiences necessary to make them employable, and the lack of a clear progression of training courses that interested students can tailor to their careers—can go a long way toward helping capture the healthcare jobs opportunity.

To maximize this opportunity, the Council asked stakeholders in New York and California to develop national models for accelerated training and placement of healthcare workers into available jobs within their states. Both states included leadership from industry, labor, academia, government and workforce-development organizations in designing their initiatives. Governor Andrew Cuomo, Mayor Michael Bloomberg and the Partnership for New York City led New York’s effort. Lieutenant Governor Gavin Newsom, the California Community...
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✓ Student Brochure
✓ The Jobs Council’s Interim Report to the President
✓ Certification Program Contacts and Agreements
Fast track training

- Transitioning Military
- Unemployed/underemployed
- Job seekers

1 semester + internship
- Measurement, Materials and Safety
- Job Planning, Benchwork and Layout
- CNC Operator - Turning Level 1
- CNC Operator - Milling Level 1

National Institute for Metalworking Skills®

2+2 Bachelor of Science
Associate of Applied Science (Machine Tool Technology AAS)

Job!
Gaining Skills for Today’s and Tomorrow’s Manufacturing

**Academic, Personal, and Career Skills**

- **Personal effectiveness:** *show up on time, ready for work*
- **Essential academic skills in reading, writing, math, and using and locating information:** *communicate effectively and interpret key instructions*
- **Workplace skills:** *work in teams and problem-solve*

**Technical Skills**

Hands-on experience + practical application of:

- Safety
- Precision Measurement Tools and gages
- Quality Assurance
- Material Composition
- Engineering Drawings, Symbols & Notation
- CNC

**Nationally portable, industry-recognized credentials**

Right Skills Now for Manufacturing
ACT IMPLEMENTATION FOR RIGHT SKILLS NOW

Contact:

KeyTrain®

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340 Frazier Avenue
Chattanooga, TN 37405
(423) 266-2244 - voice
(423) 266-2111 - fax
PATHWAYS TO WORKPLACE SUCCESS
ACT WORKFORCE DEVELOPMENT

ACT is the world leader in developing innovative workforce solutions for the global marketplace. The ACT Work Readiness System offers comprehensive, evidence-based solutions to support skills advancement and workplace success.

ACT’S WORK READINESS SYSTEM

ACT’s Work Readiness System helps individuals achieve workplace success—improving the overall quality and readiness of the American workforce.

**Job Analysis**
- Access one of the largest, most robust occupational profiles databases
- Identify essential skills and skill levels for selection, hiring, and training

**Assessments**
- Measure foundational and personal skills
- Verify “real world” skills critical to job success

**Training & Curriculum**
- Identify skill gaps
- Improve workplace skills

**Certification**
- Earn portable credentials
- Build Career Pathways

**Research & Analytics**
- Understand workforce supply and demand
- Create evidence-based workforce solutions

**Benefits**
- Helps career seekers prove they have the skills needed to succeed
- Connects employers with properly skilled employees
- Offers training and curriculum solutions to close skill gaps
- Provides evidence-based credentials derived from extensive research including more than 17,000 occupational analyses
- Delivers a full range of customized professional credentialing services
- Improves the overall quality and readiness of the American workforce
CAREER PATHWAYS START HERE

ACT’s workforce solutions support skill building and portable credentials for career pathways using industry competency models. These models define the foundational and technical skills necessary in economically vital industries and sectors of the American economy. ACT’s workforce development solutions closely align to the competencies identified for industry sectors.

ACT Workforce Solutions

» Document essential ready-for-work skills with the National Career Readiness Certificate

» Measure additional foundational and personal skills using the WorkKeys® assessment system

» Define industry/occupation-specific credentials with ACT Pro™

Industry Competency Models

The U.S. Department of Labor sponsored the development of industry competency models in cooperation with sector partners. The models help promote an understanding of the skill sets and competencies essential to educate and train a globally competitive workforce.

Competency models have been created for the following industries:

» Advanced Manufacturing
» Aerospace
» Automation
» Bioscience
» Construction–Heavy
» Construction–Residential
» Energy
» Entrepreneurship

» Financial Services
» Hospitality/Hotel and Lodging
» Information Technology
» Mechatronics
» Retail
» Transportation
» Water Sector

Learn more about Industry Competency Models at www.careeronestop.org/CompetencyModels.

ACT 101 ACT Drive | Iowa City, IA 52243 | 800/967-5539 | www.act.org/workforce
ABOUT ACT

Helping People Achieve Education and Workplace Success

ACT is the world leader in developing innovative workforce solutions for the global marketplace. The ACT Work Readiness System offers comprehensive, evidence-based solutions in the areas of job analysis, skills assessments and certifications, training and curriculum, and analytical tools to support skills advancement and workplace success.

We help millions of people in high schools, colleges, professional associations, businesses, and government agencies build their skills to increase global competitiveness and develop successful career pathways. Our solutions are based on extensive research and are delivered through our nationwide network of test centers.

PARTNER WITH ACT

ACT partners with associations and advocacy organizations representing the needs of industry sectors to develop a national skills credentialing system.

To learn more about establishing a career pathway for your sector, contact workforce@act.org.

For more information about the ACT Work Readiness System and other leading-edge solutions from ACT’s Workforce Development Division, call 800/967-5539 or visit www.act.org/workforce.

To find a testing site near you, visit http://act.org/actcenters/locate/index.html.

ACT® is a trademark of ACT, Inc. ACT® and WorkKeys® are registered trademarks of ACT, Inc., in the U.S.A. and other countries. The National Career Readiness Certificate logo is a registered trademark of ACT, Inc.

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Step 1: Client enters order on the ACT Workforce website.

http://www.act.org/workforce/order

Step 2: ACT returns the contract for services to the client.

Step 3: Client signs and returns contract to ACT.

Step 4: ACT sets up client for delivery and provides training material.

Step 5: Upon completion of training the client provides specific “Realm” information. Test delivery can begin!
ACT Workforce Curriculum

KeyTrain® setup process

Step 1: Client receives quote for site license.

Step 2: Client provides a purchase order.

Step 3: Client completes and submits Site License Information Sheet.

Step 4: ACT staff sets up the account and emails the client the license and KeyTrain User Guide.

Step 5: Implementation Training is arranged with client.

Step 6: Accounts are monitored for usage and additional support is provided where needed.

KeyTrain®
Site Setup Process


WorkKeys and KeyTrain are registered trademarks and the National Career Readiness Certificate is a trademark of ACT, Inc.
NIMS Implementation for Right Skills Now

Contact:

James A. Wall
Deputy Director
jwall@nims-skills.org
NIMS

The National Institute for Metalworking Skills (NIMS) is a national non-profit organized under section 501 (c) (3) of the Internal Revenue Code. NIMS is audited annually in accordance with the requirements of OMB Circular A-133 and is governed by a volunteer Board of Directors representing industry, labor, and education.

NIMS was formed in 1995 by the metalworking trade associations to develop and maintain a global competitive workforce. NIMS fulfills its mission in five ways:

- Skill Standards
- Individual Skill Credentials
- Training Program Accreditation
- Competency-Based Apprenticeship
- Structured On-the-Job Training

NIMS is accredited by the American National Standards Institute (ANSI) as a Developer of American National Standards. The NIMS standards are industry-written and industry-validated in accord with the NIMS procedures that have been accredited by ANSI. The NIMS standards cover 24 occupational areas within the metalworking industry.

NIMS skill certifications include performance assessments and related knowledge exams that are based on the skill standards. The credentials are used by industry as a basis for recruiting, hiring, placement and promotion, and by training and educational institutions as performance measures. Through December 31, 2010, NIMS had issued over 26,000 credentials.

NIMS program accreditation is gained by companies and educational institutions whose training programs meet NIMS quality standards. The process includes both an internal analysis and an on-site audit.

NIMS 21st Century Apprenticeship is a competency-based training system that integrates national certifications with on-the-job training and related technical instruction. NIMS National Guideline Standards for Competency-based Apprenticeship have been certified by the U.S. Department of Labor.

NIMS Structured On-the Job Training includes the development and national certification of company personnel responsible for creating, delivering and managing on-the-job training.

All NIMS standards, certifications and programs are industry-written and industry-validated for the precision manufacturing industry. The standards are subject to regular, periodic reviews under the procedures as accredited and audited by ANSI.
NIMS Credentialing Program

NIMS National Certifications

There are 52 individual NIMS certifications in which individuals can earn national, portable credentials. With the exception of the Measurement, Materials and Safety credential, which requires only a theory examination, all NIMS credentials require both performance and theory examinations.

Standards Based

The NIMS credentials are based on the national skill standards. The certification requirements are designed and piloted by the industry through rigorous and highly disciplined procedures.

Performance Requirements

Candidates first complete the required performance examination. In Machining Level I and II, this requires the manufacturing of a part or a program and making the part from a NIMS-issued print. For other certifications; e.g., Stamping, CNC Operator, or Tool & Die, the candidate will be tested on-the-job, or in a lab, using skill checks contained in a Credentialing Achievement Record through which the candidate is evaluated three to five times against the competencies for that process occupation. There is a 100 percent requirement for the performance; i.e., parts must meet all features on the print and all skill checks must be met.

Knowledge Requirements

Following satisfactory completion of the performance requirements, the candidate must pass a related knowledge examination. Passing of the knowledge exam indicates that the candidate understands the basic principles, concepts and methodologies of the manufacturing process involved with that credential.

Uses of the Credentials

Companies are increasingly preferring or demanding the NIMS credentials. General Dynamics in Greensboro requires NIMS credentials from every applicant. Oklahoma City companies pay an extra 50 cents per hour for NIMS credentials. OSMI in Ohio and South Carolina requires NIMS credentials for pay raises. An ad by the Houston Port Authority requires NIMS credentials.

Schools are using the credentials as course and graduation requirements. Schools from Northern Maine Community College on the East Coast to Petaluma Technical School on the West are using NIMS credentials as course and graduation requirements. Company personnel in Hennepin College’s (MN) customized job training all earn credentials at Level I, II & III. Marshall University requires NIMS level I for its degree and candidates receive 43 credits for that achievement at Marshall. In Pennsylvania and Connecticut, all high school students test against four NIMS credentials.
AGREEMENT

Unlimited Registration and Testing

For a period of five years, NIMS will provide the program:

- Unlimited Number of Registrations
- Unlimited Number of Candidate Tests at all Levels for all Manufacturing Credentials

This is applicable to all students and instructors who are enrolled in the program.

The NIMS Right Skills Now agreement lasts for two years upon execution.

Accreditation Charges Waived

During the time of this agreement, the program may apply to be accredited by NIMS and host the NIMS evaluation team with the normal NIMS fee of $1,500 for accreditation waived. Any accreditation earned through the NIMS Right Skills Now agreement shall expire at termination date of this agreement. The accreditation may be renewed with the renewal of this agreement.

Immediate Access

NIMS will provide immediate access to the Unlimited Registration and Testing for the program upon execution.

Fee

This is a fixed price contract. The fee to the program for the NIMS Right Skills Now agreement is $5,000 annually per institution. The initial payment will not be due until 60 days from the date of execution.

Cancellation/Modification

This Agreement is subject to cancellation or modification upon consent of both parties.

This Agreement covers all NIMS Manufacturing Credentials. It does not cover the Structured On-The-Job Training Program (OJT Trainer, OJT Senior Trainer, and Company Training Coordinator)

Acceptance

_________________________________________  _________________________
Signature                                          Date

_________________________________________  _________________________
Stephen C. Mandes, Executive Director, NIMS       Date
RIGHT SKILLS NOW
FOR MANUFACTURING

GET INVOLVED AT RIGHTSKILLSNOW.ORG