

# CTE: THE KEY TO ECONOMIC DEVELOPMENT

Manufacturing:  
Is the  
**largest**  
**industry**

in the United States<sup>1</sup>



Accounts for  
12 percent of U.S. GDP<sup>2</sup>



Provides about one  
in six private-sector  
jobs<sup>3</sup>

What is the pathway to these  
fulfilling and essential careers?

**Career and Technical Education!**



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# Advanced Manufacturing

The growing sub-field of advanced  
manufacturing:

- tops the list of key and emerging industries in many states
- uses cutting-edge technology and processes to make products that are high tech, unique, improved and less expensive
- requires high-skilled workers

What jobs are available in advanced  
manufacturing?

Manufacturing will continue to be the largest industry in the United States through 2020, with advanced manufacturing accounting for much of production growth.<sup>4</sup> In 2010, 13 percent of U.S. workers were employed in manufacturing; by 2025, 3.5 million manufacturing jobs will need to be filled.<sup>5</sup> Talent shortages mean skilled employees are in demand: About 70 percent of manufacturing executives report a lack of workers with the necessary computer and technical skills.<sup>6</sup> Job growth is predicted for setters, operators and tenders of mixing and blending machines for chemical manufacturing, as well as computer-controlled machine tool operators, maintenance and repair workers, and purchasing agents.<sup>7</sup>

Manufacturing is well known for paying a family-sustaining wage, even for workers with less than a college degree. The average manufacturing employee in 2013 earned more than \$77,000 including benefits, while machinists and welders with at least a high school diploma can earn above the national median wage of \$34,750.<sup>8</sup>

By 2018, 42 percent of jobs in manufacturing will require some postsecondary education, such as a postsecondary certificate, an associate degree or a license.<sup>9</sup> Industry-recognized certifications are also a critical asset for this sector. Advanced manufacturing occupations require academic, employability and technical skills, including skills in quality production processes, maintenance, safety and customer needs. In addition, 12 percent of managerial and professional office jobs are in manufacturing.<sup>10</sup> Advanced manufacturing careers include:

- machinists
- production supervisors
- inspectors
- engineers
- accountants
- business administrators
- plant managers
- lineworkers



## Endnotes

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## How does CTE prepare the advanced manufacturing workforce?

Career and technical education (CTE) prepares high school, postsecondary and adult students for careers in advanced manufacturing through:

- the national Career Clusters® Framework—including Career Clusters and pathways in manufacturing, STEM and business management and administration—which outlines course progressions that help students explore career options and prepare for college and career success
- CTE courses in production systems, computer-integrated manufacturing, machining and plastics processing, all integrated with rigorous academics
- work-based learning experiences, such as Cardinal Manufacturing, a manufacturing business operated by high school students in Wisconsin, as well as apprenticeships and internships on-site at manufacturing facilities<sup>11</sup>
- career and technical student organization enrichment experiences, such as SkillsUSA and Technology Student Association competitions in automated manufacturing technology and manufacturing prototype<sup>12</sup>
- opportunities to earn stackable postsecondary certificates, degrees and industry-recognized certifications, such as the Manufacturing Skill Standards Council Certified Production Technician and Certified Logistics Technician credentials<sup>13</sup>

## What are promising programs in advanced manufacturing?

NASA is providing a unique learning opportunity for students in the Machine Tool Technology program at **Mount Washington Valley Career and Technical Center (MWVCTC)**, part of Kennett High School in Conway, New Hampshire. MWVCTC is one of only 40 schools nationwide chosen for the High Schools United with NASA to Create Hardware (HUNCH) program. HUNCH recruits secondary and middle school students to help address challenges at the International Space Station. The program enables students to build their skills in aerospace manufacturing, while providing NASA with cost-effective hardware, such as the mechanical pencil designed and manufactured by MWVCTC's Machine Tool Technology program. The MWVCTC machining program is project based, including extensive math and drafting content; offers students the chance to earn five college credits through the state's Running Start program; and has a prior history of excellence, as demonstrated by its performance in SkillsUSA competitions.<sup>14</sup>

Forsyth Tech in Winston-Salem, North Carolina, is piloting the **National Association of Manufacturers (NAM)-endorsed Manufacturing Skills Certification System**, offering industry certification exam opportunities for students enrolled in computer-integrated machining, mechanical engineering technology, welding and industrial systems technology for-credit programs. The NAM-endorsed Skills Certification System's nationally portable, industry-recognized and stackable 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. In addition to Forsyth Tech, many North Carolina community colleges offer training to prepare students for at least one of the industry-recognized certifications that are part of the NAM-endorsed Skills Certification System. These programs are reaping results: In 2014, 7,494 manufacturing-related certifications were awarded in North Carolina.<sup>15</sup>

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