Mapping Ohio's Manufacturing Skills Assets

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Ohio Association of Community Colleges

ACKNOWLEDGEMENTS

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Introduction

For the past 200 years, Ohio's economy has been built on the success of its manufacturing sector. From the development of mechanized production at the end of the 19th century to the growth of the steel, glass, rubber, automobile and coal industries in the 20th century, and to the development of biotechnology, advanced manufacturing and materials engineering in the early years of the 21st century, Ohio manufacturers have been pioneers in creating sustainable businesses and well-paying jobs – and in building better lives for millions of workers and families.

A robust manufacturing sector is an important indicator of Ohio's and the nation's capacity to innovate and prosper. Yet, today, the good times and the economic opportunities generated by manufacturers are in jeopardy. Jobs are being lost in both traditional and high-tech industries. Concerns are being heard about the future viability of whole industries. And questions are being raised about the manufacturing sector's ability to compete in a world where innovation and talent reign supreme.

In this environment, numerous obstacles to the competitiveness of manufacturing must be addressed – and removed. Together, private industry and government must respond to and capitalize on the effects of globalization. They must streamline the regulation process for manufacturers, just as they must find ways to ensure access to affordable and reliable energy. They must create effective incentives for manufacturing and encourage Ohioans to pursue careers in this economic sector. And most importantly, they must create a network of education, training, research and incubation centers to develop a highly-skilled workforce, commercialize advanced manufacturing technologies and support the start-up of innovative businesses.

A few years ago, the National Association of Manufacturers (NAM) queried its members about these experiences in identifying and recruiting skilled workers. In "The Skills Gap: The Shortage of Qualified Workers – A Growing Challenge to the American Economy," the NAM later reported that 88 percent of manufacturers were having difficulties finding qualified candidates in at least one job function, from unskilled production-line positions to highly technical computer programmers. It also said that 60 percent of manufacturers typically rejected half of all applicants as unqualified.

About the same time, Peter Drucker pointed to the supply of knowledge workers – men and women capable of performing sophisticated, technology-related tasks – as America's sole advantage in the global economy. Yet, a decade letter this asset is being threatened. According to the NAM, how we meet growing skills shortages – through increased choice and competition in education, a more streamlined and effective job and vocational training apparatus, and greater emphasis on technology education is one of the biggest challenges facing America's 21st century economy.

For Ohio, these are serious challenges. But none is more critical than the challenge of closing the state's ***manufacturing skills gap.*** Research and the experience of many Ohio manufacturers confirm that the state's skills gaps are persisting and becoming more serious – and that it is limiting manufacturers' ability to innovate and compete.

However, the news is not all bad on the manufacturing front. Schools, colleges and universities are taking steps to ensure that their graduates are ready to succeed in the workplace. There is a growing awareness that curricula – at all levels – must be better aligned with employers' skills needs. Educators and manufacturers are beginning to work collaboratively to give more students hands-on learning experiences through a variety of internships, mentorships and apprenticeship programs. And, interest is growing in the development of explicit skill standards capable of driving and supporting a Manufacturing Skills Certification System

No one believes that a system of skill standards is some sort of "magic bullet" for employers who cannot find qualified workers. Yet, a skills certification system with portable, industry-recognized credentials can be part of the solution and has drawn the support of Governor Strickland, the Governor's Workforce Policy Advisory Board, the Ohio Board of Regents and the Ohio Association of Community Colleges. Many of Ohio's postsecondary institutions are already using the ACT WorkKeys National Career Readiness Certificate, as well as certificates issued by the National Institute for Metalworking Skills (NIMS), the Manufacturing Skills Standards Council and the American Welding Society to assess the work readiness of their students. And virtually all of Ohio's adult and college programs use industry or business advisory councils to improve alignment and to keep the content of their instructional programs current.

The development of a manufacturing skills certification system will have important consequences for Ohio's schools, colleges and universities – and specifically for its high schools, community colleges and adult career and technical centers. Ultimately, such an initiative will have implications for curriculum, instructional approaches, assessments and testing, credit transfer and student mobility, and a wide range of other practices in both educational institutions and the manufacturing community.

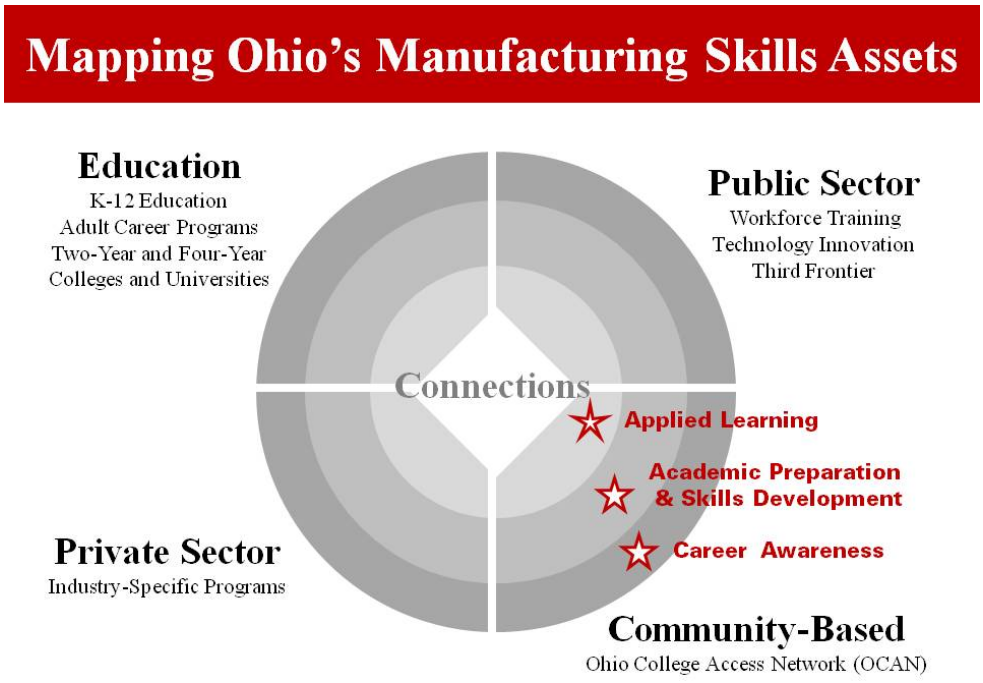
To support this work, The Manufacturing Institute, an affiliate of the NAM, through a grant from the Bill & Melinda Gates Foundation, has funded this review of the ***state's manufacturing skills assets*** – that is, the programs, resources and organizations that could be used to support the implementation of a manufacturing skills certification system in Ohio. The asset map presented in this document has been prepared under the direction of the Ohio Association of Community Colleges. It seeks to address, among other things, these questions:

1. What programs of study specific to manufacturing are presently being offered by the state's community and technical colleges, adult career-technical programs or proprietary programs?
2. What types of secondary programs currently serve as education pathways for manufacturing?
3. What state initiatives currently support either the manufacturing sector or skills certification?

4. What are the manufacturing organizations or associations in the state – and what is their interest and involvement in these initiatives?
5. What career awareness and student recruitment strategies are there in the state?
6. What other government programs might already be aligned to support the skills certification project? And what other career, technical, or experiential learning programs exist that would be a natural fit or pipeline for manufacturing?
7. What types of organizations serve low-income young adults in the area of skills training and development? What other groups might be focused on the same topics and be willing to leverage resources?
8. What are universities and their economic development partners doing to support the manufacturing industry or community colleges?

Structuring the Presentation

With a focus on the contributions that organizations and programs can make to a statewide skills certification system – and how the policies and resources of those assets already align to support such a system – the asset map presented here will be structured around four sectors, which are depicted in the graphic below. These sectors – both public and private – offer learners multiple educational and workforce training options for manufacturing and related careers. With growing opportunities for student mobility, the identified organizations and programs provide a strong foundation for the development, implementation and support of a manufacturing skills certification system.



- **Education assets** include all levels of education and training from elementary and secondary education through postsecondary education (e.g., two-year colleges, four-year colleges sand universities and adult career-technical programs. They also encompass public and private institutions.

- **Community-based assets** also reflect a diverse set of assets, including the Ohio College Access Program, the Urban League, foundations and other charitable organizations.

- **Public sector assets** include programs and initiatives that are designed to help low-income populations and dislocated workers. They include state and local workforce development entities, just as they encompass a variety of technology innovation and Third Frontier initiatives.

- **Private sector assets** include initiatives driven and funded by the private sector. Some are industry-specific while others fall into the category of local or regional economic development activities.

As this report will document, Ohio has a rich array of assets to support the development of manufacturing skills – and the "architecture" needed to push out skill certificates. Yet, this impressive architecture – second to that of no other state – will require better alignment and stronger connections before it has the capacity to get the job done.

To be sure, Ohio's policy leaders and educators have taken significant steps in recent years to improve the structure of Ohio's education and training systems. In fact, they have laid the foundation for Ohio's first real workforce development system by:

- Building an "pipeline" from secondary education through college and careers that is beginning to focus on the transitions among levels of training;
- Restructuring adult learning opportunities and recognizing that learning does not and cannot end at age 21; and
- Creating the University System of Ohio, which has given postsecondary learning greater focus and a stronger sense of urgency.

Just as important, the state's policy leaders have joined with educators and Ohio's business community to improve the connections among these assets – to improve the rules, roles and relationships that affect our ability to educate children and youth, and to prepare all learners (at all ages) for success in postsecondary education and careers. Much has been accomplished, but building an effective system hat fully aligns these assets must be one of Ohio's top priorities in the years ahead.

Ohio's Advantage: Three Connecting Assets

In 2008, Governor Strickland observed that "the future of jobs growth in Ohio is in investing in our regional strengths and in making sure we have the most educated, highly skilled workforce possible." While few would disagree with this assertion, transforming these words into action is no simple task. It requires a realignment of existing education and workforce training programs, the creation of new initiatives and a culture that promotes collaborative efforts that reach beyond the boundaries of discrete jurisdictions or single organizations.

During the past decade, Ohio has launched three initiatives designed to "connect" education, workforce development and the needs of business. All of these initiatives – linked to the newly created University System of Ohio – enrich the state's manufacturing skills assets. They also support Ohio's efforts to turn its educational institutions – at all levels – into demand-driven engines of economic development.

To fully understand the state's manufacturing skills assets, we must begin by profiling these three initiatives.

ASSET #1: Articulation and Transfer: Bringing Down the Silos

For more than a decade, the vision of a statewide system of student mobility has driven Ohio's "articulation and transfer" initiatives, which have been designed to promote student mobility by guaranteeing that certain courses can be transferred and applied to degrees and certificates in multiple disciplines at other two- and four-year colleges and universities. Ohio's articulation and transfer story reflects a commitment to radical changes in the state's culture of learning and in its thinking about credit transfer that historically have been institutionally focused, not *student centered.*

Ohio's story is built on a belief that traditional credit transfer practices have served as a barrier for students wanting to improve their knowledge and skills, particularly adult workers with credits from multiple institutions. These practices have discouraged learners from beginning at lower cost, more convenient institutional options. They also have inhibited quality, multi-institutional advising due to widespread uncertainty about what credits really count in transfer, just as they have restricted student mobility at a time when a credit transfer system that encourages college participation is most needed.

Today, Ohio has established transfer pathways that are guaranteed, supported by state-of-the-art technology and a sophisticated student advising system. From a manufacturing perspective, it is important to note that the Ohio Board of Regents and Ohio Department of Education have worked together to develop policies and procedures that enable students to transfer agreed upon technical courses completed at an adult career center or a public secondary career-technical institution to a public college or university. The courses impacted by the career technical credit transfer (CT^2) process are those that adhere to or are part of a recognized industry standard, such as automotive technology, IT-networking and mechanical engineering technology.

With respect to Ohio's articulation and transfer initiatives, it should be noted that the state has ***not*** established a statewide common course numbering system, believing that its credit transfer and student mobility system far surpasses a static numbering system model. Here are the key elements of Ohio's alternative model:

- All General Education course are guaranteed to transfer and apply to the degree
- Identified beginning courses in 38 majors – including engineering, engineering technology and science and mathematics- are guaranteed to transfer and apply to the major.
- Agreed upon courses in technical programs that are part of a recognized industry standard also are guaranteed to transfer. In all, 17 such program transfer from adult and secondary career-technical programs to college. This credit transfer is also being extended to apprenticeship programs, beginning with the electrical trades.
- To facilitate the transfer and guarantee of credits applying to the next level, a technology infrastructure has been developed to send and receive transcript electronically and the development of an Articulation and Transfer Clearinghouse that will interpret courses equivalencies. This will ensure that the application of credit guarantees is enforced.

Ohio's student mobility system goes way beyond the normal two-year to university model to include secondary schools, college and universities as well as adult career centers for both traditional students and the returning workforce. Additionally, Ohio's system is significant since it enables guaranteed transfer and provides for the easy development of credit pathways for building "stackable" certificate programs for the manufacturing workforce. For more information, see *Bringing Down the Silos: A Primer of Credit Transfer and Student Mobility.* Jonathan Tafel, March 2010.

ASSET #2: Career-Technical Programs: Helping All Ohioans Reach Their Full Potential

Across the nation, more than 50 million workers lack a college degree; nearly two-thirds have no college experience at all. In today's economy, the risks for individual social mobility and collective economic prosperity are severe. But in Ohio, this is less a matter for concern than a call to action.

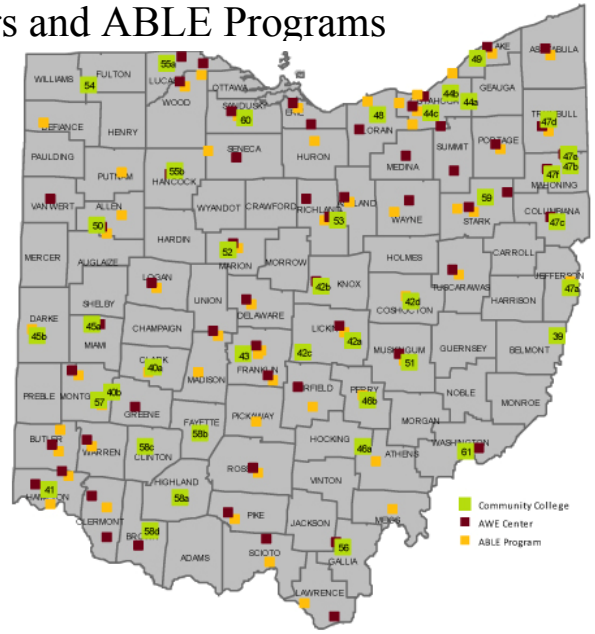
By removing the barriers to adult learning – and transforming a postsecondary education system that was built largely for younger, full-time, traditional students – Ohio is helping adult workers acquire the skills and credentials that will allow them to succeed economically and to make a more positive contribution to society.

Responding to the provisions of Amended Substitute House Bill 119 (2007), the State Advisory Committee on the Transfer of Adult Career-Technical Programs was convened in November 2007 and directed to craft a strategy for the successful transition of certain adult workforce development programs from the Ohio Department of Education to the Ohio Board of Regents.[1] From the outset, committee members understood that their charge involved more than simply shifting a few programs and the people who carry them out from one administrative agency to another.

Rejecting this narrow task, they worked to identify ways to strengthen the governance of Ohio's adult learning system; ensure that its structures, programs and funding are aligned with employers' workforce needs and learners' expectations; improve the performance and productivity of Ohio's talent development system with instructional programs that capitalize on best practices, state-of-the-art technology and high-quality teaching; and create, for the first time, the foundation of an aligned educational pipeline (including Adult Basic Literacy Education) under the Ohio Board of Regents.

This transfer of responsibilities was completed in 2009. And while substantial work will be required to create a truly aligned education and workforce development system, this new configuration of learning assets holds the promise of better coordinating programs and services – and improving learning opportunities for adults, both traditional postsecondary students and adults already in the workforce. It also makes implementation of a new manufacturing skills certification system possible.

Ohio's Community Colleges, Adult Career-Technical Centers and ABLE Programs



[1] Prior to this action, Ohio was one of only a few states that separated the state-level governance of adult career-technical programs from higher education by locating them in two different agencies.

ASSET #3: The Ohio Skills Bank: Helping Leaders Close Talent Demand/Supply Gaps

Ohio's employers need to remain globally competitive in both the long and short term. For this purpose, they need a skilled talent pool to perform the work that will keep the state strong throughout the 21st century. This is the basis for The Ohio Skills Bank (OSB) that was launched in 2008. The OSB strategically positions the state's adult education, training and workforce assets to build pipelines of talented graduates and certificate holders to meet targeted regional economic needs.

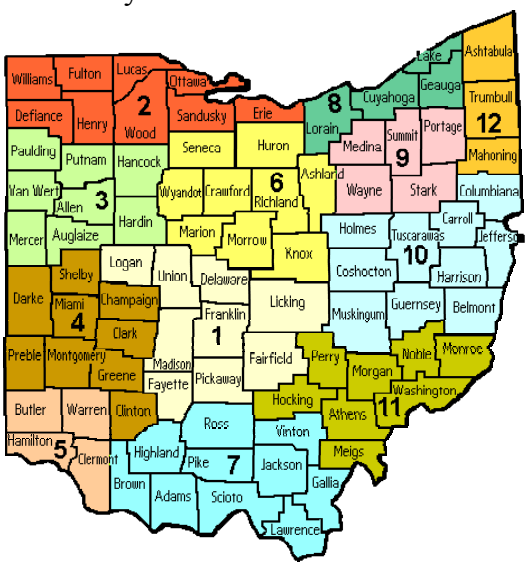
The skills gap between the needs of Ohio employers and the attributes of the state's existing workforce is well documented. The Ohio Skills Bank is a data- and employer-driven process aimed at creating the skilled workforce needed by industries identified as economic drivers in each region. It is a statewide initiative led by the Ohio Board of Regents in partnership with the Ohio Department of Development and the Ohio Department of Job and Family Services.

Ohio's economic recovery relies on aligning the state's workforce and economic development systems. The Ohio Skills Bank process is intended to provide a mechanism through which these two systems work together. Traditionally, workforce development professionals tend to be focused on the immediate needs of workers and their ability to fill immediate job vacancies, while economic development professionals tend to look ahead in order to attract new businesses in growing industries and create value-added propositions for existing businesses to encourage employer sustainability and expansion.

While both viewpoints are needed to ensure a healthy economic recovery, professionals from both workforce and economic development must understand the value of working together to integrate these viewpoints. Most importantly, incorporating these viewpoints will naturally lead to the support and development of a talent pipeline that strengthens industries that are growing, will continue to grow, and have a demonstrated business demand.

Structured around the state's 12 economic development regions, the OSB promotes demand-driven workforce planning across the state in eight critical industry clusters:

- Advanced Energy and Environmental Technology;
- Aerospace, Propulsion & Power;
- Food Manufacturing and Agriculture;
- Bio-science (including health);
- Motor Vehicle and Parts Manufacturing;
- Polymer and Advanced Materials; and
- Logistics, Distribution and Transportation
- Professional Services



Collaboration Alive and Well in OSB Region 7

Appropriately, the Ohio Skills Bank operates both regionally and at the statewide level. Region 7, located in Southern Ohio, shows us how the OSB's area-wide development and implementation of workforce training initiatives can help drive a new manufacturing skills certification system.

Region 7 has made significant strides in aligning and coordinating the area's education and workforce training programs. Participants in the regional initiative include Ohio University-Chillicothe, Rio Grande Community College, Collins Career and Technical Center, Pickaway-Ross Career and Technical Center, Southern State Community College, Shawnee State University, Scioto County Career and Technical Center, Ohio Valley Tech Prep, Pike County Career-Technical Center, and Buckeye Hill Career Center, as well as a number of ABLE programs, workforce initiatives and other regional stakeholders.

Region 7 was an active participant in the state's 2008-09 Early Adopter Stackable Certificates initiative, where it developed an advanced manufacturing pathway. Implementation has begun in the areas of health care, distribution and logistics, construction and building trades, and advanced energy/utilities now being finalized.

In this latter area, an advanced energy certification and associated set of processes is being established to respond to USEC and a consortium of energy employers in Region 7. These energy employers have traditionally only hired workers with an associate's degree or higher. A team from Southern State Department of Development, Workforce Development, and Pickaway-Ross CTC met with the employers and determined that a set of multiple training and credentialing opportunities could be created to satisfy the entry level requirements as determined by the employers.

This certification development process will require the collaboration of ABLE, Career-Technical Education, community colleges, four-year colleges and universities and other regional stakeholders. This advanced energy certification will be developed within the larger framework of the regional stackable certificates initiative.

- ***Proposed Certificate:*** Advanced Energy Operator - 600 hours of instruction to quality for Pell funding.
- ***Level of Training:*** This proposed certificate would come after the Basic Certificate and could be tied to the Advance certificate prior to entering community college level work.

The proposed certificate and the work being developed by the Advanced Energy/Utilities pathway may be articulated into a 2 + 2 program with the region's universities. All universities and colleges in the region will meet to agree on the amount of credit they will assign to the complete certification package. The colleges may also need to agree on smaller chunks or smaller components of the package since some students will not complete all aspects of training (some may only need MSSC training or just OSHAA) and similar credit for these components should be worked out ahead of time. The goal would be transcripted credit so that students could transition their credit anywhere.

Identifying Education Assets

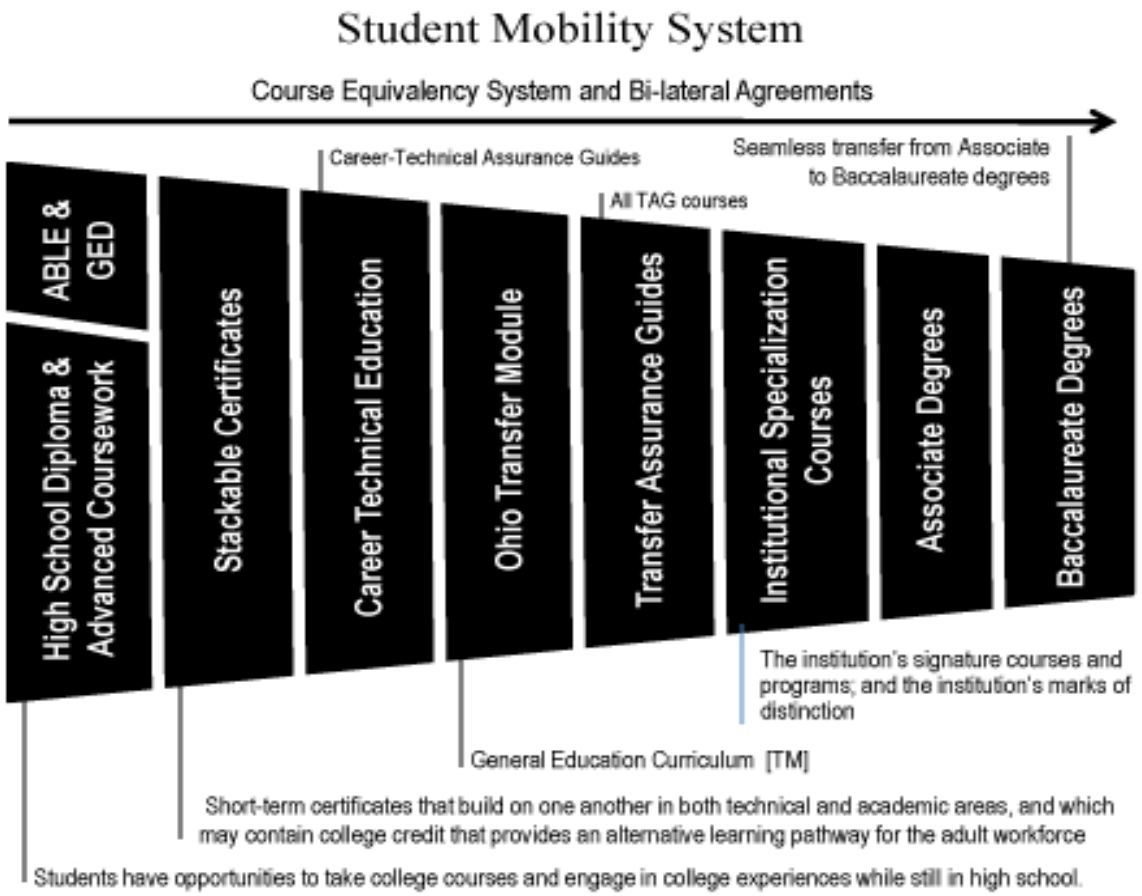
The information in this section of the report responds to the following questions identified on pages 3 and 4:

- ***What programs of study specific to manufacturing are presently being offered by the state's community and technical colleges, adult career-technical programs or proprietary programs? (Question #1)***
- ***What types of secondary programs currently serve as education pathways for manufacturing? (Question #2)***
- ***What career awareness and student recruitment strategies are there in the state? (Question #5) NOTE: This question also is addressed in the discussion of community-based assets.***
- ***What are universities and their economic development partners doing to support the manufacturing industry or community colleges? (Question #8) NOTE: This question also is addressed in the discussion of public sector and private sector* assets.**

Ohio's educational infrastructure is designed to promote career and disciplinary pathways for both traditional students and the returning workforce. High school students can follow a career pathway through career-technical programs that lead to a two-year institution, or to a four-year university/college academic and work-related program. College Tech Prep, Project Lead the Way and Early College High Schools are examples of these pathways. Dual credit is available for both academic and technical courses that are guaranteed to transfer and follow the student from high school to college.

The returning workforce also has pathway options and guaranteed credit transfer. Adult students have many options in pursing an industry-recognized credential or college degree. They can start at a two-year community college or technical college – or for that matter, at an adult career center. They can complete their studies there or students can transfer later to a four-year institution. Alternatively, students can begin college at a four-year institution, later deciding to transfer to a two-year community college, or they can choose to be concurrently enrolled – taking courses at two or more institutions at the same time. Finally, students may decide to pursue one or more certificates that build one on another ("stackable") to reach their work and educational objectives.

All of these occupational and educational pathways are available and the coursework is guaranteed to transfer and apply at other institutions. The following "Learning-Mobility Continuum" diagram illustrates these options form high school through degree programs:



Secondary Career-Technical Education

At the secondary level, Ohio's industrial and engineering career-technical learning opportunities are structured around five program areas:

(1) Manufacturing Design and Development;

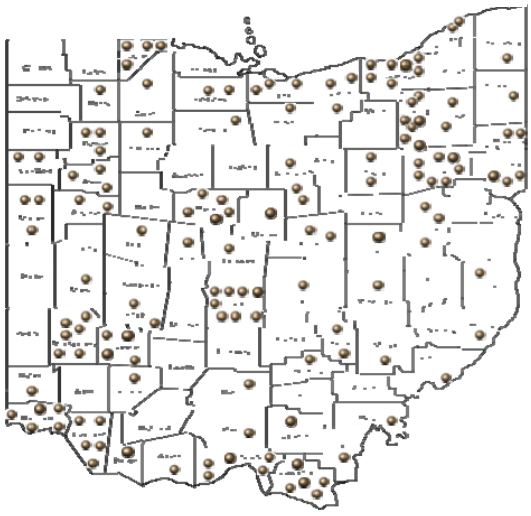
(2) Precision Machining;

(3) Manufacturing Automation and Robotics;

(4) Electronics; and

(5) Welding and Cutting.

Secondary Industrial & Engineering Career-Technical Programs in Ohio
(supporting automation, robotics & process controllers)
2008-2009
Total students: 9,109 Total programs: 182



In recent years, an Engineering Sciences – Project Lead The Way – has been added. This model is part of the state's career-technical secondary program. Here, all students are required to complete Engineering Design and Development, Principles of Engineering and Digital Electronics before enrolling in a fourth elective course. The most common elective in Ohio is Computer Integrated Manufacturing.

Ohio's Industrial and Engineering Career and Technical Programs in Ohio

	Number of Students Served Annually	Number of Locations Statewide
Manufacturing Design and Development	760	42
Precision Machining	850	47
Manufacturing Automation and Robotics (NEW PROGRAM)	20	1
Electronics	450	25
Welding and Cutting	1,900	57

Another recent addition to the state's secondary offerings is a Manufacturing Operations Career Pathway, which is open to all career-technical students. The pathway utilizes business and industry, mathematics, science and technology standards to prepare learners for careers in manufacturing operations management. Through this program, students are introduced to process and product quality assurance, logistics, maintenance, manufacturing costs, marketing, and safety and health.

The program seeks and receives input from local business and industry representatives on the knowledge and skills needed to enter the workforce. It also receives input from a postsecondary Advisory Council. The program is funded through Perkins funds, Ohio Career Technical dollars and local school district budgets.

Finally, Ohio's High Schools That Work and Making Middle Grades Work initiatives also have direct relevance for the development of manufacturing skills. This is a school improvement process that schools join with commitment to implement the Ten Key Practices and concepts of HSTW/MMGW. The program uses research-proven strategies to help states transform their public high schools into places where all students learn at high levels. It has a specific focus on integrating academic and career technical preparation (college and career ready students).

Through these initiatives, students can participate in any of the 16 pathways, one of which is manufacturing. In Ohio, 110 traditional high schools, 32 career centers and 90 middle-grade schools have adopted this program. Funding is provided through the state's biennial budget. HSTW/MMGW is part of a 32 state network. Measured in terms of participating institutions, Ohio is one of the largest members of the network.

Illustrative Profiles: Secondary Career-Technical Education

Manufacturing Design and Development Utilizing business and industry, mathematics, science and technology standards, this career-technical education program introduces concepts of planning, preparation and interpretation of mechanical, and/or architectural drawings and sketches using various CAD software.	▪ This program serves about 760 students a year. The program is offered at 42 locations across the state, including urban areas with a predominately underserved, high poverty student population and rural areas. ▪ The program, which offers both academic instruction and technical training, is a non-traditional career pathway for females. ▪ Design is critical to all manufacturing areas from household consumer products to large industrial equipment and automotive systems. ▪ The program seeks and receives input from local businesses and industry Advisory Councils about the knowledge and skills needed to enter and succeed in the workforce from a local business and industry Advisory Council. ▪ This program is funded through Perkins Funds, Ohio Career Technical funding and local school district budgets.
Precision Machining Utilizing business and industry, math, science, and technology standards, the program introduces concepts related to set-up and operation; and the control of various metal working equipment including concepts of: interpretation of schematics, analysis of materials, heat treating processes, CNC machine functions, preparation of CNC programs based on specifications and rapid-prototyping.	▪ These programs are located in all areas of the state including large urban areas with a predominately underserved, high poverty student population and small rural areas of high-poverty, low-income. This is a non-traditional career pathway for females. ▪ There are 47 programs across Ohio offering this program, serving approximately 850 students in all areas of the state. ▪ Precision machining predominately supports those manufacturing process utilizing metals and rapid prototyping processes. ▪ The program seeks and receives input as to the knowledge and skills needed to enter the workforce from a local business and industry Advisory Council. ▪ This program is funded through Perkins Funds, Ohio Career Technical funding and local school district budgets.

Manufacturing Automation and Robotics (Secondary Career-Technical) Utilizing business and industry, math, English, science and technology standards, this program introduces the concepts of automation and robotics technology. It includes concepts of automation and robotics; Computer Numerical Control (CNC); data acquisition and analysis, electrical/electronic controls, fluid power, robotics and programmable logic controllers (PLC).	▪ There is currently one program in Ohio as this is a new career pathway. The program is located in Southwest Ohio at the Great Oaks Institute of Technology. The enrollment for the 2009-2010 academic year is 20. ▪ This is a non-traditional career pathway for females. The enrollment is predominately male, age 16 – 18, in a suburban area. ▪ Automation and robotics forms the underpinnings of multiple, if not all, manufacturing. The Automation and Robotics program supports a breath of manufacturing operations in Ohio. ▪ This program seeks and receives input as to the knowledge and skills needed to enter the workforce from a local business and industry Advisory Council. ▪ This program is funded through Perkins Funds, Ohio Career Technical funding and local school district budget.

Electronics Utilizing business and industry, math, science, and technology standards, introduces concepts of electronic theory and practice including: interpretation of diagrams, schematics, and wiring diagrams; cabling applications; analysis of power supplies; analysis and simulated construction of series and parallel electronic circuits; and the analysis of interfacing of electronic products.	▪ There are 25 programs serving approximately 450 students in all areas of the state. ▪ These programs are located in large urban areas with a predominately underserved, high poverty student population, and in small rural areas of high-poverty, low-income. This is a non-traditional career pathway for females. ▪ Electronics supports components of automation and electronics as well as a diverse number of other manufacturing functions. It seeks and receives input as to the knowledge and skills needed to enter the workforce from a local business and industry Advisory Council. ▪ This program seeks and receives input as to the knowledge and skills needed to enter the workforce from a local business and industry Advisory Council. ▪ This program is funded through Perkins Funds, Ohio Career Technical funding and local school district budget.

Welding and Cutting (Secondary Career Technical) Utilizing business and industry, math, science, and technology standards, this program introduces the concepts of materials science, specialty metals joining, interpretation of drawings and prints, Shielded and Gas Metal Arc Welding, and Thermal Cutting. Students are eligible for American Welding Society Level 1 Certification upon completion.	▪ Approximately 1,900 students are served annually in programs that are located in all areas of the state, including large urban areas with a predominately underserved, high poverty student population and small rural areas of high-poverty, low-income. This is a non-traditional career pathway for females. Students are 16 – 19 years of age. ▪ Welding and cutting supports manufacturing operations utilizing a variety of materials, predominately metals. ▪ This program seeks and receives input as to the knowledge and skills needed to enter the workforce from a local business and industry Advisory Council. ▪ There are 57 programs across Ohio. ▪ The program is funded through Perkins Funds, Ohio Career Technical funding and local school district budgets.

Engineering Science – Project Lead The Way Utilizing a STEM framework of rigorous mathematics, science and technology, this pre-engineering program incorporates concepts of principles of engineering, engineering design, digital electronics and computer integrated manufacturing in a problem-based, computer driven classroom strategy.	▪ Project Lead The Way provides academic instruction, skill development training and linkages to industry-based learning experiences. It serves approximately 10,000 students annually. ▪ Project Lead The Way programs—there are 230 of them – are located in all areas of the state including large urban areas with a predominately underserved, high poverty student population and small rural areas of high-poverty, low-income. In 2008-09, 10% of the programs were in urban and rural areas of high-poverty. ▪ Project Lead The Way is a non-traditional career pathway for females. In the 2008-09 academic year 17% of the enrollment was non-Caucasian/non-white students with a female enrollment of 30%. This career pathway begins in middle school and transitions into post-secondary with advanced college credit. ▪ Engineering science supports all aspects of the manufacturing industry from design to market. The program seeks and receives input as to the knowledge and skills needed to enter the workforce from a local business and industry Advisory Council. At the state level a Business and Industry Executive Council serves to input program development, funding opportunities and advocates with state leaders. ▪ This program is funded through Perkins Funds, Ohio Career Technical funding and local school district budget, corporate and foundation funding directly to schools.

College Tech Prep, STEM and Other 2+2 Models

Innovation has driven improvements in virtually every sector of the American economy from health care and energy to technology and bioscience. Yet, as Ohio Grantmakers Forum observed in its 2006 report, ***Education for Ohio's Future,*** "despite some encouraging exceptions, too much of education remains largely stuck in an outdated model that assumes a nine-month school year, a six-hour school day, the prevalence of stay-at-home moms, adherence to rigid grading systems and standardized testing, separate and distinct subject areas, pencil-and-paper testing, and stand-and-deliver lecture-style instruction."

Today, Ohio schools are still virtually locked into an industrial-age model and our well-worn pathways to reform have yield only limited results. Yet, it needs to be acknowledged that there have been some important changes in the way schools deliver instruction and use their assets, how they use time and talent, and how they allocate and spend resources. And a number of these innovations – including changes in the definition of "schooling," relationships between schools and communities, and transitions from secondary to postsecondary learning – have direct implications for the development of manufacturing skills.

Most visibly, these innovations are reflected in the:

- **Ohio College Tech Program,** which prepares students for high-skill, high-demand technical careers in a competitive global economy. The program offers 16 rigorous technical education pathways, just as they emphasize mathematics, science and technology and lead to postsecondary education.

- **Ohio STEM Learning Network,** which works with ten STEM (science, technology, engineering and mathematics)-focused secondary schools and 26 K-8 Programs of Excellence to help implement a rigorous and relevant course of study in STEM.

- **Early College High Schools,** which offer up to two years of college credit while students simultaneously complete their high school coursework. The Bill & Melinda Gates Foundation is providing substantial funding for this initiative, as well as for the Ohio STEM Learning Network and other STEM-related initiatives. More information about the Gates Foundation's investments in this area can be found in the discussion of community-based assets.

Illustrative Profiles: College Tech Prep, STEM and Other 2+2 Models

Ohio College Tech Prep This program prepares students for high-skill, high-demand technical careers in a competitive global economy. Sixteen rigorous technical educational pathways emphasize math, science and technology and lead to postsecondary education (2+2 pathway). Educators, employers and communities collaborate to develop and deliver Tech Prep opportunities to all Ohio students.	▪ Ohio College Tech Prep programming can be found in Career Centers, comprehensive high schools and compacts leading to postsecondary educational opportunities at two-year and four-year institutions. All the 23 Ohio 2-year postsecondary institutions have entered into articulation agreements with one or more of the 16 career fields, while a few four-year postsecondary institutions have signed articulation agreements. These four-year institutions are University of Toledo; Youngstown State; The University of Akron and University of Cincinnati. ▪ The manufacturing fields included in the program are manufacturing technologies, manufacturing operations, automation and robotics, integrated systems technology, manufacturing design and development, electronics, precision machining, manufacturing occupations, welding and cutting, engineering technologies, computer integrated manufacturing, materials joining technologies, and engineering design and development. In 2009, more than 2,200 secondary Tech Prep students were enrolled in these manufacturing-related fields. ▪ The primary activities of Ohio College Tech Prep are: (1) provide a seamless educational pathway for students to matriculate from secondary to postsecondary educational opportunities; (2) provide articulation options for students as they enter into postsecondary education; (3) build partnerships among secondary education, postsecondary education, adult education and business/industry stakeholders; (4) provide support for students throughout their educational career; (5) ensure relevant educational programming to meet regional workforce development needs; (6) assist teacher and faculty in the implementation of inquiry/problem- based pedagogy; and (7) provide programming accessible to all Ohio's students. ▪ Ohio College Tech Prep is targeted to provide workforce development to meet the individual regional economic development needs. These needs are identified by the local Ohio College Tech Prep Governing Board from each consortium. ▪ Manufacturers/business/industry partnerships are developed to provide information for problem-based, inquiry based learning opportunities, on the job experiences for teachers and faculty to understand the industry, input in the development of Career Field Technical Content Standards at the state level and input into technical assessment availability and applicability.

Ohio STEM Learning Network This statewide network has five regional hubs, 10 STEM-focused secondary schools and 26 K-8 Programs of Excellence to help implement a rigorous and relevant course of study in STEM; support inquiry-based learning approaches; and, build student motivation, competence and persistence to pursue advanced STEM academics and careers, particularly in Ohio's driver industries.	▪ Approximately 500 students are being served by this emerging network. Many programs target underrepresented student populations in STEM (e.g., females and minorities). ▪ Ten STEM-focused secondary schools have engaged one or a blend of targeted industries ranging from avionics, biosciences, robotics, design, polymers, engineering and architecture. ▪ Each of the 10 STEM secondary schools has a collaborative sponsorship structure that includes representatives from STEM-oriented businesses, higher education and K-12 education. Manufacturing and engineering organizations include General Electric, Battelle Memorial Institute, Goodyear, American Electric Power and Wright Patterson Air Force Base. ▪ STEM secondary schools are located in Cleveland, Cincinnati, Columbus, Dayton, Akron, Reynoldsburg, New Miami and Sandusky. K-8 Programs of Excellence are all across the state, most of them focused on Project Lead the Way support systems. ▪ The Ohio STEM Learning Network is funded through a combination of state, federal, corporate and philanthropic resources, including the Bill and Melinda Gates Foundation.

Ohio's Early College High School Program The ECHS program creates high schools that offer up to two years of college credit while students simultaneously complete their high school course work. KnowledgeWorks Foundation has been a leader in advancing these schools, which seek to expand educational opportunities for underrepresented populations, including low-income and minority students, first-generation college goers and English language learners.	▪ Ohio's nine Early College High Schools, all of which have unique funding, business and instructional models in order to serve approximately 2,170 students, are: Columbus Africentric Early College High School, Akron Early College High School, Canton Early College High School, Cleveland Design Lab Early College High School, Dayton Early College High School, Lorain Early College High School, Metro Early College High School (Franklin County), Toledo Early College High School and Youngstown Early College High School ▪ Since 2003, the state of Ohio has invested approximately $22 million in Early College High Schools, adding additional public support to the initial $8.6 million invested by KnowledgeWorks Foundation and the Bill & Melinda Gates Foundation. ▪ ECHS' dual-enrollment model allows students to earn high school and college credits simultaneously. The program has served more than 2,200 students since its inception and a third of them have graduated with both a high school diploma and two years of college credit (60 hours) or an associate degree. ▪ This postsecondary work greatly enhances a student's likelihood of earning a bachelor's degree. In fact, between 2003 and 2007 students in the state's nine Early College High Schools earned more than 10,000 hours of college credits.

Postsecondary Institutions

According to the state of Ohio's 2008-2017 Strategic Plan for Higher Education, Ohio's future economic prosperity depends upon its ability to raise the education level of its population. For that purpose, three actions are required:

1. Ohio's colleges and universities must graduate more students.
2. The state must keep more of its graduate in Ohio.
3. Ohio must attract more degree holders from out of s state.

It is a formidable challenge that will require mobilizing Ohio's extensive network of public universities and community colleges – the University System of Ohio – and a diverse collection of independent colleges and universities (including both not-for-profit and for-profit institutions).

The University System of Ohio consists of the state's 13 public university campuses, one free-standing medical college, 24 regional branch campuses, 23 two-year community and technical colleges, and an array of adult literacy and adult workforce centers, as well as 112 non-profit and 27 for-profit independent colleges and universities and that authorized to offer credits, credentials and degrees in Ohio. In this spirit, the state's strategic plan sets out a collection of strategies for transforming the University System of Ohio into a high-quality, flexible system of higher education that offers a wide range of educational options, while driving down the average amount that students pay to among the lowest in the nation.

Acknowledging the critical connection between education and the state's future economic prosperity, the Strategic Plan for Higher Education sets out several key strategies – areas where aligned activity is required. Among these strategies, which have clear implications for the state's commitment to developing manufacturing skills (among other things) are the following:

- State law should make clear that anyone with a high school diploma or GED will have access to higher education to the community college of their choice. General Associate degrees will be fully transferable to a university. Universities will have flexibility to set admission standards that conform to their missions.

- Adult courses will be more flexible than traditional courses in times, locations and duration. More online courses will be available to adult learners.

- The Adult Basic and Literacy Education (ABLE) programs will build a network of adult education programs focused on helping adults become college ready.

- University System of Ohio adult career-technical and apprenticeship programs will be included in the transfer system. Courses offered and certificates earned will have the opportunity and be encouraged to meet standards sufficient for college credit.

- Adult learners will build their academic and technical skills by earning a series of pre-college and college-level "stackable certificates" that provide a pathway to career-oriented postsecondary training and economic success. This will make it easier for adults to prepare themselves for satisfying and productive careers and allow them to connect pre-college academic work to credit-bearing career and technical coursework that leads ultimately to a college degree.

That's a vision of the future, but where is Ohio today. What can we say about higher education's manufacturing skills assets?

Perhaps the most comprehensive way to answer this question is to look at the state's Higher Education Information (HEI) system, which offers us a complete listing of relevant degree programs by specific institutions across the five operating sectors: (1) two-year community and technical colleges; (2) university regional campuses; (3) university main campuses; (4) private not-for-profit institutions; and (5) private for-profit institutions.

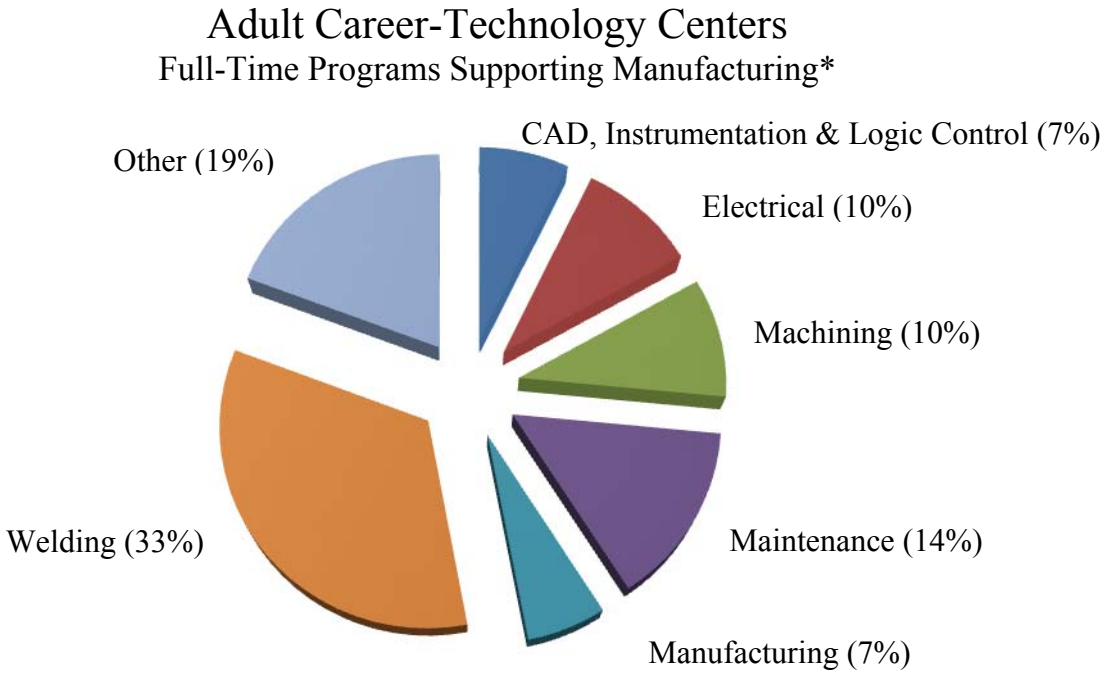
It is an impressive list – 36 pages of degree programs. For those who are looking for all the details, that listing can be found in Appendix A. But on the next page, we will provide a brief glimpse of programs supporting manufacturing by CIP codes, showing awarded degrees and credentials by institutional cluster. It needs to be emphasized that these summary data are being presented for illustrative purposes only – to give readers a sense of what kinds of data are available.

Degrees and Certificates Awarded in FY2007-2009 in Manufacturing Fields (BY CIP CODE)

CIP	SUBJECT TITLE	COMM. COLLEGE	UNIV. MAIN CAMPUS	UNIV. REG. CAMPUS	PRIVATE, NOT-FOR-PROFIT	PRIVATE, FOR PROFIT
140101	Engineering	Associate 26 (2007) 24 (2008) 36 (2009)	Bachelor 176(2007) 166(2008) 193(2008)	 0 (2007) 0 (2008) 0 (2009)	Bachelor 0 (2007) 0 (2008) 1 (2009)	 0 (2007) 0 (2008) 0 (2009)
141001	Electrical Engineering	Associate 3 (2007) 8 (2008) 1 (2009)	Bachelor 432(2007) 365(2008) 322(2009)	 0 (2007) 0 (2008) 0 (2009)	Bachelor 49 (2007) 60 (2008) 37 (2009)	Associate 24 (2007) 61 (2008) 58 (2009)
141901	Mechanical Engineering	Associate 7 (2007) 14 (2008) 0 (2009)	Bachelor 606(2007) 579(2008) 619(2009)	 0 (2007) 0 (2008) 0 (2009)	Bachelor 175(2007) 180(2008) 191(2009)	 0 (2007) 0 (2008) 0 (2009)
143501	Industrial Engineering	Associate 10 (2007) 10 (2008) 10 (2009)	Bachelor 122(2007) 111(2008) 103(2009)	 0 (2007) 0 (2008) 0 (2009)	 0 (2007) 0 (2008) 0 (2009)	1-2 Years 0 (2007) 32 (2008) 31 (2009)
150201	Civil Engineering Tech	< 1 Year 4 (2007) 9 (2008) 5 (2009)	Bachelor 59 (2007) 41 (2008) 9 (2009)	 0 (2007) 0 (2008) 0 (2009)	 0 (2007) 0 (2008) 0 (2009)	 0 (2007) 0 (2008) 0 (2009)
150401	Biomedical Engineering	< 1 Year 0 (2007) 0 (2008) 3 (2009)	 0 (2007) 0 (2008) 0 (2009)	 0 (2007) 0 (2008) 0 (2009)	 0 (2007) 0 (2008) 0 (2009)	Bachelor 0 (2007) 8 (2008) 11 (2009)
150507	Environmental Eng. Tech	Associate 21 (2008) 25 (2009) 10 (2010)	Associate 1 (2007) 0 (2008) 0 (2009)	Associate 4 (2007) 2 (2008) 0 (2009)	Bachelor 23 (2007) 23 (2008) 26 (2009)	 0 (2007) 0 (2008) 0 (2009)
150612	Industrial Technology	< 1 Year 2 (2007) 5 (2008) 4 (2009)	Bachelor 57 (2007) 37 (2008) 42 (2009)	Associate 8 (2007) 3 (2008) 0 (2009)	Associate 1 (2007) 5 (2008) 8 (2009)	 0 (2007) 0 (2008) 0 (2009)
150702	Quality Control Technology	< 1 Year 7 (2007) 16 (2008) 22 (2009)	Post-BA cert 1 (2007) 1 (2008) 1 (2009)	 0 (2007) 0 (2008) 0 (2009)	 0 (2007) 0 (2008) 0 (2009)	 0 (2007) 0 (2008) 0 (2009)
150404	Instrumentation Technology	< 1 Year 2 (2007) 7 (2008) 3 (2009)	Associate 1 (2007) 0 (2008) 0 (2009)	 0 (2007) 0 (2008) 0 (2009)	 0 (2007) 0 (2008) 0 (2009)	 0 (2007) 0 (2008) 0 (2009)

Another way to look at postsecondary education's manufacturing skills assets is to get a sense of programs offered by the state's adult career-technical centers. Presently, data for these centers are not available through the HEI system, so all institutions were surveyed to gather the information.

The pie chart below summarizes the data, focusing exclusively on full-time programs. Many learning experiences that are part-time and customized (non-credit) are not included here.



*This information includes only full-time programs. In addition, adult career centers offer many part-time courses, short- term and industry customized programs that support manufacturing. These data represent the total number of institutions/programs that responded to a February 2010 survey.

More information about these training programs can be found in Appendix B, where there is a listing of all career-technical programs by institution.

"Green" training programs give us another perspective on postsecondary education's manufacturing assets. This is an area of growing interest and activity – one that holds significant promise for Ohio's future economic prosperity, just as it is creating opportunities for workers and manufacturing skills certification. With data generated by the Ohio Board of Regents, the following chart summarizes "green" training programs offered by the University System of Ohio.

Ohio's Two-Year College Green Training Programs

	Wind (1)	Solar (2)	GeoThermal	Nuclear	Efficiency (3)	Weatherization	Power Plant	Advanced Manuf.	Welding*	Electro-Mechanical	Automotive Tech	Applied Tech	Renewable Energy	LEED	Fuel Cell
COLLEGES															
Belmont Tech					4		1	2	2						
COTC					1			1							
Cincinnati State	2	2			1					1	1			1	1
Clark State					1			2							
Columbus State					1		1				1	1			
Cuyahoga Community	1	1			2			2	1	1	1	1	1	1	
Edison Community								2					1		
Hocking College	1	2	1		1						1	1		1	
James A. Rhodes State								1		1					
Eastern Gateway					1		1		2	1					
Lakeland Community	2			1										1	
Lorain CCC	2				1		1	1	1	1		1			
Marion Technical	2	2													
North Central State	2				2			2	2			1			
Northwest State	2		1		1										1
Owens Community		2			3	1							1		
Rio Grande Community					1		1	1	1						
Sinclair Community					1						1				
Southern State								1							
Stark State	2												1		1
Terra State	2			1	4			2	2		1	1			
Washington State		1			2		1	2			1	1			
Zane State					1										

(1) Wind programs include manufacturing, installation and maintenance.
(2) Solar programs include manufacturing, installation and maintenance.
(3) Energy efficiency programs include Smart Grid, HVAC, Electrician and Energy Audits.

NOTE: Some of the programs identified in this chart are collaborative and non-credit programs. Also, some are still in the proposal stage.

SOURCE: Ohio Board of Regents

Advanced training centers and specialized programs have been developed at a number of the state's two-year community colleges and four-year public universities.

Centers of Excellence have been established at several of the state's public universities in:

- Advanced Energy
- Transportation
- Agriculture, Food Production and Environmental Technologies
- Biomedical
- Attracting and Retaining Talent

Under the direction of the University System of Ohio, these Centers are developing distinctive missions that are recognized by students, faculty and business leaders, while eliminating unnecessary competition for resources, students and faculty within the state. Each university is collaborating to help build on each other's strengths, while competing globally to bring talent and resources to the state.

These Centers are the basic building blocks of universities as economic drivers. Nationally, recognized programs in key areas of academic study serve as the platform for world-class centers of research, which in turn are home to remarkable collections of intellectual talent and attract public and private investment. Research centers attract private capital looking for inventions to turn into businesses, creating jobs and economic prosperity.

Illustrative of this initiative, Governor Strickland announced the establishment of eight such Centers in advanced energy in October 2009. The Centers are located at the following universities:

Bowling Green State University	Sustainability and the Environment
Case Western Reserve University	Great Lakes Energy Institute
Central State University	Emergency Technologies
University of Cincinnati	Sustaining the Urban Environment
University of Dayton	von Ohain Fuels and Combustion; and Strategic Energy and Environmental Information
The Ohio State University	Climate, Energy and the Environment
Ohio University	Energy and the Environment
University of Toledo	Advanced Renewable Energy and the Environment

With a sharp focus on advanced training, similar centers have been established at a number of Ohio's two-year community colleges. Brief summaries of five of these centers are provided on the next page of this report.

Examples of Two-Year Colleges' Advanced Training Centers

- **Advanced Integrated Manufacturing Center (AIM)** at Sinclair Community College provides assistance to manufacturing companies in the Miami Valley with "lean implementation and process improvement" and hands-on employee training, and design and manufacture complex prototypes. With the 1,500 square-foot facility, the Center has state-of-the-art technology and equipped with more than 100 manufacturing labs.

  The AIM Center is also home to the *National Center for Manufacturing Education (NCME), Project Lead the Way Ohio,* and the *Product Development Center***,** which provides manufacturers with the training, resources and support necessary to boost productivity and profitability.
- **United Technologies Center (UTC)** at Cuyahoga Community College is one of the largest technology training facilities in the country. It houses the Workforce and Economic Development Division and the Manufacturing programs, such as alternative energy installation certificate, building energy efficiency auditor, pathways to green jobs, wind turbine technician, building construction trades certificate, digital cabling, logistics and supply chain management, warehouse distribution boot camp, hazardous material/dangerous goods training, and intermediate certificate in global logistics.
- **Manufacturing Center for Excellence** at Lorain County Community College in the Nord Advanced Technology Center provides assistance and technical training in advanced methods for production and process improvement. The Nord Advanced Technology Center is the area's leading technical training center for industry—the 50,000 square-foot facility is equipped for today's most sophisticated factory automation. Services include: (1) Advanced Manufacturing Education and Training; (2) Customized Distance Learning; (3) Technology Transfer and Best Practices; (4) Process Improvement; and (5) Advanced Manufacturing Partnerships
- **Fuel Cell Prototyping Center** at Stark State College of Technology is housed in a new $4.7 million Fuel Cell Prototyping Center, which is designed for use by emerging and fuel cell-related technology companies to assist them in pre-commercialization prototyping and demonstration stages of the development of fuel cell-based power generation systems. More than $18 million in grants has been generated over the past five years to develop fuel cell curricula, support industry research and development and prepare technicians for the emerging field.

  The college's partnership with the National Science Foundation (NSF) continues as Stark State recently received $1.6 million for a *Great Lakes Fuel Cell Education Partnership* that enables the college to share and expand its program expertise with high schools, two-year colleges and universities in Indiana, Michigan New York Pennsylvania and Ohio, Fuel cell and related businesses in the five-state region will support this partnership.
- Cincinnati State and Technical College's new **Energy and Environment Center (EEC)** is home to the college's initiatives related to energy, environment and economics. The EEC is becoming a regional leader in energy efficiency and conservation, renewable energy, sustainable design and construction, climate control, and water and air issues. It includes multiple academic and non-academic areas of the college, such as the renewable energy and efficiency major, sustainable design and construction certificate, workforce development center and institutional advancement. The EEC is merging Cincinnati State's technical know-how with true community outreach to make energy, environmental and economic issues and technologies accessible to the public.

Illustrative Profiles: Postsecondary Institutions

Great Oaks Electro-Mechanical Maintenance Technology The program teaches the all-important aspects of manufacturing and facility maintenance; troubleshoot and repair mechanical, electronic and electrical systems. Students get needed skills using test instruments such as oscilloscopes, electronic multi-meters and logic probes.	▪ Nineteen students are served annually with a class capacity of 24.The average student is 30 years old and comes from a community in southwest Ohio. A majority of students are classified as disadvantaged (WIA, Assistance Recipient, etc.); 20 percent are African Americans and 80 percent are white males. ▪ Industries served include field service technician, electronic engineering technician, electrical maintenance technician, electro-mechanical maintenance technician, testing and measurement technician, and assembly and inspection technician. ▪ All Great Oaks Adult Workforce Development Boards have an active business advisory committee that provides input and program direction. Services are provided in Region 5 and the Greater Cincinnati MSA. ▪ Students contribute to tuition by self pay, federal financial aid and/or Pell Grants. ▪ Associate Electronic Technician Certification is available for qualified students. Articulated and transcripted credits are available for enrollment in USO-affiliated programs.
Welding Technology, Columbiana County Career and Technical Center The program offers academic instructions and technical training, and it promotes career awareness, school/ industry linkages and student support services. It also offers industry certification.	▪ Many of the Lisbon, Ohio program's students are looking for career changes due to layoff. The medium age of students is 30, but there is a wide range from high school graduates coming straight into the program to others who have worked in a plant for many years. ▪ Approximately 85 percent of the program's 100 students receive some type of financial aid. ▪ The program has active advisory boards with members from local businesses that hire its students.

Butler Tech Advanced Manufacturing Technology This program includes manufacturing and maintenance fundamentals, quality and continuous improvement, production processes, industrial electricity and mechanics, industrial fluid power, basic machining, welding, industrial controls and Programmable Logic Controllers, and automation systems.	▪ Students are equipped to achieve professional certifications, such as the Manufacturing Skills Standards Council Certified Production Technician, and go on to meet the demands of changing technologies for Ohio's leading manufacturers. ▪ Presently, eight students are enrolled in the program, which has a capacity of 15. Enrollees are 18 years of age and up. The program is open to all income levels while our typical student profiles includes dislocated workers, adults looking to improve their current skills to advanced their careers, and young people seeking a career. ▪ Butler Tech full-time industrial programs have an advisory committee that includes members of the business and industry community. The Southwest Ohio Manufacturers' Consortium serves as an advisory committee to this program. ▪ Students pay tuition and fees for the training. The program also receives funding from federal financial aid grants and student loans, Veterans benefits, and other public resources are available for financial assistance.
Laboratory Tech: Biotech, AAS Degree, University of Cincinnati-Raymond Walters College This program offers education and training in biotechnology, including research and development and advanced manufacturing. Students learn essential laboratory techniques in molecular biology, cell biology, protein chemistry, microbiology, and cell culture. In addition, students learn to manage data and follow safe laboratory practices and good documentation practices.	▪ Between 15 and 30 students – between the ages of 18 and 50 – are enrolled in this program each year. Those who complete the program earn a Biotechnology certificate. ▪ Community-based organizations engaged in the program include research laboratories and advanced manufacturing firms. An advisory committee with representatives from local laboratories and advanced manufacturing companies provides descriptions of skills sets needed by new employees. Companies serve as internship sites and also provide guest speakers for classes. ▪ The program is funded through tuition and state subsidies to Raymond Walters College, which is located in Blue Ash, OH. ▪ We are in the process of redeveloping the program to increase the Good Manufacturing Practices (GMP) and applied microbiology content and expand manufacturing components.

Secondary and Postsecondary Internship Program, Kent State University This initiative has placed 22 students in a fully funded internship in ten manufacturing industries working 15 hours/week in a predefined internship assignment.	▪ All participating high schools are in Appalachia. Therefore, they are mainly from low-income families and traditional high school age. ▪ The manufacturing industries include Allied Manufacturing and Engineering, General Electric, Gradall Industries, Inc., The MK Morse Company, Lauren Manufacturing, Lauren AgriSystems, Edgetech I.G., Basic Systems, Inc. ASAP LLC, and Progressive Foam. ▪ Manufacturing leaders play a major role in making these internships available and in mentoring student interns. ▪ The internship program is funded through the US Department of Labor and Ohio Valley Interactive Technology Alliance (OVITA) Workforce Innovation in Regional Economic Development (WIRED).

Mechanical Engineering Technology, Youngstown State University This program includes both classroom and laboratory experiences. The curriculum stresses the application of established engineering and computer knowledge and methods to the solution of practical problems, including the study of sciences and mathematics supporting technology as well as methods, processes, skills, and materials used in technology.	▪ The program emphasizes practical industrial application of up-to-date technology. This means MET graduates can find opportunities in every industry that uses machines in its factories. ▪ After completion of two years of full-time study, students earn an Associate in Applied Science degree (AAS). They may continue on their formal education to earn the Bachelor of Science in Applied Science degree (BSAS), pursue full time employment or pursue their degree while working. ▪ The two-plus-two nature of the degree provides early entry into a career plus flexible education opportunities. Students receive training in applied engineering and manufacturing principles. Hands-on training with machine tools (lathes, milling machines, drill presses, etc), automated equipment (robotics, programmable logic controllers, work cells) and materials processing (machining, casting, rapid prototyping). ▪ Graduates of the MET AAS degree program work as engineering technicians. The industry-oriented two-year degree allows them to quickly find employment in their chosen field. Due to the practical nature of the program, they immediately become productive in careers involving design, drafting, testing, and production of industrial machines and consumer products. ▪ Graduates of the BSAS degree program work as engineering technologists. Because their education is more extensive, they are prepared for more responsibility and more rapid advancement. Application-oriented courses in hydraulics, tool design, machine design, and robotics prepare them for more advanced design work, while courses dealing with manufacturing systems analysis, quality control, and industrial management prepare them for supervisory positions in industry. ▪ The program's graduates have been placed in numerous industries, including automotive, defense, automation, metals and materials processing, construction and food production/processing.

SkillsTrac

SkillsTrac is a comprehensive industrial maintenance training program, specially designed for the advanced manufacturing industry. SkillsTrac prepares its students with the skills needed to maintain, troubleshoot and repair automation systems and components. While the program is geared primarily toward the industrial automation market, the principles taught can apply to maintenance in nearly any industry.

- Advanced manufacturing operations employ modern automation systems, which include programmable logic controllers, human-machine interfaces, variable frequency control of AC motors, motion control of servomotors, and robotics.
- The program is made up of multiple levels, which grow in complexity with each successive level. The lower two levels provide the foundation on which modern industrial maintenance rests: Maintenance Basics and Industrial Mechanics, which form the bottom or Green Level, and Industrial Electricity and Industrial Fluid Power, which form the Yellow Level. Maintenance personnel can often run across the need to perform machining and welding operations to repair a piece of machinery. The third level in the sequence provides Basic Machining and Basic Welding training. The fourth level begins the advanced training in automation and consists of Industrial Controls and Programmable Logic Controllers. The top level, Blue, builds on all others and provides in-depth training in Automation Systems and Robotics and Motion Control.
- SkillsTrac training consists of course content, taught mostly in an online format, and hands-on validation lab content, taught in an advanced training lab. There also are some instances in the program where an instructor leads the training in a traditional format. The online classes serve as the instructor and textbook for the basic course material. Tooling University, a SkillsTrac training partner, offers the online courses asynchronously. Students enroll at their local school, which assigns them seats in the online system. They can begin taking the online courses immediately.
- SkillsTrac has served 334 trainees (from 27 companies) during the past three years. Fourteen trainees have come from six job centers (displaced workers).
- The SkillsTrac program was developed by a consortium of four colleges and vocational schools, ten One-Stop and economic development organizations, and over thirty manufacturers and was funded by a U.S. Department of Labor Community Based Job Training Grant. The schools deliver the training to incumbent workers from the manufacturing community and to the dislocated worker base in western Ohio.
- The 33 industry partners contributed over 344 hours to curriculum development, equipment purchases and partnership management over the past three years.
- Participating institutions are: Edison Community College, Wright State University-Lake Campus, Sinclair Community College, and Upper Valley JVS.
- SkillsTrac was funded by a U.S. Department of Labor Community Based Job Training Grant.

Weld-Ed National Center for Welding Education and Training The program is a national partnership of colleges, universities, professional societies, government and private industry committed to increasing the number and quality of welding and materials joining technicians to meet industry demand. Weld-Ed strives to improve the quality of education and training services to address the hiring and professional development needs of the welding industry.	▪ The Center's Goals are to (1) increase the number of welding technicians to meet the on-going workforce needs; (2) promote comprehensive reform of welding education; and (3) promote and enhance faculty professional development and continuing education for welding educators. ▪ The program drives the future of the materials joining industry in the U.S. Working together the educational partners, business partners and the American Welding Society (AWS) are identifying the new and emerging technologies and methods that will be keys to the competitiveness of the industry. ▪ Weld-Ed is funded by the National Science Foundation and housed at Lorain County Community College. It is committed to support the NAM Endorsed Skills Certification system. ▪ Manufacturers have reviewed Competency Models that are the basis for instructional outcomes and standards. In addition, manufacturers have participated in the National and Local Skill panels. The members of the National Skills panel will move into the role of Central Advisory Board for Weld-Ed. In addition, AWS is a Center premier partner. ▪ Services are provided nationally through regional partners.

Two Initiatives Promote High-Quality Instruction

Training programs, no matter how excellent or accessible, won't be highly effective if they don't have quality instruction and materials. Ohio understands the need for quality instruction on a n umber of fronts and has taken steps to adequately address this need.

Ohio Resource Center

The Board of Regents established the Ohio Resource Center for Mathematics, Science and Reading (ORC) in 1999 to provide high quality, web-based materials and professional development for the teaching profession both at the secondary and college level. The ORC's site receives approximately 30,000 visits per month (www.ohiorc.org).

The ORC is a "virtual center" that provides peer-reviewed, best practice learning materials for use by teachers and adults. The Center's materials target specifically those intending specific careers as well as toward those wishing to attain "basic skills" necessary for work in different occupations.

Two projects of note funded by the Ohio Department of Education are the C*areer Pathways* and *Standards First* initiatives. *Standards First* involves correlating instructional activities to specific career fields. The *Career Pathways* project provides a searchable database for the competencies within Ohio's 16 career fields and gives inquiry-based, project-based learning objects. Visit www.ohiorc.org, then go to Career Pathways or Standards First on left side of the page.

FordPAS

This program is dedicated to preparing all students to succeed as citizens and workers in the 21st century global economy. To achieve this success, teachers must employ strategies that encourage the active, self-monitored learning that will yield these results.

- The hallmark of the Ford PAS approach is to integrate what and how students learn with what and how their teachers teach because the two are inextricably linked. The "pillars" of Ford PAS are the key skills that students learn and the key teaching strategies that teachers employ throughout the curriculum.
- The Ford PAS Learning Pillars correspond to the essential skills identified by the Partnership for 21st Century Skills, which brings together the business community, education leaders, and policymakers to define a powerful vision for 21st century education. These skills complement and support the knowledge and skills defined in national academic standards.
- Based at Sinclair Community College in Dayton, the program has been active in Ohio since 2006. A total of 132 teachers have been trained during the past four years. A total of 36 schools throughout the state presently have active programs, and approximately 10,000 students throughout the state have exposure to the program.
- Trainees are from mid 20s to early 50s. Students in this program range across all income brackets.
- The program is funded by a short-term Perkins grant, and by revenue generated from trainings.

Sinclair Community College also is the statewide training center for Project Lead The Way. It provides the initiative's teacher training each year, which consists of 80 hours of rigorous hands-on training, including the mathematics, science and problem-based curriculum specific to each Project Lead The Way course. Through 2009, 644 teachers have been trained in Project Lead The Way courses.

Identifying Community-Based Assets

The information in this section of the report responds to the following questions identified on pages 3 and 4:

- ***What career awareness and student recruitment strategies are there in the state? (Question #5) NOTE: This question also is addressed in the discussion of education assets.***
- ***What types of organizations serve low-income young adults in the area of skills training and development? What other groups might be focused on the same topics and be willing to leverage resources? (Question #7)***

As they relate to manufacturing skills, Ohio's community-based assets are marked by their diversity. They include:

- A dynamic web-based system that facilitates occupation and career exploration using labor market data This **Oho Career Information Sys**tem blends community-based and public sector resources.

- **The Ohio College Access Network (OCAN),** which provides leadership and support for college access organizations while working closely with KnowledgeWorks Foundation, Ohio Business Roundtable and the Ohio Board of Regents and other community-based partners. An independent 501 (c)(3) organization, OCAN was the first statewide coordinating body for college access programs in the nation. Currently, 35 college access programs serve nearly 205 of Ohio's 612 school districts, touching 173,000 students annually.

    - College access organizations are community-based, non-profit organizations designed to increase the number of students who pursue education beyond high school with a particular focus on low income and first generation college students.

    - The mission of these organizations is to open the doors to postsecondary education by providing financial aid and college application advising, last dollar scholarships, college visit opportunities, entrance exam courses and career guidance.

Lumina Foundation Funds QuickStart To College Program

With support from the Lumina Foundation, James A. Rhodes State College, Owens Community College, and Zane State College are participating in the QuickStart program, a pre-admissions program focused on recruiting adult students. Lumina's support came in the form of a three year, $522,200 grant through the Ohio Learning Network. The grant ends in December 2010.

The goal of the QuickStart to College Project is to increase the participation of Ohio's adults – particularly those who are low income and have low work skills – in community colleges. Specifically, the project is designed to meet five objectives:

1) Create a sustainable recruiting and transition course;
2) Build adults' fundamental mathematics and English skills needed for success in college;
3) Build a strong foundation for comprehensive academic and student support services in an environment accessible to the unemployed and the underemployed in the three regions;
4) Create the learning plan in the first month of work; and
5) Create a process to ensure continuous improvement within the state's community colleges.

The five components of the Quick Start to College project are being piloted by the three consortium colleges. The Ohio Board of Regents and the Ohio Learning Network are now seeking to expand this program across the University System of Ohio.

- **Ohio and national foundations** that contribute more than $300 million a year to education and training. Ohio has the largest number of "community foundations" in the nation – more than 300 of them. If fully mobilized, these foundations can be powerful assets for developing manufacturing skills. The activities of a number of Ohio and national foundations – including the Greater Cincinnati Workforce Network's Greater Cincinnati Advanced Manufacturing Career Pathway Partnership – are highlighted in this report. Beyond those featured initiatives, it should be noted for illustrative purposes that:
    - The Cleveland Metropolitan School District recently received over $136,000 from Rockwell Automation Foundation.
    - The Ohio Department of Education has received $338,000 from the Society of Manufacturing Engineers/Education Foundation to support the start up of Project Lead The Way programs at the middle school level, and to support Summer Institutes in Welding and Automation and Robotics (summer 2009) and Summer Gateway Academies for middle school students to introduce critical thinking skills, teamwork and concepts of engineering.
    - Midpark Schools have received a series of grants/donations from the Nord Family Foundation. In addition, the Nord Foundation was a major sponsor of the 2007 Fall Project Lead The Way Ohio Conference held at Case Western Reserve University.
    - Steve Stuckey of Allied Machining and Engineering in Dover, Ohio has raised over $1.2 million in Tuscarawas County to support Project Lead The Way in all high schools and middle schools in that county.

- The Bill & Melinda Gates Foundation has joined with the Lumina Foundation for Education in funding the Developmental Education Initiative through MDC, Inc. Building on the Achieving the Dream: Community Colleges Count initiative, this is a three-year national effort to make community college students' learning experiences more successful. Targeting low-income students and students of color, the groundbreaking initiative is designed to make it possible for developmental (i.e., remedial) education students to move quickly into college-level courses, complete them and earn a certificate or degree that is essential to building prosperous and successful lives.

Again, for illustrative purposes:

- KnowledgeWorks Foundation has funded the development of Career Pathways in three sites across Ohio (2005 through 2008). Each site received $300,000 over the three-year period: Cincinnati State Community and Technical College/Great Oaks Career Center; Washington State Community College, and James Rhodes State College. Through the Governor's Workforce Policy Board, the state of Ohio has invested another $900,000 to fund three additional Career Pathways (administered by KnowledgeWorks Foundation): Youngstown State University, Lakeland Community College and Pickering-Ross Career and Technology Center.

- Ohio was one of six states participating in the Ford Foundation-funded Community College Bridges to Opportunity initiative through the KnowledgeWorks Foundation. Ohio received $3 million over the period from 2005-2008 to align workforce policies, structures and education. This initiative had a significant impact on Ohio's workforce alignment and was the force for bringing the workforce education entities under one umbrella at the Ohio Board of Regents. Specifically, the initiative's focus was:

    - Promote policy innovation, which support the integration of the multiple community college missions through the selected engagement of policymakers, institutional practitioners, and multi-stakeholders coalitions of support from business, labor, and community groups and educational leaders.

    - Research ways in which state and local policies can enhance community college's efforts to expand educational and economic opportunities for disadvantaged students.

    - Develop models of effective classroom and administrative practice for use by policymakers, college administrators, and advocacy coalitions.

- Ohio TRiO is a community of professionals committed to helping students who want to achieve success in school and in life. TRiO programs receive funding from the United States Department of Education. It offers a variety of services to help participants – who come from low-income and working families, often the first in their families to attend college – achieve success. TRiO program services include the following: financial aid information and assistance; career exploration and planning; academic advising; college information and college placement, study skills and test preparation, cultural events and academic instruction.

Bill & Melinda Gates Foundation Makes a Major Commitment to Education and Training in Ohio

The Bill & Melinda Gates Foundation has made a major commitment to improving learning opportunities for Ohioans from birth through careers. Ohio's Shifting Gears initiative, which has received significant support from the Gates Foundations, is highlighted elsewhere in this report. Here are some of the Foundation's other commitments in Ohio:

- **Battelle-For-Kids Ohio Value-Added High Schools**

These value-added high schools commit to a goal of dramatically increasing the number of students who take the ACT college entrance exam and putting programs in pace to help achieve an average composite score of 22 on the mathematics portion of the exam, which signals college readiness with no need for remediation in Ohio Public colleges. These schools also are using ACT's end-of-course exams in high school I Algebra I & II, Pre-Calculus, Geometry, Biology, Chemistry, English 9, 10 and 11. The Gates Foundation is currently working with 40 high schools and selected colleges and universities across Ohio.

- **Achieving The Dream**

The Foundation is supporting this initiative in five Ohio community colleges. The purpose is to improve remedial education at the community colleges and raise graduation rates. Specifically, the grants are focused on increasing the number of students who graduate with associate degrees; improving the colleges' retention rates; raising students' persistence rates; and improving the colleges' performance on student satisfaction and student engagement surveys.

- **YouthBuild Program**

The Foundation supports this initiative in Columbus to assist low-income youth ages 16-24 towards their GED or high school diplomas. It also provides a direct link to Columbus State Community College through a partnership that provides mobility into and through college. The YouthBuild programs are testing and putting into place a set of interventions and supports that will ensure high rates of postsecondary enrollment and credential attainment by program graduates.

- **Ohio High School Transformation Initiative**

Gates is supporting an initiative to replace the Ohio's massive and ineffective high schools with almost 60 smaller schools. Numerous studies have found that students in smaller schools exhibit better grades, increased college enrollment, and a better sense of belonging, safety and security. All were missing factors for a large number of students in the larger Ohio schools.

- **Ohio Early College High Schools Initiative**

The Foundation is supporting nine Early College High Schools in the state that create opportunity for up to two years of college credit while students simultaneously complete their high school course work. The schools seek to expand educational opportunities for underrepresented populations, including low-income and minority students, first-generation college participants and English language learners.

- **Ohio STEM Learning Network (OSLN)**

The Foundation supports creation of a statewide network of five regional hubs, 10 STEM-focused secondary schools and 26 K-8 Programs of Excellence designed to implement a rigorous and relevant course of study in STEM; support teachers in inquiry-based learning approaches; and build student motivation, competence and persistence to pursue advanced STEM academics and careers, particularly in Ohio's driver industries. In addition, the Gates Foundation is supporting the Business Alliance for Higher Education and the Economy (BAHEE), for which STEM learning is a major priority.

- Urban League organizations in Akron, Columbus, Dayton, Toledo, Lorain County and Cincinnati.
    - Urban Leagues are non-profit community service organization established to provide direct services in the areas of employment, training, business and career development, education, health, housing and youth development.
    - Their mission is to promote, encourage, assist and work to improve the social and economic conditions of African Americans, other minorities and those who are disadvantaged.

Illustrative Profiles: Community-Based Assets

Ohio Career Information System (OCIS) with Individual Academic and Career Plan (IACP) OCIS is a dynamic web-based system that facilitates occupation and career exploration using labor market data. The system also has an integrated planning tool, IACP, which enables students to customize a pathway that best fits their interests and strengths.	▪ OCIS has 1,160 sites and 234,270 student portfolio accounts throughout the state. ▪ Students served range from 6th to 12th grade (some college students and adults also are served), from low, median and high income families. Students with special needs are included. ▪ The system does not target specific industries. However, the searchable labor database covers all 16 pathways and the portfolio can be used to support a program of study specializing in manufacturing. ▪ Information on emerging industries is available through OCIS and accounts can be customized based on the instructor and student preferences. OCIS can be used to tailor and track student learning, internships coursework and higher education experiences focused on manufacturing or other pathways ▪ Students explore all industries and can compare occupations by interests, wage and skills. Students are encouraged to build experiences with occupations (i.e. job shadowing, internships, etc.) in order to make a more informed career decision. ▪ The system is available and accessible throughout the state of Ohio in any school, district, career center, library, or one-stop that pays for a license. ▪ The system is funded through fee-based annual licenses ▪ OCIS contains more than 60 occupation pathways and more than 50 programs of study of which are related to the manufacturing industry. Each occupation has related videos, interviews and other information that supports students in learning more about the opportunities available.

Ohio College Access Network OCAN is an intermediary support organization that partners with the state of Ohio and its broad membership to provide college access advocacy and support mechanisms that help more Ohioans enroll in and pay for education beyond high school.	▪ With a membership of over 70 entities in Ohio that includes 37 traditional college access organizations, the Network reaches close to 130,000 students annually with critical college application assistance, financial aid advice and college and career planning information. OCAN programs currently are serving about 200 or Ohio's 612 school districts. ▪ OCAN was founded in 1999 by KnowledgeWorks Foundation, in collaboration with the Ohio Board of Regents and Ohio Department of Education. OCAN is an independent 501 (c)(3) organization that provides leadership and support for Ohio college access organizations while working closely with the aforementioned partners and the Ohio Business Roundtable to help increase the college going rate in the state. ▪ Each year, OCAN's ***Know How 2 Go*** campaign encourages and prepares 2,500 low-income and first-generation students to actively pursue higher education. ▪ OCAN's ***OHIO CAN! Partnership*** was designed to enrich participants' capabilities to increase scholarship offerings, expand corporate partnerships for internship opportunities and fortify their infrastructure to sustain these initiatives after the campaign is completed. During a two-year campaign, the Ohio Board of Regents and OCAN encouraged the development of public/private partnerships to leverage the state's $8.5 million investment to raise $100 million by the end of 2009, and to provide scholarships and internship awards enabling nearly 20,000 additional students to attend Ohio institutions of higher education.

SkillsUSA Ohio This is a non-profit student organization serving high school and college students enrolled in trade, technical, service and health occupations. It offers an applied method of instruction to prepare Ohio's high performance workers in public career and technical programs. It provides quality learning experiences for students in leadership, teamwork, citizenship and character development.	▪ Approximately 6,200 Ohioans are enrolled in manufacturing related SkllsUSA chapters, while 31,000+ students are participating in all areas of career-technical education. Members are students enrolled in career-technical programs at the high school level and all population demographic groups. ▪ In manufacturing, SkillsUSA offers instruction in precision machining, robotics and automation, drafting, production printing, electronics and engineering program areas. ▪ Industry serves on state and local advisory and technical committees and coordinates/sponsors Skill events at the local, regional and state level. ▪ Program funding comes from membership dues, private contributions and registration fees. ODE staff assigned to manage the state association are paid out of the state budget and the Perkins program. ▪ SkillsUSA emphasizes total quality at work – high ethical standards, superior work skills, life-long education, and pride in the dignity of work. It also promotes understanding of the free-enterprise system and involvement in community service.

The Fund for Our Economic Future (FFEF) This Fund is a collaboration of philanthropic organizations (over 80 philanthropies have contributed) and individuals that have united to strengthen the economic competitiveness of Northeast Ohio (that includes Akron, Canton, Cleveland, Mansfield and Youngstown) through grantmaking, research *and civic engagement.	▪ Begun in 2004, the mission of the Fund is to encourage and advance a regional competitiveness agenda that will lead to long-term economic revitalization that strengthens our region's core cities, encourages inclusion and enhances the region's quality of life. ▪ The Fund is a 501(c)3 organization governed by its members. Members include organizations and individuals who have committed $100,000 or more to the Fund over a three-year period. Since 2004, the Fund has raised more than $70 million and the vast majority of the Fund's grantmaking to regional economic development organizations that accelerate, attract and grow companies in the region. ▪ The Fund works with partners in Advance Northeast Ohio, the region's economic action plan, to develop and implement regional strategies that address four key priority areas: (1) business growth and attraction; (2() talent development; (3) growth through racial and economic inclusion; and (4) government collaboration and efficiency. ▪ In 2008, the FFEF created the Regional Talent Network (RTN), chaired by the President/CEO of Lubrizol. The RTN has developed some traction in the region as an effort that is aimed at engaging employers in helping shape and advance a new strategy for addressing talent issues on a regional basis. Partners include the metro chambers, Ohio Department of Development, the Ohio Skills Bank coordinators, WIB directors and/or their employer outreach staff, and industry sector intermediaries. ▪ Over 40% of all Ohio manufacturing takes place in the 16 counties of Northeast Ohio. Both the FFEF, through its sponsored programs and activities, and the RTN are vehicles for supporting the implementation of the manufacturing skills certifications in the region.

NEOCAM Northeast Ohio Campaign for American Manufacturing NEOCAM is a diverse coalition of Northeast Ohio manufacturing companies that informs the public and elected officials of the importance and economic impact of manufacturing to our communities.	▪ Coalition members work together for policies that enhance the competiveness of American-based manufacturing. ▪ NEOCAM is mobilizing business owners, managers and employees to talk directly to members of Congress, the Administration in Washington and other public officials about the importance of a strong, American-based manufacturing infrastructure. ▪ NEOCAM is committed to engaging in an energetic debate about these issues, and pushing local policy makers to act on these, wherever there is consensus. Four issues are of current concern: ▪ Support a Sound Dollar, End Currency Manipulation. ▪ Time-Out on Free Trade Agreements ▪ Restore funding for the Manufacturing Extension Partnership. ▪ Ohio Tax Reform to recognize the critical role of manufacturing to Ohio's economy.

Greater Cincinnati Advanced Manufacturing Career Pathway Partnership The goal of this program is to build a partnership of manufacturers, educational institutions, and service providers that works closely with employers to identify in-demand occupations and the needed skills, conduct gap analyses, improve and coordinate training programs to respond to the needs of employers, and create career pathways for low-income adults to get the skills they need to get good jobs that are in demand.	▪ This partnership is an initiative of the Greater Cincinnati Workforce Network. ▪ One of the partnership's first activities is to provide short-term skills training resulting in industry-recognized credentials that enables participants to obtain in-demand entry-level jobs in the advanced manufacturing industry. The program also integrates wrap-around support services, including career assessment and counseling, case management, assistance securing child care and transportation, assistance accessing financial aid and public benefits, soft skills training, and job placement, retention, and advancement services. The purpose is to help low-skill individuals obtain, retain, and advance in careers in the high-demand advanced manufacturing industry. ▪ The partnership's objective is to serve 500 individuals by the end of 2011. ▪ In addition, the partnership is committed to serving most economically disadvantaged individuals in the Greater Cincinnati community, including low-skill adults over age 18 who are unemployed or underemployed, individuals receiving public assistance, individuals with low educational attainment, individuals with inconsistent work histories, and individuals facing multiple barriers to obtaining and retaining employment. ▪ Key industries engaged in the partnership are advanced manufacturing, aerospace, biotech, high-tech machining and others. ▪ An Employer Chair provides leadership for the career pathway development process, and the partnership has engaged a team of nine diverse manufacturing employers in monthly implementation meetings. ▪ Educational institutions and community-based organizations engaged with the partnership include: Butler Technology and Career Development Schools, Cincinnati State Technical and Community College, Cincinnati Public School (Woodward High School), Great Oaks Career Campuses, Gateway Community and Technical College, Ivy Tech Community College, the University of Cincinnati (including Clermont and Raymond Walters), Community Action Agency, Urban League, Brighton Center and Mercy Neighborhood Ministries. ▪ Other community-based partners include: Carol Ann & Ralph V. Haile, Jr./ US Bank Foundation, Greater Cincinnati Foundation, KnowledgeWorks Foundation, Macy's Corporation, Messer Construction, National Fund for Workforce Solutions, Ohio Skills Bank, Procter & Gamble Fund, The Thomas J. Emery Memorial Foundation and United Way of Greater Cincinnati.

Identifying Public Sector Assets

The information in this section of the report responds to the following questions identified on pages 3 and 4:

- ***What state initiatives currently support either the manufacturing sector or skills certification?(Question #4)***
- ***What other government programs might already be aligned to support the skills certification project? And what other career, technical, or experiential learning programs exist that would be a natural fit or pipeline for manufacturing? (Question #6)***
- ***What are universities and their economic development partners doing to support the manufacturing industry or community colleges? (Question #8) NOTE: This question also is addressed in the discussion of education and private sector assets.)***

To enhance its workforce development initiatives, the state of Ohio must build an effective system of workforce training and skills development. It must maximize its use of federal funds, and it must leverage and align its own resources to promote policies and programs that achieve Ohio's goals for a competitive 21st century workforce.

Both the federal Workforce Investment Act of 1998 (WIA) and Ohio law require that the state establish a workforce policy board to assist the Governor with the development, implementation and continuous improvement of Ohio's workforce development system. For this purpose, Governor Strickland reconstituted the Governor's Workforce Policy Advisory Board by executive order in 2007.

The Advisory Board serves the role defined for state boards in WIA and advises the Governor with respect to business, workforce training, education and other issues that shape a demand-driven workforce development system. Those issues include, without limitation, talent integration and accountability mechanisms that will measure and report the quantitative and qualitative impact of the workforce development system on local, regional and state economies and individual Ohio workers.

How do the Governor and members of the Advisory Board view the issue of manufacturing skills certification? This question was answered directly in January 2010 when the Advisory Board passed a resolution that said: ***"The Credential Committee of the Board will work in collaboration with state agencies, business and industry, and education stakeholders to develop and adopt a comprehensive statewide manufacturing worker certification program."***

This is a tremendous asset – a clear statement of support for a manufacturing skills certification system. But it is not alone!

- At the state level, workforce policies and their implementation are the shared responsibility of the Ohio Department of Development, Ohio Board of Regents and the Ohio Department of Job and Family Services.

- This reflects a continuing commitment to align workforce policies and practices – to connect economic development with education and workforce training, and to make effective use of the state's education and training resources.

- It also points to a determination to design and carryout workforce policies that address the needs of diverse populations from young people to adults, from low-income workers and dislocated workers to those who work in high-tech industries whose success in the global marketplace demands both innovation and talent.

Two assets often ignored in conversations about the development and effective use of manufacturing skills are:

- **Ohio's Third Frontier Initiative**

  The Ohio Third Frontier represents an unprecedented and bipartisan commitment to expand Ohio's technological strengths and promote commercialization that leads to economic prosperity throughout the state. Designed to build world-class research programs, nurture early-stage companies and foster technology development that makes existing industries more productive, Ohio's $1.6 billion Third Frontier initiative creates opportunity through innovation.

  The Third Frontier Initiative targets its investments to support technology areas that represent Ohio's key competitive opportunities:

  - Advanced and Alternative Energy
  - Biomedical
  - Advanced Materials
  - Instruments - Controls - Electronics
  - Advanced Propulsion

- **The Ohio Edison Technology Centers**

  Edison Technology Centers focus on companies in the market entry and growth and sustainability phases of the commercialization framework. They ensure that Ohio producers have the opportunity to compete in the global economy. The evolution of Ohio industries calls for a strategic approach to enhance Ohio's historical strengths, aligning technologies and resources to make sure that our state remains a vibrant competitor for generations to come.

According to the Ohio Department of Development, Ohio's Edison Centers are a benchmark for technology-based economic development programs for many states in the U.S. In Ohio, the Edison Centers are becoming more recognized for our contribution in laying the groundwork for the future. The Edison Centers have become the nucleus for the commercialization of technology, private investment and for industry advancement in the key technology areas in the state; biosciences, information technology, advanced materials and advanced manufacturing, and food production and processing technologies.

With more than 5,000 private sector clients, the Centers not only have an intimate knowledge of the cutting edge technology of many industries but also are positioned to be the optimal partners for Ohio's inventors and creators such as the Wright Centers of Innovation. Edison Centers provide a comprehensive array of innovation services to core Ohio and global industries in the areas of:

- Life Science/Bio
- Material Joining
- LEAN Manufacturing
- Food Processing
- Information Technology

CLIP Team Targets Dayton's Low-Income Youth

Dayton area leaders are studying solutions to a critical problem affecting the financial stability of families and our region's economic development. Low income youth are not on track to obtain postsecondary credentials that would provide them with family-supporting incomes and would provide local employers with a stronger, more talented workforce.

A cross-organizational group, called the **Communities Learning in Partnership (CLIP)** team, is studying this problem and developing community-wide solutions. An action plan to facilitate system-wide changes is being developed through a planning grant from the Bill & Melinda Gates Foundation.

The CLIP team is comprised of the City of Dayton, Montgomery County, Dayton Public Schools and other school districts, higher education institutions, community-based organizations, business and industry representatives, and other stakeholders.

Dayton is in competition with several other cities nationwide for an implementation grant that would help the community implement the action plan. The focus of the plan, which will be submitted to the Gates Foundation in May 2010, is to influence the systems, policies and practices that community leaders working together can change to reach a common goal: to increase the number of low-income youth who obtain a postsecondary credential by age 26.

Ohio's Shifting Gears Initiative

Ohio's Shifting Gears Initiative aims to increase the educational attainment and earnings potential of lower-income working adults by widening their access to postsecondary workforce education, shortening their paths to degrees or credentials, and speeding their progress with fewer interruptions.

The initiative focuses on stimulating change in the delivery of services in Adult Basic and Literacy Education, Adult Career-Technical Education, and Community and Technical Colleges, primarily by establishing service standards based on best practices.

Standards address the collaborative provision of (1) comprehensive assessment, career exploration, and advising; and (2) integration of basic academic with technical education in priority fields through contextualized curriculum and dual or concurrent enrollment. The initiative will develop these standards in consultation with providers and consumers. It will promote their implementation in all sectors of a unified University System of Ohio (USO) by advocating for funding incentives and non-financial institutional supports, including research, technical assistance and professional development sponsored by the Board of Regents.

Shifting Gears will underwrite development of new data tools for use by institutions and state administrators, commission special policy studies and propose appropriate performance metrics for adult student success in all sectors. It will disseminate its results to increase public awareness and build consensus for positive change across the University System and among state and local decision-makers and opinion leaders.

Target Population. The intended beneficiaries of Shifting Gears are adults with less than a postsecondary credential or two-year degree. who comprise two-thirds of Ohio's working age population. Within this large population, the initiative is especially concerned to improve educational outcomes for the 33,000 Pell-eligible adults enrolled in two-year colleges; more than 12,000 economically disadvantaged adults taking career development courses at Adult Career Centers and roughly 10,000 higher-level adult basic education and ESL students for whom postsecondary education is a near-term possibility.

Organization. The Ohio Board of Regents is the lead agency for Shifting Gears. The Governor's Office and the departments of Development and Job and Family Services are principal partners. Their directors serve on a Senior Leadership Committee along with the Chancellor, members of both houses of the Ohio General Assembly and leaders of the three participating USO sectors.

Budget. For 2010-2011, Ohio Shifting Gears is supported by $559,000 in funding from the Joyce Foundation, including funds carried over from 2009. This is supplemented by $378,000 in cash and in-kind match from related grants and state administrative funds.

Illustrative Profiles: Public Sector Assets

Transformations – Training for Technology This is a highly successful, innovative program designed and implemented at Lorain County Community College with a focus on dislocated workers.	▪ The 18-week Transformations Program combines broad-based education with specialized technical skills, generating a program that can be implemented as credit, non-credit credit, or a combination of both. The program takes a holistic approach to education and training incorporating assessment, education, counseling, job search skills and job placement. ▪ Originally designed and developed in 1991 through a grant from the U. S. Department of Education, the model has been utilized for dislocated worker programs as well as customized incumbent worker programs. Since the program's inception, 34 groups of dislocated workers have graduated from the Transformations Program for a total of 700+ students, with a job placement rate of 98 percent within approximately 3 months or less of graduation. ▪ A customized model was developed for Ford Motor Company, Brook Park, Ohio, to prepare incumbent workers for their complex billion dollar Duratec Engine Line. Additional customized models have been implemented for AT&T and O'Sullivan Corporation. ▪ Lorain County Community College develops models to prepare dislocated workers in those specific areas of technology. The Ohio Department of Job and Family Services, Lorain County Employment Network (WIA), and many local non-profit organizations refer dislocated workers to the program orientations to determine if the program meets their career goals. If individuals meet the criteria as dislocated workers, they are issued a voucher from the Lorain County Employment Network (WIA). ▪ The Transformations program serves students of all ages and income levels, as well as dislocated workers and incumbent workers from industry. ▪ The success of the Transformations Program for dislocated workers is based on local partnerships between Lorain County Community College, business/industry, local non-profit organizations, and the Lorain County Workforce Investment Board. Advisory committees are formed from business and industry to identify what skill sets are needed and establish competency levels.

Identifying Private Sector Assets

The information in this section of the report responds to the following questions identified on pages 3 and 4:

- ***What are the manufacturing organizations or associations in the state – and what is their interest and involvement in these initiatives? (Question #3)***
- ***What are universities and their economic development partners doing to support the manufacturing industry or community colleges? (Question #8) NOTE: This question also is addressed in the discussion of education and private sector assets.)***

Ohio is rich with manufacturing associations and national manufacturing associations that have a presence in the state. They are:

- Precision Metalforming Educational Foundation
- Precision Metalforming Association (PMA)
- National Tooling and Machining Association (NTMA)
- Society for Manufacturing Engineers Education Foundation
- Society for Manufacturing Engineers
- American Welding Society, District 7
- American Welding Society, District 10
- American Welding Society Education Services Department
- Magnet
- Ohio Manufacturer's Association
- Cleveland Engineering Society
- Wire-Net
- Tech-Solve

In addition, the national headquarters for PMA is located in Cleveland and NTMA is relocating its national office to Cleveland in 2010.

Ohio has two Manufacturing Extension Programs funded by NIST in the U.S. Department of Commerce:

- Tech-Solve, located in Cincinnati, serves companies in the southern part of the state.
- MAGNET, the Manufacturing Advocacy and Growth Network, serves companies in northern Ohio.

Both of these programs are focused on helping smaller manufacturers to be competitive and workforce development is a critical factor. Implementing skills certification will be an asset to their efforts.

Illustrative Profiles: Private Sector Assets

Dream It Do It Northeast Ohio The program's goal is to make Northeast Ohio the best place in the world for manufacturing and a player in the global economy. To achieve this we need a highly-skilled workforce, globally competitive companies, and a supportive business environment.	▪ MAGNET launched the program in 2007 in response to manufacturers' need for skilled workers. The Dream It! Do It! campaign is a coordinated effort by education and training institutions, the public workforce sector, the philanthropic community and manufacturers to reach out to students, parents and educators, informing them about the great opportunities in manufacturing and the new demands of the industry, and encouraging young people to prepare for these challenging careers. ▪ In the short term, the program is implementing strategies through the education institutions to provide the necessary training and certifications to our current workforce who would be a good fit in the manufacturing arena. ▪ Approximately 1,500 students are impacted by the campaign – middle school through postsecondary and including transitioning workers. ▪ The campaign is focused on a broad range of manufacturing industries and skill sets from entry level through master's degrees. ▪ Employers are engaged through the MAGNET Manufacturing Ambassador Program, which connects educators and students with manufacturers through internships, externships, classroom speaking engagements, tours, distance learning programs and other career awareness activities. ▪ The program operates in 16 Northeast Ohio counties: Ashland, Ashtabula, Carroll, Columbiana, Cuyahoga, Geauga, Lake, Lorain, Mahoning, Medina, Portage, Richland, Stark, Summit, Trumbull and Wayne. ▪ The campaign is funded by corporations and foundations, and receives grants and contracts for the delivery of services through partnerships. The latest report to funders summarizes annual activities. It can be found at http://www.dreamit-doit.com/northeastohio.

Capitalizing on Ohio's Connecting Assets:
Initial Thoughts about the Road Ahead

In ***The Skills Gap,*** the National Association of Manufacturers and its partners assert that students, educators and employers need a framework for determining what employees need to know and be able to do in order to function effectively in the modern workplace. They conclude: "Changing work requirements are changing the nature of today's schools. The voluntary standards should be industry-designed and driven, and should provide common language of work skills to enable all parties to better communicate their needs to one another."

This is the basis, in part, for the development of a manufacturing skills certification system. And a critical first step in creating such a system is to document the state's assets in this area – and, by inference, to identify the deficiencies and/or gaps in the current assets and workforce training system.

That is the rationale for this mapping of Ohio's manufacturing skills assets. The information reported here can provide the groundwork for building the state's capacity to prepare tomorrow's workers (and many Ohioans who are already in the workplace) to generate new designs and processes, to use new technologies, and to strengthen and expand our manufacturing industries.

Those are ***not*** the tasks of this project – they are the next steps in a process that will go a long way in shaping Ohio's economic growth and prosperity. Yet, there are lessons that can be drawn from this mapping exercise that can guide the work that lies ahead. Here, in capsule form, are some of those lessons:

- Ohio's emerging workforce development architecture is impressive. It reflects the protracted efforts of employers, educators and the state's education and workforce development policy leaders. This architecture has the ***potential*** for pushing out skill certificates, but numerous obstacles must first be overcome. Most importantly, the state's education and training assets need to be fully aligned and a seamless workforce development system needs to be created. This is why the effective operationalization of Ohio's newly created "connectors" must be one of the state's top priorities in the years ahead.

- The Ohio Skills Bank program matches employers' workforce needs with learners' skills. The alignment of adult career-technical training and ABLE (Adult Basic and Literacy Education) with the state's higher education system promotes student success. Effective articulation and transfer processes develop career pathways that let students know where credits are going to count and where they are going to be recognized and accepted across the state. All of these initiatives must be strengthened and fully implemented. They must become part of a comprehensive workforce development system. Until this is done, Ohio will not have consistent implementation of a manufacturing skills certification system across the state.

- Serious efforts are needed to coordinate the work being done through the Governor's Office, Ohio Department of Development, Ohio Board of Regents and other state agencies with the work that flows from this mapping exercise. Ohio doesn't need multiple initiatives.

- Outreach is needed to mobilize other state policy leaders, along with educators and business decision makers. They need to be aware of this work. They must understand it. They must support it. And the best way to accomplish this is to make sure they are involved in it.

- Employers must be intimately involved in the crafting of a skills certification system. It is not something that can be left to policy makers and educators. The entire system must be accepted and "owned" by business, and its needs to be portable and credit-bearing, wherever applicable.

- A new culture of collaboration – among educators, public officials and private sector leaders – must be nurtured, and the processes that define the relationship among these constituencies need to be streamlined. This challenge is clearest in three areas:

    1. The connection between those hiring (human resources) – the demand side – and those producing – the supply side – needs to be strengthened. The "divide" between them needs to be eliminated by ensuring that curriculum and skills meet the needs of industry, by being more creative in matching skills and needs, and by getting rid of the "cross-talk" that too often characterizes the relationship between educators and business decision-makers.

    2. New ways to assess work readiness need to be developed. Traditional approaches to measuring workers' readiness must be enhanced with performance-based and other innovative assessments that document workers' knowledge and skills.

    3. Ohio needs to address the "math problem." Mathematics is widely seen as a "gatekeeper" that prevents many Ohioans – particularly adult returning learners – from achieving their objectives and preventing them from completing certificate or degree programs. For many of these adult learners, part of the answer is "just in time" mathematics that gives students the foundation for further learning (as needed), as opposed to "just in case" mathematics that focuses on a much broader set of skills and expectations.

- Finally, Ohio needs to address critical funding issues. How are we going to pay for the building of an effective workforce development system that meets the needs of incumbent and future workers by connecting and making better use of the assets that Ohio's leaders, educators and employers have put in place.

These are serious challenges, but they are not beyond Ohio's reach.

Appendix A

Higher Education Information (HEI) System Data on Degrees and Certificates Awarded in FY 2005 to FY 2009 in Manufacturing Fields, By Types of Institutions

Degrees and Certificates Awarded in FY 2005 to FY 2009 in Manufacturing Fields

Community Colleges

Subject Code	Subject Title	Award Level	2005	2006	2007	2008	2009
Community Colleges: Belmont Technical College							
150000	Engineering Technology, General	Associate Degree	11	19	3		
150101	Architectural Engineering Technology/Technician	Associate Degree	8	15	10		
150201	Civil Engineering Technology/Technician	Associate Degree	8	5	6	5	6
150303	Electrical, Electronic and Communications Engineering Technology/Technician	Associate Degree	1	1		10	18
150399	Electrical and Electronic Engineering Technologies/Technicians, Other	Associate Degree			16		
150403	Electromechanical Technology/Electromechanical Engineering Technology	Associate Degree				3	4
150499	Electromechanical and Instrumentation and Maintenance Technologies/Technicians, Other	Associate Degree	9	2	2		
150501	Heating, Ventilation, Air Conditioning and Refrigeration Engineering Technology/Technician	Less than One-Year Award			3	3	2
		One to less than Two-Year Award		1	2	1	
		Associate Degree			3	7	4
460410	Roofer	Associate Degree				5	
479999	Mechanic and Repair Technologies/Technicians, Other	Associate Degree	6				
480501	Machine Tool Technology/Machinist	One to less than Two-Year Award		3			
		Associate Degree	9	3			
480507	Tool and Die Technology/Technician	Associate Degree				6	1
480508	Welding Technology/Welder	Less than One-Year Award			1	2	
		One to less than Two-Year Award	2	2	2		
		Associate Degree	5	5	3	7	5
Community Colleges: Central Ohio Technical College							
150303	Electrical, Electronic and Communications Engineering Technology/Technician	Associate Degree	10	5	12	5	11
150403	Electromechanical Technology/Electromechanical Engineering Technology	Associate Degree	7	4	3		8
150613	Manufacturing Engineering Technology/Technician	Associate Degree	1		1		1
151303	Architectural Drafting and Architectural CAD/CADD	Associate Degree	5	2	7	4	10
151304	Civil Drafting and Civil Engineering CAD/CADD	Associate Degree	1	3		2	
151306	Mechanical Drafting and Mechanical Drafting CAD/CADD	Associate Degree	1	4	1		
Community Colleges: Cincinnati State Tech. & Community College							
150101	Architectural Engineering Technology/Technician	Associate Degree	16	17	9	10	15
150201	Civil Engineering Technology/Technician	Less than One-Year Award	3				
		One to less than Two-Year Award					3
		Associate Degree	30	24	23	31	47

Degrees and Certificates Awarded in FY 2005 to FY 2009 in Manufacturing Fields

Community Colleges

Subject Code	Subject Title	Award Level	2005	2006	2007	2008	2009
150303	Electrical, Electronic and Communications Engineering Technology/Technician	Less than One-Year Award					2
		Associate Degree	6	7	7	8	9
150304	Laser and Optical Technology/Technician	Associate Degree	1	3	1	2	1
150399	Electrical and Electronic Engineering Technologies/Technicians, Other	Less than One-Year Award				7	1
		Associate Degree		1			
150401	Biomedical Technology/Technician	Associate Degree	8	8	12	12	8
150403	Electromechanical Technology/Electromechanical Engineering Technology	Associate Degree	10	7	10	6	8
150404	Instrumentation Technology/Technician	Less than One-Year Award			1	7	2
150507	Environmental Engineering Technology/Environmental Technology	Associate Degree	1	3	8	7	2
150599	Environmental Control Technologies/Technicians, Other	Associate Degree	7	10	16	10	2
150607	Plastics and Polymer Engineering Technology/Technician	Associate Degree	5	4	1	3	2
150612	Industrial Technology/Technician	Less than One-Year Award	5				
		Associate Degree	7	5	8	6	3
150613	Manufacturing Engineering Technology/Technician	Less than One-Year Award		3	4	5	5
150799	Quality Control and Safety Technologies/Technicians, Other	Less than One-Year Award	2		1	9	2
150801	Aeronautical/Aerospace Engineering Technology/Technician	Less than One-Year Award	1				
		Associate Degree	15	10	13	13	7
150803	Automotive Engineering Technology/Technician	Less than One-Year Award	3	1	2		
		Associate Degree	11	10	12	11	15
150805	Mechanical Engineering/Mechanical Technology/Technician	Less than One-Year Award				4	
		Associate Degree	13	17	17	21	18
151201	Computer Engineering Technology/Technician	Associate Degree	45	44	45	34	20
151202	Computer Technology/Computer Systems Technology	Associate Degree	13	17	13	15	11
159999	Engineering Technologies and Engineering-Related Fields, Other	Less than One-Year Award			2		
419999	Science Technologies/Technicians, Other	Associate Degree	5	10	7	7	7
470104	Computer Installation and Repair Technology/Technician	Less than One-Year Award		1		4	
470609	Avionics Maintenance Technology/Technician	Less than One-Year Award			4	5	
		One to less than Two-Year Award					1
Community Colleges: Clark State Community College							
150201	Civil Engineering Technology/Technician	Associate Degree	1			1	
150399	Electrical and Electronic Engineering Technologies/Technicians, Other	One to less than Two-Year Award			1		

Degrees and Certificates Awarded in FY 2005 to FY 2009 in Manufacturing Fields

Community Colleges

Subject Code	Subject Title	Award Level	2005	2006	2007	2008	2009
150612	Industrial Technology/Technician	One to less than Two-Year Award	1	3	2		2
		Associate Degree	1		2	3	2
150805	Mechanical Engineering/Mechanical Technology/Technician	Associate Degree					2
151301	Drafting and Design Technology/Technician, General	One to less than Two-Year Award		1	1		
		Associate Degree	1	3	2	2	3
159999	Engineering Technologies and Engineering-Related Fields, Other	Associate Degree				1	
520203	Logistics, Materials, and Supply Chain Management	Associate Degree		1	1	2	4
Community Colleges: Columbus State Community College							
150101	Architectural Engineering Technology/Technician	One to less than Two-Year Award		3		4	3
		Associate Degree	22	30	20	41	35
150201	Civil Engineering Technology/Technician	Associate Degree	5	8	4	11	2
150303	Electrical, Electronic and Communications Engineering Technology/Technician	Associate Degree	21	19	7	13	15
150399	Electrical and Electronic Engineering Technologies/Technicians, Other	One to less than Two-Year Award				14	5
		Associate Degree	1	1	2	4	8
150403	Electromechanical Technology/Electromechanical Engineering Technology	Associate Degree	6	9	7	11	9
150501	Heating, Ventilation, Air Conditioning and Refrigeration Engineering Technology/Technician	One to less than Two-Year Award		9	19	13	15
		Associate Degree	5	3	5	5	4
150699	Industrial Production Technologies/Technicians, Other	One to less than Two-Year Award				3	3
150701	Occupational Safety and Health Technology/Technician	One to less than Two-Year Award				2	1
150702	Quality Control Technology/Technician	Associate Degree		2	1		
150801	Aeronautical/Aerospace Engineering Technology/Technician	Associate Degree	11	5	3	6	9
150803	Automotive Engineering Technology/Technician	Less than One-Year Award		79			
		One to less than Two-Year Award			63	68	72
		Associate Degree	30	23	18	32	24
150805	Mechanical Engineering/Mechanical Technology/Technician	Associate Degree	11	11	3	11	10
151001	Construction Engineering Technology/Technician	Less than One-Year Award		18			
		One to less than Two-Year Award			24	25	13
		Associate Degree	22	19	29	28	36
151304	Civil Drafting and Civil Engineering CAD/CADD	One to less than Two-Year Award					1
159999	Engineering Technologies and Engineering-Related Fields, Other	One to less than Two-Year Award		8	18	18	15
		Associate Degree	43	39	26	28	29

Degrees and Certificates Awarded in FY 2005 to FY 2009 in Manufacturing Fields

Community Colleges

Subject Code	Subject Title	Award Level	2005	2006	2007	2008	2009
470607	Airframe Mechanics and Aircraft Maintenance Technology/Technician	One to less than Two-Year Award		16	26		
470608	Aircraft Powerplant Technology/Technician	One to less than Two-Year Award		30	21	19	
470609	Avionics Maintenance Technology/Technician	Two to less than Four-Year Award					17
479999	Mechanic and Repair Technologies/Technicians, Other	One to less than Two-Year Award					1
480801	Boilermaking/Boilermaker	Less than One-Year Award			1	2	14
520203	Logistics, Materials, and Supply Chain Management	Less than One-Year Award		5			
		One to less than Two-Year Award			7	5	6
		Associate Degree	4	3	2	5	5
Community Colleges: Cuyahoga Community College, Eastern							
149999	Engineering, Other	Associate Degree	2			2	
150303	Electrical, Electronic and Communications Engineering Technology/Technician	Associate Degree			1		
150399	Electrical and Electronic Engineering Technologies/Technicians, Other	Associate Degree	1				
150803	Automotive Engineering Technology/Technician	One to less than Two-Year Award			1		
150805	Mechanical Engineering/Mechanical Technology/Technician	Associate Degree	1	2	2		
151001	Construction Engineering Technology/Technician	Associate Degree			1	1	1
151201	Computer Engineering Technology/Technician	Associate Degree	4	3	1	4	1
151202	Computer Technology/Computer Systems Technology	One to less than Two-Year Award	1	2		1	6
159999	Engineering Technologies and Engineering-Related Fields, Other	Associate Degree			1		2
480501	Machine Tool Technology/Machinist	Associate Degree				1	
Community Colleges: Cuyahoga Community College, Metro							
149999	Engineering, Other	Associate Degree	3	5	4	12	8
150101	Architectural Engineering Technology/Technician	Associate Degree			2		
150303	Electrical, Electronic and Communications Engineering Technology/Technician	Associate Degree	1	3	4	1	4
150399	Electrical and Electronic Engineering Technologies/Technicians, Other	Associate Degree	4		3	3	4
150612	Industrial Technology/Technician	One to less than Two-Year Award	2		1		
		Associate Degree	1	1			
150803	Automotive Engineering Technology/Technician	Associate Degree					1
150805	Mechanical Engineering/Mechanical Technology/Technician	Associate Degree	5	5	3	5	2
151001	Construction Engineering Technology/Technician	Associate Degree		3	3	4	1
151201	Computer Engineering Technology/Technician	Associate Degree	3	5	3	7	3
151202	Computer Technology/Computer Systems Technology	One to less than Two-Year Award	2	1	2	4	4

Degrees and Certificates Awarded in FY 2005 to FY 2009 in Manufacturing Fields

Community Colleges

Subject Code	Subject Title	Award Level	2005	2006	2007	2008	2009
159999	Engineering Technologies and Engineering-Related Fields, Other	Associate Degree	1				1
470303	Industrial Mechanics and Maintenance Technology	Associate Degree					2
480501	Machine Tool Technology/Machinist	Associate Degree	1				1
489999	Precision Production, Other	Associate Degree	1			1	1
Community Colleges: Cuyahoga Community College, Western							
149999	Engineering, Other	Associate Degree	2	2	3	1	1
150101	Architectural Engineering Technology/Technician	Associate Degree	1	3	1		
150303	Electrical, Electronic and Communications Engineering Technology/Technician	Associate Degree	1	3	1	2	
150399	Electrical and Electronic Engineering Technologies/Technicians, Other	Associate Degree	2				1
150612	Industrial Technology/Technician	One to less than Two-Year Award				1	
		Associate Degree	1				1
150803	Automotive Engineering Technology/Technician	One to less than Two-Year Award	2	1	1	4	3
		Associate Degree	12	13	17	15	11
150805	Mechanical Engineering/Mechanical Technology/Technician	Associate Degree	1	4	3	1	1
151001	Construction Engineering Technology/Technician	Associate Degree		3	4	3	3
151201	Computer Engineering Technology/Technician	Associate Degree	9	13	15	11	8
151202	Computer Technology/Computer Systems Technology	One to less than Two-Year Award	4	3	4	3	3
159999	Engineering Technologies and Engineering-Related Fields, Other	Associate Degree	5	8	10	4	19
480501	Machine Tool Technology/Machinist	Associate Degree	1		2	2	
489999	Precision Production, Other	Associate Degree		1			
Community Colleges: Eastern Gateway Community College							
142701	Systems Engineering	Associate Degree	1	3	2	1	1
150303	Electrical, Electronic and Communications Engineering Technology/Technician	One to less than Two-Year Award			1		
		Associate Degree	2	19	1	11	12
150403	Electromechanical Technology/Electromechanical Engineering Technology	Associate Degree	1		1		
150404	Instrumentation Technology/Technician	Associate Degree	2	1			
150612	Industrial Technology/Technician	One to less than Two-Year Award		1			
150805	Mechanical Engineering/Mechanical Technology/Technician	Associate Degree	2		2	3	3
151202	Computer Technology/Computer Systems Technology	One to less than Two-Year Award	1	1	1		
151306	Mechanical Drafting and Mechanical Drafting CAD/CADD	Associate Degree	5	5	4	3	2
480508	Welding Technology/Welder	One to less than Two-Year Award				1	1

Degrees and Certificates Awarded in FY 2005 to FY 2009 in Manufacturing Fields

Community Colleges

Subject Code	Subject Title	Award Level	2005	2006	2007	2008	2009
Community Colleges: Edison State Community College							
140101	Engineering, General	One to less than Two-Year Award	1	1			
142701	Systems Engineering	Less than One-Year Award		1			
		Associate Degree		12			
150303	Electrical, Electronic and Communications Engineering Technology/Technician	Associate Degree			3	2	1
150399	Electrical and Electronic Engineering Technologies/Technicians, Other	Associate Degree	4				
150403	Electromechanical Technology/Electromechanical Engineering Technology	One to less than Two-Year Award		1			
		Associate Degree			2		4
150607	Plastics and Polymer Engineering Technology/Technician	One to less than Two-Year Award	3	1			
		Associate Degree	3	1	1		
150612	Industrial Technology/Technician	Less than One-Year Award	30		1		
		Associate Degree	4		3	5	2
150613	Manufacturing Engineering Technology/Technician	Associate Degree	5				
150702	Quality Control Technology/Technician	Less than One-Year Award		1		1	
		One to less than Two-Year Award	1	1			
		Associate Degree			1		
150805	Mechanical Engineering/Mechanical Technology/Technician	One to less than Two-Year Award	3		1		2
		Associate Degree	12	7	10	8	4
151201	Computer Engineering Technology/Technician	One to less than Two-Year Award			1		
		Associate Degree		17	1		
151202	Computer Technology/Computer Systems Technology	Associate Degree	4	1			2
151203	Computer Hardware Technology/Technician	Less than One-Year Award				1	
		Associate Degree	5		1		
151302	CAD/CADD Drafting and/or Design Technology/Technician	Less than One-Year Award			1		1
151306	Mechanical Drafting and Mechanical Drafting CAD/CADD	Less than One-Year Award					1
		One to less than Two-Year Award	2				
		Associate Degree		7	11	6	6
470613	Medium/Heavy Vehicle and Truck Technology/Technician	One to less than Two-Year Award					1
		Associate Degree				2	2
480508	Welding Technology/Welder	Associate Degree		2			2
520203	Logistics, Materials, and Supply Chain Management	Less than One-Year Award	1	1			

Degrees and Certificates Awarded in FY 2005 to FY 2009 in Manufacturing Fields

Community Colleges

Subject Code	Subject Title	Award Level	2005	2006	2007	2008	2009
		Associate Degree	1		3	2	1
Community Colleges: Hocking Technical College							
150303	Electrical, Electronic and Communications Engineering Technology/Technician	Less than One-Year Award	2		1	1	
		Associate Degree	11	14	15	14	
150399	Electrical and Electronic Engineering Technologies/Technicians, Other	Less than One-Year Award					1
		Associate Degree	8	12	9	8	3
150499	Electromechanical and Instrumentation and Maintenance Technologies/Technicians, Other	Less than One-Year Award		7	8		
		Associate Degree		7	6	2	1
150501	Heating, Ventilation, Air Conditioning and Refrigeration Engineering Technology/Technician	Less than One-Year Award	1	2	3	10	5
		Associate Degree		2	3	2	1
150503	Energy Management and Systems Technology/Technician	Less than One-Year Award					17
		Associate Degree		1	6	6	1
150803	Automotive Engineering Technology/Technician	Associate Degree	1	2	5		
151001	Construction Engineering Technology/Technician	Less than One-Year Award					2
		Associate Degree		7	20	13	14
151202	Computer Technology/Computer Systems Technology	Less than One-Year Award	1	34	12		
151301	Drafting and Design Technology/Technician, General	Less than One-Year Award	4		32		
		Associate Degree	3	8	4	10	4
159999	Engineering Technologies and Engineering-Related Fields, Other	Less than One-Year Award		6	10		
470303	Industrial Mechanics and Maintenance Technology	Less than One-Year Award	3				
470614	Alternative Fuel Vehicle Technology/Technician	Less than One-Year Award	15	2	16		
Community Colleges: James A. Rhodes State College							
150201	Civil Engineering Technology/Technician	Less than One-Year Award	2	4	2	3	
		Associate Degree	8	13	14	12	12
150303	Electrical, Electronic and Communications Engineering Technology/Technician	Associate Degree	7	6	2	4	5
150405	Robotics Technology/Technician	One to less than Two-Year Award	4	3		3	
		Associate Degree	1	1	5	5	5
150599	Environmental Control Technologies/Technicians, Other	Less than One-Year Award	11	14	9	14	6
		Associate Degree	3	6	1	3	2
150612	Industrial Technology/Technician	Less than One-Year Award		9		4	2
		Associate Degree	1	6	2	3	2

Degrees and Certificates Awarded in FY 2005 to FY 2009 in Manufacturing Fields

Community Colleges

Subject Code	Subject Title	Award Level	2005	2006	2007	2008	2009
150702	Quality Control Technology/Technician	Less than One-Year Award	2	10		2	2
		One to less than Two-Year Award	1	6	1	1	
		Associate Degree	2	5	5	4	4
150805	Mechanical Engineering/Mechanical Technology/Technician	One to less than Two-Year Award	4	3		11	
		Associate Degree	5	5	4	4	6
150899	Mechanical Engineering Related Technologies/Technicians, Other	Associate Degree	5	10	8	7	10
150999	Mining and Petroleum Technologies/Technicians, Other	Less than One-Year Award		1			
151202	Computer Technology/Computer Systems Technology	One to less than Two-Year Award		3		1	
		Associate Degree	8	10	5	7	3
Community Colleges: Lakeland Community College							
150201	Civil Engineering Technology/Technician	Associate Degree	5	8	3	8	7
150303	Electrical, Electronic and Communications Engineering Technology/Technician	One to less than Two-Year Award	6	7	2	2	
		Associate Degree	37	15	26	32	29
150404	Instrumentation Technology/Technician	Associate Degree	2	1			1
150503	Energy Management and Systems Technology/Technician	Associate Degree		1	10	12	20
150612	Industrial Technology/Technician	One to less than Two-Year Award	4				1
		Associate Degree				1	
150702	Quality Control Technology/Technician	One to less than Two-Year Award	2	2			
		Associate Degree		2			
150805	Mechanical Engineering/Mechanical Technology/Technician	Associate Degree	2	6	4	5	5
150899	Mechanical Engineering Related Technologies/Technicians, Other	Associate Degree					2
151001	Construction Engineering Technology/Technician	One to less than Two-Year Award	1		2	1	1
151201	Computer Engineering Technology/Technician	Less than One-Year Award			1		
		One to less than Two-Year Award	6	2	1		1
		Associate Degree	3	1	1	1	1
151202	Computer Technology/Computer Systems Technology	Associate Degree		2	5	3	2
151303	Architectural Drafting and Architectural CAD/CADD	One to less than Two-Year Award				1	
151306	Mechanical Drafting and Mechanical Drafting CAD/CADD	Less than One-Year Award		4	1	7	7
		One to less than Two-Year Award	5	2	4	9	4
410101	Biology Technician/Biotechnology Laboratory Technician	One to less than Two-Year Award			1		
		Associate Degree	1	7	4	1	6

Degrees and Certificates Awarded in FY 2005 to FY 2009 in Manufacturing Fields

Community Colleges

Subject Code	Subject Title	Award Level	2005	2006	2007	2008	2009
410301	Chemical Technology/Technician	One to less than Two-Year Award	1	3	10	2	2
Community Colleges: Lorain County Community College							
141001	Electrical and Electronics Engineering	One to less than Two-Year Award	6	5	3	8	1
		Associate Degree	31	33	29	23	14
143501	Industrial Engineering	Associate Degree	1		1		
150303	Electrical, Electronic and Communications Engineering Technology/Technician	One to less than Two-Year Award				3	
		Associate Degree	12	12	13	13	23
150611	Metallurgical Technology/Technician	One to less than Two-Year Award		2			
150613	Manufacturing Engineering Technology/Technician	Associate Degree	13	18	14	15	15
150702	Quality Control Technology/Technician	One to less than Two-Year Award				1	1
150805	Mechanical Engineering/Mechanical Technology/Technician	One to less than Two-Year Award		1	2	2	
151001	Construction Engineering Technology/Technician	Associate Degree			1	2	
151301	Drafting and Design Technology/Technician, General	One to less than Two-Year Award	2	3	4	4	2
470604	Automobile/Automotive Mechanics Technology/Technician	Associate Degree	7	3	4		1
480508	Welding Technology/Welder	Associate Degree	1		1	1	
Community Colleges: Marion Technical College							
150101	Architectural Engineering Technology/Technician	One to less than Two-Year Award		1		1	
150303	Electrical, Electronic and Communications Engineering Technology/Technician	One to less than Two-Year Award	9	6	8	1	
		Associate Degree	9	13	14	8	6
150399	Electrical and Electronic Engineering Technologies/Technicians, Other	Less than One-Year Award	7	4	3		
		One to less than Two-Year Award				4	
150699	Industrial Production Technologies/Technicians, Other	Less than One-Year Award		2	1		
		One to less than Two-Year Award				1	
		Associate Degree		2	4		2
150702	Quality Control Technology/Technician	One to less than Two-Year Award				1	
150805	Mechanical Engineering/Mechanical Technology/Technician	Less than One-Year Award	2	7	5		
		Associate Degree	12	8	11	8	5
Community Colleges: North Central State College							
150303	Electrical, Electronic and Communications Engineering Technology/Technician	Associate Degree	9	6	14	6	7
150403	Electromechanical Technology/Electromechanical Engineering Technology	Associate Degree	2				
150501	Heating, Ventilation, Air Conditioning and Refrigeration Engineering Technology/Technician	Less than One-Year Award	2				

Degrees and Certificates Awarded in FY 2005 to FY 2009 in Manufacturing Fields

Community Colleges

Subject Code	Subject Title	Award Level	2005	2006	2007	2008	2009
		Associate Degree	2		1		
150805	Mechanical Engineering/Mechanical Technology/Technician	Associate Degree	18	13	14	7	3
150903	Petroleum Technology/Technician	Associate Degree		4			4
151301	Drafting and Design Technology/Technician, General	Less than One-Year Award			3		1
		Associate Degree		3	10	11	9
151306	Mechanical Drafting and Mechanical Drafting CAD/CADD	Less than One-Year Award	1				
		Associate Degree	7				
480507	Tool and Die Technology/Technician	Associate Degree	2	3		1	2
Community Colleges: Northwest State Community College							
140901	Computer Engineering, General	Associate Degree					15
141901	Mechanical Engineering	Associate Degree	9	10	7	14	
149999	Engineering, Other	Associate Degree	5	8	2	5	
150303	Electrical, Electronic and Communications Engineering Technology/Technician	One to less than Two-Year Award	5	4	6	5	7
		Associate Degree	2	12	4	7	
150501	Heating, Ventilation, Air Conditioning and Refrigeration Engineering Technology/Technician	One to less than Two-Year Award			1	1	2
150607	Plastics and Polymer Engineering Technology/Technician	One to less than Two-Year Award				1	2
		Associate Degree	2	9	4	6	10
150702	Quality Control Technology/Technician	One to less than Two-Year Award			1	1	
		Associate Degree		1			
150803	Automotive Engineering Technology/Technician	Associate Degree			3	1	1
150805	Mechanical Engineering/Mechanical Technology/Technician	One to less than Two-Year Award		3	4	2	
		Associate Degree	8	9	7	8	1
150899	Mechanical Engineering Related Technologies/Technicians, Other	One to less than Two-Year Award	1				
151201	Computer Engineering Technology/Technician	One to less than Two-Year Award				1	
151302	CAD/CADD Drafting and/or Design Technology/Technician	One to less than Two-Year Award					4
151501	Engineering/Industrial Management	Associate Degree	1		2	1	
470303	Industrial Mechanics and Maintenance Technology	One to less than Two-Year Award					3
480501	Machine Tool Technology/Machinist	One to less than Two-Year Award				2	
		Associate Degree			3	3	
480506	Sheet Metal Technology/Sheetworking	One to less than Two-Year Award		1			
480507	Tool and Die Technology/Technician	One to less than Two-Year Award	2		1	1	

Degrees and Certificates Awarded in FY 2005 to FY 2009 in Manufacturing Fields

Community Colleges

Subject Code	Subject Title	Award Level	2005	2006	2007	2008	2009
		Associate Degree	2	2			
480599	Precision Metal Working, Other	One to less than Two-Year Award	4	4	3	2	
		Associate Degree		1	2	7	12
480703	Cabinetmaking and Millwork	One to less than Two-Year Award					1
Community Colleges: Owens State Community College, Findlay							
150303	Electrical, Electronic and Communications Engineering Technology/Technician	Less than One-Year Award	3		2	5	4
		Associate Degree	3	4	7	3	8
150403	Electromechanical Technology/Electromechanical Engineering Technology	Associate Degree	1		2		
150612	Industrial Technology/Technician	Associate Degree	3	1	1	1	1
150702	Quality Control Technology/Technician	Less than One-Year Award	2				1
		Associate Degree	2	1			2
150805	Mechanical Engineering/Mechanical Technology/Technician	Associate Degree	3	2	2	2	4
151201	Computer Engineering Technology/Technician	Less than One-Year Award					1
		Associate Degree	1		2	1	1
151302	CAD/CADD Drafting and/or Design Technology/Technician	Less than One-Year Award	1		2		
151303	Architectural Drafting and Architectural CAD/CADD	Less than One-Year Award					1
		Associate Degree	4	3	3	3	4
151399	Drafting/Design Engineering Technologies/Technicians, Other	Associate Degree	1		1		
480507	Tool and Die Technology/Technician	Less than One-Year Award	1	3	1	2	2
480508	Welding Technology/Welder	Less than One-Year Award	4	4	12	16	14
		Associate Degree				1	1
Community Colleges: Owens State Community College, Toledo							
140101	Engineering, General	Associate Degree	2	2			2
150101	Architectural Engineering Technology/Technician	Less than One-Year Award	1	8	6	6	5
		Associate Degree	8	15	8	10	9
150303	Electrical, Electronic and Communications Engineering Technology/Technician	Less than One-Year Award	6	8	4	6	5
		Associate Degree	15	17	29	23	33
150399	Electrical and Electronic Engineering Technologies/Technicians, Other	Less than One-Year Award					1
150401	Biomedical Technology/Technician	Less than One-Year Award		1			3
		Associate Degree	3	9	4	6	15
150403	Electromechanical Technology/Electromechanical Engineering Technology	Associate Degree	4	1	2	3	1

Degrees and Certificates Awarded in FY 2005 to FY 2009 in Manufacturing Fields

Community Colleges

Subject Code	Subject Title	Award Level	2005	2006	2007	2008	2009
150501	Heating, Ventilation, Air Conditioning and Refrigeration Engineering Technology/Technician	Less than One-Year Award	1		10	6	4
150507	Environmental Engineering Technology/Environmental Technology	Less than One-Year Award	1	3	3	1	1
		Associate Degree	4	6	6	4	3
150612	Industrial Technology/Technician	Less than One-Year Award	2	2	1	1	2
		Associate Degree	7	8	6	3	12
150613	Manufacturing Engineering Technology/Technician	Associate Degree			2		1
150701	Occupational Safety and Health Technology/Technician	Less than One-Year Award	5	3	5	3	2
150702	Quality Control Technology/Technician	Less than One-Year Award	2	14	7	12	16
		Associate Degree	2	2	2	2	4
150803	Automotive Engineering Technology/Technician	Less than One-Year Award	15	22	26	17	11
		Associate Degree	25	25	40	30	37
150805	Mechanical Engineering/Mechanical Technology/Technician	Associate Degree	6	14	10	5	5
151001	Construction Engineering Technology/Technician	Less than One-Year Award			3	4	2
		Associate Degree	2	5	5	6	3
151201	Computer Engineering Technology/Technician	Less than One-Year Award	3	9	2	1	1
		Associate Degree	14	16	8	8	10
151302	CAD/CADD Drafting and/or Design Technology/Technician	Less than One-Year Award	5	3	1	2	
151303	Architectural Drafting and Architectural CAD/CADD	Less than One-Year Award				5	4
		Associate Degree	4	9	3	11	10
151399	Drafting/Design Engineering Technologies/Technicians, Other	Associate Degree	2				
480507	Tool and Die Technology/Technician	Less than One-Year Award	6	9	5	3	8
		Associate Degree	1				
480508	Welding Technology/Welder	Less than One-Year Award	26	18	26	27	42
		Associate Degree		4	5	5	6
Community Colleges: Rio Grande Community College							
150405	Robotics Technology/Technician	Associate Degree	8	3	4	2	3
150612	Industrial Technology/Technician	One to less than Two-Year Award	1				
		Associate Degree	5	4	1	9	8
150699	Industrial Production Technologies/Technicians, Other	One to less than Two-Year Award	1				
		Associate Degree	3	7	2	3	6
151202	Computer Technology/Computer Systems Technology	Associate Degree	4		2	9	

Degrees and Certificates Awarded in FY 2005 to FY 2009 in Manufacturing Fields

Community Colleges

Subject Code	Subject Title	Award Level	2005	2006	2007	2008	2009
151301	Drafting and Design Technology/Technician, General	One to less than Two-Year Award	1				
		Associate Degree	5	2	2	4	1
480702	Furniture Design and Manufacturing	One to less than Two-Year Award	1				
		Associate Degree	1	1	4	2	6
Community Colleges: Sinclair Community College							
140101	Engineering, General	Associate Degree	13	10	21	23	24
143501	Industrial Engineering	Associate Degree	10	5	9	10	10
150101	Architectural Engineering Technology/Technician	Associate Degree	13	8	11	13	10
150201	Civil Engineering Technology/Technician	Less than One-Year Award	2	3	2	6	5
		Associate Degree	11	4	9	15	15
150303	Electrical, Electronic and Communications Engineering Technology/Technician	Less than One-Year Award		2	1	34	13
		One to less than Two-Year Award	3			2	
		Associate Degree	14	20	7	24	16
150403	Electromechanical Technology/Electromechanical Engineering Technology	Less than One-Year Award	2	1	4	2	15
		Associate Degree	3	4	8	4	6
150404	Instrumentation Technology/Technician	Less than One-Year Award			1		1
150501	Heating, Ventilation, Air Conditioning and Refrigeration Engineering Technology/Technician	Less than One-Year Award	8	19	15	13	12
150507	Environmental Engineering Technology/Environmental Technology	Associate Degree	5	5	7	4	5
150607	Plastics and Polymer Engineering Technology/Technician	Associate Degree	1		1	1	
150613	Manufacturing Engineering Technology/Technician	One to less than Two-Year Award				3	20
		Associate Degree				5	5
150699	Industrial Production Technologies/Technicians, Other	Less than One-Year Award	3	2	6	3	1
		One to less than Two-Year Award	17	23	26	18	4
		Associate Degree	16	17	14	15	9
150701	Occupational Safety and Health Technology/Technician	Associate Degree	1	2			2
150702	Quality Control Technology/Technician	Less than One-Year Award				1	3
		One to less than Two-Year Award			1		1
		Associate Degree	3	2	2	4	3
150803	Automotive Engineering Technology/Technician	Less than One-Year Award	2	4	9	17	7
		One to less than Two-Year Award	49	69	52	103	58
		Associate Degree	45	85	59	64	47

Degrees and Certificates Awarded in FY 2005 to FY 2009 in Manufacturing Fields

Community Colleges

Subject Code	Subject Title	Award Level	2005	2006	2007	2008	2009
150805	Mechanical Engineering/Mechanical Technology/Technician	Less than One-Year Award	2		4	1	1
150899	Mechanical Engineering Related Technologies/Technicians, Other	Associate Degree	11	14	22	17	14
151001	Construction Engineering Technology/Technician	Less than One-Year Award		4		24	17
151301	Drafting and Design Technology/Technician, General	Less than One-Year Award	3	1	3	4	4
		Associate Degree					1
151399	Drafting/Design Engineering Technologies/Technicians, Other	Less than One-Year Award		1			
		Associate Degree	7	8	2	5	2
159999	Engineering Technologies and Engineering-Related Fields, Other	Associate Degree				2	
410101	Biology Technician/Biotechnology Laboratory Technician	Associate Degree					13
470607	Airframe Mechanics and Aircraft Maintenance Technology/Technician	One to less than Two-Year Award	1	3		3	1
		Associate Degree	1				2
470608	Aircraft Powerplant Technology/Technician	One to less than Two-Year Award		3		4	3
470609	Avionics Maintenance Technology/Technician	One to less than Two-Year Award	1	3		2	1
480506	Sheet Metal Technology/Sheetworking	Less than One-Year Award					12
480507	Tool and Die Technology/Technician	Less than One-Year Award			5	4	7
		One to less than Two-Year Award	3		2	1	2
520203	Logistics, Materials, and Supply Chain Management	Less than One-Year Award					3
		One to less than Two-Year Award					3
		Associate Degree		1	1		1
Community Colleges: Southern State Community College, Central							
150399	Electrical and Electronic Engineering Technologies/Technicians, Other	Associate Degree	2	1	3	9	5
151202	Computer Technology/Computer Systems Technology	Associate Degree	1	1		2	1
151302	CAD/CADD Drafting and/or Design Technology/Technician	Associate Degree	3	1	3	1	6
Community Colleges: Stark State College of Technology							
140101	Engineering, General	Associate Degree	4	2	4	1	10
150201	Civil Engineering Technology/Technician	Associate Degree	20	31	29	38	37
150303	Electrical, Electronic and Communications Engineering Technology/Technician	Associate Degree	27	32	33	39	39
150399	Electrical and Electronic Engineering Technologies/Technicians, Other	Associate Degree	33	21	24	24	31
150499	Electromechanical and Instrumentation and Maintenance Technologies/Technicians, Other	Associate Degree				4	
150501	Heating, Ventilation, Air Conditioning and Refrigeration Engineering Technology/Technician	One to less than Two-Year Award	1	5	5	16	10
		Associate Degree	5	5	6	9	6

Degrees and Certificates Awarded in FY 2005 to FY 2009 in Manufacturing Fields

Community Colleges

Subject Code	Subject Title	Award Level	2005	2006	2007	2008	2009
150612	Industrial Technology/Technician	One to less than Two-Year Award					2
		Associate Degree	2	2	5	4	2
150803	Automotive Engineering Technology/Technician	Associate Degree	33	30	52	41	28
151201	Computer Engineering Technology/Technician	Associate Degree	65	58	61	51	39
151303	Architectural Drafting and Architectural CAD/CADD	Associate Degree	6	5	9	15	4
Community Colleges: Terra State Community College							
140101	Engineering, General	Associate Degree	3	1	1		
150101	Architectural Engineering Technology/Technician	Less than One-Year Award					1
		Associate Degree	3	2	8	3	3
150303	Electrical, Electronic and Communications Engineering Technology/Technician	Less than One-Year Award			2	1	
		One to less than Two-Year Award	10	17	6	1	
		Associate Degree	10	20	21	10	23
150399	Electrical and Electronic Engineering Technologies/Technicians, Other	Less than One-Year Award					4
150403	Electromechanical Technology/Electromechanical Engineering Technology	Less than One-Year Award					1
		One to less than Two-Year Award					1
150405	Robotics Technology/Technician	Less than One-Year Award			1	1	
		One to less than Two-Year Award		1			
		Associate Degree	4	6	4	5	3
150501	Heating, Ventilation, Air Conditioning and Refrigeration Engineering Technology/Technician	Less than One-Year Award			1	16	9
		One to less than Two-Year Award	8	13	3	10	
		Associate Degree	9	7	3	9	5
150607	Plastics and Polymer Engineering Technology/Technician	Less than One-Year Award			1		3
		One to less than Two-Year Award		1		1	
		Associate Degree	3	15	9	6	3
150803	Automotive Engineering Technology/Technician	Less than One-Year Award	6	6		7	4
		Associate Degree	1	1	2	3	2
150805	Mechanical Engineering/Mechanical Technology/Technician	Associate Degree					1
150899	Mechanical Engineering Related Technologies/Technicians, Other	Less than One-Year Award			2	4	
		One to less than Two-Year Award	1	1			
		Associate Degree	19	32	7	10	8
151302	CAD/CADD Drafting and/or Design Technology/Technician	Less than One-Year Award					5

Degrees and Certificates Awarded in FY 2005 to FY 2009 in Manufacturing Fields

Community Colleges

Subject Code	Subject Title	Award Level	2005	2006	2007	2008	2009
159999	Engineering Technologies and Engineering-Related Fields, Other	Associate Degree	16	17	13	4	
410205	Nuclear/Nuclear Power Technology/Technician	Associate Degree				11	10
480506	Sheet Metal Technology/Sheetworking	Associate Degree	3	6	2	3	1
480507	Tool and Die Technology/Technician	Less than One-Year Award			1		1
		One to less than Two-Year Award	4	4			
480508	Welding Technology/Welder	Less than One-Year Award				2	4
		One to less than Two-Year Award	3	5	2		
		Associate Degree	2	3	2		1
Community Colleges: Washington State Community College							
140101	Engineering, General	Associate Degree	1				
150303	Electrical, Electronic and Communications Engineering Technology/Technician	Associate Degree	3	7	4	9	6
150399	Electrical and Electronic Engineering Technologies/Technicians, Other	Associate Degree	10	5	1	1	8
150404	Instrumentation Technology/Technician	Associate Degree	1			1	1
150501	Heating, Ventilation, Air Conditioning and Refrigeration Engineering Technology/Technician	Associate Degree	8	1	1	6	3
150612	Industrial Technology/Technician	Associate Degree	1	2	5	3	5
150699	Industrial Production Technologies/Technicians, Other	Associate Degree	2	3	1	1	3
150805	Mechanical Engineering/Mechanical Technology/Technician	Associate Degree	3	2	3	2	1
151202	Computer Technology/Computer Systems Technology	Associate Degree	9	10	10	4	12
151301	Drafting and Design Technology/Technician, General	One to less than Two-Year Award		1		1	1
		Associate Degree	1	4	6	3	2
470604	Automobile/Automotive Mechanics Technology/Technician	Associate Degree	5	8	6	1	4
470605	Diesel Mechanics Technology/Technician	Associate Degree	8	21	13	15	21
Community Colleges: Zane State College							
150399	Electrical and Electronic Engineering Technologies/Technicians, Other	Associate Degree	12	12	28	28	43
150599	Environmental Control Technologies/Technicians, Other	Associate Degree	4	6	3	4	4
159999	Engineering Technologies and Engineering-Related Fields, Other	Associate Degree	10	11	15	11	12
480507	Tool and Die Technology/Technician	Associate Degree	8	1	7	3	7
480508	Welding Technology/Welder	One to less than Two-Year Award					1

Degrees and Certificates Awarded in FY 2005 to FY 2009 in Manufacturing Fields

University Regional Campuses

Subject Code	Subject Title	Award Level	2005	2006	2007	2008	2009
University Regional Campuses: Bowling Green State University, Firelands							
150303	Electrical, Electronic and Communications Engineering Technology/Technician	Associate Degree	1	1	2	2	
150399	Electrical and Electronic Engineering Technologies/Technicians, Other	Associate Degree	3				
150403	Electromechanical Technology/Electromechanical Engineering Technology	Associate Degree		1	1	4	3
150612	Industrial Technology/Technician	Associate Degree	2	2	1	1	
150613	Manufacturing Engineering Technology/Technician	Associate Degree					1
150805	Mechanical Engineering/Mechanical Technology/Technician	Associate Degree			1	2	2
151201	Computer Engineering Technology/Technician	Associate Degree	9	8		2	2
159999	Engineering Technologies and Engineering-Related Fields, Other	Associate Degree		1	1		2
University Regional Campuses: Kent State University, Ashtabula							
150399	Electrical and Electronic Engineering Technologies/Technicians, Other	Associate Degree	2	1	2	2	1
150507	Environmental Engineering Technology/Environmental Technology	Associate Degree			1		
150599	Environmental Control Technologies/Technicians, Other	Associate Degree		1			
150805	Mechanical Engineering/Mechanical Technology/Technician	Associate Degree	2	4	4	2	4
University Regional Campuses: Kent State University, Geauga							
150699	Industrial Production Technologies/Technicians, Other	Associate Degree	4		1	3	1
University Regional Campuses: Kent State University, Salem							
150612	Industrial Technology/Technician	Associate Degree	8	3	5		
University Regional Campuses: Kent State University, Trumbull							
150399	Electrical and Electronic Engineering Technologies/Technicians, Other	Associate Degree	1	1	1		2
150612	Industrial Technology/Technician	Associate Degree		1	1	1	
150699	Industrial Production Technologies/Technicians, Other	Less than One-Year Award					1
		Associate Degree	6	6	2	3	1
150803	Automotive Engineering Technology/Technician	Associate Degree	1	1			
150805	Mechanical Engineering/Mechanical Technology/Technician	Associate Degree	8	9	3	3	4
159999	Engineering Technologies and Engineering-Related Fields, Other	Associate Degree	2				
University Regional Campuses: Kent State University, Tuscarawas							
150399	Electrical and Electronic Engineering Technologies/Technicians, Other	Associate Degree	14	6		6	2
150612	Industrial Technology/Technician	Associate Degree	1	1	1	1	
150805	Mechanical Engineering/Mechanical Technology/Technician	Associate Degree	9	16	8	9	10
159999	Engineering Technologies and Engineering-Related Fields, Other	Associate Degree	9	16	31	18	23

Degrees and Certificates Awarded in FY 2005 to FY 2009 in Manufacturing Fields

University Regional Campuses

Subject Code	Subject Title	Award Level	2005	2006	2007	2008	2009
University Regional Campuses: OSU, Agricultural Technical Institute							
140301	Agricultural Engineering	Associate Degree	1				
151001	Construction Engineering Technology/Technician	Associate Degree	14	6	9	3	10
University Regional Campuses: Ohio University, Chillicothe							
150507	Environmental Engineering Technology/Environmental Technology	Associate Degree			3	2	
150508	Hazardous Materials Management and Waste Technology/Technician	Associate Degree	3				
University Regional Campuses: Ohio University, Lancaster							
150303	Electrical, Electronic and Communications Engineering Technology/Technician	Associate Degree	5	1	1		
159999	Engineering Technologies and Engineering-Related Fields, Other	Associate Degree	1	1	5		3
University Regional Campuses: University of Akron, Wayne							
150702	Quality Control Technology/Technician	Less than One-Year Award		1			
470104	Computer Installation and Repair Technology/Technician	Less than One-Year Award	2	1			
University Regional Campuses: University of Cincinnati, Clermont							
100308	Computer Typography and Composition Equipment Operator	One to less than Two-Year Award			1	3	1
		Associate Degree	11	5	13	7	11
150303	Electrical, Electronic and Communications Engineering Technology/Technician	Associate Degree	2		1	1	
150799	Quality Control and Safety Technologies/Technicians, Other	Less than One-Year Award	2		4	1	1
		One to less than Two-Year Award	1	2	1	1	
151202	Computer Technology/Computer Systems Technology	Less than One-Year Award	12	2	1	1	1
		Associate Degree	2	3	6	8	12
419999	Science Technologies/Technicians, Other	Associate Degree	3		1	2	3
University Regional Campuses: University of Cincinnati, Raymond Walters							
151202	Computer Technology/Computer Systems Technology	Associate Degree	22	10	7	10	11
		Post-baccalaureate certificate	1	2	1	1	
410301	Chemical Technology/Technician	Associate Degree	6	4	10	5	5
		Post-baccalaureate certificate		1	1	1	
419999	Science Technologies/Technicians, Other	Associate Degree	10	7	13	7	4
470604	Automobile/Automotive Mechanics Technology/Technician	Post-baccalaureate certificate	1		1		
University Regional Campuses: Wright State University, Lake							
150000	Engineering Technology, General	Associate Degree	15	13	7	6	4
151301	Drafting and Design Technology/Technician, General	Associate Degree	5	2	5	3	1

Degrees and Certificates Awarded in FY 2005 to FY 2009 in Manufacturing Fields

University Main Campuses

Subject Code	Subject Title	Award Level	2005	2006	2007	2008	2009
University Main Campuses: Bowling Green State University							
150303	Electrical, Electronic and Communications Engineering Technology/Technician	Bachelor's Degree	9	19	21	18	16
150612	Industrial Technology/Technician	Bachelor's Degree	11	8	8		
		Master's Degree	6	4	2	4	2
150702	Quality Control Technology/Technician	Post-baccalaureate certificate			1	1	1
150801	Aeronautical/Aerospace Engineering Technology/Technician	Bachelor's Degree	16	32	20	28	21
150805	Mechanical Engineering/Mechanical Technology/Technician	Bachelor's Degree	16	14	13	18	8
151001	Construction Engineering Technology/Technician	Bachelor's Degree	46	46	44	59	55
		Master's Degree	1	2	3	2	2
159999	Engineering Technologies and Engineering-Related Fields, Other	Bachelor's Degree				2	11
520203	Logistics, Materials, and Supply Chain Management	Bachelor's Degree	7	20	37	58	65
University Main Campuses: Central State University							
143601	Manufacturing Engineering	Bachelor's Degree	6	6	7		7
150612	Industrial Technology/Technician	Bachelor's Degree	1	4	3	2	1
University Main Campuses: Cleveland State University							
140101	Engineering, General	Doctoral Degree	10	7	8	8	11
140701	Chemical Engineering	Bachelor's Degree	8	19	8	7	14
		Master's Degree	26	17	15	9	16
140801	Civil Engineering, General	Bachelor's Degree	9	21	8	14	18
		Master's Degree	15	26	12	19	12
140901	Computer Engineering, General	Bachelor's Degree	11	9	10	3	11
140903	Computer Software Engineering	Master's Degree					7
141001	Electrical and Electronics Engineering	Bachelor's Degree	18	39	39	25	21
		Master's Degree	53	52	70	57	52
141101	Engineering Mechanics	Master's Degree	1	1	1	1	
141901	Mechanical Engineering	Bachelor's Degree	27	24	39	29	14
		Master's Degree	20	11	25	18	19
143501	Industrial Engineering	Bachelor's Degree	7	5	7	5	5
		Master's Degree	18	13	17	16	21
150303	Electrical, Electronic and Communications Engineering Technology/Technician	Bachelor's Degree	9	7	8	9	5
150899	Mechanical Engineering Related Technologies/Technicians, Other	Bachelor's Degree	11	14	11	7	9

Degrees and Certificates Awarded in FY 2005 to FY 2009 in Manufacturing Fields

University Main Campuses

Subject Code	Subject Title	Award Level	2005	2006	2007	2008	2009
410101	Biology Technician/Biotechnology Laboratory Technician	Bachelor's Degree	3	5	1	1	3
		Post-baccalaureate certificate				2	
University Main Campuses: Kent State University							
140101	Engineering, General	Bachelor's Degree	162	177	142	123	143
		Master's Degree	38	18	20	28	33
140201	Aerospace, Aeronautical and Astronautical/Space Engineering	Less than One-Year Award			1		
143501	Industrial Engineering	Bachelor's Degree	10	10	5	6	4
150699	Industrial Production Technologies/Technicians, Other	Less than One-Year Award				1	
University Main Campuses: Miami University							
140101	Engineering, General	Bachelor's Degree		1		3	2
140701	Chemical Engineering	Bachelor's Degree				4	19
140901	Computer Engineering, General	Bachelor's Degree		2	13	11	6
141001	Electrical and Electronics Engineering	Bachelor's Degree		1	7	8	10
141201	Engineering Physics/Applied Physics	Bachelor's Degree	2	5	7	6	7
141901	Mechanical Engineering	Bachelor's Degree	4	21	20	47	39
143601	Manufacturing Engineering	Bachelor's Degree	27	19	7	3	6
150000	Engineering Technology, General	Associate Degree	1		5	3	3
		Bachelor's Degree	28	24	30	17	20
150303	Electrical, Electronic and Communications Engineering Technology/Technician	Associate Degree	3	7	2	2	
150805	Mechanical Engineering/Mechanical Technology/Technician	One to less than Two-Year Award	3	4	1		1
		Associate Degree	10	13	11	13	9
151202	Computer Technology/Computer Systems Technology	One to less than Two-Year Award	1	1	1	1	
151501	Engineering/Industrial Management	Bachelor's Degree	34	30	32	22	20
410301	Chemical Technology/Technician	Associate Degree		3	1	4	3
University Main Campuses: Ohio State University							
140101	Engineering, General	Master's Degree					16
140201	Aerospace, Aeronautical and Astronautical/Space Engineering	Bachelor's Degree	40	43	35	47	40
		Master's Degree	6	10	3	7	17
		Doctoral Degree			2	3	2
140301	Agricultural Engineering	Bachelor's Degree	82	65	37	34	37
		Master's Degree	3	6	3	5	5

Degrees and Certificates Awarded in FY 2005 to FY 2009 in Manufacturing Fields

University Main Campuses

Subject Code	Subject Title	Award Level	2005	2006	2007	2008	2009
		Doctoral Degree	1	4	3	6	3
140501	Bioengineering and Biomedical Engineering	Master's Degree	7	8	7	4	9
		Doctoral Degree	7	4	6	6	8
140701	Chemical Engineering	Bachelor's Degree	52	49	49	49	73
		Master's Degree	3	2	5	6	16
		Doctoral Degree	19	21	11	11	15
140801	Civil Engineering, General	Bachelor's Degree	71	77	81	92	70
		Master's Degree	17	18	17	11	22
		Doctoral Degree	5	6	3	9	4
141001	Electrical and Electronics Engineering	Bachelor's Degree	195	186	176	130	132
		Master's Degree	87	58	60	42	62
		Doctoral Degree	21	38	39	35	19
141101	Engineering Mechanics	Doctoral Degree	1				
141201	Engineering Physics/Applied Physics	Bachelor's Degree	5	8	11	13	13
141801	Materials Engineering	Bachelor's Degree	27	35	28	24	24
		Master's Degree	20	24	23	27	15
		Doctoral Degree	10	18	8	13	19
141901	Mechanical Engineering	Bachelor's Degree	150	155	175	157	181
		Master's Degree	69	70	52	69	66
		Doctoral Degree	9	15	12	22	25
142001	Metallurgical Engineering	Bachelor's Degree	1				
142301	Nuclear Engineering	Master's Degree	10	4	8	14	8
		Doctoral Degree		1	3		
143501	Industrial Engineering	Bachelor's Degree	101	113	86	75	65
		Master's Degree	53	35	27	25	22
		Doctoral Degree	10	7	9	14	11
149999	Engineering, Other	Bachelor's Degree	29	45	36	38	22
		Master's Degree	7	10	11	6	16
		Doctoral Degree	3	4	2	4	1
520203	Logistics, Materials, and Supply Chain Management	Bachelor's Degree	138	119	76	72	73
		Master's Degree		2	10	20	

Degrees and Certificates Awarded in FY 2005 to FY 2009 in Manufacturing Fields

University Main Campuses

Subject Code	Subject Title	Award Level	2005	2006	2007	2008	2009
University Main Campuses: Ohio University							
140501	Bioengineering and Biomedical Engineering	Master's Degree					1
140701	Chemical Engineering	Less than One-Year Award				2	1
		Bachelor's Degree	15	7	10	13	6
		Master's Degree	8	3	7	8	5
		Doctoral Degree	1	1	2	2	4
140801	Civil Engineering, General	Bachelor's Degree	34	33	30	43	30
		Master's Degree	8	6	8	6	7
141001	Electrical and Electronics Engineering	Bachelor's Degree	49	47	38	39	30
		Master's Degree	18	17	11	9	21
		Doctoral Degree	4	9	8	5	4
141901	Mechanical Engineering	Bachelor's Degree	56	46	46	54	54
		Master's Degree	15	23	13	18	7
143501	Industrial Engineering	Bachelor's Degree	7	7	14	10	13
		Master's Degree	28	29	19	18	16
149999	Engineering, Other	Doctoral Degree	3	6	2	4	4
150303	Electrical, Electronic and Communications Engineering Technology/Technician	Associate Degree			1		
150507	Environmental Engineering Technology/Environmental Technology	Associate Degree	1		1		
150612	Industrial Technology/Technician	Bachelor's Degree	47	37	36	35	41
University Main Campuses: Shawnee State University							
141401	Environmental/Environmental Health Engineering	Bachelor's Degree	5		5	3	12
150403	Electromechanical Technology/Electromechanical Engineering Technology	Associate Degree	14	12	8	17	9
150404	Instrumentation Technology/Technician	Associate Degree			1		
150607	Plastics and Polymer Engineering Technology/Technician	Associate Degree	2			1	
		Bachelor's Degree	6	3	6	3	5
151201	Computer Engineering Technology/Technician	Bachelor's Degree	7	6	11	4	6
151301	Drafting and Design Technology/Technician, General	One to less than Two-Year Award	9	2	2	1	
		Associate Degree	7	7	6	5	7
159999	Engineering Technologies and Engineering-Related Fields, Other	Bachelor's Degree				1	2
University Main Campuses: University of Akron							
140101	Engineering, General	Bachelor's Degree	2	2	5	4	1

Degrees and Certificates Awarded in FY 2005 to FY 2009 in Manufacturing Fields

University Main Campuses

Subject Code	Subject Title	Award Level	2005	2006	2007	2008	2009
		Master's Degree		17	3	2	3
		Doctoral Degree	20	8	1	1	1
140501	Bioengineering and Biomedical Engineering	Bachelor's Degree	2	11	14	10	15
		Master's Degree	9		12	13	19
		Doctoral Degree				1	
140701	Chemical Engineering	Less than One-Year Award			12	4	4
		Bachelor's Degree	17	26	20	17	15
		Master's Degree	11	10	8	6	4
		Doctoral Degree		6	2	6	4
140801	Civil Engineering, General	Bachelor's Degree	20	27	15	35	30
		Master's Degree	10	11	10	8	6
		Doctoral Degree		6	6	5	4
140804	Transportation and Highway Engineering	Post-baccalaureate certificate	1				
140901	Computer Engineering, General	Bachelor's Degree	12	15	12	7	4
141001	Electrical and Electronics Engineering	Bachelor's Degree	19	26	24	35	32
		Master's Degree	10	7	6	11	10
		Doctoral Degree		1	2	3	4
141901	Mechanical Engineering	Bachelor's Degree	51	67	64	64	78
		Master's Degree	12	19	10	13	22
		Doctoral Degree		1	4	10	4
143201	Polymer/Plastics Engineering	Bachelor's Degree	11	5	9	5	4
		Master's Degree	9	6	3	1	1
		Doctoral Degree	17	12	10	16	8
150303	Electrical, Electronic and Communications Engineering Technology/Technician	Less than One-Year Award		1		1	1
		Associate Degree	9	11	7	7	9
		Bachelor's Degree	12	9	10	10	12
150607	Plastics and Polymer Engineering Technology/Technician	Associate Degree		2		1	1
150612	Industrial Technology/Technician	Associate Degree	15				
		Bachelor's Degree	2				
150613	Manufacturing Engineering Technology/Technician	Associate Degree		5	3	8	5
		Bachelor's Degree		16	9	3	7

Degrees and Certificates Awarded in FY 2005 to FY 2009 in Manufacturing Fields

University Main Campuses

Subject Code	Subject Title	Award Level	2005	2006	2007	2008	2009
150699	Industrial Production Technologies/Technicians, Other	Bachelor's Degree	7				
150805	Mechanical Engineering/Mechanical Technology/Technician	Associate Degree	17	14	15	12	14
		Bachelor's Degree	28	22	23	17	23
151001	Construction Engineering Technology/Technician	Less than One-Year Award	1	1	3	1	3
		Associate Degree	15	20	19	23	23
		Bachelor's Degree	27	23	28	29	24
151301	Drafting and Design Technology/Technician, General	Less than One-Year Award			2		2
		Associate Degree	4	6	9	10	12
151501	Engineering/Industrial Management	Master's Degree	8				
470104	Computer Installation and Repair Technology/Technician	Less than One-Year Award		2			
520203	Logistics, Materials, and Supply Chain Management	Associate Degree		2	1		2
		Bachelor's Degree	1				
University Main Campuses: University of Cincinnati							
140101	Engineering, General	Bachelor's Degree	30	41	28	36	47
		Master's Degree	2	1		2	
140201	Aerospace, Aeronautical and Astronautical/Space Engineering	Bachelor's Degree	22	41	25	39	37
		Master's Degree	22	11	11	19	14
		Doctoral Degree	4	4	7	6	2
140401	Architectural Engineering	Bachelor's Degree	16	13	14	18	18
140501	Bioengineering and Biomedical Engineering	Bachelor's Degree	11	15	22	27	31
		Master's Degree		1			2
		Doctoral Degree		1	2	6	5
140701	Chemical Engineering	Bachelor's Degree	46	31	26	27	32
		Master's Degree	6	11	4	2	1
		Doctoral Degree	2	4	2	8	5
140801	Civil Engineering, General	Bachelor's Degree	38	41	39	52	48
		Master's Degree	22	24	16	21	18
		Doctoral Degree	2	2	2		3
140901	Computer Engineering, General	Bachelor's Degree	18	18	14	20	11
		Master's Degree	20	33	26	19	17
		Doctoral Degree	13	15	15	12	11

Degrees and Certificates Awarded in FY 2005 to FY 2009 in Manufacturing Fields

University Main Campuses

Subject Code	Subject Title	Award Level	2005	2006	2007	2008	2009
141001	Electrical and Electronics Engineering	Bachelor's Degree	49	36	42	38	24
		Master's Degree	27	34	34	27	24
		Doctoral Degree	11	14	13	9	10
141101	Engineering Mechanics	Bachelor's Degree	2	1			
		Master's Degree	1			1	
		Doctoral Degree	1	1			
141401	Environmental/Environmental Health Engineering	Master's Degree	2	1	2	6	12
		Doctoral Degree				5	4
141801	Materials Engineering	Bachelor's Degree	15	4	15	12	10
		Master's Degree	17	24	13	10	10
		Doctoral Degree	6	6	11	11	3
141901	Mechanical Engineering	Associate Degree					1
		Bachelor's Degree	108	102	124	102	106
		Master's Degree	43	57	32	47	33
		Doctoral Degree	6	4	7	12	1
142001	Metallurgical Engineering	Master's Degree	1	1			
		Doctoral Degree	1				
142301	Nuclear Engineering	Master's Degree	5	2	9	4	5
		Doctoral Degree	3	2	1		1
143501	Industrial Engineering	Bachelor's Degree	12	10		1	
		Master's Degree	37	22	17	27	6
		Doctoral Degree	1	3	5	2	1
150101	Architectural Engineering Technology/Technician	Associate Degree	9	7		3	5
150201	Civil Engineering Technology/Technician	Associate Degree	21	19	28	27	22
150303	Electrical, Electronic and Communications Engineering Technology/Technician	Associate Degree	1	4	1	5	4
		Bachelor's Degree	16	13	9	14	12
150501	Heating, Ventilation, Air Conditioning and Refrigeration Engineering Technology/Technician	One to less than Two-Year Award		1			
150613	Manufacturing Engineering Technology/Technician	Associate Degree	7	10	10	13	4
150805	Mechanical Engineering/Mechanical Technology/Technician	Associate Degree	9	6	12	31	8
151201	Computer Engineering Technology/Technician	Bachelor's Degree	5	8	9	9	6
410301	Chemical Technology/Technician	Associate Degree	4	1	2	2	4

Degrees and Certificates Awarded in FY 2005 to FY 2009 in Manufacturing Fields

University Main Campuses

Subject Code	Subject Title	Award Level	2005	2006	2007	2008	2009
		Bachelor's Degree	7	6	5	10	14
480701	Woodworking, General	One to less than Two-Year Award					1
University Main Campuses: University of Toledo							
140501	Bioengineering and Biomedical Engineering	Bachelor's Degree	24	24	28	23	31
		Master's Degree	5	17	4	15	2
140701	Chemical Engineering	Bachelor's Degree	38	34	29	23	29
		Master's Degree	8	4	9	5	4
140801	Civil Engineering, General	Bachelor's Degree	44	27	38	32	30
		Master's Degree	31	12	5	12	9
140901	Computer Engineering, General	Bachelor's Degree	109	94	88	83	64
141001	Electrical and Electronics Engineering	Bachelor's Degree	40	40	44	28	23
		Master's Degree	18	12	8	9	22
141301	Engineering Science	Master's Degree	16	7	11	20	19
		Doctoral Degree	20	20	15	20	13
141901	Mechanical Engineering	Bachelor's Degree	73	85	74	61	65
		Master's Degree	17	21	23	6	8
143501	Industrial Engineering	Bachelor's Degree	7	9	3	11	11
		Master's Degree	10	1	3		2
150201	Civil Engineering Technology/Technician	Associate Degree	2	2			
		Bachelor's Degree	29	45	49	30	
150303	Electrical, Electronic and Communications Engineering Technology/Technician	Associate Degree	6	3	2		
150403	Electromechanical Technology/Electromechanical Engineering Technology	Bachelor's Degree	32	26	27	36	29
150507	Environmental Engineering Technology/Environmental Technology	Associate Degree	1				
150805	Mechanical Engineering/Mechanical Technology/Technician	Associate Degree	8	3	1		
		Bachelor's Degree	75	74	65	46	62
151001	Construction Engineering Technology/Technician	Bachelor's Degree					35
410301	Chemical Technology/Technician	Associate Degree	1				
520203	Logistics, Materials, and Supply Chain Management	Bachelor's Degree	9	9	11	10	17
University Main Campuses: Wright State University							
140101	Engineering, General	Doctoral Degree	12	9	7	15	16
140501	Bioengineering and Biomedical Engineering	Bachelor's Degree	16	17	16	14	21

Degrees and Certificates Awarded in FY 2005 to FY 2009 in Manufacturing Fields

University Main Campuses

Subject Code	Subject Title	Award Level	2005	2006	2007	2008	2009
		Master's Degree	18	41	17	17	27
140901	Computer Engineering, General	Bachelor's Degree	14	17	19	18	23
		Master's Degree	21	21	16	10	17
		Doctoral Degree	2	4	10	7	5
141001	Electrical and Electronics Engineering	Bachelor's Degree	26	36	34	35	32
		Master's Degree	100	79	62	95	108
141201	Engineering Physics/Applied Physics	Bachelor's Degree	2	3	4	2	3
141301	Engineering Science	Bachelor's Degree	6	6	10	3	3
		Master's Degree	25	20	25	13	20
141801	Materials Engineering	Bachelor's Degree		5	3	7	4
		Master's Degree	5	9	4	3	3
141901	Mechanical Engineering	Bachelor's Degree	52	49	46	45	55
		Master's Degree	19	20	10	12	14
520203	Logistics, Materials, and Supply Chain Management	Master's Degree		21	15	14	18
University Main Campuses: Youngstown State University							
140701	Chemical Engineering	Bachelor's Degree	10	7	4	12	6
		Master's Degree	1	1			1
140801	Civil Engineering, General	Bachelor's Degree	14	16	14	20	14
		Master's Degree	2	8		4	1
141001	Electrical and Electronics Engineering	Bachelor's Degree	19	30	28	27	18
		Master's Degree	4	3	4	3	2
141901	Mechanical Engineering	Bachelor's Degree	24	32	18	20	27
		Master's Degree	2	5	3	4	1
143501	Industrial Engineering	Bachelor's Degree	10	9	7	3	5
		Master's Degree	3	2	1	3	2
150201	Civil Engineering Technology/Technician	Associate Degree	9	8	8	11	14
		Bachelor's Degree	18	17	10	11	9
150303	Electrical, Electronic and Communications Engineering Technology/Technician	Associate Degree	14	13	10	15	5
		Bachelor's Degree	12	11	9	11	8
150399	Electrical and Electronic Engineering Technologies/Technicians, Other	Associate Degree	17	17	40	54	59
150805	Mechanical Engineering/Mechanical Technology/Technician	Associate Degree	4	7	5	9	7

Degrees and Certificates Awarded in FY 2005 to FY 2009 in Manufacturing Fields

University Main Campuses

Subject Code	Subject Title	Award Level	2005	2006	2007	2008	2009
		Bachelor's Degree	13	12	3	9	11
151001	Construction Engineering Technology/Technician	Associate Degree		1			
151201	Computer Engineering Technology/Technician	Bachelor's Degree	1				
151301	Drafting and Design Technology/Technician, General	Associate Degree	2	3	1	1	2

Degrees and Certificates Awarded in FY 2005 to FY 2009 in Manufacturing Fields

Private Not-for-Profit

Subject Code	Subject Title	Award Level	2005	2006	2007	2008	2009
Private Not-for-Profit: Case Western Reserve University							
140101	Engineering, General	Bachelor's Degree	1				1
		Master's Degree	14	12	1	10	11
140201	Aerospace, Aeronautical and Astronautical/Space Engineering	Bachelor's Degree	13	10	12	10	18
		Master's Degree			3	1	3
140501	Bioengineering and Biomedical Engineering	Bachelor's Degree	49	94	101	76	93
		Master's Degree	21	17	13	32	11
		Doctoral Degree	16	15	12	15	21
140701	Chemical Engineering	Bachelor's Degree	20	19	18	27	20
		Master's Degree	3	12	1	1	3
		Doctoral Degree	4	8	4	9	6
140801	Civil Engineering, General	Bachelor's Degree	13	18	14	10	20
		Master's Degree	5	4	8	2	4
		Doctoral Degree	5	3	2	2	3
140901	Computer Engineering, General	Bachelor's Degree	36	35	35	14	19
		Master's Degree	4	9	5	10	8
		Doctoral Degree	2	3	4	4	2
141001	Electrical and Electronics Engineering	Bachelor's Degree	25	37	17	20	29
		Master's Degree	17	19	12	10	10
		Doctoral Degree	5	3	2	2	5
141201	Engineering Physics/Applied Physics	Bachelor's Degree	6	1	9	4	4
141301	Engineering Science	Doctoral Degree					1
141801	Materials Engineering	Bachelor's Degree	7	2	6	4	4
		Master's Degree	10	8	7	4	11
		Doctoral Degree	6	6	2	2	4
141901	Mechanical Engineering	Bachelor's Degree	44	46	61	45	48
		Master's Degree	17	16	11	9	8
		Doctoral Degree	11	19	6	2	5
142701	Systems Engineering	Bachelor's Degree	10	12	15	5	4
		Master's Degree	1	2	4	6	1
		Doctoral Degree	3	4	1	7	2

Degrees and Certificates Awarded in FY 2005 to FY 2009 in Manufacturing Fields

Private Not-for-Profit

Subject Code	Subject Title	Award Level	2005	2006	2007	2008	2009
143201	Polymer/Plastics Engineering	Bachelor's Degree	5	5	3	6	7
		Master's Degree	2	2	3	2	1
		Doctoral Degree	12	5	13	7	7
143701	Operations Research	Master's Degree	10	6	13	11	9
		Doctoral Degree	4	2	3	3	2
149999	Engineering, Other	Bachelor's Degree	2				
		Master's Degree		2	3	1	
		Doctoral Degree				1	
151501	Engineering/Industrial Management	Master's Degree	34	31	44	36	37
Private Not-for-Profit: Cedarville University							
100105	Communications Technology/Technician	Bachelor's Degree	9	16	17	16	23
140901	Computer Engineering, General	Bachelor's Degree		6	8	8	2
141001	Electrical and Electronics Engineering	Bachelor's Degree	17	12	9	11	9
141901	Mechanical Engineering	Bachelor's Degree	23	39	29	24	31
Private Not-for-Profit: Chancellor University							
151501	Engineering/Industrial Management	Bachelor's Degree	3	5	1		
Private Not-for-Profit: Defiance College							
100105	Communications Technology/Technician	Associate Degree		1			
		Bachelor's Degree	1	1	3		
Private Not-for-Profit: Franciscan University of Steubenville							
141301	Engineering Science	Bachelor's Degree	3	1	3	1	
Private Not-for-Profit: John Carroll University							
141201	Engineering Physics/Applied Physics	Bachelor's Degree	2	3	2	5	5
520203	Logistics, Materials, and Supply Chain Management	Bachelor's Degree	1	6	5	7	4
Private Not-for-Profit: Malone University							
100203	Recording Arts Technology/Technician	Bachelor's Degree			5	8	1
Private Not-for-Profit: Marietta College							
142501	Petroleum Engineering	Bachelor's Degree	13	12	25	17	21
Private Not-for-Profit: National Institute of Technology							
150399	Electrical and Electronic Engineering Technologies/Technicians, Other	Associate Degree	24				
Private Not-for-Profit: Oberlin College							

Degrees and Certificates Awarded in FY 2005 to FY 2009 in Manufacturing Fields

Private Not-for-Profit

Subject Code	Subject Title	Award Level	2005	2006	2007	2008	2009
149999	Engineering, Other	Bachelor's Degree	4	1	1	3	1
Private Not-for-Profit: Ohio Northern University							
140801	Civil Engineering, General	Bachelor's Degree	13	26	20	27	25
140901	Computer Engineering, General	Bachelor's Degree	6	13	7	12	10
141001	Electrical and Electronics Engineering	Bachelor's Degree	12	17	10	13	10
141901	Mechanical Engineering	Bachelor's Degree	21	32	29	38	38
150612	Industrial Technology/Technician	Bachelor's Degree	28	22	24	16	17
150613	Manufacturing Engineering Technology/Technician	Bachelor's Degree					3
Private Not-for-Profit: The University of Findlay							
150507	Environmental Engineering Technology/Environmental Technology	Bachelor's Degree	27	21	21	23	26
		Master's Degree	27	31	33	28	36
Private Not-for-Profit: University of Dayton							
140101	Engineering, General	Master's Degree			1		
140201	Aerospace, Aeronautical and Astronautical/Space Engineering	Master's Degree	6	5	6	11	7
		Doctoral Degree			2		
140701	Chemical Engineering	Bachelor's Degree	30	34	31	43	32
		Master's Degree	8	4	7	7	6
140801	Civil Engineering, General	Bachelor's Degree	29	30	38	39	35
		Master's Degree	9	3	4	2	3
140901	Computer Engineering, General	Bachelor's Degree	7	16	9	11	6
141001	Electrical and Electronics Engineering	Bachelor's Degree	24	28	10	15	11
		Master's Degree	22	28	31	26	17
		Doctoral Degree	1	5	5	4	2
141101	Engineering Mechanics	Master's Degree					1
141801	Materials Engineering	Master's Degree	9	12	15	9	17
		Doctoral Degree	4	2	6	5	3
141901	Mechanical Engineering	Bachelor's Degree	62	52	56	73	74
		Master's Degree	20	26	21	23	17
		Doctoral Degree	4	7	3	1	5
143601	Manufacturing Engineering	Master's Degree	17	28	20	31	27
150303	Electrical, Electronic and Communications Engineering Technology/Technician	Bachelor's Degree	11	10	11	18	25

Degrees and Certificates Awarded in FY 2005 to FY 2009 in Manufacturing Fields

Private Not-for-Profit

Subject Code	Subject Title	Award Level	2005	2006	2007	2008	2009
150612	Industrial Technology/Technician	Bachelor's Degree	13	17	13	13	18
150613	Manufacturing Engineering Technology/Technician	Bachelor's Degree	4	4	6	17	17
150805	Mechanical Engineering/Mechanical Technology/Technician	Bachelor's Degree	26	21	22	29	23
151201	Computer Engineering Technology/Technician	Bachelor's Degree	4	8	10	7	4
Private Not-for-Profit: University of Northwestern Ohio							
470604	Automobile/Automotive Mechanics Technology/Technician	One to less than Two-Year Award	74	57	123	199	197
		Associate Degree	96	103	133	360	430
470605	Diesel Mechanics Technology/Technician	Less than One-Year Award				33	53
		One to less than Two-Year Award	78	100	90	119	112
		Associate Degree	80	188	102	188	198
479999	Mechanic and Repair Technologies/Technicians, Other	Less than One-Year Award			15		
		One to less than Two-Year Award	50	71	57		
		Associate Degree	118	136	113		
Private Not-for-Profit: University of Rio Grande							
150405	Robotics Technology/Technician	Associate Degree	6	3	4	2	3
150612	Industrial Technology/Technician	Associate Degree		3	1	6	8
		Bachelor's Degree	4	9	6	2	2
150699	Industrial Production Technologies/Technicians, Other	Associate Degree	4	8	14	13	6
151202	Computer Technology/Computer Systems Technology	Associate Degree	2		2		
151301	Drafting and Design Technology/Technician, General	Associate Degree	6	3	2	5	1
480508	Welding Technology/Welder	One to less than Two-Year Award			5		2
480702	Furniture Design and Manufacturing	Associate Degree		1	4	3	5
Private Not-for-Profit: Wilberforce University							
140901	Computer Engineering, General	Bachelor's Degree	3	1	1	3	
141001	Electrical and Electronics Engineering	Bachelor's Degree	1	2	3	1	5

Degrees and Certificates Awarded in FY 2005 to FY 2009 in Manufacturing Fields

Private, For-Profit

Subject Code	Subject Title	Award Level	2005	2006	2007	2008	2009
Private, For-Profit: Bohecker College							
150501	Heating, Ventilation, Air Conditioning and Refrigeration Engineering Technology/Technician	One to less than Two-Year Award			4	39	50
		Associate Degree				2	1
Private, For-Profit: Brown Mackie College-Akron							
141001	Electrical and Electronics Engineering	Associate Degree	1	3	2	1	
151301	Drafting and Design Technology/Technician, General	Associate Degree		4	2	1	
Private, For-Profit: Brown Mackie College-Cincinnati							
151302	CAD/CADD Drafting and/or Design Technology/Technician	One to less than Two-Year Award			1		
151399	Drafting/Design Engineering Technologies/Technicians, Other	Associate Degree	8	8	4	6	
Private, For-Profit: Brown Mackie College-Findlay							
141001	Electrical and Electronics Engineering	Associate Degree	1				
151301	Drafting and Design Technology/Technician, General	Associate Degree		3			
Private, For-Profit: Brown Mackie College-North Canton							
150303	Electrical, Electronic and Communications Engineering Technology/Technician	One to less than Two-Year Award	1		1		
		Associate Degree	10	9	2	6	
151301	Drafting and Design Technology/Technician, General	One to less than Two-Year Award	2	1			
		Associate Degree	14	13	6	10	
Private, For-Profit: Bryant and Stratton College-Cleveland							
141001	Electrical and Electronics Engineering	Associate Degree	13	4	2	2	8
		Bachelor's Degree	8	8	3	4	4
151303	Architectural Drafting and Architectural CAD/CADD	Associate Degree	5	2			
Private, For-Profit: Chancellor University							
151501	Engineering/Industrial Management	Bachelor's Degree				1	
Private, For-Profit: Cleveland Institute of Electronics							
100105	Communications Technology/Technician	One to less than Two-Year Award				19	7
141001	Electrical and Electronics Engineering	One to less than Two-Year Award				1	1
143501	Industrial Engineering	One to less than Two-Year Award				32	31
150000	Engineering Technology, General	One to less than Two-Year Award				3	1
150303	Electrical, Electronic and Communications Engineering Technology/Technician	Associate Degree				30	32
150399	Electrical and Electronic Engineering Technologies/Technicians, Other	Two to less than Four-Year Award				9	7
150404	Instrumentation Technology/Technician	Two to less than Four-Year Award				5	2

Degrees and Certificates Awarded in FY 2005 to FY 2009 in Manufacturing Fields

Private, For-Profit

Subject Code	Subject Title	Award Level	2005	2006	2007	2008	2009
159999	Engineering Technologies and Engineering-Related Fields, Other	One to less than Two-Year Award				30	49
Private, For-Profit: Davis College							
470104	Computer Installation and Repair Technology/Technician	One to less than Two-Year Award	1		1		
Private, For-Profit: Daymar College - Chillicothe							
151202	Computer Technology/Computer Systems Technology	Associate Degree	5				
Private, For-Profit: Daymar College - New Boston							
151202	Computer Technology/Computer Systems Technology	Associate Degree	2				
Private, For-Profit: DeVry University-Ohio							
150303	Electrical, Electronic and Communications Engineering Technology/Technician	Associate Degree	85	52	52	25	28
		Bachelor's Degree	72	63	49	28	29
150401	Biomedical Technology/Technician	Bachelor's Degree				8	11
151201	Computer Engineering Technology/Technician	Bachelor's Degree	105	50	40	35	22
Private, For-Profit: ETI Technical College							
141001	Electrical and Electronics Engineering	Associate Degree	8	8	9	8	8
150303	Electrical, Electronic and Communications Engineering Technology/Technician	One to less than Two-Year Award	4		1	1	
Private, For-Profit: Gallipolis Career College							
151202	Computer Technology/Computer Systems Technology	Associate Degree	7	6	4	3	1
Private, For-Profit: ITT Technical Institute-Dayton							
150000	Engineering Technology, General	Associate Degree	45	43			
150303	Electrical, Electronic and Communications Engineering Technology/Technician	Associate Degree			35	32	30
151301	Drafting and Design Technology/Technician, General	Associate Degree	24	22			
151302	CAD/CADD Drafting and/or Design Technology/Technician	Associate Degree			24	17	20
Private, For-Profit: ITT Technical Institute-Hilliard							
150000	Engineering Technology, General	Associate Degree		11			
150303	Electrical, Electronic and Communications Engineering Technology/Technician	Associate Degree			27	15	17
151301	Drafting and Design Technology/Technician, General	Associate Degree		8			
151302	CAD/CADD Drafting and/or Design Technology/Technician	Associate Degree			21	26	27
Private, For-Profit: ITT Technical Institute-Maumee							
150303	Electrical, Electronic and Communications Engineering Technology/Technician	Associate Degree					9
151302	CAD/CADD Drafting and/or Design Technology/Technician	Associate Degree					11
Private, For-Profit: ITT Technical Institute-Norwood							

Degrees and Certificates Awarded in FY 2005 to FY 2009 in Manufacturing Fields

Private, For-Profit

Subject Code	Subject Title	Award Level	2005	2006	2007	2008	2009
150000	Engineering Technology, General	Associate Degree	54	36			
150303	Electrical, Electronic and Communications Engineering Technology/Technician	Associate Degree			24	33	42
151301	Drafting and Design Technology/Technician, General	Associate Degree	18	28			
151302	CAD/CADD Drafting and/or Design Technology/Technician	Associate Degree			15	14	22
Private, For-Profit: ITT Technical Institute-Strongsville							
150000	Engineering Technology, General	Associate Degree	46	37			
150303	Electrical, Electronic and Communications Engineering Technology/Technician	Associate Degree			28	29	17
151301	Drafting and Design Technology/Technician, General	Associate Degree	28	18			
151302	CAD/CADD Drafting and/or Design Technology/Technician	Associate Degree			18	24	32
Private, For-Profit: ITT Technical Institute-Warrensville Heights							
150303	Electrical, Electronic and Communications Engineering Technology/Technician	Associate Degree				5	15
151302	CAD/CADD Drafting and/or Design Technology/Technician	Associate Degree				5	7
Private, For-Profit: ITT Technical Institute-Youngstown							
150000	Engineering Technology, General	Associate Degree	44	46			
150303	Electrical, Electronic and Communications Engineering Technology/Technician	Associate Degree			31	28	35
151301	Drafting and Design Technology/Technician, General	Associate Degree	28	19			
151302	CAD/CADD Drafting and/or Design Technology/Technician	Associate Degree			16	29	27
Private, For-Profit: National Institute of Technology							
150399	Electrical and Electronic Engineering Technologies/Technicians, Other	Associate Degree		24	33	29	28
Private, For-Profit: Ohio Business College							
151202	Computer Technology/Computer Systems Technology	Less than One-Year Award			3		7
		One to less than Two-Year Award		3			
Private, For-Profit: Ohio Business College-Lorain							
151202	Computer Technology/Computer Systems Technology	Less than One-Year Award				1	1
		One to less than Two-Year Award	2	5			
		Associate Degree			1	1	5
Private, For-Profit: Ohio Institute of Photography and Technology							
150303	Electrical, Electronic and Communications Engineering Technology/Technician	One to less than Two-Year Award					5
151202	Computer Technology/Computer Systems Technology	Less than One-Year Award					10
Private, For-Profit: Ohio Technical College							
470604	Automobile/Automotive Mechanics Technology/Technician	One to less than Two-Year Award	65	66	46	97	

Degrees and Certificates Awarded in FY 2005 to FY 2009 in Manufacturing Fields

Private, For-Profit

Subject Code	Subject Title	Award Level	2005	2006	2007	2008	2009
		Two to less than Four-Year Award					119
470605	Diesel Mechanics Technology/Technician	Associate Degree	5	9	5	9	8
		Two to less than Four-Year Award	15	13	21	45	19
479999	Mechanic and Repair Technologies/Technicians, Other	Associate Degree	42	48	52	59	23
Private, For-Profit: Quest Career College							
410101	Biology Technician/Biotechnology Laboratory Technician	One to less than Two-Year Award	1				
		Associate Degree	9	1			
Private, For-Profit: RETS College							
141001	Electrical and Electronics Engineering	Associate Degree	22	12	11	50	42
150501	Heating, Ventilation, Air Conditioning and Refrigeration Engineering Technology/Technician	One to less than Two-Year Award	182	125	108	121	179
Private, For-Profit: Remington College-Cleveland Campus							
150303	Electrical, Electronic and Communications Engineering Technology/Technician	One to less than Two-Year Award					6
Private, For-Profit: Technology Education College							
150101	Architectural Engineering Technology/Technician	One to less than Two-Year Award	19				
		Associate Degree	19	8			
Private, For-Profit: Vatterott College-Cleveland							
150501	Heating, Ventilation, Air Conditioning and Refrigeration Engineering Technology/Technician	Associate Degree	26	19	22	27	20
460302	Electrician	One to less than Two-Year Award	20	19	25	23	23
		Associate Degree	15	21	19	15	22

Appendix B

Adult Career-Technology Centers

Full-Time Programs Supporting Manufacturing*

INSTITUTION	PROGRAM
Ashland County/West Holmes	Industrial Maintenance
Tri-County Adult Career Center	Welding Technician
Butler County Adult Career	Advanced Manufacturing Technology
	Industrial Maintenance Technology
	Industrial Welding
	Machining Series
	Programmable Logic Control
	Manufacturing Production Technology
Columbiana County C-T Center	Welding (American Welding Society Certified)
Polaris	Welding Technology (AWS Certified)
Penta Career Center	Welding Technician
	Machine Trades
	Builder, Construction, Remodeler
	Marine Trades Skills
Gallia-Jackson-Vinton	Welding Technician
Green County	Precision Machining
Great Oaks Institute of Technology	Welding Technician
	Aviation Maintenance & Powerplant Technology
	Electro-Mechanical Maintenance Technology
Auburn Career Center	Introduction to Manufacturing (100 hr.)
	CAD Engineering Technology
	Welding Technology
Lawrence County	Welding Technician
Licking County	Electrical Trades
	Power Transmission Technology
	Supervisory Management
Ohio Hi-Point	Industrial Maintenance Technology
Lorain County	Precision Machining
	Welding Technology
Mahoning County	Certified Welder (MCCTC)
	Modern Machining (MCCTC)
Miami Valley Career	Electrical Trades
Madison Adult Career Ctr.	Welding Technology
	Precision Machining/CNC Technology
Pickaway-Ross	Industrial Maintenance
	Electrical & Instrumentation
	Welding
	Manufacturing Skills Standards Council
Pioneer Career Technical Center	Welding Technology

Scioto County CTC	Advanced Welding Technology Course
	Stationary Engineering Exam Training
	Distribution Line Mechanic Program
	Industrial Maintenance Program
	ACP Program
	Industrial Electricity Program (1200 hrs.-1year)
EHOVE	TIOG Welding
	Programmable Logic Controllers
	Motor Controls
	OSHA Safety Training
	ARC Welding
	MIG Welding
	Machining Fundamentals
	Fluid Power and Alternative Energy
	Blueprint Reading for Industry
Southern Hills CTC	Complete Welding
Upper Valley	Alternative Energy Green Systems Mgt.
	Multi-Skilled Maintenance Technology
Warren County CTC	Electrical Mechanical - PLC Technology
	Certified Welding Technician
Collins Career Center	Industrial Maintenance Technology
	Steam Plant Operations
	Residential & Commercial Electricity
Delaware Area CTC	Welding & Sheet Metal Fabrication
Knox County Career Center	Welding 1 & 2
	Manufacturing Technology
Alliance City	Welding Technology
Cleveland Municipal	Welding Technology
Washington County	Welding Technology
Ashtabula County JVS	Introduction to Machining Trades
	Apprenticeship Program
	Computerized Numerical Control
	CAD-Computer Aided Drafting
	Industrial Electricity
	Industrial Maintenance
	Industrial Welding
	Introduction to MasterCam
	Plant Boiler Operator
	Programmable Logic Controls
	SolidWorks
	Welding
	Blueprint Reading
	Machine Trades
Wayne County Career Center	Building Maintenance Technology
	Industrial Maintenance Technology
	Precision Machining Technology
	Welding Technology

*This listing includes on full-time programs. In addition, adult career centers offer many part-time courses, short-term and industry customized programs that support manufacturing.