INNOVATIVE
Earn-and-Learn Strategies
FOR BUILDING OHIO'S MANUFACTURING WORKFORCE

A project of the Ohio Manufacturing Workforce Partnership

The Ohio Manufacturers' ASSOCIATION

OhioTechNet

OhioHigherEd
Department of Higher Education

GUIDE FOR OHIO
MANUFACTURERS, EDUCATORS AND COMMUNITY LEADERS

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MEETING OHIO MANUFACTURERS' WORKFORCE CHALLENGE

Ohio manufacturers face a shared challenge: a critical labor shortage, particularly in skilled positions. It pervades all stages of manufacturing, from engineering to production, and will grow as technology advances and requires higher levels of training.

UPSKILLING THROUGH EARN-AND-LEARN STRATEGIES

To build Ohio's manufacturing talent pipeline, the Ohio Manufacturing Workforce Partnership (OMWP) is leading a statewide initiative to upskill 5,000 Ohioans with innovative earn-and-learn (apprenticeship) strategies. OMWP is a collaboration between Ohio TechNet (OTN), a consortium of Ohio's community colleges and other post-secondary education institutions, and The Ohio Manufacturers' Association (OMA), which facilitates the statewide network of manufacturer-led regional sector partnerships.

OMWP's earn-and-learn programs are currently supported by the U.S. Department of Labor (USDOL), through its Scaling Apprenticeship Through Sector-Based Strategies initiative, which provided a $12 million grant.

Our approach takes the best of traditional, registered apprenticeships – structured on-the-job training, with related classroom instruction, and regularly increasing wages – and gives manufacturers the flexibility to determine which skills and outcomes are most important to their long-term success.

FACTS ABOUT THE SKILLS GAP

A skilled workforce is the single most critical element of innovation and success, but the hardest asset for manufacturers to acquire.

2/3 — Two-thirds of manufacturers surveyed cited the inability to find skilled workers as a top challenge, according to a Q1 2020 survey by the National Association of Manufacturers.

$26.2 Billion — Manufacturers are set to spend $26.2 billion in 2020 on internal and external upskilling initiatives, according to the Manufacturing Institute.

2.4 Million — U.S. manufacturers may have as many as 2.4 million jobs that go unfilled by 2028, according to a Deloitte study.

ABOUT THIS GUIDE

OMWP has created this comprehensive guide to share with Ohio manufacturers, educators and community leaders the many advantages of an earn-and-learn strategy, lay out the path forward, and connect with the resources they need to get started.

OUR ROLE

OMWP provides a framework to support locally driven efforts through Ohio's industry sector partnerships to develop and scale innovative models that respond to the needs of employers as well as career seekers. Through Ohio's sector partnerships, local manufacturers are working together to create industry-led solutions in partnership with education, workforce and economic development partners.

Because sector partnerships are industry-led and locally driven, they are in the best position to identify the specific needs and challenges that manufacturers face. They will make key decisions about the types of strategies that will work best for their members.

SECTOR PARTNERSHIPS 101

- Industry-led, focused on manufacturing workforce issues
- Regional, collaborative approach
- Staffed by a neutral intermediary who has or can develop relationships with local manufacturers, education, workforce, economic development, and other community-based organizations

Source: National Governors Association report
State Sector Strategies Coming of Age: Implications for
State Workforce Policymakers

K-12

Adult basic education

Adult Technical Centers

Community Colleges

Career Technical Centers

Universities

Community-based organizations

Human services organizations

Workforce boards, OhioMeansJobs Centers

Economic development organizations

Industry Members
(Representatives from firms in a single industry)

Convener/Intermediary

Strategic Partners
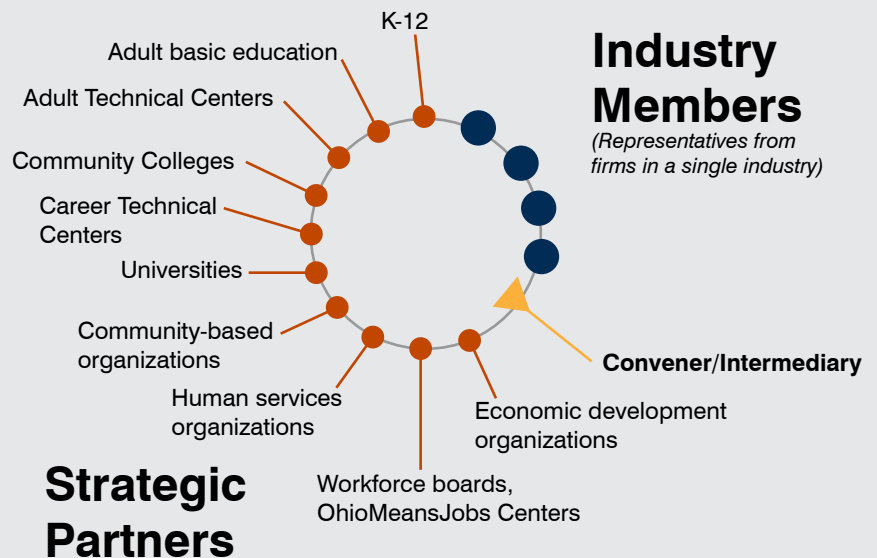
Ohio Manufacturing Workforce Partnerships Implementing Earn-and-Learn Programs
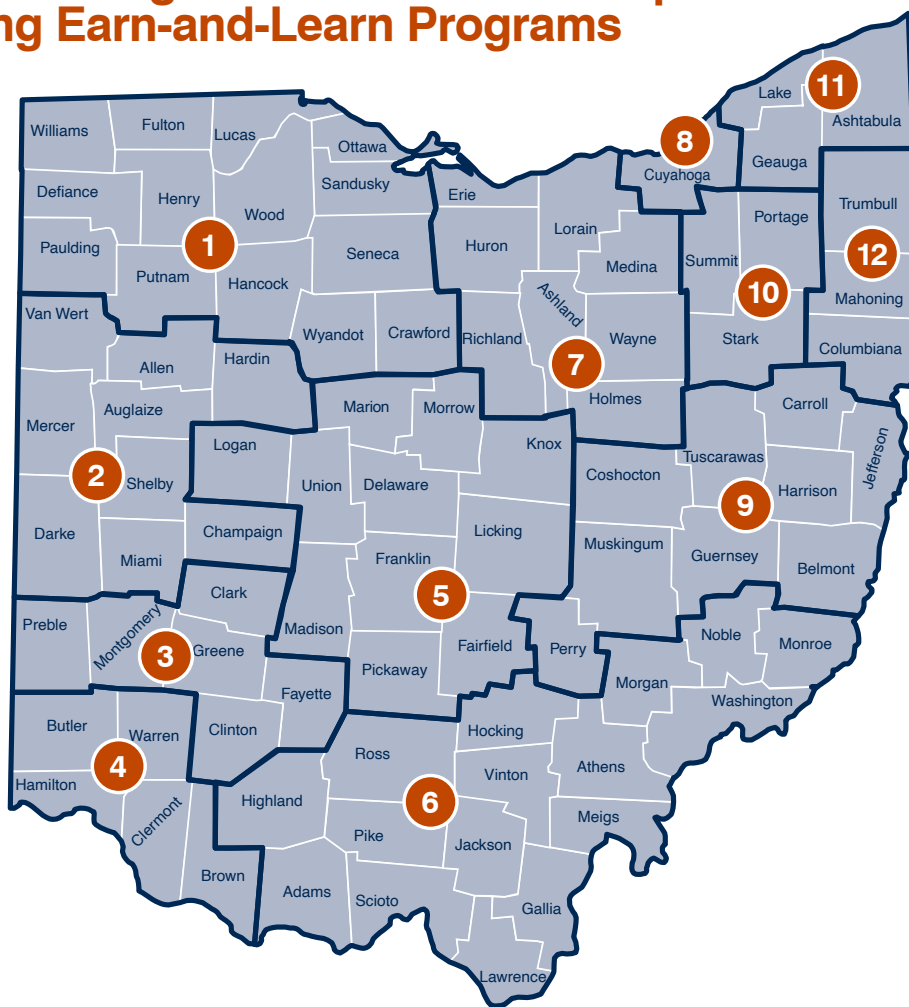
Region 1—Northwest State Community College (on behalf of Northwest Ohio Manufacturing Alliance)

Region 2—Rhodes State College (on behalf of West Central Ohio Manufacturing Partnership)

Region 3—Dayton Regional Manufacturing Workforce Partnership

Region 4—TechSolve

Region 5—Columbus State Community College (on behalf of Central Ohio Manufacturing Partnership)

Region 6—Building Bridges to Careers, Shawnee State University, Appalachian Ohio Manufacturing Partnership

Region 7—Lorain County Community College in partnership with regional sector partnerships

Region 8—MAGNET (on behalf of Workforce Connect Manufacturing Sector Partnership)

Region 9—Building Bridges to Careers

Region 10—ConxusNEO

Region 11—Manufacturing Works (on behalf of Alliance for Working Together)

Region 12—Mahoning Valley Manufacturers Coalition

Note: Colleges identified are fiscal agents for listed regions. Each region may engage multiple education partners as they utilize funds budgeted for educational innovation.

CLICK HERE TO FIND REGIONAL CONTACT INFORMATION

THE VALUE OF EARN-AND-LEARN STRATEGIES

Manufacturing businesses of all sizes need new ways to partner with Ohio's educators, including community colleges, universities, adult technical centers, and career technical centers to ensure that our communities are ready for both the jobs of today and those of tomorrow. Through innovative earn-and-learn strategies, Ohio's manufacturers can build the talent pipeline to meet their workforce needs while providing rewarding, long-term careers.

WHY EARN-AND-LEARN?

Earn-and-learn strategies are proven solutions to help manufacturers recruit, train and retain a skilled workforce. By combining instruction with on-the-job training, earn-and-learn increases relevancy, accelerates learning, and ensures the employee is mastering the essential skills. Earn-and-learn strategies give employers the opportunity to build a workforce trained to their specific needs.

Helping employees advance increases loyalty and improves retention. According to a LinkedIn survey, 93% of employees said they would stay longer at a company that invests in their career development.

For employees, earn-and-learn strategies provide the opportunity to access exciting career pathways and gain credentials that lead to new opportunities. Because students earn a living wage while completing training, they have the opportunity to avoid debt while gaining their education – potentially while earning a degree.

This strong industry-education collaboration will transform workforce development and ensure Ohio remains a leader in manufacturing talent innovation. Earn-and-learn strategies taken to scale:
- Provide new opportunities for employers to build a workforce to their specifications
- Offer flexible employment models for individuals
- Generate tailored programs designed by education partners that reduce the time and expense of earning degrees or credentials

HALLMARKS OF EARN-AND-LEARN

Under the USDOL grant, Ohio's earn-and-learn projects must meet five requirements:

1

Provide paid, work-based learning delivered by the employer.

The program must pay participants at least the applicable federal, state or local minimum wage or a federally approved stipend under federal wage requirements, and offer participants potential wage increases. Programs also will offer participants the opportunity to advance in the industry. Consistent with state and federal guidelines, OMWP's target earn-and-learn average wage is $16/hour at completion.

2

Offer structured, on-the-job training and mentorship.

Participants will have opportunities to apply what they are learning to their work through well-designed and highly structured experiences. Mentors will support the apprentices while they are learning on the job. They will provide guidance on industry and company culture, as well as workplace policies and procedures. The on-the-job training will be structured to allow sufficient time for the apprentice to become proficient in the job skills.

3

Provide or arrange for technical instruction relevant to approved apprenticeship pathways.

Earn-and-learn programs must provide or arrange for classroom or related instruction to help apprentices achieve proficiency goals and earn credentials or certifications. Programs may allow participants to receive college credit and earn credit-bearing academic certificates and degrees.

4

Ensure completion of a nationally portable, industry-recognized credential.

Examples of this type of credential include:
- A Registered Apprenticeship Certificate of Completion.
- Certifications awarded by national bodies such as NIMS and AWS, which require an assessment.
- Certificates awarded by equipment vendors like FANUC and Mitsubishi, which can be provided through an instructor who has completed a train-the-trainer program.
- Credit-bearing academic short-term and long-term certificates and 2- and 4-year degree programs.

5

Meet standards for safety and equal opportunity.

The program must adhere to all applicable federal, state and local laws and regulations related to safety, employment and equal opportunity.

THE IMPORTANCE OF CREDENTIALS

The requirement for nationally portable, industry-recognized credentials is an essential element for earn-and-learn projects under the OMWP's USDOL grant. The credentials provide third-party verification of an individual's competence that will be recognized anywhere in the country. They can take many forms, including certifications, certificates, licenses, and degrees.

"Nationally portable, industry-recognized" means the credential has value to more than one employer. In other words, it cannot be unique to a specific company or a specific region.

According to the Manufacturing Institute, companies large and small have achieved measurable results when recognizing industry credentials, including:

- **More job-ready candidates.** Applicants with certifications have demonstrated an ability to be productive faster than those without certifications.
- **Better promotion decisions.** Certified workers are better candidates for promotion. Some employers use certifications as criteria for employees seeking a promotion or to identify those most qualified for future training and advancement.
- **Improved safety and quality.** Manufacturers report fewer accidents and improved safety ratings. Certified workers understand the critical role that safety and quality play in a production environment.
- **Reduced turnover.** Employers have reported as much as a 50% reduction in turnover resulting from hiring certified workers.
- **Increased productivity.** Reduced overtime and scrap rate, additional new business, and an overall improvement in production metrics can be achieved with a certification-rich workforce.

TYPES OF CREDENTIALS

- **CERTIFICATION:** A nationally-portable, industry-recognized credential awarded to individuals who pass a standardized assessment that recognizes his or her knowledge, skill, or competency in a particular specialty.
- **CERTIFICATE:** Nationally portable, industry-recognized certificates are issued by credentialing entities/authorities with faculty training specific to the certificate,
- **REGISTERED APPRENTICESHIP CERTIFICATE:** Registered Apprenticeship programs are awarded a Certificate of Completion from the U.S. Department of Labor (USDOL) or the USDOL-recognized State Apprenticeship Agency. Ohio has a State Apprenticeship Agency.
- **EDUCATIONAL CREDENTIALS:** College credit-bearing short-term (e.g. one-year) academic certificates (such as postsecondary manufacturing certificate programs that usually require full-time, six-month to one-year completion of required courses or their part-time equivalent,) or AA degrees, and BA or BS degrees.

CREDENTIALS AND CAREER PATHWAYS

Credentials help with retention when they are aligned to well-defined career pathways, which is attractive to workers who desire long-term career development. Manufacturing careers are often perceived, incorrectly, as "dead end." Using credentials to map out long-term career paths highlight the opportunities ahead in manufacturing as the employee gains skills at each step along the way.

Credentials help provide clear career pathways because they are "stackable" – they build on a foundation of basic academic and workplace skills, such as critical thinking, following instructions, and dependability. From there, workers gain core technical skills, including safety, quality, and maintenance. Finally, workers gain specialized, occupationally specific skills, such as machining, welding, industrial maintenance, automation or robotics. College credits earned along the way can ultimately lead to an academic certificate or a 2- or 4-year degree.

Credentials link education and work, ensuring graduates have the skills required for jobs in today's manufacturing economy. Credentials can:

• Connect academics to employer needs to create efficiencies in workforce development
• Provide third-party validation of skills and minimize hiring risks for employers
• Increase placement and wage gains for students
• Increase the acceptance of credits for articulation across programs and institutions, enhancing efficiencies of the educational delivery system and promoting student completion.

Through the earn-and-learn approach, students earn industry-recognized, nationally portable credentials with real value in the marketplace. It's a good investment for employers.

VISIT THE CAREER PATHWAYS SECTION AT MAKINGOHIO.COM
to learn how ongoing training can lead to career advancement.

PRODUCTION TECHNICIAN
MAINTENANCE TECHNICIAN'S ASSISTANT

PREVENTIVE MAINTENANCE TECHNICIAN

MULTICRAFT MAINTENANCE TECHNICIAN

FOREMAN/GROUP LEAD

ELECTRONICS INSTRUMENTATION TECH

MAINTENANCE SUPERVISOR

ENGINEERING TECHNOLOGIST

FACILITIES MANAGER/ SUPERINTENDENT

PLANT ENGINEER
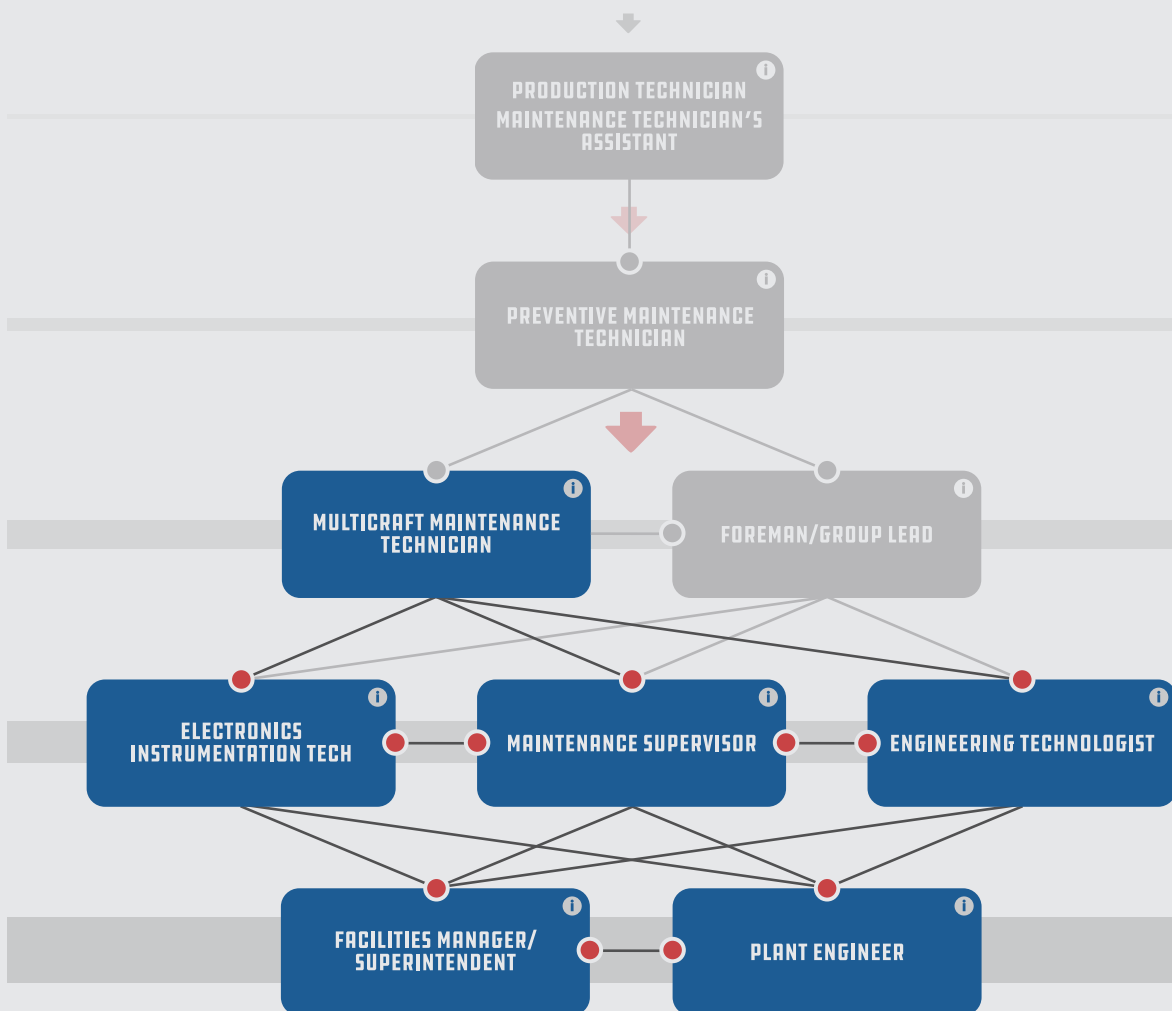
OHIO SUCCESS STORIES

There are many earn-and-learn programs across Ohio's manufacturing landscape that demonstrate effectiveness in closing skills gaps through upskilling, new talent recruitment and innovative training models. Below are examples of earn-and-learn strategies that attest to the power of this approach:

	Right Skills Now	WorkAdvance	Columbus State Community College Modern Manufacturing Work Study Program	Lorain County Community College TRAIN OH Learn & Earn	The Federation for Advanced Manufacturing Education (FAME)	Mahoning Valley Manufacturers' Coalition Group Sponsored Registered Apprenticeship	New Apprenticeships Customized to Employer Needs
Paid work-based learning (WBL) delivered by employer	8-week paid internship	Participants are hired by employer and paid wages during training	Students work onsite with program employers 3 days a week	Students work onsite with program employers 3 days a week (1900 hours of work experience)	Students work onsite with sponsoring company 3 days a week (1800 hours of OJT)	Apprentices are paid a percent of journeyworker wages with regular increases tied to progress	
Structured on-the-job (OJT) and mentorship	320 hours of OJT	Up to 6 months of wages covered by WIOA OJT dollars. Wages are paid through Goodwill and employer gets 50% wage reimbursement	OJT built around employer needs/aligns with classroom component	OJT provided by students' employer supervisor and tracked on a routine basis	OJT provided by student's sponsoring employer. Students are assigned mentors and success coaches throughout the program	Length of OJT determined by occupation and, if competency-based, apprentice's ability to master competencies	Don't see what you're looking for? That's okay! OMWP will provide technical assistance to help you design an innovative apprenticeship that meets all five hallmarks and your business needs.
Related technical instruction (RTI)	180 hours of classroom training	100 hours of technical training as well as 80 hours of soft skill training	Students study in class 2 days a week	Hands on classroom and lab (aligned to needs of employer)	Students attend college classes 2 days a week	At least 144 hours per year of apprenticeship	
Nationally portable industry-recognized credentials	NCRC & NIMS	NIMS	Prepares students to pass related certification exams	Associates Degree; IPC J-STD-001 Certification OR FANUC Certification (based on course of study)	Associates degree and an AMT Certification	Apprentices receive 13 NIMS credentials. These are also used to demonstrate mastery.	
Employment must meet standards for safety, supervision and equal opportunity	Monitored by employer and provider	Yes	Yes	Monitored by employer and in lab by provider	Yes	Monitored by DOL or state office of apprenticeship	
Partners	Cuyahoga County Community College in partnership with MAGNET and Swagelok	Eastern Gateway Community College, Mahoning County Career and Technical Center, Nordson, and Mahoning Valley Manufacturers Coalition	Columbus State Community College in partnership with Honda and other industry partners in the Central Ohio region	Lorain County Community College in collaboration with 50+ industry partners in Northeast Ohio	Raise the Bar Hancock County, OH! FAME, employer sponsors	MVMC members (multiple companies), multiple education providers (Ohio Technical Centers and Community Colleges)	

A CLOSER LOOK

Here are two earn-and-learn projects that speak to the power of the collaboration and impact on the employer/
manufacturer, educator, apprentice, community and state.

WORKADVANCE

Lifting workers out of low-wage-jobs, providing sustainable careers, and giving people a second chance are some of
the ways this job-skills training program is changing lives, building local communities, and improving the future of Ohio.
WorkAdvance is an initiative led by the Mahoning Valley Manufacturers Coalition (MVMC) to help people jump-start a
career through paid technical training that creates a modern skilled workforce.

The MVMC partnered with Nordson Corp., Youngstown Area Goodwill Industries, Eastern Gateway Community College,
and Mahoning Youngstown Community Action Program to create an initiative that meets people where they are in life
and helps them attain skills to become successfully employed.

"There's no one solution to keeping our young people here," says Arthur Daly, vice president of the Youngstown campus
of Eastern Gateway Community College. "This is what sells our community."

The program provides a paid two-week career coaching workshop, 100 hours of paid technical training along with
ongoing support essential for a successful transition into an entry-level skilled manufacturing position. It has led to full-
time manufacturing careers at Nordson Corp. in Austintown for most of the participants.

"This is the first time we've been able to connect all the dots through a deep engagement through services, resources
and employer," says Jessica Borza, MVMC executive director.

Based on the initial success of this strategy, MVMC is looking to expand the program and serve more manufacturers
seeking skilled entry-level employees.

MODERN MANUFACTURING WORK-STUDY PROGRAM

Columbus State Community College in collaboration with Miami University, Central Ohio high schools, Honda North
America, and other manufacturers is educating the next generation of multi-craft manufacturing support technicians
for the Central Ohio region. This Modern Manufacturing Work-Study program addresses industry's need for qualified
manufacturing technicians by creating an interdisciplinary curriculum pathway with engineering technology, supply chain
management, and information technology coursework.

The goal of the project has been to build an academic pathway and expand the supply of next-generation multi-craft
manufacturing technicians in many industries to address the growing shortage in the Central Ohio region. This model is
continuously expanding to encompass additional K-12 partners, colleges, manufacturers and community partners.
Click here for more information.

TRAIN OH

The TRAIN OH program at Lorain County Community College (LCCC) offers an earn-and-learn approach to earning a certificate or degree. It combines a hands-on college degree in several in-demand career fields with paid work-based learning with Northeast Ohio companies.

TRAIN OH allows students to attend school full-time, two days a week, and work at a sponsoring company three days a week. LCCC degree programs currently offering TRAIN OH earn-and-learn opportunities include:
• Micro Electromechanical Systems (MEMS)
• Automation Engineering Technologies
• Cyber & Information Systems

LCCC has engaged local employers to offer paid work-based learning through this program. TRAIN OH is an employment program that provides full-time or part-time entry-level jobs, or internships with businesses that need to attract and retain employees. Benefits for students include:
• Hands-on experience and on-the-job training.
• Earning a livable wage while completing education.
• Early exposure to the hiring process including resume building, job search skills, interviewing, and employability skills.

Employers can partner with LCCC via TRAIN OH to form partnerships that create a continuous pipeline of skilled employees, lower the time and cost to recruit and retain top talent, support additional education to increase the skill levels of employees, and have the opportunity to hire students into full-time positions at the completion of the program.

Employers are encouraged to support TRAIN OH in a number of ways:
• Sponsor a student for a paid work-based learning opportunity
• Participate on an industry advisory council at LCCC
• Participate in the design of the earn and learn program
• Review resumes of students and provide feedback
• Interview students
• Hire students

TRAIN OH successes include:
• A military vet who worked at Lincoln Electric while enrolled in the TRAIN OH program at LCCC and transitioned to a full-time position at Vexos
• An employer feature on Vexos that includes the journey of an LCCC student as he followed TRAIN OH from associate degree, accepting a full-time offer of employment and continuing on to pursue a bachelor's degree at LCCC.

BEST PRACTICES

STEPS TO BUILD SUCCESSFUL EARN-AND-LEARN STRATEGIES

These steps provide a roadmap for developing an earn-and-learn strategy. While not purely sequential, the steps build on each other. Working through the sector partnership:

1. **Determine the Workforce Need.** Manufacturers will first identify the skills needed to fill a critical workforce gap and the basic training necessary to fuel their business and drive regional economic growth. Often high-demand skills will translate to jobs needed across multiple manufacturers. Manufacturers and their sector partnership will frame the logical career pathway for those who are interested in the skills training and job opportunities.

2. **Assess Area Programs.** The sector partnership will identify and evaluate resources and expertise already available in the community to support the identified skills development through workforce development groups, community organizations and education partners.

3. **Identify Existing Resources.** Many models exist, inside and outside Ohio, for talent pipeline development. You may not need to reinvent the wheel. Through collaboration within the sector partnership,you may be able to identify existing resources or initiatives already underway in the region that can be taken to scale.

4. **Secure and Onboard Partners.** The sector partnership will provide an in-depth orientation to key partners in the region so "buy-in" and collaboration begin early. The sector partnership will build in mechanisms for ongoing engagement, such as regular sessions to share progress and operational meetings with community stakeholders to review outcomes.

5. **Align Strategies to Credentials.** Based on the needs identified by area manufacturers, the sector partnership will identify a credential or set of credentials best suited to validate the skills needed. Once target occupations are agreed upon, the on-the-job-training hours, competencies and related technical instruction requirements will be defined. The sector partnership will identify gaps in curricula and develop new instructional modules to fill gaps and determine where in the sequence of instruction various certification exams should be administered.

6. **Establish Systems to Support the Strategy:** Manufacturers will help identify all possible sources that might feed potential students and current workers into the new earn-and-learn strategy. The sector partnership can engage community-based organizations and the public workforce system (workforce development boards and

OhioMeansJobs centers) to recruit veterans, displaced workers, and underserved populations, such as people of color, women and ex-offenders to connect both traditional and nontraditional candidates with manufacturing opportunities. Community-based organizations typically offer networks and resources that can power community outreach. Additionally, pre-apprenticeship programs can be feeders to apprenticeship programs. Pre-apprenticeship programs can help reach high school student who are undecided about a career and allow them exposure to manufacturing careers.

7. **Align to Career Pathways and Create Articulation Agreements.** Based on the targeted high-demand needs, the sector partnerships and educators will use career pathways found on the Making Ohio website (among others) to connect levels of education, training, support services and credentials to optimize the process. Prior Learning Assessment is an example of how previous work experience, such as in the military, can be articulated to award academic credit and make career pathways more efficient. Collaboration will be fostered across secondary, two-year and four-year institutions, and articulation agreements developed to maximize transfer of credit.

ASSESSING PROGRAMS AND RESOURCES IN THE REGION

Identifying and evaluating the programs, resources, and organizations that may support the development of earn-and-learn strategies are critical steps. Investing the time to do this assessment upfront will ultimately save time by identifying and leveraging important local and state resources, and also help to create a network of organizations and programs to support deployment of a manufacturing earn-and-learn strategy. Below is a list of questions and thought starters to guide the sector partnership, educators, and community partners in this important assessment activity.

What programs of study specific to manufacturing already exist among your local education institutions and training providers?

Educational institutions can create feeders to programs focused on the target population that is 17 years of age or older and out of high school, including career technical centers, adult technical centers, community colleges and four-year colleges. Consider the types of programs that currently serve as education pathways for manufacturing in the region. These may include:
- High school career academies
- Secondary and postsecondary vocational and technical education programs
- Internship and externship programs
- Apprenticeship programs
- Associate degree programs and certificate programs at community colleges
- 2+2 programs between high schools and community colleges
- Programs at four-year universities

The programs of study can be grouped into categories by high-demand occupations, including welding, machining, industrial maintenance and robotics/automation.

What initiatives currently support either the manufacturing sector or skills certification?

These might include state, regional or local initiatives in manufacturing, education, or workforce development. Examples include:
- TechCred
- ApprenticeOhio
- RAPIDS grants through the Ohio Department of Higher Education
- Workforce Innovation and Opportunity Act, through the Ohio Department of Jobs and Family Services
- FastPathOhio

In addition, funding may be available through local resources, such as philanthropic organizations. Your education partner(s) may also help underwrite some costs through financial aid, such as federal Pell Grants.

What other government programs might already be aligned to support earn-and-learn programs and related skills certification?

Consider state and local workforce development boards: Do they have specific initiatives or goals around manufacturing or skills certification? And consider economic development organizations: Are they targeting manufacturing as an industry in their strategic plans?

FOSTERING COLLABORATION

The strength of the sector partnership is its unique ability to foster collaboration. Successful earn-and-learn strategies are born from collaboration among partners – businesses, workforce intermediaries (such as industry associations or labor organizations), educational institutions, the public workforce system, and other key community organizations. The sector partnership members work together to identify the resources needed, design the earn-and-learn program, and recruit apprentices. Every partner has a critical role to play.

MANUFACTURERS
- Identify the skills and knowledge that apprentices need to learn
- Provide industry and/or workforce specific expertise (e.g. curriculum development)
- Hire new workers, or select current employees, to be apprentices
- Provide on-the-job training
- Identify and engage experienced mentors to work with apprentices
- Pay progressively higher wages as apprentices' skills increase
- Provide related instruction in-house or in partnership with others

EDUCATIONAL INSTITUTIONS (4-year college, community college, adult technical center, career and technical education)
- Develop curriculum for related instruction
- Deliver related instruction to apprentices
- Provide college credit for courses successfully completed, as applicable
- Aggregate demand for apprentices
- Provide specialized facilities/equipment
- Offer access to financial resources, outreach

PUBLIC WORKFORCE SYSTEM (Workforce Development Boards, American Job Centers)
- Develop sector and career pathway strategies utilizing apprenticeship
- Recruit and screen candidates to be apprentices
- Provide pre-apprenticeship and basic skills training
- Provide support services (such as tools, uniforms, equipment, or books)
- Contribute funding for on-the-job training or related instruction

APPRENTICESHIP SYSTEM (ApprenticeOhio)
- Provide technical assistance and support to new sponsors
- Answer questions about the apprenticeship model
- Guide manufacturers through the steps to develop and register a program
- Connect businesses with training providers
- Advise partners on sources of funding to support apprenticeships

Other partners play important roles, too. For example, **economic development organizations** can help connect manufacturers to sector partnerships in the region. The **K-12 educational system** can help develop pipelines to apprenticeship for students. **Community-based organizations** may have capacity to help specific worker populations, such as women, veterans, minorities, individuals with disabilities, and others, prepare for apprenticeships and provide supportive services to apprentices.

OHIO MANUFACTURING OPPORTUNITIES

Manufacturing is a critical part of Ohio's economy, with more than 700,000 jobs and contributing 17% of Ohio's gross domestic product. This section explores several key issues for building on that success.

ATTRACTING THE 21ST CENTURY WORKFORCE

How can we bring more people into rewarding manufacturing careers in Ohio? That question is at the heart of solving this workforce development challenge. To find answers, the OMA conducted research designed to uncover opportunities and barriers to attracting more Ohioans to rewarding careers in manufacturing. Here are seven key findings:

1. **Perceptions of manufacturing are generally favorable, but lack clarity.**
   Respondents agree that manufacturing is important to national and local economies. They believe there is an abundance of available jobs. Still, the perceptions that the manufacturing workplace is "dirty, dark, and dangerous" persist, and respondents fail to describe manufacturing beyond established stereotypes. And while 58% might encourage others' interests in manufacturing, only 39% have been encouraged by others to consider the same.

   Initial perceptions of the manufacturing industry are positive (70% overall). Gen X women (85%) and Gen X men (73%) have the most positive first impressions. Students (41%) and millennial females (57%) had the lowest initial impression of manufacturing.

EXISTING PERCEPTIONS FAVORABLE, LACKING CLARITY

70% have favorable view overall

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Favorable compared to other industries, but lacking clarity

Industry	%
Tech	84%
Development (software)	78%
Engineering/Architecture	73%
Healthcare Medical	74%
Construction	73%
Education	70%
Military	71%
Manufacturing	70%
Transportation/Distribution	67%
Legal	65%
Food Service	64%
Utilities	62%
Sales	56%
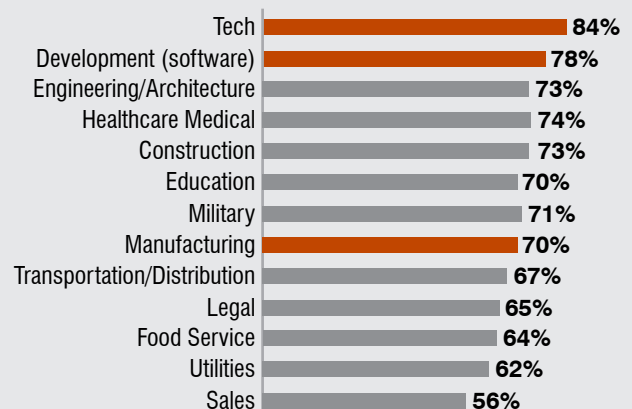
2. Job seekers expect detailed information.

Respondents claim they spend a lot of time researching job opportunities and use online tools such as LinkedIn. Projected career path, statistical evidence of success, and information source credibility are equally important.

Job switchers seek depth and detail in industry claims. They look for relatable stories and are frank and thoughtful in considering new careers. Switchers are more likely to be mid-life, female, with modest educational attainment, and much more open to manufacturing.

- 72% have switched careers at least two times
- 71% have not achieved a bachelor's degree
- 50% see manufacturing as potentially providing long-term career opportunities

3. Pay, benefits, and job stability messages are well-received.

Respondents found claims of good pay, job security, work-life balance, and good health benefits to be compelling. However, most need more information to convince them of credibility – they want statistics, sources cited, graphical representations, and specifics to make it more believable. They want to know what manufacturing sectors make up a specific statistic, what job levels it includes, what number of work hours it includes, and what the average manufacturing pay is in their specific locales.

OVERALL REACTIONS TO MESSAGES

Below are reasons some people have given in support of a career in the manufacturing industry in Ohio. For each, respondents indicated if it is a very convincing, somewhat convincing, not too convincing, or not at all convincing reason to consider a career in manufacturing. Total Sample: N = 269.

Reason	Percentage
Manufacturers have one of the highest percentages of workers who are eligible for health benefits provided by their employer.	86%
Manufacturing jobs pay really well.	83%
Manufacturing jobs afford a considerable work-life balance such as flexible hours and compressed workweeks (in which workers can work longer hours in fewer days, allowing them to have more days off).	82%
The manufacturing industry in the U.S. is high-tech. Manufacturers in the U.S. perform more than three-quarters of all private-sector research and development (R&D) in the nation.	77%
Manufacturing spurs innovation and contributes to the social good.	76%
U.S. manufacturing jobs are stable and provide as much job security as other jobs in other industries. Workers in manufacturing had the highest tenure among major industries, at 5.3 years in January 2016.	75%
Manufacturing allows you to create with your hands, seeing the fruits of your labor on a daily basis.	74%

4. **Manufacturing is perceived as open to everyone.**
   Respondents perceive manufacturing as an industry that accommodates workers of all ages, educational attainment, ambitions, and backgrounds. This suggests an opportunity for manufacturers to reinforce these perceptions and attract a more diverse workforce.

5. **Variety in manufacturing needs more exposure.**
   Respondents value creativity and self-expression alongside work-life balance and keep these top-of-mind in their job searches. But most have moderate to low expectations for how well manufacturers deliver on these aspects, and associate manufacturing with a high degree of monotony and repetition.

6. **Leadership and growth opportunities need to be clarified.**
   Most respondents include leadership ambitions in their career goals but are unable to articulate leadership in a manufacturing context. As manufacturers communicate workplace opportunities, they should illustrate the long-term career path even as it fills the sector's immediate workforce needs.

7. **Focus on Tech and Manufacturing, not Tech versus Manufacturing.**
   Today's lives are tech-enabled. The more manufacturing can reflect the deep utilization of technology, the increasing sophistication of the manufacturing environment because of technology, and the sector's embrace of social and cultural tech media, the more likely manufacturing will be positioned as a relevant, "cool" workforce sector.

IN-DEMAND JOBS

OCCUPATION	Number of Jobs	Annual Openings	Wages per Hour
MACHINING			
Entry-Level: CNC Machine Operators; Machinists; Machine Setters and Operators	85,381	8,290	$17.97
Middle-Skilled: CNC Programmers; Tool & Die Maker, Industrial Designers	11,343	1,049	$25.04
Higher Skilled: Industrial Production Managers; Mechanical Engineers	25,934	1,903	$40.73
PRODUCTION			
Entry-Level: Metal Fabricators and Fitters; Assemblers; Production Workers	132,078	13,883	$15.66
Middle-Skilled: Production Supervisors	30,654	2,898	$28.16
Higher Skilled: Industrial Engineers	14,744	1,102	$38.24
WELDING			
Entry-Level: Welders & Setters	21,230	2,259	$18.49
Middle-Skilled: Welding Inspectors; Welding Supervisors	61,833	5,912	$23.09
Higher Skilled: Materials Engineers; Materials Scientists	2,234	186	$42.31
INDUSTRIAL MAINTENANCE			
Entry-Level: Industrial Machinery Mechanics; Maintenance; Millwrights; Maintenance and Repair Workers; Crane and Tower Operators	82,459	8,482	$20.50
Middle-Skilled: Mechanical/Electrical Drafters; Engineering Technicians; Electrical Installer and Repairer	17,629	1,584	$26.63
Higher Skilled: Mechatronics/Robotics Engineers; Electrical Engineers	17,412	1,231	$41.85

Source: Ohio Department of Jobs and Family Services, Labor Market Information Service, 2018

See Appendix on page 22 for relevant credentials

REASONS TO CONSIDER A CAREER IN OHIO MANUFACTURING

When working with students, families or current workers in low-wage industries who may not be aware of all Ohio manufacturing has to offer, share with them the following:

MORE OPPORTUNITY
Ohio's manufacturing sector offers opportunity to build a long-term career.

BEYOND JUST A LIVING WAGE
The average annual earnings of Ohio workers on manufacturing payrolls in 2018 (the latest year available) was $61,500—with some subsectors well above $65,000.

OUTSTANDING BENEFITS
Data show 92% of U.S. manufacturing employees were eligible for health care insurance in 2018 - the highest percentage of eligibility in any economic sector.

PATHWAYS TO CAREER GROWTH
With few barriers to entry, there are numerous opportunities for growth, promotions and advancement in every type of manufacturing.

OHIO'S NO. 1 INDUSTRY
With roughly 700,000 employees and an annual payroll of more than $40 billion, manufacturing provides the highest total annual wages of any Ohio industry sector.

TOMORROW'S TECHNOLOGY TODAY
From 3-D printing to next-gen robotics, today's manufacturers are pushing the envelope of what's possible, while building the future before our very eyes.

MANUFACTURING IS AN ECONOMIC POWERHOUSE
Taken alone, manufacturing in the United States would be the eighth-largest economy in the world. In Ohio, it represents almost 17% of the state's entire economic output.

PRODUCING FOR GLOBAL DEMAND
Ohio supplies the world with both the durable and nondurable goods it demands. In 2018, Ohio exported $53B in goods to more than 200 countries and territories.

MANY EMPLOYERS TO CHOOSE FROM
Ohio has more than 14,000 manufacturing businesses statewide. That's why more than one out of 10 of Ohio's workers is employed in manufacturing.

WAGES GO FURTHER IN OHIO
Ohio's comparable cost of living is favorable to other states. A manufacturing job in Ohio will provide for a better quality of life than in other parts of the country.

COMMITTED PARTNERS IN EDUCATION
Ohio has numerous community colleges, adult technical centers, career technical centers and universities specializing in current and emerging manufacturing needs.

PRIORITIZING A HEALTHY PLANET
U.S. manufacturers added nearly 20% more value to the economy over the past decade while actually reducing GHG emissions. And Ohio manufacturers lead statewide reductions/recycling of Ohio-generated waste.

RESOURCES

There are numerous organizations that may provide additional resources for earn-and-learn strategies. While each of these organizations varies in mission, they can provide excellent guidance and leadership to ensure the development of a qualified talent pipeline.

THE OHIO MANUFACTURERS' ASSOCIATION – WORKFORCE SERVICES
The OMA offers a wide range of resources on workforce issues.

SKILLSCOMMONS
The OMA has partnered with California State University SkillsCommons to provide easy access to high-quality free and open training resources for Ohio manufacturers and their workforce partners.

OHIO TECHNET
Based at Lorain County Community College, Ohio TechNet is a statewide consortium of community colleges and universities focused on building the 21st century manufacturing workforce.

GOVERNOR'S OFFICE OF WORKFORCE TRANSFORMATION
The Office of Workforce Transformation's mission is to connect Ohio's business, training and education communities to build a dynamically skilled, productive and purposeful workforce.

OHIO MEANS JOBS
OhioMeansJobs.com is Ohio's free, online career counseling center that connects businesses to job seekers and provides career services to all Ohioans.

OHIO TECHCRED
The TechCred Program offers funding to businesses to help Ohioans learn new skills and help employers build a stronger workforce with the skills needed in a technology-infused economy.

OHIO MANUFACTURING EXTENSION PARTNERSHIP (MEP)
Ohio MEP helps Ohio's small and medium-sized manufacturers to increase sales, create jobs and generate cost savings through technological innovation, workforce training, and improved management practices.

APPRENTICEOHIO

Registered Apprenticeships provide technical instruction with on-the-job training, resulting in an individual gaining the academic skills and garnering hands-on professional experience.

THE MANUFACTURING INSTITUTE

The Manufacturing Institute is an authority on the attraction, qualification and development of world-class manufacturing talent. The Manufacturing Institute offers a variety of resources including research, promotional materials, webinars, and expertise to support manufacturers in their quest to develop a qualified talent pipeline.

O*NET

The O*NET program is the nation's primary source of occupational information. Central to the project is the O*NET database, containing information on hundreds of standardized and occupation-specific descriptors. The database, which is available to the public at no cost, is continually updated by surveying a broad range of workers from each occupation. Information from this database forms the heart of O*NET OnLine, an interactive application for exploring and searching occupations. Companies use O*NET in countless ways, such as matching competencies to job profiles, learning about related jobs and expected growth of occupations, and benchmarking pay scales.

WORKFORCE DEVELOPMENT BOARDS

Workforce Development Boards (WDBs) are present in every community in the nation. The WDBs' main role is to direct federal, state and local funding to workforce development programs. WDBs conduct and publish research on these programs and the needs of their regional economies. They oversee One-Stop Career Centers (OhioMeansJobs centers).

WISE PATHWAYS

WISE Pathways shares best practices and offers materials and strategies that engage women in high-demand career pathways where they are currently underrepresented.

FASTPATHOHIO

With FastPathOhio, you can earn credit by creating petitions to have your work or life learning experiences assessed at one of the participating colleges.

APPENDIX

LEARN ABOUT IN-DEMAND NATIONALLY PORTABLE MANUFACTURING CREDENTIALS

One of the five hallmarks of the Ohio Manufacturing Workforce Partnership (OMWP) earn-and-learn program is **Obtainment of a Nationally-Portable Industry Recognized Credential.** There are several types of credentials that meet this requirement.

The primary purpose of this tool is to help sector partnerships, manufacturers, and educators quickly and easily identify the **Industry Recognized Certifications and Certificates** that best align with their upskilling needs.

Nationally portable credentials help businesses clearly communicate their needs and expectations with students and educators. They also give job seekers and employees ways to demonstrate marketable competencies. Credentials provide an objective way for:

- Students to validate the skills and knowledge they can bring to the job
- Educational providers to establish the value of their product
- Employers to have a level of understanding about the skill level of an individual before hiring them

Embedding nationally portable credentials within work-based learning programs benefits the student, the educational provider, and the employer.

HOW TO USE THIS TOOL

On the pages that follow, you will find summaries of some of the most commonly accepted and recognized manufacturing-related credentials in Ohio. Many of these credentials are approved by the Ohio Department of Education (ODE) for points towards graduation, recognized by the Ohio Department of Higher Education (ODHE), and/or eligible for Ohio TechCred funding (through the Office of Workforce Transformation).

Credentials are organized into four in-demand career pathways: Machining, Production, Maintenance, and Welding. You will also see Industry 4.0 credentials in each section. Within each of the four pathways, you'll find summaries of the most popular credentials along with links to more information. Scan these summaries to see what competencies and skills the credential assesses, and which best matches the skills and abilities you want your trainees to master. Note that the Production section includes credentials that may also relate to other pathways. If you are looking for foundational or broadly applied skills, take a look there.

Machining Pathway

Make precision parts using machine tools such as lathes, milling machines and grinders using computer-controlled (CNC) machines and manual equipment. Responsibilities include fabricating, modifying or repairing mechanical instruments, applying knowledge of mechanics, mathematics, metal properties, layout, and machining procedures.

COMMON CREDENTIALS

JOB PLANNING, BENCHWORK & LAYOUT	
Credentialing body	NIMS
Skill level	Entry
Competencies	Applied mathematics, Assembly, Cutting tool selection, Drilling, Filing, Fits, Inspection, Layout, Machine safety, Material preparations, Measurements, Print reading, Process planning, Reaming, Sawing, Shop safety, Threading
Cost	https://www.nims-skills.org/credentialing-fees
More information	https://www.nims-skills.org/credentials/job-planning-benchwork-layout
Accepted by	ODE, ODHE

MEASUREMENT, MATERIALS, AND SAFETY	
Credentialing body	NIMS
Skill level	Entry
Competencies	Applied mathematics, Filing, Fits, Geometrical dimensioning and tolerance (GD&T), Inspection, Machine maintenance, Machine safety, Machining applications, Materials, Measurements, Print reading, Shop safety
Cost	https://www.nims-skills.org/credentialing-fees
More information	https://www.nims-skills.org/credentials/measurement-materials-safety
Accepted by	ODE, ODHE

CNC LATHE OPERATIONS	
Credentialing body	NIMS
Skill level	Entry
Competencies	Applied mathematics, Cutting tool assembly, GD&T, Inspection, Machine maintenance, Machine safety, Machining applications, Measurements, Operations, Print reading, Shop safety
Cost	https://www.nims-skills.org/credentialing-fees
More information	https://www.nims-skills.org/credentials/cnc-lathe-operations
Accepted by	ODE, ODHE

Machining Pathway

CNC LATHE PROGRAMMING SETUP & OPERATIONS	
Credentialing body	NIMS
Skill level	Entry
Competencies	Applied mathematics, Cutting tool assembly, Cutting tool selection, GD&T, Inspection, Machine maintenance, Machine safety, Machining applications, Measurements, Operations, Print reading, Process planning, Programming, Setup, Shop safety
Cost	https://www.nims-skills.org/credentialing-fees
More information	https://www.nims-skills.org/credentials/cnc-lathe-programming-setup-operations
Accepted by	ODE, ODHE

CNC MILL OPERATIONS	
Credentialing body	NIMS
Skill level	Entry
Competencies	Applied mathematics, Cutting tool assembly, GD&T, Inspection, Machining maintenance, Machine safety, Machining applications, Operations, Print reading, Shop safety
Cost	https://www.nims-skills.org/credentialing-fees
More information	https://www.nims-skills.org/credentials/cnc-mill-operations
Accepted by	ODE, ODHE

CNC MILL PROGRAMMING SETUP & OPERATIONS	
Credentialing body	NIMS
Skill level	Entry
Competencies	Applied mathematics, Cutting tool assembly, Cutting tool selection, GD&T, Inspection, Machine maintenance, Machine safety, Machining applications, Measurements, Operations, Print reading, Process planning, Programming, Setup, Shop safety
Cost	https://www.nims-skills.org/credentialing-fees
More information	https://www.nims-skills.org/credentials/cnc-mill-programming-setup-operations
Accepted by	ODE, ODHE

DRILL PRESS I	
Credentialing body	NIMS
Skill level	Entry
Competencies	Applied mathematics, Cutting tool assembly, Cutting tool selection, Inspection, Machine maintenance, Machine safety, Machining applications, Measurements, Operations, Print reading, Process panning, Setup, Shop safety
Cost	https://www.nims-skills.org/credentialing-fees
More information	https://www.nims-skills.org/credentials/drill-press-i
Accepted by	ODE, ODHE

Machining Pathway

EDM II (2-AXIS WIRE)	
Credentialing body	NIMS
Skill level	Advanced
Competencies	Job planning and management, Quality control and inspection, Process adjustment and improvement, General maintenance, Industrial safety and environmental protection, Career management and employment relations, Written and oral communications, Mathematics, Engineering drawings and sketches, Measurement, Metalworking theory, Applied materials
Cost	https://www.nims-skills.org/credentialing-fees
More information	https://www.nims-skills.org/credentials/edm-ii-2-axis-wire
Accepted by	TechCred

GRINDING I	
Credentialing body	NIMS
Skill level	Entry
Competencies	Applied mathematics, Cutting tool selection, GD&T, Inspection, Machine maintenance, Machine safety, Machining applications, Measurements, Operations, Print reading, Process planning, Setup, Shop safety
Cost	https://www.nims-skills.org/credentialing-fees
More information	https://www.nims-skills.org/credentials/grinding-i
Accepted by	ODE, ODHE

MILLING I	
Credentialing body	NIMS
Skill level	Entry
Competencies	Applied mathematics, Cutting tool assembly, Cutting tool selection, GD&T, Inspection, Machine maintenance, Machine safety, Machining applications, Material preparation, Measurements, Operations, Print reading, Process panning, Setup, Shop safety
Cost	https://www.nims-skills.org/credentialing-fees
More information	https://www.nims-skills.org/credentials/milling-i
Accepted by	ODE, ODHE

TURNING I (BETWEEN CENTERS)	
Credentialing body	NIMS
Skill level	Entry
Competencies	Applied mathematics, Cutting tool assembly, Cutting tool selection, GD&T, Inspection, Machine maintenance, Machine safety, Machining applications, Material preparation, Measurements, Operations, Print reading, Process panning, Setup, Shop safety
Cost	https://www.nims-skills.org/credentialing-fees
More information	https://www.nims-skills.org/credentials/turning-i-between-centers
Accepted by	ODE, ODHE

Machining Pathway

TURNING I (CHUCKING SKILLS)	
Credentialing body	NIMS
Skill level	Entry
Competencies	Applied mathematics, Cutting tool assembly, Cutting tool selection, GD&T, Inspection, Machine maintenance, Machine safety, Machining applications, Material preparation, Measurements, Operations, Print reading, Process panning, Setup, Shop safety
Cost	https://www.nims-skills.org/credentialing-fees
More information	https://www.nims-skills.org/credentials/turning-i-chucking-skills
Accepted by	ODE, ODHE

ADDITIONAL CREDENTIALS

CREDENTIAL	ACCEPTED BY	ADDITIONAL INFORMATION
CAMWorks Multi-Axis Milling Essentials	TechCred	Hawk Ridge Systems
FANUC Handling Tool Operation & Programming J2P0310 IACT Approved	ODE, TechCred	FANUC America
FANUC Certified CNC Machining Center Programming, Setup, and Operation	ODE	FANUC America
FANUC Certified CNC Turning Center Programming, Setup, and Operation	ODE	FANUC America
NIMS CAM Milling I	TechCred	NIMS-Skills
NIMS CAM Turning I	TechCred	NIMS-Skills
NIMS Machining Level 1 Certification (multiple credentials)	ODE, ODHE	NIMS Machining Credentials
NIMS Machining Level 2 Certification (multiple credentials)	ODE, ODHE	NIMS Machining Credentials
NIMS Machining Level 3 Certification (multiple credentials)	ODE, ODHE	NIMS Machining Credentials

Production Pathway

Make precision parts using machine tools such as lathes, milling machines and grinders using computer-controlled (CNC) machines and manual equipment. Responsibilities include fabricating, modifying or repairing mechanical instruments, applying knowledge of mechanics, mathematics, metal properties, layout, and machining procedures.

COMMON CREDENTIALS

CERTIFIED PRODUCTION TECHNICIAN	
Credentialing body	MSSC
Skill level	Entry
Competencies	Safety, Quality practices & measurement, Manufacturing processes & production, Maintenance awareness
Cost	info@msscusa.org • 703-739-9000
More information	https://www.msscusa.org/certification/production-certification-cpt/
Accepted by	ODE, ODHE, TechCred

CERTIFIED QUALITY TECHNICIAN	
Credentialing body	ASQ
Skill level	Advanced
Competencies	Define quality concepts and processes, Apply quality tools, Interpret information and data, Demonstrate statistical terminology and techniques, Collect data for specific techniques, Interpret control chart results, process capability, and specification limits, Select appropriate measurement and test equipment (MT&E). Apply calibration standards hierarchy and traceability for MT&E, Read and interpret blueprints, Apply basic inspection concepts, techniques, and processes, Understand sampling characteristics, types, and selecting samples from lots, Identify and segregate nonconforming material, Understand, apply, and communicate quality audit types and their components, tools, and techniques, Understand risk assessment and mitigation, Apply elements of corrective and preventative actions
Cost	$418 for non-members of ASQ
More information	https://asq.org/cert/quality-technician
Accepted by	ODHE

Production Pathway

CERTIFIED QUALITY INSPECTOR	
Credentialing body	ASQ
Skill level	Entry
Competencies	Demonstrate knowledge of basic statistical terms and techniques, Perform data plotting, Recognize out-of-control conditions, Understand plan-do-check-act (PDCA) and team concepts, Understand types of measurement, scales and terminology, Distinguish between accuracy and precision, Select appropriate measuring tools and techniques, Measure using surface plate layouts and other hand tools, Identify inspection errors and initiate resolution, Demonstrate basic calibration knowledge, Read and interpret blueprints, Define critical, major, and minor blueprint characteristics, Demonstrate knowledge of ASME Y14.5M, GD&T, and x, y, z coordinate systems, Use inspection planning tools, Perform product audits, Determine sample size for lots, Pull random samples, Demonstrate knowledge of testing methods, Identify and report nonconforming material, Understand product, material, and calibration traceability, Demonstrate strong knowledge of basic mathematic operations, Perform measurement conversions
Cost	$418 for non-members of ASQ
More information	https://asq.org/cert/quality-inspector
Accepted by	ODHE

SIX SIGMA BLACK BELT	
Credentialing body	ASQ
Skill level	Advanced
Competencies	Deploy six sigma within a project, Implement tools and techniques to deploy strategic directions for initiatives, Apply operational change management techniques, Define various types of benchmarking, Describe various types of performance measures, Select appropriate financial measure and calculate its result, Demonstrate understanding of components and techniques used in managing teams, Describe elements that can result in team success, Use appropriate techniques to overcome various group dynamics challenges, Select data collection methods and collect voice of the customer data, Use customer feedback to determine customer requirements, Understand elements of a project charter, Use various tools to track project progress, Define and use process flow metrics and analysis tools to indicate process performance, Develop and implement data collection plans, Use techniques in sampling, data capture, and processing tools.
Cost	$538 for non-members of ASQ
More information	https://asq.org/cert/six-sigma-black-belt
Accepted by	ODHE

Production Pathway

ADDITIONAL CREDENTIALS

CREDENTIAL	ACCEPTED BY	ADDITIONAL INFORMATION
ABB IRC5 Operations Web-Based Training	TechCred	ABB
Allen Bradley Accelerated Logix5000 Maintainer Certificate Level 1	TechCred	Rockwell Automation
Allen Bradley Accelerated Logix5000 Programmer Certificate Level 1	TechCred	Rockwell Automation
Allen Bradley ControlLogix / Studio5000 Logix Designer Level 1: Fundamentals and Troubleshooting	TechCred	Rockwell Automation
Allen Bradley ControlLogix Advanced	TechCred	Rockwell Automation
Allen Bradley ControlLogix Advanced Programming Languages	TechCred	Rockwell Automation
Allen Bradley FactoryTalk View ME	TechCred	Rockwell Automation
Allen Bradley FactoryTalk View SE	TechCred	Rockwell Automation
Allen Bradley GuardLogix	TechCred	Rockwell Automation
Allen Bradley Kinetix 5700 Troubleshooting and Project Interpretation	TechCred	Rockwell Automation
Allen Bradley Motion Control Fundamentals using Kinetix 5700 (CIP) Servo Drives	TechCred	Rockwell Automation
Allen Bradley PowerFlex 750-Series Maintenance & Troubleshooting	TechCred	Rockwell Automation
Allen Bradley SLC-500 Advanced	TechCred	Rockwell Automation
Allen Bradley SLC-500 Introduction (Modules 1-3)	TechCred	Rockwell Automation
Allen Bradley Studio 5000 Logix Designer Level 1: CompactLogix Fundamentals and Troubleshooting	TechCred	Rockwell Automation
Allen Bradley Studio 5000 Logix Designer Level 1: ControlLogix System Fundamentals	TechCred	Rockwell Automation
Allen Bradley Studio 5000 Logix Designer Level 2: Basic Ladder Logic Programming	TechCred	Rockwell Automation
Allen Bradley Studio 5000 Logix Designer Level 4: Kinetix 6500 (CIP) Programming	TechCred	Rockwell Automation
Amada AP 100 US Laser	TechCred	Amada
APICS - Certified in Production Inventory Management	ODHE	APICS
APICS - Certified Supply Chain Professional	ODHE	APICS
ASQ Certified Calibration Technician	ODHE	ASQ
ASQ Certified Quality Engineer	ODHE	ASQ
ASQ Certified Quality Manager	ODHE	ASQ
ASQ Certified Quality Process Analyst	ODHE	ASQ
ASQ Six Sigma Green Belt	ODHE	ASQ
AutoCAD Advanced Inventor	TechCred	Certiport
AutoCAD Professional	ODE	Certiport
AutoCAD User	ODE	Certiport
Autodesk Certified Professional: AutoCAD for Design and Drafting	TechCred	AutoDesk

Production Pathway

CREDENTIAL	ACCEPTED BY	ADDITIONAL INFORMATION
Autodesk Certified User in AutoCAD	TechCred, ODHE	Certiport
Autodesk Inventor Advanced Assembly Modelling	TechCred	Certiport
Autodesk Inventor Advanced Part Modelling	TechCred	Certiport
Autodesk Inventor Certified User Certification	TechCred, ODE	Certiport
Autodesk Inventor Professional Simulation Course	TechCred	Certiport
Autodesk/Certiport: AutoCAD Civil 3D	ODHE	Certiport
FANUC Advanced TPP Programming	TechCred	FANUC America
FANUC Dual Check Safety V7.50 & Newer	TechCred	FANUC America
FANUC iRVision	TechCred	FANUC America
FANUC Robot Operations	TechCred	FANUC America
FANUC V-IRVision Operation and Programming	TechCred	FANUC America
FANUC Certified Education Robot Training	ODHE	FANUC America
KUKA KORE Robot Programming and Operation Certification	TechCred, ODE	KUKA
Yaskawa Motoman FS100 / DX100 Basic Programming w/Material Handling (IACET Approved)	TechCred, ODE, ODHE	Motoman
Yaskawa Motoman Robotics DX100	TechCred	Motoman
Yaskawa Motoman Robotics DX200	TechCred	Motoman
Yaskawa Motoman Robotics MLX100	TechCred	Motoman
Yaskawa Motoman Robotics MLX200	TechCred	Motoman
Yaskawa Motoman Robotics NX100	TechCred	Motoman
Manufacturing Skill Standards Council Certified Logistics Technician	ODE, ODHE	MSSC
Manufacturing Skills Standards Council Certified Logistics Associate	ODHE	MSSC
Certified SolidWorks Associate (CSWA)	TechCred, ODE	SolidWorks
Certified SolidWorks Professional (CSWP)	TechCred, ODE	SolidWorks
Mitsubishi GX Works2 Programming (TRSFT101P)	TechCred	Mitsubishi
Mitsubishi GX Works2 Structured Programming (TRSFT104P)	TechCred	Mitsubishi
Mitsubishi GX Works3 Programming (TRSFT108P)	TechCred	Mitsubishi
Mitsubishi Safety Systems iQ-R (TRPLC306P)	TechCred	Mitsubishi
Mitsubishi Safety Systems QS/WS (TRPLC303P)	TechCred	Mitsubishi
IPC J-STD-001	ODE	IPC

Maintenance Pathway

Play a key role by installing machines and equipment and routinely inspecting and maintaining equipment to ensure the facility runs smoothly. Duties may involve installing or repairing electrical and mechanical equipment, preventive maintenance of machines, tools, and equipment, and installing and aligning new equipment.

COMMON CREDENTIALS

MAINTENANCE OPERATIONS	
Credentialing body	NIMS
Skill level	Entry
Competencies	Safety, health and environmental rules and regulations, Operate a machine, Monitor a machine, Interpret machine operations and maintenance documentation, Perform machine maintenance procedures, Perform preventative maintenance, Perform predictive maintenance, Technical drawings, Selection and safe use of proper hand tools, Move, handle and store materials and equipment, Systems troubleshooting methodologies
Cost	https://www.nims-skills.org/credentialing-fees
More information	https://www.nims-skills.org/credentials/maintenance-operations
Accepted by	ODE, ODHE, TechCred

BASIC MECHANICAL SYSTEMS	
Credentialing body	NIMS
Skill level	Entry
Competencies	Mechanical power transmission safety, Use dimensional measurement tools, Power transmission, Align and adjust a gear drive, Install, algin and adjust a pillow block bearing, Equipment lubrication, Power transmissions troubleshooting
Cost	https://www.nims-skills.org/credentialing-fees
More information	https://www.nims-skills.org/credentials/basic-mechanical-systems
Accepted by	ODE, ODHE, TechCred

ELECTRICAL SYSTEMS	
Credentialing body	NIMS
Skill level	Entry
Competencies	Electrical power and control systems safety, Interpret electrical control and power schematics, Adjust limit switches and electronic sensors, Measure voltage, current and resistance in an electrical circuit, Select, install and test fuses and circuit breakers, Install and test DC electric motors, Install and test AC circuit motors, Install and test electrical relay control components and circuits, Install and test electro-fluid power components and circuits, Test and repair machine electrical ground, Troubleshoot an electrical motor relay control circuit, Troubleshoot a solenoid-operated fluid power relay control circuit, Replace electrical control wiring using terminal attachment, Replace electrical control wiring solder attachment, Transformers
Cost	https://www.nims-skills.org/credentialing-fees
More information	https://www.nims-skills.org/credentials/electrical-systems
Accepted by	ODE, ODHE, TechCred

Maintenance Pathway

BASIC HYDRAULIC SYSTEMS	
Credentialing body	NIMS
Skill level	Entry
Competencies	Fluid power systems safety, Interpret basic fluid power schematics, Start up and shut down a hydraulic system an adjust system pressure, Adjust hydraulic actuator speed using a flow control valve, Service a hydraulic filter, Install hydraulic conductors, Install and test components in a basic hydraulic circuit, Troubleshoot a basic hydraulic circuit
Cost	https://www.nims-skills.org/credentialing-fees
More information	https://www.nims-skills.org/credentials/basic-hydraulic-systems
Accepted by	ODE, ODHE, TechCred

BASIC PNEUMATIC SYSTEMS	
Credentialing body	NIMS
Skill level	Entry
Competencies	Fluid power systems safety, Adjust pneumatic system branch operating pressure using a regulator, Adjust pneumatic actuator speed using a flow control valve, Service a pneumatic filter, Service a pneumatic lubricator, Install pneumatic conductors, Start up and shut down a reciprocating air compressor and adjust operating pressure, Install and test components in a basic pneumatic circuit, Troubleshoot a basic pneumatic circuit
Cost	https://www.nims-skills.org/credentialing-fees
More information	https://www.nims-skills.org/credentials/basic-pneumatic-systems
Accepted by	ODE, ODHE, TechCred

ELECTRONIC CONTROL SYSTEMS	
Credentialing body	NIMS
Skill level	Entry
Competencies	Electronic power and control systems safety rules, Connect and test a DC power supply, Install and test a solid-state relay, Install and test analog electronic sensors, AC variable frequency drive, Transfer programs to programmable controller using a PC, Create basic PLC ladder-style program, Install and test basic PLC components, Basic troubleshooting
Cost	https://www.nims-skills.org/credentialing-fees
More information	https://www.nims-skills.org/credentials/electronic-control-systems
Accepted by	ODE, ODHE, TechCred

Maintenance Pathway

PROCESS CONTROL SYSTEMS	
Credentialing body	NIMS
Skill level	Entry
Competencies	Safety, health, and environmental rules and regulations, Safety data sheets, Technical documentations, Analogue sensors, Final control systems, Single loop process control system
Cost	https://www.nims-skills.org/credentialing-fees
More information	https://www.nims-skills.org/credentials/process-control-systems
Accepted by	ODE, ODHE, TechCred

MAINTENANCE WELDING	
Credentialing body	NIMS
Skill level	Entry
Competencies	Safety, health, and environmental rules and regulations, Safety data sheets, Technical documentations, Acetylene torches for cutting steel, Welding concepts, SMAW welders for basic welds on flat stock, GMAW welders for basic welds on flat stock, Plasma cutters for cutting flat stock
Cost	https://www.nims-skills.org/credentialing-fees
More information	https://www.nims-skills.org/credentials/maintenance-welding
Accepted by	ODE, ODHE, TechCred

MAINTENANCE PIPING	
Credentialing body	NIMS
Skill level	Entry
Competencies	Piping system safety rules, Interpret basic piping schematics, Identification and selection of correct material, Measurement and preparation, Piping systems installation
Cost	https://www.nims-skills.org/credentialing-fees
More information	https://www.nims-skills.org/credentials/maintenance-piping
Accepted by	ODE, ODHE, TechCred

Maintenance Pathway

ADDITIONAL CREDENTIALS

CREDENTIAL	ACCEPTED BY	ADDITIONAL INFORMATION
Allen Bradley PLC	ODE	Automation Training
Coperion K-Tron Control Systems & Feeder Maintenance and Operation	TechCred	Coperion
FANUC Electrical Maintenance with R-301B Controller	TechCred	FANUC America
International Fluid Power Society - Fluid Power Connector and Conductor	ODHE	IFPS
International Fluid Power Society - Hydraulic Specialist	ODHE	IFPS
International Fluid Power Society - Industrial Hydraulic Mechanic	ODHE	IFPS
International Fluid Power Society - Industrial Hydraulic Technician	ODHE	IFPS
International Fluid Power Society - Mobile Hydraulic Mechanic	ODHE	IFPS
International Fluid Power Society - Mobile Hydraulic Technician	ODHE	IFPS
International Fluid Power Society - Pneumatic Mechanic	ODHE	IFPS
International Fluid Power Society - Pneumatic Specialist	ODHE	IFPS
International Fluid Power Society - Pneumatic Technician	ODHE	IFPS
International Society of Automation - Certified Control System Technician (CCST)	TechCred	ISA
NCCER Level 1	ODE	NCCER
NIMS Industrial Technology Maintenance (9 credentials)	ODHE	NIMS
NIMS Machine Maintenance, Service and Repair	ODHE	NIMS
NOCTI Industrial Maintenance Mechanic	TechCred	NOCTI
Mitsubishi PLC Basics (GX Works2)	TechCred	Mitsubishi
Mitsubishi PLC Troubleshooting	TechCred	Mitsubishi

Welding Pathway

Fabricate and assemble metal structures and equipment through the use of welders, cutters, shapers and measuring tools.

COMMON CREDENTIALS

CERTIFIED WELDER	
Credentialing body	AWS
Skill level	Entry
Competencies	Procedures used in structural steel, petroleum pipelines, sheet metal, and chemical refinery welding industries. Available in multiple areas including: SMAW Plate, GMAW Plate, FCAW Plate, GTAW Plate, SMAW Pipe, GTAW Pipe (Carbon Steel/Stainless Steel), GMAW/SMAW Pipe (Carbon Steel or Chrome PWHT)
Cost	https://www.aws.org/library/doclib/2236-PRICE-LIST-202001.pdf
More information	https://www.aws.org/certification/page/certified-welder-program
Accepted by	ODE, ODHE, TechCred

CERTIFIED WELDING ENGINEER	
Credentialing body	AWS
Skill level	Advanced
Competencies	Basic science fundamentals, Strength of materials, Heat transfer and fluid mechanics, NDE/Weld discontinuities, Welding heat sources and arc physics, Welding processes and controls, Welding and joining metallurgy, Weld design, Brazing and soldering
Cost	https://www.aws.org/library/doclib/2236-PRICE-LIST-202001.pdf
More information	https://www.aws.org/certification/detail/certified-welding-engineer
Accepted by	ODHE

CERTIFIED WELDING INSPECTOR	
Credentialing body	AWS
Skill level	Advanced
Competencies	Prepare reports, Understand the fundamentals of quality welding procedures and quality audits/surveillance, Verify material compliance, Verify welding equipment appropriateness and procedure qualification compliance, perform visual examinations, review welding inspection reports, implement weld inspection quality assurance plans, develop visual inspection training
Cost	https://www.aws.org/library/doclib/2236-PRICE-LIST-202001.pdf
More information	https://www.aws.org/certification/page/certified-welding-inspector-2
Accepted by	ODE, ODHE, TechCred

Welding Pathway

CERTIFIED WELDING FABRICATOR	
Credentialing body	AWS
Skill level	Advanced
Competencies	Document control, Material control, Welding, Inspection, Nonconformance systems, Measuring & testing equipment, Internal quality audits
Cost	https://www.aws.org/library/doclib/2236-PRICE-LIST-202001.pdf
More information	https://www.aws.org/certification/certifiedweldingfabricator
Accepted by	ODHE

CERTIFIED ROBOTIC ARC WELDING OPERATOR/TECHNICIAN	
Credentialing body	AWS
Skill level	Advanced
Competencies	Weld equipment setup, Welding processes, Weld examination, Symbols, Safety, Destructive testing, Conversion and Calculations, Robot programming, Welding procedures, Programming logic, Kinematic concepts, Robotic arc weld cell, Components
Cost	https://www.aws.org/library/doclib/2236-PRICE-LIST-202001.pdf
More information	https://www.aws.org/certification/detail/certified-robotic-arc-welding
Accepted by	ODE, ODHE, TechCred

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A project of the Ohio Manufacturing Workforce Partnership

The Ohio Manufacturers' ASSOCIATION

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Department of Higher Education

FOR MORE INFORMATION:

Workforce@OHIOMFG.COM