

# MANUFACTURING AND REGISTERED APPRENTICESHIP: **A TOOLKIT**

AFL-CIO Working for America Institute  
and **ApprenticeshipUSA**





## AFL-CIO Endorses Expansion of Registered Apprenticeship

The Working for America Institute (WAI) is an Industry Partner with the US Department of Labor in its historic investment in our nation's registered apprenticeship programs. The AFL-CIO is proud that the WAI will help to lead efforts to expand registered apprenticeship in advanced manufacturing. In doing so the WAI is working closely with the AFL-CIO Industrial Union Council and will actively support and promote joint labor-management training partnerships.

Richard L. Trumka  
**President**

Elizabeth Shuler  
**Secretary-Treasurer**

Tefere Gebre  
**Executive Vice President**

Daniel Marschall  
**Executive Director**

Manufacturing has long been, and continues to be, a cornerstone of our nation's economy. The benefits of a healthy manufacturing sector spread far beyond manufacturing itself creating value for local and regional economies and our national competitiveness.

Registered apprenticeships in manufacturing are a key element in labor's agenda to revitalize manufacturing, increase U.S. employer competitiveness in a global economy, and advance the skills and wages of industrial workers.

Unions and our signatory employers have a long and proud history of designing and implementing apprenticeship programs, stretching back decades. Training programs and apprenticeships are at the heart of organized labor's efforts to ensure that working people have a voice in our country's ever-changing economy. Through union apprenticeship programs, individuals gain life-changing skills to do high-quality work and obtain solid, family-sustaining careers.

We are pleased that this *Toolkit* will provide industrial unions, employers, workforce intermediary partnerships, and other stakeholders in workforce development and education useful and practical information on how to create meaningful and sustainable registered apprenticeship programs in manufacturing.

A handwritten signature in black ink that reads "Richard L. Trumka". The signature is stylized and written in a cursive-like font.

Richard L. Trumka  
President  
AFL-CIO  
June 2017



# INTRODUCTION: A TOOLKIT FOR MANUFACTURING AND REGISTERED APPRENTICESHIP

Registered apprenticeship is growing in importance to the manufacturing sector of the U.S. economy. A robust and technologically sophisticated manufacturing industry is essential to our nation's economic success, and to our ability to raise wages and provide family-supporting jobs. Across the nation, manufacturing jobs offer powerful economic benefits.

The challenges faced by U.S. manufacturers, and their unions and workers, cannot be ignored. Advanced manufacturing companies and industrial unions face complicated workforce challenges in an increasingly competitive global marketplace. Those challenges require a skilled workforce to foster employer success and empower workers to control their career development.

Registered apprenticeship can address skill shortages and skill gaps that are impeding manufacturers' efforts to expand, innovate and compete in a global environment, as well as address the latest technological advances.

The AFL-CIO Working for America Institute, under contract with the U.S. Department of Labor, has developed this toolkit to assist companies, unions and other stakeholders to develop, register and implement apprenticeship programs.

We hope this toolkit becomes a valuable resource for all stakeholders. It is a work in progress that will evolve as the AFL-CIO Working for America Institute gains further knowledge and experience in expanding the apprenticeship model and implementing registered apprenticeship programs. We encourage your feedback.

Whether you're a business or labor organization, an industry association or workforce intermediary partnership, a community college or the public workforce system, or a community-based organization, we invite you to use this toolkit.

Daniel Marschall, Ph.D.  
Executive Director  
AFL-CIO Working for America Institute  
June 2017



# CONTENTS

<b>1. Registered Apprenticeship</b>	<b>9</b>
A. Key Components	9
B. Partnerships	10
C. Employer Considerations	12
D. Types of Apprenticeship Programs	12
E. Apprentice Sponsors	13
F. Related Instruction	15
G. On-the-Job-Learning (OJL)	15
H. Support for Apprentices and Diversity	16
<b>2. Career Pathways in Manufacturing</b>	<b>17</b>
<b>3. Joint Labor-Management Partnerships</b>	<b>19</b>
A. Introduction	19
B. No Labor Agreement	19
C. Unionized Facility with a Collective Bargaining Agreement	19
<b>4. Apprenticeship Preparation and Pre-Apprenticeship Programs</b>	<b>21</b>
<b>Appendices</b>	<b>23</b>
<b>Appendix A – Examples of Registered Apprenticeship Programs in Manufacturing</b>	<b>24</b>
<b>Appendix B – Resources on Registered Apprenticeship</b>	<b>27</b>
<b>Appendix C – Members of the Industrial Union Council</b>	<b>28</b>
<b>Acknowledgments</b>	<b>29</b>



# 1. REGISTERED APPRENTICESHIP

Unions and their signatory employers have a long and proud history of designing and implementing apprenticeship programs, stretching back to the decades around the Civil War. Between 60% and 70% of registered apprentices are in labor-affiliated programs that contribute more than \$1.56 billion a year to the economy.

The presence of Registered Apprenticeship is most apparent in the building and construction trades, where unions and employers are engaged in more than 1,600 joint labor-management apprenticeship training committees.

In the modern era, Registered Apprenticeship has evolved into a complex system that encompasses more than 1,000 occupations in such diverse industries as health care, hospitality and food services, information technology and advanced manufacturing. Training is provided by thousands of state and federal apprenticeship sponsors, including joint labor-management committees. More than 400,000 apprentices participate every year in about 20,000 Registered Apprenticeship programs nationwide.

Registered Apprenticeship is governed by standards approved by the federal government Office of Apprenticeship and State Apprenticeship Agencies. At its core, Registered Apprenticeship has been successful because the “hands-on, earn while you learn” approach provides highly skilled workers and supports them with wages from a job while they learn skills and a trade that enables them to move forward on a career pathway. The practice of apprenticeship is an important expression of the move toward a “multiple career pathway” perspective in the provision of education and skill training in the United States.

When apprentices enter a Registered Apprenticeship program operated by a joint labor-management committee—especially if it is established and funded

through a collective bargaining agreement—they are engaged in a private-sector institution with an increased chance of long-term sustainability. Apprenticeship programs are strongest when they are part of self-funding institutions.

Registered Apprenticeship that is part of a system governed by unions and employers provides tangible benefits. Employers, unions and workers are collaborating for the good of an entire industry. The productivity of a company stands to increase. Workers have greater opportunities for career advancement and power over their own lives. Communities benefit from the increase in good jobs and income. These joint labor-management bodies demonstrate the commitment of employers toward ongoing skill training. The voice of workers helps to guarantee the quality and worker-centered nature of the training. As the competitiveness of firms increase, the benefits of productivity are shared more widely.

## A. Key Components

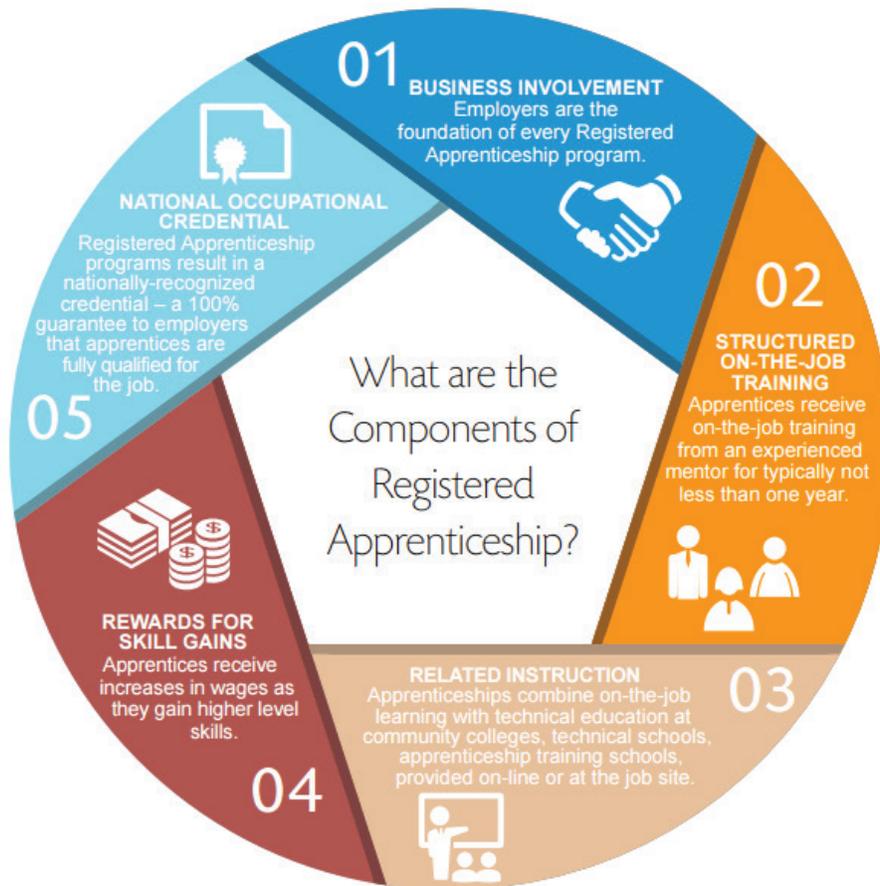
The U.S. Department of Labor has identified five key components of Registered Apprenticeship in its “Quick-Start Toolkit,” available at: [https://doleta.gov/oa/employers/apprenticeship\\_toolkit.pdf](https://doleta.gov/oa/employers/apprenticeship_toolkit.pdf).

**Business Involvement**—Employers are the foundation of every Registered Apprenticeship program.

**Structured on-the-Job Training**—Apprentices receive on-the-job training from an experienced mentor for no less than one year.

**Related Instruction**—Apprenticeships combine on-the-job learning with technical education at community colleges, technical schools, apprenticeship training schools, online or at the jobsite.

**Rewards for Skill Gains**—Apprentices receive increases in wages as they gain higher-level skills.



**National Occupational Credential**—Registered Apprenticeship programs result in a nationally recognized credential—a 100% guarantee to employers that apprentices are fully qualified for the job.

## B. Partnerships

The development of a successful Registered Apprenticeship program requires collaboration and cooperation with multiple partners, with each having an important role to play. Illustrated below are examples of the essential key partnerships and the role of the partner.

### Roles of the Partners

**Employers and Businesses**—Individual company, consortium of businesses

- ▶ Identify the skills and knowledge apprentices must learn
- ▶ Hire new workers or select current employees to be apprentices

- ▶ Provide on-the-job training
- ▶ Identify an experienced mentor to work with apprentices
- ▶ Pay progressively higher wages as skills increase
- ▶ Can provide related instruction in-house or in partnership with others

### Labor Organizations

- ▶ Appoint Joint Committee members
- ▶ Identify the skills and knowledge apprentices must learn
- ▶ Identify an experienced mentor to work with apprentices
- ▶ Provide on-the-job training
- ▶ Promote and explain apprenticeship to members
- ▶ Ensure compliance with collective bargaining agreement

**Workforce Intermediaries**—Industry associations, labor organizations, joint labor-management organizations, community-based organizations

- ▶ Provide industry- and/or workforce-specific expertise (e.g., curriculum development) to support employers in a particular industry sector
- ▶ Can serve as sponsor of an apprenticeship program, taking responsibility for the administration of the program (thereby reducing the burden on employers)
- ▶ Aggregate demand for apprentices, particularly with small- and medium-size employers that may not have the capacity to develop an apprenticeship program on their own
- ▶ Can be the provider of related instruction and supportive services as appropriate

**Public Workforce System**—Workforce Development Board, American Job Center

- ▶ Develop sector and/or career pathway strategies utilizing apprenticeship
- ▶ Recruit and screen candidates to be apprentices
- ▶ Provide pre-apprenticeship and basic skills preparation

- ▶ Provide supportive services (such as tools, uniforms, equipment or books)
- ▶ Contribute funding for on-the-job training or related instruction

**State and Federal Apprenticeship Agencies**—State office of apprenticeship

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

**Community and Technical Colleges**—May include four-year colleges

- ▶ Develop curriculum for related instruction
- ▶ Deliver related instruction to apprentices
- ▶ Can provide college credit for courses successfully completed
- ▶ Aggregate demand for apprentices



Other partners play important roles, too! For example, economic development organizations can serve as a convener of businesses in the region. The K–12 educational system can help develop pipelines to apprenticeship for students. Community-based organizations may have capacity to help certain worker populations, such as women or veterans, and can provide supportive services to apprentices.

### C. Employer Considerations

The decision to participate in Registered Apprenticeship for an employer requires careful consideration of a multitude of factors that involve hiring an employee. These considerations include:

**Participating in Registered Apprenticeship is a voluntary activity.** It is paid for by the volunteers. Volunteer sponsors agree to train apprentices according to written and agreed-upon standards. There are reporting requirements and regulatory requirements, and meeting those requirements requires resources to support the program. *States and intermediaries offer assistance to employers to help understand and comply with regulatory and reporting requirements.*

**Apprentices are employees.** If a person is not hired by an employer, there is no Registered Apprenticeship. Like any other employee, apprentices' employment includes paid wages, fringe benefits, unemployment insurance, Social Security, federal/state/local taxes, workers' compensation and all other costs specific to any company. Employees often are one of the largest costs an employer has. *Recent studies have demonstrated a \$1.47 return on each \$1 invested in Registered Apprenticeship training.*

The **standards** requiring employer compliance **may involve training that may not be needed** by individual businesses. *While the training standards are rigorous, the standards for on-the-job learning and related instruction are flexible to meet employer specific needs.*

Some employers think **if they train and credential employees, they will leave for a similar job** with another employer or they will demand more money. *Employers who sponsor and train apprentices report a different outcome. Employers have indicated that employee loyalty increases when the employer shows the employee they are willing to invest in their education and training, thereby increasing their skills.*

**Workforce intermediaries can assist sponsors** *in finding ways to help offset the costs associated with hiring and training apprentices. They are a valuable resource in setting up and operating an apprenticeship program at the sponsor.*

Sample employer guides are available at: <http://dwd.wisconsin.gov/apprenticeship/sponsors.htm>.

### D. Types of Apprenticeship Programs

Apprenticeships can be designed three basic ways: time-based, competency-based or a hybrid.

A *time-based* apprenticeship for an occupation requires a minimum of 2,000 hours, which includes an outline of the specific work processes and the approximate time requirement for learning each individual work process under that occupation. Both related instruction and the completion of on-the-job learning are based on dedicating the time for each activity.

*Competency- /performance-based* apprenticeship programs are premised on attainment of demonstrated, observable and measurable competencies in lieu of meeting time-based work experience and on-the-job learning. Competency is defined as “an observable, measurable pattern of skills, knowledge, abilities, behaviors and other characteristics that an individual needs to perform work roles or occupational functions successfully.”

Competency-based programs still have to comply with the requirement for the allocation of the approximate time to be spent in each major process. Therefore, work experience process schedules and related instruction outlines must specify *approximate time of completion or attainment of each competency*, which can be applied toward the 2,000-hour requirement (competencies demonstrated notwithstanding and assuming no credit for previous experience). In competency- /performance-based programs, apprentices may accelerate the rate of competency achievement or take additional time beyond the approximate time of completion or attainment due the open entry and exit design. Competency- /performance-based training programs have the following characteristics:

- ▶ Competencies should be identified and defined through a job/task analysis and directly related to the job/role;

- ▶ Organized learning activities should be structured and, wherever possible, self-paced with open entry and open exit;
- ▶ Measures or tests of competency attainment should be observable, repeatable and agreed to in advance; and
- ▶ Work experience process schedules and related instruction outlines should include the approximate time/hours or minimum–maximum times/hours for each competency attained in order to document successful completion.

- Select
- Register
- Train
- Credential apprentices

Registered Apprenticeship sponsors include unions, employers, joint labor-management bodies, community colleges and universities, workforce boards, industry associations, workforce intermediaries, government agencies and the military.

The *hybrid apprenticeship* combines aspects of both time-based and competency-based programs. In addition to a time-based component, which has a fixed set time for completion (e.g., 2,000, 4,000, 6,000 hours), apprentices must demonstrate competency to progress in their apprenticeship program.

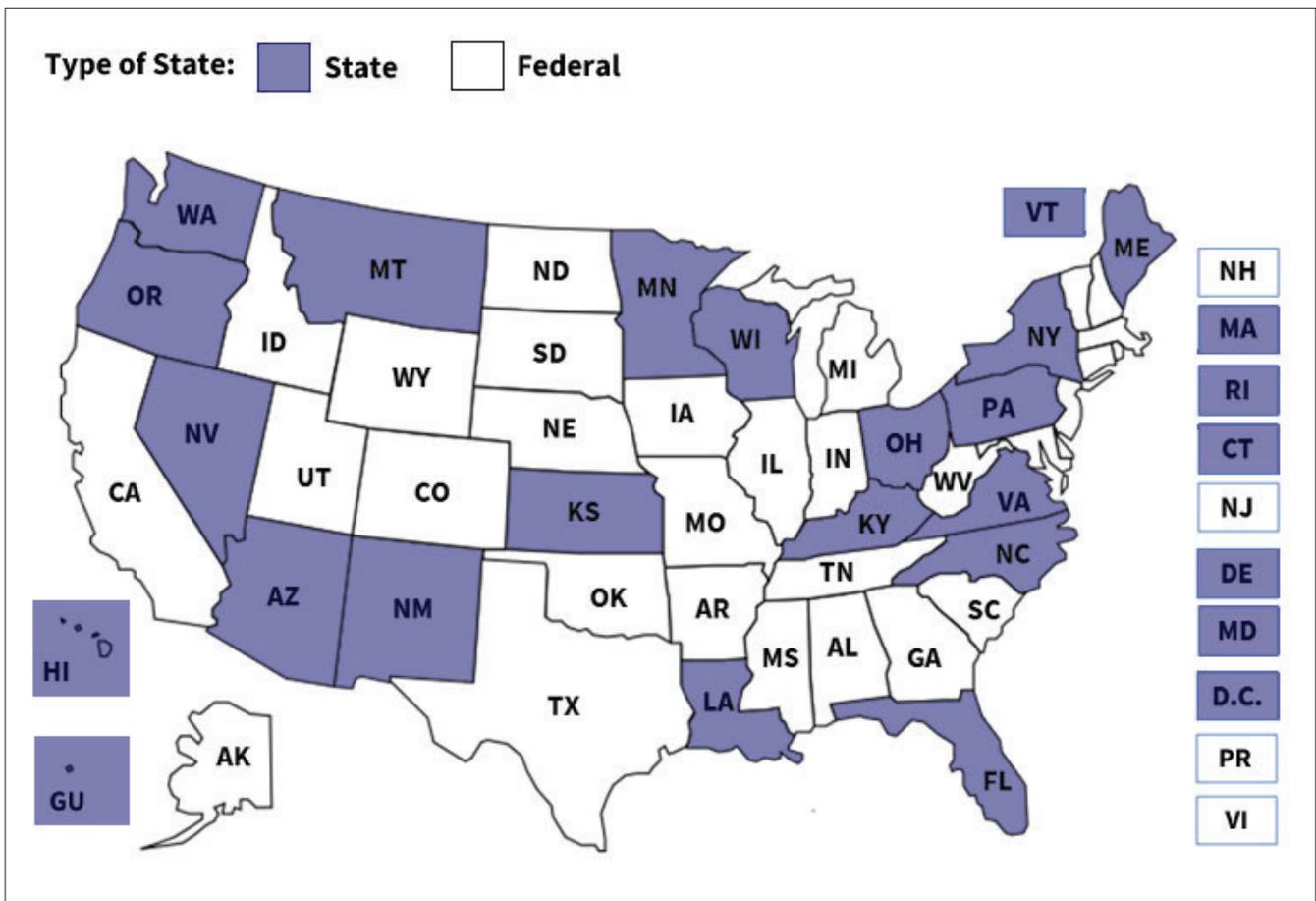
Once approved, the individual apprentice and sponsor enter into a *written agreement* that specifies the length of training, related instruction requirements, an outline of the skills to be learned and the wages the apprentice will receive. Agreements are overseen and enforced by the state apprenticeship agency (who may be a party to the agreement) or the Office of Apprenticeship (OA) of the U.S. Department of Labor (USDOL).

### E. Apprentice Sponsors

The primary responsibility of an approved sponsor is to:

- Recruit
- Screen

The role of a sponsor in Registered Apprenticeship goes beyond that of a simple employer. The sponsor’s commitment to the apprenticeship method of training is structured into several areas of responsibilities:



- ▶ **Point of Contact to Oversee Apprenticeship**
  - a. Establish your local apprenticeship committee infrastructure.
  - b. Ensure there is a local representative to oversee the local apprenticeship program and ensure it meets the requirements of the Standards of Apprenticeship and connection to the registration agency (USDOL and/or state apprenticeship agency).

Apprentices are registered in one of two administrative structures. In some states, the program is administered by the federal OA. These states are commonly known as “fed states.” In other states, there is a state advisory council that approves occupations and registers apprentices at the state level. These states are commonly known as “SAC states.” See the map on Page 15 to determine whether a state is governed by federal or state apprenticeship authorities.

The rules and requirements are the same across all fed states. SAC states’ rules and reporting requirements may differ from those of fed states and other SAC states. It is important to know whom to contact with questions and reports. To find the contacts for each state, go to: <https://doleta.gov/oa/contactlist.cfm>.

- ▶ **Apprentice Recruitment Plan**
  - a. Establish an outreach plan to ensure apprentices are selected from a diverse pool of qualified candidates.
  - b. Some things to think about include:
    - Will recruitment focus on incumbent workers, new hires or both?
    - Can collaborators such as local workforce centers (American Job Centers), worker centers, unions and/or human resource departments help with screening to ensure applicants meet the minimum qualifications listed in the standards and as agreed to by local employers and other stakeholders?
- ▶ **Candidate Screening and Selection**
  - a. Create a transparent application process that is publicized appropriately to provide your recruitment pool with an opportunity to apply.
  - b. Consider minimum qualifications and process for screening that could include testing, interviews, other assessments and seniority.

- c. For candidates in similar or related jobs, consider shortening the apprenticeship term based on competency assessments, prior learning assessments or time on related tasks.
- d. Transparency and consistency are critical throughout the screening and selection process.

▶ **Apprentice Registration**

- a. Create and hold an apprenticeship orientation for the selected apprentice(s) to review their apprentice role, responsibilities and expectations of the program; provide to apprentices a copy of the Apprenticeship Standards.
- b. Fill out the federal and/or state apprenticeship agreement form by the apprentice and local apprenticeship sponsor, with signed copies sent to the registration agency.

▶ **Related Technical Instruction** (*aka classroom education*)

- a. Identify a training provider willing and able to implement the RTI as described in the standards, as customized to local employer needs.
- b. Apprenticeship instructor requirements:
  - Meet the State Department of Education’s requirements for a vocational technical instructor in the state of registration, or
  - Be a subject matter expert, which is an individual determined by the employer who is recognized as having expertise in the industry, and
  - Have training in teaching techniques and adult learning styles, which may occur before or after the apprenticeship instructor has started to provide the RTI.
- c. Identify training facilities, (i.e., on employer site, on-site at the training provider, at another convenient location, or online).
- d. Work with local colleges to determine whether postsecondary credit is available and/or whether training can be translated into credit.
- e. Work with training providers to ensure instructors understand the core aspects of apprenticeship and its relationship to the workplace.
- f. Determine Related Technical Instruction policies, including attendance requirements, comparable course credit, passing grades, hours of instruction on or off work time, and who is responsible for the cost of training (i.e., training funds, grants, employer, apprentice, etc.)

- g. Apprentices who have completed related instructional programs or demonstrate related knowledge may receive credit for prior learning.

For additional information on becoming an apprenticeship sponsor in manufacturing, see the Wisconsin Technical Assistance Guide: [https://dwd.wisconsin.gov/apprenticeship/pdf/ss\\_tag\\_web.pdf](https://dwd.wisconsin.gov/apprenticeship/pdf/ss_tag_web.pdf).

## F. Related Instruction

Apprentices receive related instruction that complements on-the-job learning. This instruction delivers the technical, workforce and academic competencies that apply to the job. It can be provided by a community college, a technical school or an apprenticeship training school—or by the business itself. Education partners collaborate with business to develop the curriculum based on the skills and knowledge needed by apprentices. All partners work together to identify how to pay for the related instruction, including the cost to the employer and other funds that can be leveraged.

One of the issues that comes up is the relationship of Related Technical Instruction to the completion of the Registered Apprenticeship program. Apprenticeship promotes learning both on the job and in the classroom. Excellence in job competency and knowledge is the overall goal. The issue of completion and certification of RTI can be addressed in a variety of ways with this overall goal in mind. Ultimately, it is up to the sponsor to certify completion of related instruction.

- ▶ **Related Technical Instruction** may be provided by a variety of different educational providers, including any of the following:
  - a. A college
  - b. A qualified training organization
  - c. A trainer of the employer
  - d. A contracted instructor
  - e. A labor/management training fund instructor
  - f. A union instructor
  - g. Other appropriate and qualified education and training providers
- ▶ The training provider should certify that the apprentice has completed the coursework successfully, or has failed to do so.
- ▶ The training provider(s) certifies successful completion of the RTI with a passing grade. This result will allow

the sponsor to sign off on the completion of this part of the apprenticeship.

If an apprentice does not successfully complete all parts of the related instruction, the sponsor can address this issue in a variety of ways:

- a. Provide access to additional training by the original training provider or another training provider to address the learning needed by the apprentice;
- b. Extend the apprenticeship to allow the apprentice to retake a course; and/or
- c. Provide special training to support gaps in the apprentice’s related instruction.

If the sponsor deems that the apprentice has met the RTI requirements through other related training, the sponsor may certify that an apprentice will receive credit for prior or alternate learning.

- ▶ The ultimate decision on the completion of the apprenticeship lies with the sponsor and their apprenticeship committee, where applicable, or their designated local point of contact.

## G. On-the-Job Learning (OJL)

Learning on the job constitutes nearly 90% of RA training. To be effective, OJL must be structured to ensure apprentices learn the key aspects of the trade. When structuring OJL, a sponsor needs to:

- Decide the order and sequence of the OJL, which is a local decision;
- Create a plan for journey workers/mentors and supervisors to play a critical role in this part of the training;
- Decide on the apprentice evaluation process;
- Consider training for journey workers/mentors and supervisors, and determine how they will support and implement evaluation;
- The time of an apprenticeship can be shortened (but must be a minimum of six months) if the local program determines the apprentice has relevant prior experience; and
- Have an Employer Participation Agreement form signed by the employer agreeing to train its apprentices to the competencies and work processes within the standards.

The importance of learning from a skilled worker already in the trade cannot be overemphasized. Many states and workforce intermediaries have developed training

programs and materials for use with apprentices. An apprenticeship training representative can aid in seeking out training materials for mentors.

To maximize the effectiveness of mentors, it is recommended that training include both mentors and front-line supervisors. Such training is regarded as a best practice. Incorporating the mentors and supervisors into the initial stage of the training aligns their work on assessment and builds a team that supports the apprentices. For additional information on OJL in manufacturing, see these sites:

- [www.unionlearn.org.uk/mentoring-apprentices](http://www.unionlearn.org.uk/mentoring-apprentices)
- [www.go2hr.ca/sites/default/files/legacy/industrytraining/go2-Sponsor-Effective-Journey-person-Apprentice-Mentoring.pdf](http://www.go2hr.ca/sites/default/files/legacy/industrytraining/go2-Sponsor-Effective-Journey-person-Apprentice-Mentoring.pdf)

## H. Support for Apprentices and Diversity

Support services refer to any service that assists participants to qualify for and maintain participation in an apprenticeship preparation or apprenticeship readiness program, and/or Registered Apprenticeship program.

Broadly, support services are those intended to assist individual participants—those with a need that has been expressed or identified as the result of an assessment—in completing an apprenticeship preparatory program, gaining employment, acquiring necessary skills or addressing any other identified barriers.

Support services are a key element in developing and maintaining diversity in apprenticeship. Certain groups are *underrepresented* in specific industries and across occupations. Such underrepresentation becomes evident in terms of: (a) access to apprenticeship opportunities, and/or (b) a lack of retention in the program once they achieve apprenticeship enrollment. The groups frequently cited as underrepresented, or adversely impacted, include women, people of color and individuals with disabilities.

The U.S. Department of Labor has issued new Equal Employment Opportunity regulations to help increase diversity of the apprenticeship program. The department has issued a question-and-answer summary to help people understand the requirements. The document can be found at: <https://www.doleta.gov/oa/eeo/pdf/FAQs.pdf>

In addition to EEO regulations, apprenticeship sponsors should develop working relationships with *community agencies* and *workforce intermediaries* to assist them in providing specialized recruitment and retention services. Their roots in a community and specialized services tailored to specific populations are a valuable resource to sponsors seeking to diversify a workforce. Apprenticeship preparatory organizations may directly provide support services or facilitate the provision of support services through referrals. In designing a program, support services should be identified and available to apprentices.

The public workforce system provides services that can assist sponsors and apprentices in successfully completing a Registered Apprenticeship program. A state apprenticeship agency or USDOL apprenticeship training representative can be a useful source of information to obtain support. The following points should be considered when designing and operating a Registered Apprenticeship program:

- Develop a structure and process for mentors and supervisors to conduct training and evaluate the effectiveness of on-the-job learning.
- Consider education support, such as tutoring, career counseling, basic skills and remedial classes.
- Identify financial and other resources that may be available, if eligible, through the workforce development system (American Job Centers) or community-based organizations.

Additional information on resources available to support apprentices can be found at [www.doleta.gov/oa/federalresources/playbook.pdf](http://www.doleta.gov/oa/federalresources/playbook.pdf).

# 2. CAREER PATHWAYS IN MANUFACTURING

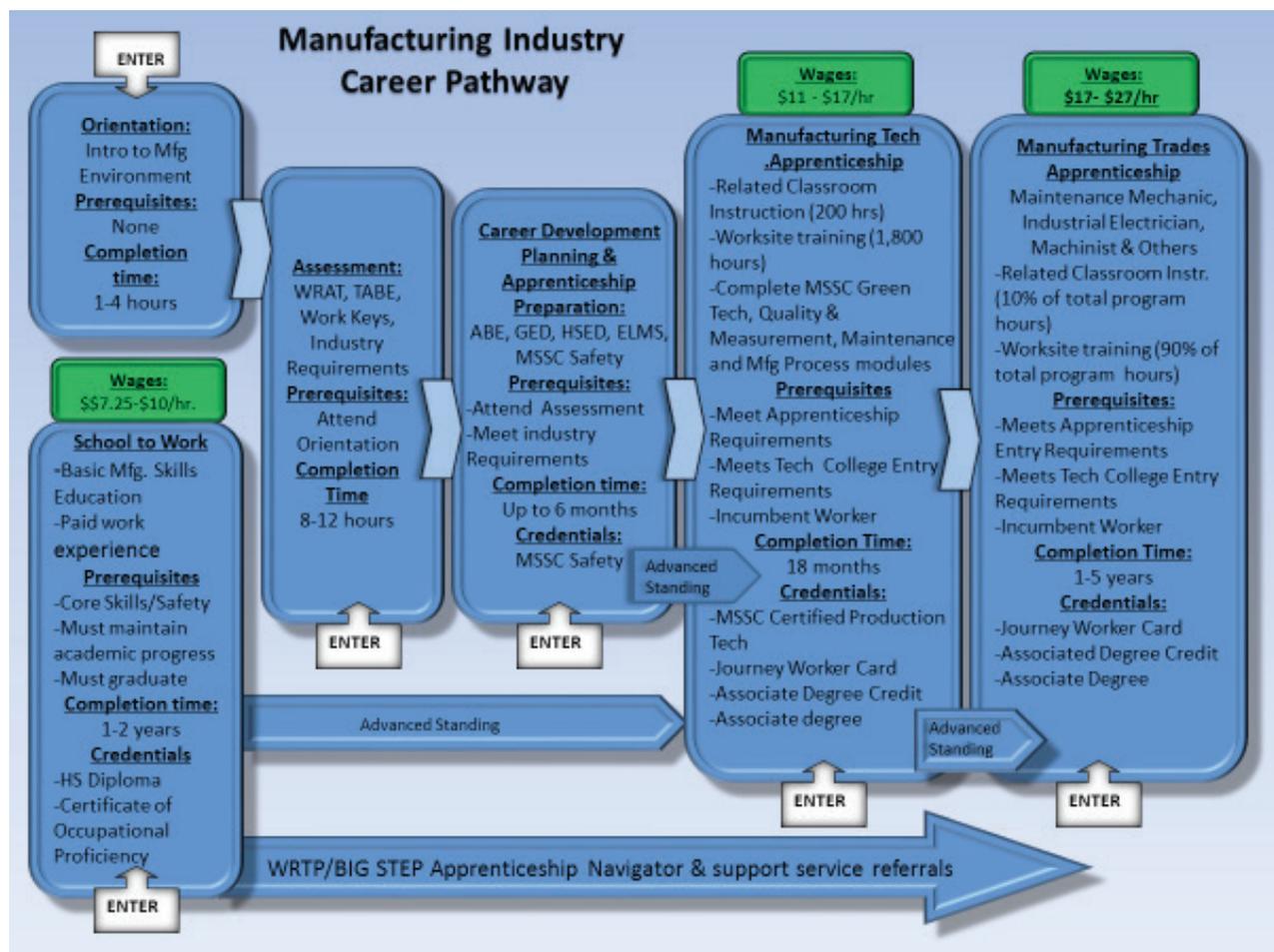
Many things are said about the manufacturing industry: Manufacturing is dead in the United States; the jobs in manufacturing are low paying; career prospects in manufacturing are limited. These claims are simply not true. Although the total number of manufacturing jobs has declined in the past 40 years, some new jobs have replaced the old ones, and manufacturing remains an essential part of our economy. Due to the retirement of existing workers and economic expansion, an estimated 3.5 million manufacturing jobs will need to be filled over the next decade.

Career paths in manufacturing lead to a multitude of good jobs characterized by living wages, good benefits,

diverse occupations and multiple paths for advancement. Registered Apprenticeship is an important element to careers in the manufacturing industry. The diagram below was developed by the Wisconsin Regional Training Partnership/Big Step workforce intermediary.

For additional information on careers in manufacturing, see these sites:

- Available occupations: [www.doleta.gov/OA/occupations.cfm](http://www.doleta.gov/OA/occupations.cfm)
- O\*Net online: [www.onetonline.org/](http://www.onetonline.org/)
- ApprenticeshipUSA Community of Practice: <https://apprenticeshipusa.workforcegaps.org/>





# 3. JOINT LABOR-MANAGEMENT PARTNERSHIPS

## A. Introduction

It is the responsibility of an in-plant or internal committee to offer the best possible training program for apprentices. Joint Apprenticeship and Training Committees (JATC) are a best practice and model approach for designing and implementing Registered Apprenticeship programs.

The concept of high-performance workplaces has been around for decades. One characteristic often cited as important to high-performing workplaces is recognition that the people who do the work, on the shop floor, have the knowledge of how to do the job best. Engagement of workers and unions is a vehicle for bringing this knowledge to apprenticeship training.

There are two courses of action open to employers and sponsors based on whether employees are joined in union.

## B. No Labor Agreement

### If there is no labor agreement:

- Determine the knowledge and skills needed for the occupation or occupations to be included in the program.
- Secure the cooperation of the workers and craft supervisors who will be expected to be included in the program.
- Have the advisory groups arrange the necessary related classroom instruction—or supervised correspondence-type instruction or online instruction—with the local vocations education director, school superintendent or community college personnel.

- Appoint an apprenticeship supervisor to maintain the standards of training established by the advisory group for the occupations involved, length of training, selection procedures, affirmative action plan, wages, tests, number to be trained, etc.
- Write up the basic details of the program as a set of apprenticeship standards. Local registration agencies will assist in the development of the apprenticeship standards.

*Note:* Human resources or training directors could spearhead this program.

## C. Unionized Facility with a Collective Bargaining Agreement

Where a substantial number of workers are represented by a collective bargaining agreement (CBA) at an apprenticeship sponsor, certain steps need to be taken to ensure the workers' rights under the CBA are not infringed upon. Collective bargaining agreements may affect apprenticeship programs in several ways. Some of the more common areas where Registered Apprenticeship intersects with CBA language include:

- Job classifications covered by the apprenticeship program
- Selection process for apprenticeship candidates
- Wage progression for apprentices (may be included in the CBA)
- Union participation in the JATC

### If there is a labor agreement:

- ▶ Discuss the proposed program with the appropriate union official if the training involves employees who would be covered under the collective bargaining agreement.

- ▶ Set up a Joint Apprenticeship and Training Committee (JATC) to administer the program. The committee should have equal representation, perhaps three members each, from labor and management respectively.
- ▶ The committee will arrange for necessary related instruction with the local education system, usually through vocational education, community colleges, supervised correspondence-type instruction or online instruction.
- ▶ The committee should agree on a set of standards for training, including occupations, length of training, selection procedures, affirmative action plan, wages, number of apprentices to be trained, etc.
- ▶ Basic details should be in writing and approved as the standards of the apprenticeship program.
- ▶ If the union has no interest in jointly administering the apprenticeship program, the company should obtain a written waiver from the union so it can adopt an alternative course of action.

In addition to its duties as an apprenticeship sponsor, the JATC also will work with pre-apprenticeship programs to prepare candidates for the apprenticeship program at the sponsor.

Additional resources on labor/management cooperative programs and the role of a JATC can be found at:

- Revised National Guidelines Boilerplates: <https://www.doleta.gov/oa/boilerplates.cfm>
- Careers and Apprenticeships: <https://aflcio.org/about/careers>

# 4. APPRENTICESHIP PREPARATION AND PRE-APPRENTICESHIP PROGRAMS

The U.S. Department of Labor does not approve youth apprenticeship programs; some states do. However, the department, in response to industry needs, has issued Training and Employment Notice (TEGL) 31–16, which provides a framework for serving youth in Registered Apprenticeship (RA).

The framework provides an important opportunity for youth to finish high school and continue on a pathway toward multiple career and educational opportunities, such as entering a Registered Apprenticeship program, earning an associate and/or a bachelor's degree, and obtaining sustainable employment. The framework seeks to enhance the competitiveness of businesses by connecting youth to work-based learning and developing in-demand skills and competencies.

In general, two types of programs are recognized as models tied to Registered Apprenticeship programs. They include pre-apprenticeship programs and Registered Apprenticeship programs that begin in high school.

## ► **Pre-apprenticeship for High School Students or School-to-Registered Apprenticeship**

A pre-apprenticeship is a program designed to prepare individuals to enter and succeed in an RA program. A model has been developed that is based on the Quality Pre-Apprenticeship Guidance, Training and Employment Notice (TEN, 13–12), which is available at: [https://wdr.doleta.gov/directives/corr\\_doc.cfm?DOCN=5842](https://wdr.doleta.gov/directives/corr_doc.cfm?DOCN=5842)

Pre-apprenticeship programs should have strong direct linkages with RA. Linkages should include:

- Students take courses for the purpose of their pre-apprenticeship that are approved by an RA

program in addition to their required high school coursework. These courses count toward high school graduation.

- Students participate in OJL activities beginning at age 16, which can count toward entry into an RA program. As students move through the program, they advance their OJL to become more skilled and more productive.
- Students may have opportunities to earn industry-recognized credentials and certifications.
- Students can apply to the RA program leading up to or upon high school graduation.
- Students may be approved for direct entry in the RA program and also may receive advanced standing in the RA program.
- Postsecondary credits are awarded based on signed articulation agreements established between local school districts, postsecondary institutions and RA programs.

## ► **Registered Apprenticeship Programs That Begin in High School**

Students may begin their RA program in high school and are fully registered as apprentices in the RA system.

- RA agreements are signed by a parent/guardian (if the student is younger than age 18), the student and employer/sponsor.
- Students take courses at their high school and/or community and technical colleges for the purpose of their apprenticeship that are approved by an RA program, in addition to their required high school coursework. These courses should count toward high school graduation. Coursework can start as early as ninth grade.
- Postsecondary credits are awarded based on signed articulation agreements established

between local school districts, postsecondary institutions and RA programs.

- Students may start OJL activities at age 16, which will count toward entry into an RA program. The specific types and conditions of permissible work activities are outlined for 16- and 17-year-olds in the Fair Labor Standards Act and in state child labor laws. The work portion of the program is flexible and is done when school is not in session, including summers and weekends, or as part of a work/study program.
- A participating signatory partner to the RA Guideline Standards or program employs the students.
- During on-the-job learning, students are supervised by a skilled mentor.
- Students who complete the RA program upon high school graduation will have gone through a time-based (a minimum of 2,000 hours of OJL and 144 hours of related instruction), a competency-based or a hybrid program, and will receive an RA certificate of completion and a high school diploma.

- The length of the program depends on the occupation's standards, industry norms and the type of program (time-based, competency-based or hybrid).

Enrollment in an RA program may begin in high school and continue after graduation. A signatory partner to the RA guideline standards or program will continue to employ the individual and count the OJL hours earned while in high school toward the RA program. Postsecondary coursework can be provided by community, technical or four-year colleges, accredited online programs or recognized RA training centers in accordance with the program's standards. Students may have opportunities to earn industry-recognized credentials and certifications.

For additional information on youth and manufacturing careers, see: Training and Employment Notice 31–16, available at: [https://wdr.doleta.gov/directives/corr\\_doc.cfm?docn=4799](https://wdr.doleta.gov/directives/corr_doc.cfm?docn=4799)

# APPENDICIES

<b>Appendix A</b>	<b>Examples of Registered Apprenticeship Programs in Manufacturing</b>	<b>26</b>
<b>A.1</b>	Industrial Manufacturing Technician	<b>26</b>
<b>A.2</b>	Mechatronics Technician	<b>27</b>
<b>A.3</b>	Industrial Machine System Technician	<b>28</b>
<b>Appendix B</b>	<b>Resources on Registered Apprenticeship</b>	<b>29</b>
<b>Appendix C</b>	<b>Members of the Industrial Union Council</b>	<b>30</b>

## A.1 Industrial Manufacturing Technician

**Job Description:** Entry-level industrial manufacturing technicians operate industrial production-related equipment, work with manufacturing-related tools and perform work processes related to a wide variety of manufacturing settings. Apprentices will learn to set up, operate, monitor and control production equipment. They also will help improve manufacturing processes and schedules to meet customer requirements.

**Length of Apprenticeship:** The apprenticeship is a hybrid program. The total number of hours is 3,000. In addition to the specified hours, the apprentice must successfully attain the competencies described in these program provisions.

*On-the-job learning competencies include:*

- Protect self and other workers from accidents and injuries – 100 hours
- Operate production equipment – 1,000 hours
- Produce quality product – 500 hours
- Interpret technical information – 200 hours
- Measure and inspect work using mechanical tools and testing equipment – 200 hours
- Demonstrate knowledge of routine equipment maintenance – 100 hours
- Demonstrate knowledge of inventory and material processes – 100 hours
- Demonstrate knowledge of trends and the current state of the business – 100 hours
- Demonstrate continuous improvement – 100 hours
- Set up production equipment – 200 hours
- Local options – 136 hours

**Related Instruction:** Related instruction teaches apprentices the science and theory behind their daily duties. It comprises 264 hours of the IMT apprenticeship program. Coursework can be delivered in a flexible fashion in-plant and in an academic institution. The instruction should include:

**Manufacturing 1:** An orientation to the occupation and manufacturing, then followed by the Manufacturing Skills Standards Council (MSSC) safety module, MSSC quality module, OSHA 10 certification, blueprint reading, visual inspection, measurement, and first aid and CPR training. Manufacturing concepts will be introduced and applied in a variety of industrial settings.

**Industrial Math for the Occupation:** This course provides applied mathematics instruction from a review of: basic arithmetic; basic algebra; applications based on geometry; right triangle trigonometry, oblique angle trigonometry and compound angles. U.S. and metric measurement systems will be introduced.

**Industrial Manufacturing 2:** The coursework includes the MSSC manufacturing processes and production and maintenance awareness modules, along with communication, lean manufacturing, problem solving and front-line leadership. Manufacturing-related concepts will be applied to a variety of industrial settings. The course concludes with an examination of emerging trends and technologies, and future directions for manufacturing.

**Communication for Apprentices:** Introduces the apprentice to basic communication concepts relating to the workplace. It is designed specifically for the apprentice to acquire the necessary skills of giving instructions, writing a technical memo and explaining a technical process. Throughout the course the apprentice will brainstorm, write, edit, revise and use one-on-one communication delivery in a small group. The course combines lecture and hands-on activities utilizing information the apprentice brings from the workplace.

**Transition to Trainer:** Developed by the Office of Apprenticeship Standards, the course teaches soon-to-be journey workers how to serve as a mentor and job coach, how to provide hands-on skill training, and how to give positive and effective performance feedback. Course is offered at multiple times each year. Course meets for eight hours.

## A.2 Mechatronics Technician

**Job Description:** A mechatronics technician is a skilled person who can combine electrical, mechanical and electronic competencies to identify, analyze and solve systematic problems.

**Length of Apprenticeship:** The apprenticeship is a competency-based program. The total number of hours is dependent on an apprentice's ability to successfully attain the competencies described in the program provisions for OJL and RI.

*On-the-job learning competencies must be demonstrated in the following areas:*

- Integrated Systems
- Communications
- Blueprint and Schematics
- Machine Tool
- Software Applications
- Basic Electronics and Electricity
- Electro-hydraulic and Pneumatics
- Mechanical Power Transmission/Drives
- Preventive and Predictive Maintenance
- Safety
- Programmable Logic Controllers
- Fundamentals of Gas and Arc Welding
- Pipefitting Fundamentals
- Manufacturing Processes and Economics
- Robotics
- Controls and Instrumentation
- Shop Floor Networking (IT Essentials)

**Related Instruction:** Related instruction teaches apprentices the science and theory behind their daily duties. It comprises approximately 1,125 hours of the MT apprenticeship program. Coursework can be delivered in a flexible fashion in-plant and in an academic institution. The related instruction should include:

- Integrated Systems – 30 hours
- Reading and Writing for Problem Solving – 45 hours
- Blueprint/Schematic Reading – 45 hours
- Introduction to Machine Tool – 45 hours
- Personal Computer Productivity – 60 hours
- Fundamentals of Electricity and Electronics – 90 hours
- Electro-Hydraulics, I, II, III – 90 hours
- Mechanical Drives and Linkages I, II – 90 hours
- General Preventative/Predictive Maintenance – 30 hours
- Industrial Safety (online) – 30 hours
- Programmable Logic Controller Application – 60 hours
- Advanced Programmable Logic Controller Application – 60 hours
- Applied Algebra, Geometry and Plane
- Trigonometry – 45 hours
- Introduction to Gas/Arc/Mig/Tig Welding – 45 hours
- Fundamentals of Pipefitting – 30 hours
- Manufacturing Processes and Economics – 45 hours
- Introduction to Robotic Technology – 60 hours
- Controls and Instrumentation – 60 hours
- Shop Floor Networking – 30 hours
- Project Management – 15 hours
- Quality Control Seminar – 15 hours
- Material Science – 15 hours
- Capstone – Integrated Systems Troubleshooting – 90 hours

## A.3 Industrial Machine System Technician

**Job Description:** Works independently or on a team, with minimum supervision, to assemble, install, align, program, troubleshoot, repair, calibrate and make improvements on a variety of high-tech flexible manufacturing machine systems. Worker also supports product quality and lowest-cost production via strong people skills, effective communication and continuous improvement of manufacturing processes.

**Length of Apprenticeship:** The apprenticeship is a time-based program. The total number of hours is 4,735, with 4,000 hours of on-the-job learning and 735 hours of related instruction.

*On-the-job learning in the following areas is required:*

Troubleshoot and repair industrial machine systems:

- Adhere to plant safety rules at all times – 150 hours
- Read blueprints and apply layout and precision measurement skills to prepare work – 200 hours
- Machine parts to rebuild/replace mechanical components and to construct new components – 700 hours
- Repair/replace belts, pulleys, bearings, gears, couplings and shafts – 200 hours
- Lubricate bearings, gears, couplings and rotating parts – 50 hours
- Align couplings and shafts – 50 hours
- Troubleshoot and repair pneumatic and hydraulic systems and components – 250 hours
- Troubleshoot AC/DC circuits – 400 hours
- Connect motors, starters, push buttons, relays and timers in motor control circuits and troubleshoot the control circuits – 300 hours

- Run conduit and electric wire to distribute power to point of use – 200 hours
- Troubleshoot electric power distribution (low-voltage) systems – 200 hours
- Program and troubleshoot PLC controls – 400 hours
- Program and troubleshoot NC/CNC controls – 350 hours
- Work in teams to solve problems and make improvements to machine and production processes – 300 hours
- Perform preventive maintenance – 250 hours

### Related Instruction:

#### *First Year*

- Technical Drawing – 15 hours
- Machine Tool Theory 1 – 45 hours
- Technical Mathematics – 75 hours
- Computer Fundamentals – 45 hours
- Machine Tool Theory 2 – 45 hours
- AC/DC Circuit Theory and Application – 60 hours
- Written Communication Skills – 45 hours
- Digital Circuits – 30 hours
- CNC Fundamentals – 45 hours

#### *Second Year*

- CNC Programming – 15 hours
- Introduction to Automated Systems/Robots – 45 hours
- Programmable Controllers – 45 hours
- Fundamentals of Mechanics – 45 hours
- Automated Manufacturing Equipment – 45 hours
- Hydraulics and Pneumatics – 30 hours
- Computer-Aided Design (Auto CAD 14) – 45 hours
- Presentation Skills – 15 hours
- Strength of Materials – 30 hours
- Introduction to Welding – 15 hours

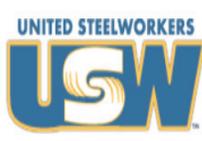
---

## Appendix B Resources on Registered Apprenticeship

NAME AND DESCRIPTION	WEBSITE URL
<b>ApprenticeshipUSA Quick-Start Toolkit:</b> Provides general information on apprenticeship programs and processes.	<a href="https://www.dol.gov/apprenticeship/toolkit/learn.htm">https://www.dol.gov/apprenticeship/toolkit/learn.htm</a>
<b>Available Occupations:</b> Complete list of federally approved registered apprenticeable occupations.	<a href="http://www.doleta.gov/OA/occupations.cfm">www.doleta.gov/OA/occupations.cfm</a>
<b>SAC State/Fed State and Contacts:</b> A map identifying state and federal apprenticeship agencies and contacts.	<a href="http://www.doleta.gov/oa/contactlist.cfm">www.doleta.gov/oa/contactlist.cfm</a>
<b>Certification of Program Registration:</b> A checklist of components needed to register an apprenticeship program.	<a href="http://www.doleta.gov/OA/cir15/Cir2015-01.pdf">www.doleta.gov/OA/cir15/Cir2015-01.pdf</a>
<b>Guidelines for Competency-Based, Hybrid and Time-Based Apprenticeship Training Approaches:</b> Detailed description of the three types of apprenticeship programs.	<a href="http://www.doleta.gov/OA/cir16/Cir2016-01.pdf">www.doleta.gov/OA/cir16/Cir2016-01.pdf</a>
<b>Sponsor Organizations:</b> Guidance on the types of organizations that can be apprenticeship sponsors.	<a href="http://www.doleta.gov/OA/bul16/Bulletin_2016-26.pdf">www.doleta.gov/OA/bul16/Bulletin_2016-26.pdf</a>
<b>DOL OA Bulletins:</b> A complete listing of USDOL/OA bulletins and guidance documents.	<a href="http://www.doleta.gov/OA/BulletinsFY15.cfm">www.doleta.gov/OA/BulletinsFY15.cfm</a>
<b>Pre-Apprenticeship:</b> USDOL/OA issuance on what makes a quality pre-apprenticeship program.	<a href="http://www.doleta.gov/OA/preapprentice.cfm">www.doleta.gov/OA/preapprentice.cfm</a>
<b>Framework on Apprenticeship for Youth:</b> WIOA guidance linking youth to registered apprenticeship through quality pre-apprenticeship programs.	<a href="https://wdr.doleta.gov/directives/corr_doc.cfm?docn=4799">https://wdr.doleta.gov/directives/corr_doc.cfm?docn=4799</a>
<b>Apprenticeship for Youth:</b> Serving youth in Registered Apprenticeship programs.	<a href="https://wdr.doleta.gov/directives/attach/TEN/TEN_13-12.pdf">https://wdr.doleta.gov/directives/attach/TEN/TEN_13-12.pdf</a>
<b>Regulations:</b> Federal regulations on Registered Apprenticeship.	<a href="http://www.doleta.gov/OA/regulations.cfm">www.doleta.gov/OA/regulations.cfm</a>
<b>Federal Resources for Apprenticeship:</b> Support services accessible through one-stops, community-based organizations and intermediaries.	<a href="http://www.doleta.gov/oa/federalresources/playbook.pdf">www.doleta.gov/oa/federalresources/playbook.pdf</a>
<b>OA Apprenticeship Agreement Form:</b> Form for registration of apprentices in the federal program.	<a href="http://www.doleta.gov/OA/bul16/2016_01.pdf">www.doleta.gov/OA/bul16/2016_01.pdf</a>

## Appendix C Members of the Industrial Union Council

The Industrial Union Council is composed of 12 unions with more than 2 million members, including nearly 1 million directly employed in the manufacturing sector. The IUC works to build and advance policy frameworks that support manufacturing in the United States.

	<p><b>Bakery, Confectionery, Tobacco Workers and Grain Millers (BCTGM)</b>  <a href="http://www.bctgm.org">www.bctgm.org</a></p>		<p><b>International Association of Machinists and Aerospace Workers (IAM)</b>  <a href="http://www.goiam.org">www.goiam.org</a></p>
	<p><b>International Brotherhood of Boilermakers (IBB)</b>  <a href="http://www.boilermakers.org">www.boilermakers.org</a></p>		<p><b>United Mine Workers of America (UMWA)</b>  <a href="http://umwa.org">http://umwa.org</a></p>
	<p><b>International Brotherhood of Electrical Workers (IBEW)</b>  <a href="http://www.ibew.org">www.ibew.org</a></p>		<p><b>Sheet, Metal, Air, Rail Transportation (SMART) Union</b>  <a href="https://smart-union.org">https://smart-union.org</a></p>
	<p><b>Glass, Molders, Pottery, Plastic &amp; Allied Workers (GMPIU)</b>  <a href="http://www.gmpiu.org">www.gmpiu.org</a></p>		<p><b>United Automobile, Aerospace and Agricultural Implement Workers of America (UAW)</b>  <a href="https://uaw.org">https://uaw.org</a></p>
	<p><b>IUE-CWA, Industrial Division of the Communications Workers of America</b>  <a href="http://www.iue-cwa.org">www.iue-cwa.org</a></p>		<p><b>United Steelworkers (USW)</b>  <a href="http://www.usw.org">www.usw.org</a></p>
	<p><b>International Federation of Professional &amp; Technical Engineers (IFPTE)</b>  <a href="http://www.ifpte.org">www.ifpte.org</a></p>		<p><b>United Food and Commercial Workers (UFCW)</b>  <a href="http://www.ufcw.org/">www.ufcw.org/</a></p>

# ACKNOWLEDGMENTS

The AFL-CIO Working for America Institute would like to thank Administrator John Ladd and the U.S. Office of Apprenticeship & Training Administration for their leadership in advancing the Registered Apprenticeship model of education and skill training in the United States. The OA is a valuable partner to RA sponsors as well as employers, unions and community-based organizations that are dedicated to the career advancement of workers in multiple industries. Sections of this toolkit are derived from technical assistance, training and promotional materials published by the OA.

The institute also would like to thank Ron Danowski (Wisconsin Regional Training Partnership), Stu Bass and John Tkach (Keystone Development Partnership), Todd

Anderson (AFL-CIO), Brad Markell (AFL-CIO Industrial Union Council), Tom Gannon and Jane McDonald (AFL-CIO Working for America Institute) for their contributions to this toolkit.

This toolkit builds on the work of many colleagues—employers, our building trades and industrial unions, USDOL and workforce development intermediaries. We thank them for their time and expertise, and for the inspiring work they do every day to help workers and employers succeed in today's economy.

Daniel Marschall, Ph.D.  
Executive Director  
AFL-CIO Working for America Institute

---

*This project has been funded, either wholly or in part, with federal funds from the Department of Labor, Employment & Training Administration under contract number DOL-ETA-16-C-0115. The contents of this publication do not necessarily reflect the views or policies of the Department of Labor, nor does mention of trade names, commercial products or organizations imply endorsement of same by the U.S. government.*





