

## Fox Valley Technical College

# 10621127 Robotic Arc Welding Basic

## Course Outcome Summary

### Course Information

<b>Description</b>	Provides a survey of multiple robot programs, safety and safety systems, learning maintenance, and program editing. Students will work with robot fixtures using the GMAW process.
<b>Instructional Level</b>	Associate Degree
<b>Total Credits</b>	2.00
<b>Total Hours</b>	72.00

### Types of Instruction

Instruction Type	Credits/Hours
Classroom/Lab	

### Course History

**Revised By** Kaye Krueger (kruegek)

### Employability Essentials

- 1. Act Responsibly - Apply ethical standards in both personal and professional behavior.**  
*Status Active*
- 2. Adapt to Change - Anticipate changes and positively respond to them.**  
*Status Active*
- 3. Communicate Effectively and Respectfully - Apply appropriate writing, speaking, and listening skills across various settings to engage diverse audiences.**  
*Status Active*
- 4. Think Critically and Creatively - Apply independent and rigorous reasoning that leads to informed decisions, innovation and personal empowerment.**  
*Status Active*
- 5. Work Collaboratively - Work collaboratively with others to complete tasks, solve problems, resolve conflicts, provide information, and offer support.**  
*Status Active*

### Course Competencies

- 1. Examine a variety of safety systems used in robotic arc welding.**

**Status**     *Active*

**Assessment Strategies**

- 1.1.     in classroom.
- 1.2.     on a written exam.

**Criteria**

*Your performance will be successful when:*

- 1.1.     you achieve at least 70% on the exam.

**Learning Objectives**

- 1.a.     Recognize the kinds of safety barriers required for robotic arc welding systems.
- 1.b.     Identify safety rules to follow when working with robotic arc welding systems.
- 1.c.     Explain the different types of emergency stops.
- 1.d.     Explain the difference between emergency stop and a soft stop.

**2. Compare different robotic welding systems.**

**Status**     *Active*

**Assessment Strategies**

- 2.1.     in classroom.
- 2.2.     on a written exam.

**Criteria**

*Your performance will be successful when:*

- 2.1.     you achieve at least 70% on the exam.

**Learning Objectives**

- 2.a.     Define the components of an arc welding cell.
- 2.b.     Explore the different applications of industrial robots.
- 2.c.     Examine the fundamentals of robot repeatability and program flow.

**3. Perform a variety of maintenance activities necessary for continuous functioning of robotic welding systems.**

**Status**     *Active*

**Assessment Strategies**

- 3.1.     in the robotics lab.
- 3.2.     with a partner/group.
- 3.3.     with the use of references [or with the use of a specific job aid]
- 3.4.     in classroom.
- 3.5.     on a written exam.

**Criteria**

*Your performance will be successful when:*

- 3.1.     you select the correct [TOOLS, EQUIPMENT, INSTRUMENTS, MATERIALS, SUPPLIES].
- 3.2.     you perform all critical steps in the right order.
- 3.3.     you wear personal protective equipment.
- 3.4.     you follow safety procedures.
- 3.5.     you verbalize an explanation of the process as you perform it.
- 3.6.     your explanation presents sound reasoning as you describe the decisions you make throughout the process.
- 3.7.     you achieve at least 70% on the exam.

**Learning Objectives**

- 3.a.     Recognize the importance of robotic arc welding systems maintenance schedules.
- 3.b.     Identify fixture accuracy to maintain part quality.
- 3.c.     Recognize the importance of torch maintenance for quality and repeatability.
- 3.d.     Review the need for an unimpeded flow of electrode wire.

**4. Modify an existing program.**

**Status**     *Active*

**Assessment Strategies**

- 4.1.     in the robotics lab.
- 4.2.     with a partner/group.
- 4.3.     with the use of references [or with the use of a specific job aid].

**Criteria**

*Your performance will be successful when:*

- 4.1.     you select a robotic welding system.
- 4.2.     you accurately modify all program steps.
- 4.3.     you wear personal protective equipment.
- 4.4.     you follow safety procedures.
- 4.5.     you demonstrate the modified program.
- 4.6.     the program that you modified must perform a weld meeting AWS standards.

**Learning Objectives**

- 4.a.     Recognize when a modification needs to occur.
- 4.b.     Identify why the modification is being made.
- 4.c.     Determine if the modification being made is robot related or other factors.
- 4.d.     Demonstrate the ability to manipulate the robot.
- 4.e.     Position the robot to weld with accuracy.
- 4.f.     Apply the fundamentals of GMAW to your robotic arc welding programs.

**5. Recover from a stopped program.**

**Status**     *Active*

**Assessment Strategies**

- 5.1.     in the robotics lab.
- 5.2.     with a partner/group.
- 5.3.     with the use of references [or with the use of a specific job aid].

**Criteria**

*Your performance will be successful when:*

- 5.1.     you select the correct robotic arc welding system.
- 5.2.     you perform all the recovery steps in the correct order.
- 5.3.     you wear personal protective equipment
- 5.4.     you follow safety procedures.
- 5.5.     you verbalize an explanation of the process as you perform it.
- 5.6.     you demonstrate a successful recovery by following the correct procedure.

**Learning Objectives**

- 5.a.     Explain collision detection systems.
- 5.b.     Explain tool point accuracy and its effect on quality.
- 5.c.     Identify the reason why the program has stopped.
- 5.d.     Demonstrate the ability to recover the robot.
- 5.e.     Evaluate the robotic system for damage.
- 5.f.     Explain the process to correct an inaccurate tool point.

**6. Assign a new robot program to a fixture change.**

**Status**     *Active*

**Assessment Strategies**

- 6.1.     in the robotics lab.
- 6.2.     with a partner/group.
- 6.3.     with the use of references [or with the use of a specific job aid].

**Criteria**

*Your performance will be successful when:*

- 6.1.     you select a robotic arc welding system and a welding fixture.

- 6.2. you perform all critical steps in the right order.
- 6.3. you wear personal protective equipment.
- 6.4. you follow safety procedures.
- 6.5. you verbalize an explanation of the process as you perform it.
- 6.6. you successfully change a robot program to match an existing fixture.
- 6.7. the program that you changed must be modified to perform a weld meeting AWS standards.

#### **Learning Objectives**

- 6.a. Match correctly the program number to the fixture.
- 6.b. Demonstrate the ability to accurately place the fixture.
- 6.c. Enter the program number using proper steps for the type of robot controller.
- 6.d. Perform a test cycle to determine accuracy of the program.
- 6.e. Demonstrate a correctly welded part after the change is complete.

### **7. Fabricate a robotic arc welding fixture.**

**Status**     *Active*

#### **Assessment Strategies**

- 7.1. in the robotics lab.
- 7.2. with a partner/group.
- 7.3. with the use of references [or with the use of a specific job aid].

#### **Criteria**

*Your performance will be successful when:*

- 7.1. you select the correct [TOOLS, EQUIPMENT, INSTRUMENTS, MATERIALS, SUPPLIES].
- 7.2. you wear personal protective equipment.
- 7.3. you follow safety procedures.
- 7.4. you fabricate a robotic arc welding fixture per your instructor's guidelines.
- 7.5. your fixture must be capable of meeting a repeatability standard set by your instructor.

#### **Learning Objectives**

- 7.a. Use fabrication skills to create a robotic arc welding fixture.
- 7.b. Determine the usability of the fixture for robotic arc welding.
- 7.c. Attach the fixture for programming.

### **8. Write a simple robotic arc welding program.**

**Status**     *Active*

#### **Assessment Strategies**

- 8.1. in the robotics lab.
- 8.2. with a partner/group.
- 8.3. with the use of references [or with the use of a specific job aid].

#### **Criteria**

*Your performance will be successful when:*

- 8.1. you select a robotic arc welding system.
- 8.2. you wear personal protective equipment.
- 8.3. you follow safety procedures.
- 8.4. you follow the steps to write a simple robotic arc welding program.
- 8.5. the program that you have written must perform a weld meeting AWS standards.

#### **Learning Objectives**

- 8.a. Create a program number.
- 8.b. Move the robot to a starting location within the work cell.
- 8.c. Record positions in space.
- 8.d. Enter welding parameters.
- 8.e. Move the robot through the program manually.
- 8.f. Run the robot automatically.
- 8.g. Make corrections as necessary.

## Grant Award

This workforce product was funded by a grant awarded by the U.S. Department of Labor's Employment and Training Administration. The product was created by the grantee and does not necessarily reflect the official position of the U.S. Department of Labor. The U.S. Department of Labor makes no guarantees, warranties, or assurances of any kind, express or implied, with respect to such information, including, but not limited to, accuracy of information or its completeness, timeliness, usefulness, adequacy, continued availability, or ownership.

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## Course Learning Plans and Performance Assessment Tasks

Type	Title	Source	Status
PAT	Safety Exam	Course	Active
PAT	Robotic Systems Exam	Course	Active
PAT	Movement Systems & End Effectors Exam	Course	Active
PAT	Programming Skill Demonstration	Course	Active
PAT	Fixture Fabrication Skills Demonstration	Course	Active
LP	Safety Systems	Course	Active
LP	Introduction	Course	Active
LP	Movement Systems and End Effectors	Course	Active
LP	Programming	Course	Active
LP	Fixture Fabrication	Course	Active