ISET-2151: ROBOTIC WELDING

Cuyahoga Community College

Viewing: ISET-2151 : Robotic Welding

Board of Trustees:
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Academic Term:
Fall 2023

Subject Code
ISET - Integrated Systems Engineering

Course Number:
2151

Title:
Robotic Welding

Catalog Description:
Concepts and fundamental skills associated with the operation and programming of robotic welding machines. Topics include safe operation of robotic welding machines; building and editing programs to complete simple and complex welds; welding variables and options; and machine maintenance and setup.

Credit Hour(s):
4

Lecture Hour(s):
2

Lab Hour(s):
4

Requisites

Prerequisite and Corequisite
ISET-2100 Gas Metal Arc Welding (MIG).

Outcomes

Course Outcome(s):
Safely operate robotic welding machines.

Objective(s):
1. Recognize the built-in safety features of robotic welding machines and their limitations.
2. Demonstrate safe programing and operating practices and techniques.
3. Setup secure fixtures and clamps to hold parts for robotic welding.
4. Discuss routine and preventative maintenance.

Course Outcome(s):
Program a robot to execute simple and complex welding programs.

Objective(s):
1. Edit and improve existing programs.
2. Discuss robotic control and operate a welding robot with the teach pendant.
3. Jog the robotic arm and teach points to build a program.
4. Use a home position and carefully choose points to program a safe approach and pullout of a robotic welding arm.
5. Program a robot to complete a simple weld.
6. Discuss welding variables and options and execute multiple types of welds.

Course Outcome(s):

Obtain FANUC America ArcTool Operation and Programming Certification.

Objective(s):

1. Safely power-up the robot from a complete shutdown.
2. Manipulate the robot using the teach pendant.
3. Setup and test robot movement parameters for a given work cell and torch.
4. Setup ArcTool for specific weld applications.
5. Create and test weld programs for a given weld task.
6. Edit weld programs in teach mode.
7. Setup and save to file management devices.
8. Manipulate I/O in program logic and real logic.
9. Master and calibrate the robot.
10. Recommend safety procedures are integrated into all training exercises.

Methods of Evaluation:

a. Quizzes
b. Laboratory activities
c. Program demonstrations
d. Tests

Course Content Outline:

a. Concepts
   i. Safe operation and precautions
   ii. Device power up
   iii. Deadman switches and emergency stops
   iv. Teach pendant operation
   v. Resetting errors
   vi. Jogging the robot
   vii. Coordinate systems
   viii. Axis limits
   ix. Teaching points to build a program
   x. Home position
   xi. Making an approach
   xii. Arc start and Arc end
   xiii. Pullout
   xiv. Ending a program
   xv. Running a program
   xvi. Editing a program
   xvii. Refining points
   xviii. Improving cycle time
   xix. J moves
   xx. Mig welding as it relates to robotic welding
   xxi. Welding complex shapes
   xxii. Circular welds
   xxiii. Adjusting weld variables
   xxiv. Welding a weave
   xxv. Wait statement
   xxvi. Program timer
   xxvii. Copying a program
   xxviii. Write protection
   xxix. Deleting a program
   xxx. Tool frame
   xxxi. Preventative maintenance
   xxxii. Setup of welder power source and welding components
b. Skills

i. Use the teach pendant to jog a robot
ii. Use the teach pendant to teach points and build a program
iii. Build programs with proper approach and pullout technique.
iv. Program a robot to perform a weld.
v. Program a robot to weld complex shapes including sharp turns and circles.
vi. Adjust welding variables such as wire feed speed, amperage, technique
vii. Editing existing programs
viii. Perform machine setup and maintenance

c. Issues
i. Safe operation of robotic welding machines

Resources

Lincoln Electric Co. Automation Division. *Robot Operator Training Course Manual*. 2020. {ts '2009-07-01 00:00:00'}.

Fanuc America. *Robotic Handling tool* . Rev.G. MI: Fanuc America, 2020.

The Lincoln Electric Company. *GMAW Welding Guide*. 2020. {ts '2006-09-01 00:00:00'}.

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