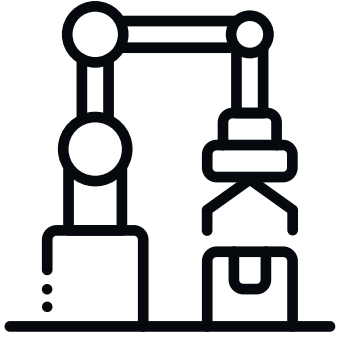


# Welding Waves



What role does automation and the use of robotic arms play in the maritime industry?

**Suggested Equipment Skill Level**

Intermediate User

**Equipment Skills**

Block Coding

## Robotic Welding Technician

**Career & Skillset Connections**

- Creativity
- Technical Skills (welding joints)
- Problem Solving

**Project Guiding Themes**

- Engineering design process
- Block coding
- Operating a robotic arm with pen end effector

**Suggested Software & Materials**

- DobotLab Software
- Pen Tool End Effectors
- Paper/Cardboard
- Tape

**Aligned VDOE CTE Course(s) and Competencies**

**Materials and Processes Technology**

36-Weeks

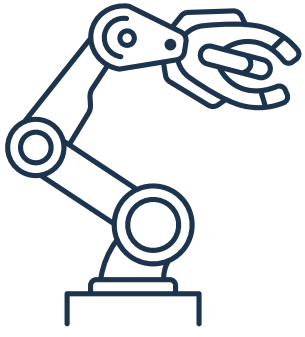
**Industrial Robotics Technology**

36-Weeks

**Engineering Analysis and Applications II**

36-Weeks

# Welding Waves



Robotic Arm-Intermediate Skill Level

What role does automation and the use of robotic arms play in the maritime industry?

## Project Problem & Career Prompt

Welcome to the exciting pilot course in welding engineering! Prepare to embark on a journey where you'll use robotic arms to simulate welding for young kids. Throughout this course, your focus will be on mastering the art of simulating various types of welds using paper and a robotic arm with a pen tool.

Dive deep into the world of welding joints as you explore the intricacies of fillet welds, groove welds, lap joints, and butt joints. Through your creative powers and precise movements, you'll bring these joints to life on paper, offering young minds an immersive experience in the captivating realm of welding.

But there's more to this adventure! As you delve into the world of welding, you'll discover the unique challenges faced in the maritime industry. Imagine welding upside down and in tight spaces—situations that maritime welders frequently encounter. With this simulation, you'll be able to expose students to these scenarios on a smaller scale, fostering an understanding of the real-world challenges faced by welding professionals.

### Project Criteria

- Final program must be completed prior to the project deadline
- 4 types of welding joints need to be incorporated into the program
- Physical model of each weld joint must be represented to be used

### Project Constraints

- Program to operate Dobot must be coded by you
- Program must include the use of the pen tool
- Each weld joint model must be created using paper or cardboard and have the ability for the pen tool to operate on it

### Suggested Pacing

- 1-2 Days of Research and Ideation
- 2-3 Days of Coding and Testing

## Project Background & Resources

Students should have a basic understanding of block coding used to program the Dobot Magician Lite. They should also have an understanding on how to use the pen tool end effector. Research on welding (where/how it is used in maritime industry and welding joints)

Robotic Welding Engineer

[https://www.youtube.com/watch?v=MtLM5i\\_SZnw](https://www.youtube.com/watch?v=MtLM5i_SZnw)

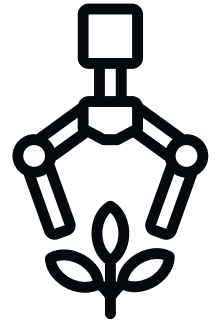
## Investigative Questions

- What are key characteristics and differences between fillet welds, groove welds, lap joints, and butt joints and how can we accurately represent them in our simulations?
- What are the specific challenges faced by maritime welders when welding upside down or in tight spaces?

# Welding Waves



## Robotic Arm



### Career & Skill Set Connections

## Robotic Welding Technician

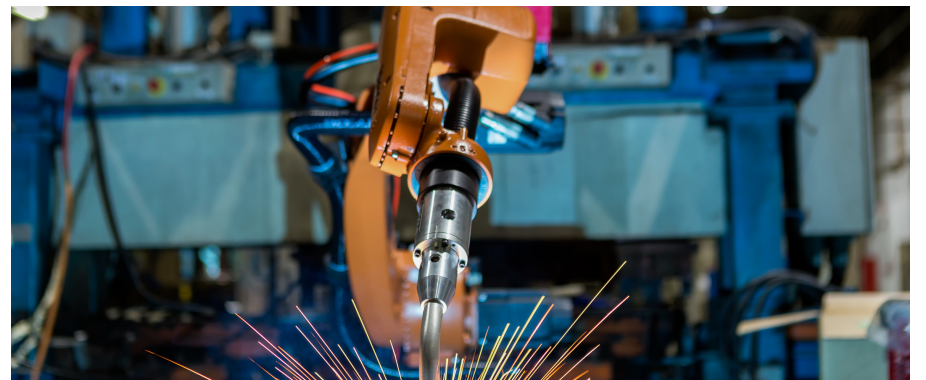
A robotic welding technician is responsible for the set-up, maintenance, and operation of robotic welding equipment. They are also responsible for designing and programming the robot, and implementing this in manufacturing and production.

### Essential Skills

- \*Analytic thinking
- \*IT Skills (Coding)
- \*Interpret blueprints and drawings
- \*Adapt to changes

### Academic Pathway

High School Diploma  
and  
Community College/Certification  
or  
Apprenticeship Program



### Aligned VDOE CTE Course(s) and Competencies

Workplace Readiness Skills & Work-Based Learning Opportunities & Examine All Aspects of an Industry

#### Industrial Robotics Technology

Using and Programming Robotic Equipment

Write programs to control robots

Understanding the Welding Lab

Describe the use of equipment and tools in a welding lab

Describe the phases of the welding process

Engineering Robotic Systems

Design a robotic system to perform a specified task

#### Engineering Analysis and Applications II

Applying the Engineering Design Process

Identify the need for a product or system

Implement a design

Using Logic and Problem-Solving Techniques

Explain the benefits of modeling and simulation

Create a model or simulation for an engineering product, process, or idea

Examining Engineering Materials and Manufacturing

Demonstrate processes used with metal, wood, polymer, ceramic, and composite materials, including adhesives

#### Materials and Processes Technology

Understanding Materials and Processes Technology Concepts

Use measuring and layout tools

Research emerging technologies

Working with Metals

Perform metal combining techniques

Apply metal materials and processes to a problem, product design, or prototype

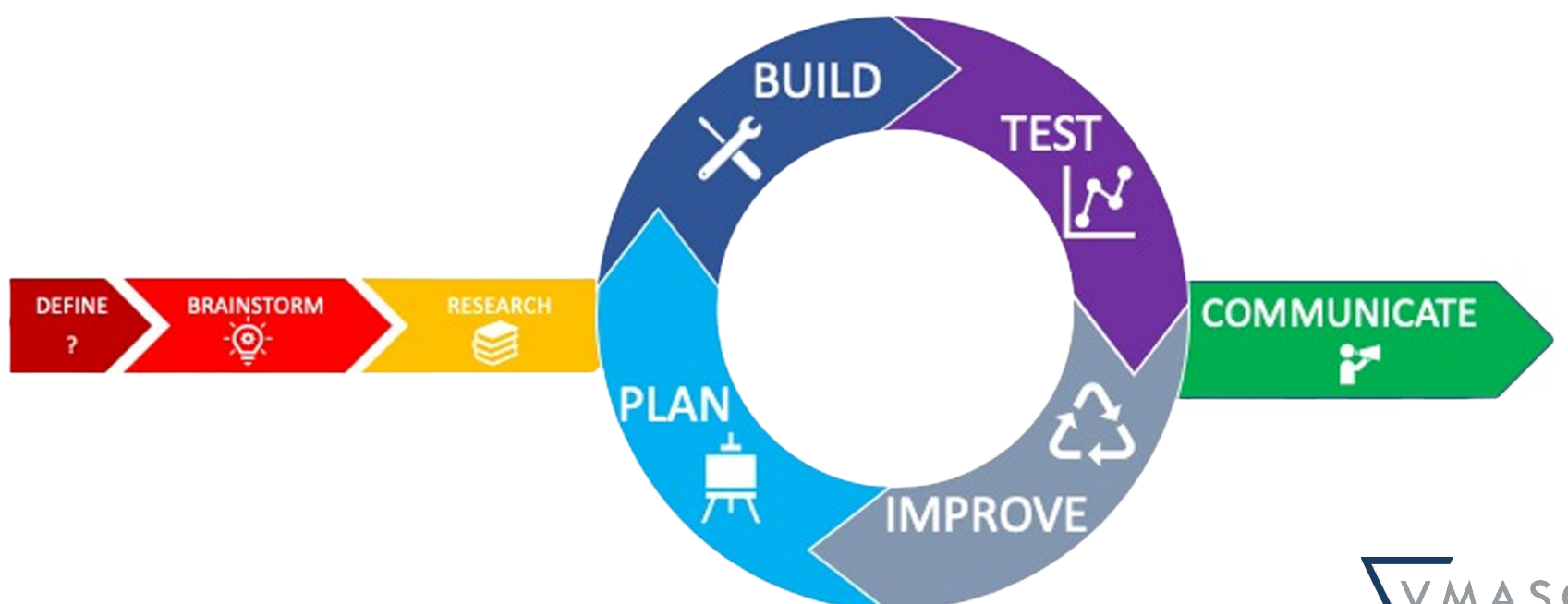
# Project Management Plan

Team  
Member  
Roles

Team  
Goals &  
Timelines

Team  
Member  
Tasking

# Sketches & Design Planning



# Notes

# Notes