

# Certificate Program: Shipyard Industry Manufacturing Technician Training

NSRP Project  
Workforce Development – Scott Christman, Ph.D.  
General Dynamics Bath Iron Works



# NSRP Project

- BIW Trade Training SME's (and subsidiaries)
- Workforce Development
- Southern Maine Community College SME's

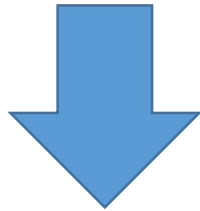


**GENERAL DYNAMICS**  
Bath Iron Works



# A Need for Basic Training

- Shipyards are hiring entry level mechanics
- Unskilled labor
- Becoming more complicated



## Basic Training to hit deck plate

1. Pre-Hire, Community College: Three-week Certificate
2. Post Hire, Shipyard: New Hire Training
3. Apprenticeship: Hybrid of both

# Deliverable

## Training Package

- Instructor's Guide
  - PowerPoint Presentation
  - Instructor Notes
- Student Guide
  - Lab Day Exercises
  - Hands-on Criteria

## Training Structure

- 120 Hours
  - Classroom – Hands-on
- Flexible Delivery
  - 3-weeks (8hrs/day)
  - 6-weeks (4hrs/day)
- Apprenticeship Program
  - Include OJT – Proficiencies
  - Supplement with Shipyard course

NSRP | National Shipbuilding Research Program

Certificate Program: Manufacturing Technician Training

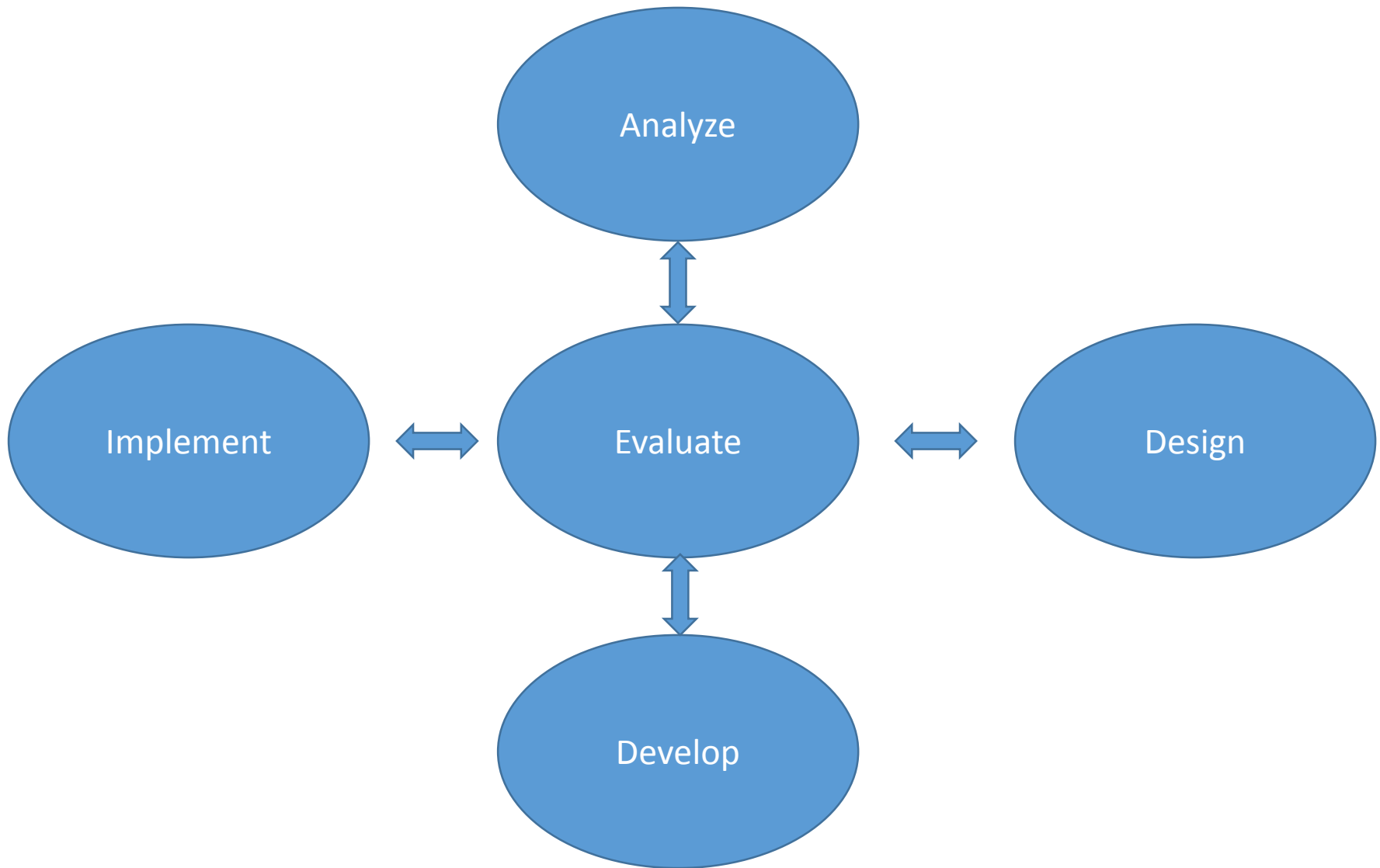
Course Curriculum  
For the  
National Shipbuilding Research Project



**Instructor's Guide**

July 2020

# The ADDIE Model



# Analysis

## Curriculum Foundation

- Definition of Training
- Rationale for Training
- Content Source
- Content Structure
- Curriculum Goals
- Scope & Sequence

### Units:

1. General Safety
2. OSHA 10
3. Technical Math
4. Print Reading
5. Manufacturing Skills - foundational
6. Manufacturing Skills - projects
7. Hot Works
8. LEAN Manufacturing
9. Resume Writing - Interview Skills

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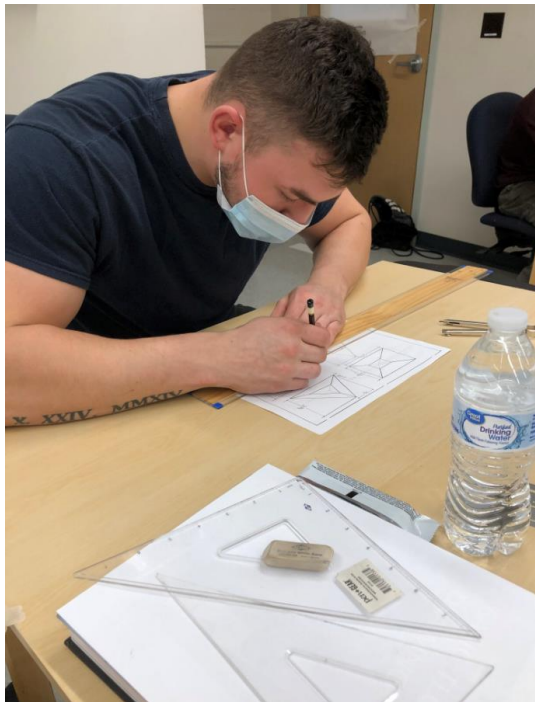
**Instructor's Guide**

July 2020

# Design

## Curriculum Foundation

### • Content Scope & Sequence



Unit	Topic	Content	Hours
1	Safety	<u>General Safety</u> <ul style="list-style-type: none"> <li>• The shipbuilding environment</li> <li>• Awareness and Personal responsibility</li> <li>• Hazard identification and management</li> <li>• Chronic vs. acute hazards</li> <li>• Ergonomics</li> <li>• Electrical and chemical hazards</li> <li>• Housekeeping: Fall hazards, Care of cords and hoses</li> <li>• PPE &amp; appropriate attire</li> <li>• Safety rules for the M-Tech shop</li> </ul>	2
2	OSHA	<u>OSHA10</u> <ul style="list-style-type: none"> <li>• PPE</li> <li>• Job Hazard Analysis,</li> <li>• Housekeeping</li> </ul>	10
3	Tech Math	<u>Basic Processes</u> <ul style="list-style-type: none"> <li>• Working with Dimensional Math</li> <li>• Fractions</li> <li>• Basic Geometry</li> </ul> <u>Practical Applications</u> <ul style="list-style-type: none"> <li>• Basic Problem Solving with Math Metrics</li> </ul>	12
4	Print Reading	<u>Basics of Print Reading</u> <ul style="list-style-type: none"> <li>• Introduction to Sketches &amp; Drawings</li> <li>• Locating Information</li> <li>• Basic Terminology</li> <li>• Weld Symbols</li> <li>• 2D &amp; 3D Sketches</li> <li>• Assembly Drawings</li> </ul> <u>Practical Applications</u> <ul style="list-style-type: none"> <li>• Types of Material and Products Used in Construction</li> </ul>	12

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## Curriculum Foundation

### • Content Scope & Sequence



5	Manufacturing Skills Foundational	<p><b>Hand Tools:</b></p> <ul style="list-style-type: none"> <li>▪ Hand tool safety, care and use</li> </ul> <p><b>Layout:</b></p> <ul style="list-style-type: none"> <li>▪ Accurate marking of lines and arcs, calculating data from print information</li> <li>▪ Geometric, layout</li> <li>▪ Foundation layout using chalk-lines etc.</li> </ul> <p><b>Sawing</b></p> <ul style="list-style-type: none"> <li>▪ Intro to sawing &amp; saw safety</li> <li>▪ Types of saws</li> <li>▪ Cutting principles, saw pitch, set, kerf</li> <li>▪ Techniques for making accurate cuts.</li> </ul> <p><b>Grinding</b></p> <ul style="list-style-type: none"> <li>▪ Grinding safety</li> <li>▪ Angle grinders</li> <li>▪ Grinding principles, grit, compounds, wheels</li> <li>▪ Grinding Techniques</li> </ul> <p><b>Drilling</b></p> <ul style="list-style-type: none"> <li>▪ Drill safety</li> <li>▪ Types of Drills</li> <li>▪ Drill bits, cutting principles</li> <li>▪ Techniques for accurate hole making</li> </ul> <p><b>Air Tools:</b></p> <ul style="list-style-type: none"> <li>▪ Air tool safety</li> <li>▪ Coupling, uncoupling and care of hoses</li> <li>▪ Die grinders, cutoff Wheels</li> </ul> <p><b>Rigging</b></p> <ul style="list-style-type: none"> <li>• Basic rigging pinch points</li> <li>• Suspended loads jacking</li> <li>• Bracing push/pull</li> <li>• Mechanical advantage, wedges, etc.</li> <li>• Come-Alongs jigs &amp; fixtures</li> <li>• Hydraulic Porta-Powers</li> </ul>	40
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# Design

## Curriculum Foundation

### • Content Scope & Sequence



6	Manufacturing Skills	<u>Applied Skills</u> Coping: Layout and fitting of metal parts using layout tools, saws and grinders Gusset Plate: Make a part from a print using layout tools, saws, grinders etc. Connector Plate: Make a part from a print using layout Bench Work: Layout, cut and drill a drill point gauge with attention to accuracy finish.	20
7	Hot Work	PPE/ clothes 60 amp plasma cutting plate and flatbar Stick welding with 7018 1/8th rod Fillet weld all positions Cutting plate and flat bars Flux cored arc welding	8
8	LEAN Manufacturing	Identifying & eliminating waste Continuous improvement Work flow Push/pull manufacturing The pursuit of perfection	8
9	Resume - Interview	<u>Resume Basics</u> <ul style="list-style-type: none"> <li>• The Basics</li> <li>• Formatting</li> <li>• Resume Sections</li> <li>• Writing Tips</li> <li>• The Cover Letter</li> </ul> <u>Interviewing Basics</u> <ul style="list-style-type: none"> <li>• Purpose</li> <li>• Being Prepared</li> <li>• How to Dress</li> <li>• Tips on Communication</li> <li>• Interview Questions</li> <li>• What to do after the Interview</li> </ul>	8

# Timeline

A  
D  
D  
I  
E

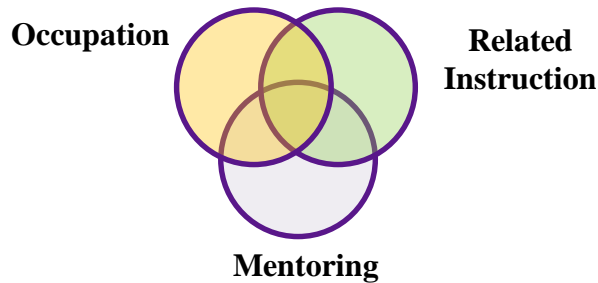
Title	Description	Team Member(s)	Receiver	Due Date
<u>Analysis &amp; Design</u> - Curriculum Data Gathering	Gather Data from Community Shipbuilders and Partners to define what is to be learned and the process by which learning will occur	BIW EB	BIW	3/1/2020
Course <u>Development</u>	Process of authoring and producing the course materials - "Core Body of Knowledge"	BIW SMCC	BIW	10/1/2020
<u>Implement</u> Pilot	Process of installing the project into real-world context	BIW SMCC	BIW	10/1/2020
<u>Evaluate</u> and Revise	Process of determining the adequacy of the instruction	BIW SMCC	BIW	2/15/2021
Final Report - at 11 Months	Generate a Report of Findings & Recommendations	BIW	ATI	5/15/2021

# Sponsored Apprenticeship

## OCCUPATION: Basic Manufacturing Technician

SOC: 17-3029.09  
TERM: 2000 hours

NAICS Code: 336611  
RTI Hours: 144 hours



SKILLS TO BE LEARNED ON THE JOB		Hours Required	Hours Attained	Proficient As of Date	Supervisor Signature
<b>MANUFACTURING TECHNICIAN SKILLS CHECKLIST</b>					
	Set up and verify the functionality of safety equipment				
	Adhere to all applicable regulations, policies, and procedures for health, safety, and environmental compliance				
	Calibrate or adjust equipment to ensure quality production, using tools such as calipers, micrometers, height gauges, protractors, or ring gauges				
	Inspect finished products for quality and adherence to customer specifications				
	Monitor and adjust production processes or equipment for quality and productivity				
	Troubleshoot problems with equipment, devices, or products				
	Test products or subassemblies for functionality or quality				
	Select cleaning materials, tools, or equipment				
	Set up and operate production equipment in accordance with current good manufacturing practices and standard operating procedures				
	Plan and lay out work to meet production and schedule requirements				
	Install new manufacturing equipment				
	Start up and shut down processing equipment				
	Prepare and assemble materials				
	Build product subassemblies or final assemblies				
	Maintain inventory of job materials				
	Clean production equipment or work areas				

# Technology Transfer

- NSRP Meetings
  - Workforce Development
  - Other Panels
- Industry
  - Other Shipyards
  - Academia



Scott Christman, Ph.D  
[Joseph.christman@gdbiw.com](mailto:Joseph.christman@gdbiw.com)

Questions?

