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## CIMWD-210 Syllabus

### *Pipe Welding – 2G and 5G Welding*

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#### Recommended Textbook:

Welding: Principles and Applications 8<sup>th</sup> Edition

#### Course Description:

Introduces safety protocols and the proper preparation used to weld pipe. Emphasizes pipe welding in 2G and 5G welding positions.

#### Course Topics

1. Safety protocols.
2. Pipe preparation and alignment.
3. Open root pass.
4. 2G welding position.
5. 5G welding position.

#### Learning Objectives

1. Demonstrate proper safety practices for pipe welding.
2. Identify and explain the 2G and 5G pipe welding positions.
3. Demonstrate the proper alignment techniques for welded pipe joints.
4. Demonstrate proper welding technique for an open root pass on plate.
5. \*Perform a weld using the proper techniques for the 2G and 5G positions using the Shielded Metal Arc Welding process.
6. \*Perform a weld using the proper techniques for the 2G and 5G positions using the Gas Tungsten Arc Welding process.

#### Competency-Based Education

The Welding Program at Henry Ford College uses a system of learning called Competency-Based Education (CBE). This competency-based welding program is centered on teaching specific job skills required in industry and mastery of these skills.

CBE is a very personalized teaching system that has the following characteristics:

- Ongoing Program
- Open entry - flexible schedule
- Credit granted for work completed
- Evaluation (grades) based on performance
- Fixed content in each course
- Variety of student levels served in each class
- Work at your own pace
- Live or taped lectures and demonstrations





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This competency-based program has several very important benefits for you:

- You will be given a list of the skills and knowledge needed to complete the program successfully.
- Your performance will not be compared to that of other students, but to a fixed standard, which has been set for the program.
- If you have already acquired certain skills required for this program, you may simply demonstrate this and begin focusing your attention on new skills.
- You will be able to review learning materials several times in order to attain the skill or knowledge.
- If you are able to attain the skills easily, you may progress through the program faster than the average person. If you progress through the program faster than average, you can graduate in a shorter time frame.

#### **What's Required of You:**

For this system to work, you will be expected to:

1. Assume the responsibility for your own learning. Your instructor will give you assistance, but the actual responsibility for learning rests with you, the student.
2. Utilize the materials provided for you. The program's resources have been carefully chosen and developed to help you learn.
3. Devote your energy to attaining the skills and knowledge required for your program.

#### **The Instructor's Role:**

The instructors in HFC's Welding Program work with students individually and guide them through the learning process with the help of many different learning resources. In CBE, instructors are often referred to as learning managers because they manage the activities in the program and facilitate the learning process. If you are having difficulty, you should go to your instructor with your problem. The instructor's goal is to find the most effective way to help you learn the tasks in the program.

#### **How your grade is computed in this program:**

If your class is a designated lecture module, your grade will be based off of an exit quiz. When a passing grade is complete, you will be able to move on to the next module.

If this class is a designated lab module, your grade will be based off of a grading matrix. You will evaluate your competencies along with the instructor. You will need a 3-ring binder to keep the finished and signed grading sheets. Those will be turned in when all projects are finished for the module your taking. The final grade will be entered when these are reviewed.





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#### Welding Technology Grading Checklist

Check	Criteria	Points
	Safety (10 points)	
	PPE	
	Equipment in working order	
	Lab rules followed	
	Work areas cleaned and tools returned	
	Welding, Cutting, & Fabrication Set-Up (10 points)	
	Welding machine set correctly	
	Cutting machines set correctly	
	Fabrication machines set correctly	
	Followed Instructions (10 points)	
	Parts cut to correct size	
	Joints assembled correctly	
	Position of weld was correct	
	Correct filler metal was used	
	Visual Inspection of weld (20 points)	
	Bead width	
	Welding angle	
	Arc gap if applicable	
	Porosity	
	Fillet weld size if applicable	
	Groove weld under fill	
	Joint penetration	
	Incomplete fusion	
	Cracks	
	Cold lap	
	Undercut	
	Arc strikes	
	Fillet weld contour if applicable	
	Inclusions	
	Groove weld height (overfill)	





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#### Corrective Action Taken:

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Student: \_\_\_\_\_ Instructor: \_\_\_\_\_

#### Grading Scale:

- A+ = 100-98
- A = 97-93
- A- = 92-90
- B+ = 89-87
- B = 86-83
- B- = 82-80
- C+ = 79-77
- C = 76-73
- C- = 72-70
- D+ = 69-67
- D = 66-63
- D- = 62-60
- E = 59-below

#### Chapter:

5

#### Estimated Time for Projects:

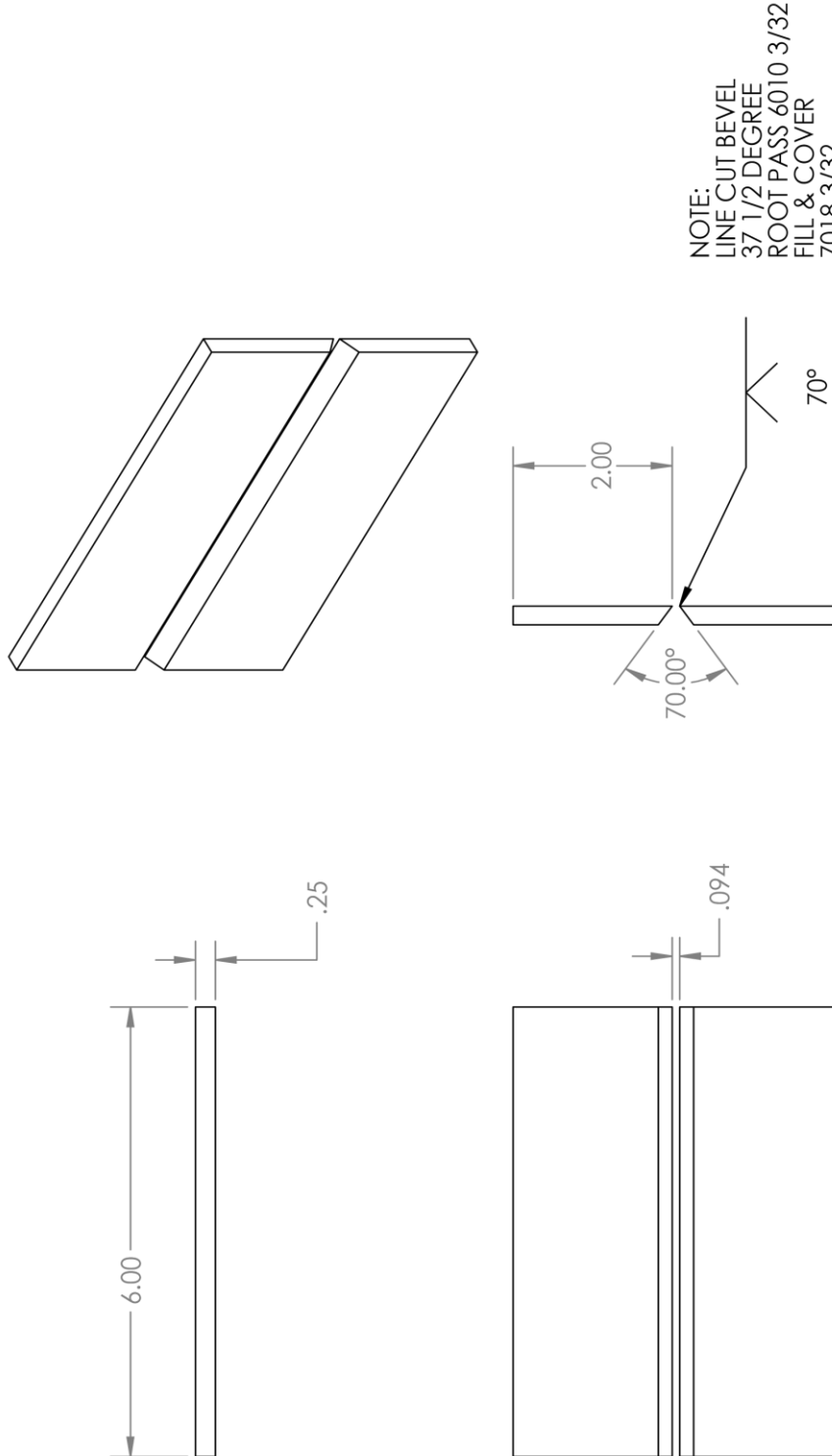
- Project 1: 4 hrs
- Project 2: 13 hrs
- Project 3: 13 hrs





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NOTE:  
LINE CUT BEVEL  
37 1/2 DEGREE  
ROOT PASS 6010 3/32  
FILL & COVER  
7018 3/32  
\*GTAW ROOT, FILL  
& COVER 3/32 FILLER

DRAWN		NAME		DATE		TITLE:		CIMWD-110 Project 4	
CHECKED		J.SIBERT		4/2/15				REV	
ENG APPR.								A PART 10.2 0	
MFG APPR.								SCALE: 1:2 WEIGHT: SHEET 1 OF 1	
G.A.								SIZE DWG. NO.	
COMMENTS:								A PART 10.2 0	
UNLESS OTHERWISE SPECIFIED:		DIMENSIONS ARE IN INCHES		TOLERANCES:		FRACTIONAL ±		ANGULAR: MACH ± BEND ±	
		TWO PLACE DECIMAL ±		THREE PLACE DECIMAL ±		INTERPRET GEOMETRIC TOLERANCING PER:		MATERIAL	
		FINISH		DO NOT SCALE DRAWING					
APPLICATION		USED ON							
APPLICATION		USED ON							
APPLICATION		USED ON							

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## CIMWD-210 Syllabus

### Pipe Welding – 2G and 5G Welding

#### Welding Procedure Specification

WPS Name	CIMWD-210 Project 1
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Weld Type	CJP Groove
Welding Process	SMAW
Position	Horizontal
Material	¼" Steel
Joint Type	Vee Butt
Backing Option	No Backer
Backing Material	

Polarity	DC+
Electrode	E6010 3/32, E7018 3/32
Transfer Mode	
Tungsten Electrode	
Shielding Gas	
Flow Rate	
Cup Size	

#### Welding Procedure

Weld Layers	Pass No.	Process	Filler Metal Classification	Filler Metal Diameter in (mm)	Current Amps	Current Type and Polarity	Wire Feed Speed	Volts	Remarks
Stringer	root	SMAW	E6010	3/32	50a	DC+			
	fill	"	E7018	3/32	75a	"			
	cover	"	E7018	3/32	75a	"			

#### Technique:

Root Pass performed with E6010 3/32 for CJP. Fill and Cover Passes performed with E7018 3/32.

Initial/Interpass Cleaning- Chip and Brush

Number of Electrodes- 1-2





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## **CIMWD-210 Syllabus**

### *Pipe Welding – 2G and 5G Welding*

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Heat Treatment:

Preheat Temperature-

Post Heat Temperature-

Interpass Temperature- Quench between passes

Stress Relieving-

Additional Notes:

Show the instructor progress every 30 minutes minimum.





## CIMWD-210 Syllabus

### Pipe Welding – 2G and 5G Welding

**NOTES:** FLAME CUT BEVEL  
3/32 LAND  
6010 3/32 ROOT  
7018 3/32 FILL & COVER

DRAWN	CHECKED	ENG APPR.	MFG APPR.	Q.A.	DATE
					3/27/2015
NAME: J.SIBERT					
COMMENTS:					
UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL: ± ANGULAR: MACH ± BEND ± TWO PLACE DECIMAL ± THREE PLACE DECIMAL ± INTERPRET GEOMETRIC TOLERANCING PER:					
MATERIAL:					
FINISH:					
DO NOT SCALE DRAWING					

SIZE DWG. NO. REV  
**A2G Drawing 0**

SCALE: 1:4 WEIGHT: SHEET 1 OF 1

TITLE: CIMWD-210 project 1

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## CIMWD-210 Syllabus

### *Pipe Welding – 2G and 5G Welding*

#### ***Welding Procedure Specification***

WPS Name	CIMWD-210 Project 1
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Weld Type	CJP Groove
Welding Process	SMAW or GTAW
Position	Horizontal
Material	3" Sch. 80 Pipe
Joint Type	Vee Butt
Backing Option	No Backer
Backing Material	

Polarity	DC+
Electrode	E6010 3/32, E7018 3/32
Transfer Mode	
Tungsten Electrode	Or 2% Ceriated
Shielding Gas	100% Argon
Flow Rate	25cfh
Cup Size	

#### ***Welding Procedure***

Weld Layers	Pass No.	Process	Filler Metal Classification	Filler Metal Diameter in (mm)	Current Amps	Current Type and Polarity	Wire Feed Speed	Volts	Remarks
Stringer	root	SMAW	E6010	3/32	50a	DC+			
	fill	"	E7018	3/32	75a	"			
	cover	"	E7018	3/32	75a	"			
Stringer	Root & Fill	GTAW	ER70s-6	1/16 or 3/32	120a	"			





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Technique:

SMAW- Root Pass performed with E6010 3/32 for CJP. Fill and Cover Passes performed with E7018 3/32.

GTAW- Root/Fill/Cover use ER70s-6 1/16" or 3/32" filler metal

Initial/Interpass Cleaning- Chip and Brush

Number of Electrodes-

Heat Treatment:

Preheat Temperature-

Post Heat Temperature-

Interpass Temperature- Quench between passes

Stress Relieving-

Additional Notes:

Show the instructor progress every 30 minutes minimum.







## CIMWD-210 Syllabus

### *Pipe Welding – 2G and 5G Welding*

#### ***Welding Procedure Specification***

WPS Name	CIMWD-210 Project 2
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Weld Type	CJP Groove
Welding Process	SMAW or GTAW
Position	5G
Material	3" Sch. 80 Pipe
Joint Type	Vee Butt
Backing Option	No Backer
Backing Material	

Polarity	DC+
Electrode	E6010 3/32, E7018 3/32
Transfer Mode	
Tungsten Electrode	Or 2% Ceriated
Shielding Gas	100% Argon
Flow Rate	25cfh
Cup Size	

#### ***Welding Procedure***

Weld Layers	Pass No.	Process	Filler Metal Classification	Filler Metal Diameter in (mm)	Current Amps	Current Type and Polarity	Wire Feed Speed	Volts	Remarks
Stringer	root	SMAW	E6010	3/32	50a	DC+			
	fill	"	E7018	3/32	75a	"			
	cover	"	E7018	3/32	75a	"			
Stringer	Root & Fill	GTAW	ER70s-6	1/16 or 3/32	120a	"			





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Technique:

SMAW- Root Pass performed with E6010 3/32 for CJP. Fill and Cover Passes performed with E7018 3/32.

GTAW- Root/Fill/Cover use ER70s-6 1/16" or 3/32" filler metal

Initial/Interpass Cleaning- Chip and Brush

Number of Electrodes-

Heat Treatment:

Preheat Temperature-

Post Heat Temperature-

Interpass Temperature- Quench between passes

Stress Relieving-

Additional Notes:

Show the instructor progress every 30 minutes minimum.





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