



CIMWD-221 Syllabus

Tool & Die Welding (GTAW)

Recommended Textbook:

Welding: Principles and Applications 8th Edition

Course Description:

Introduces safety protocols, proper preparation procedures, and welding techniques used to weld tool steel used in tools and dies. Focuses on using the gas tungsten arc welding (GTAW) process.

Course Topics

1. GTAW pad build-up.
2. GTAW line build-up.
3. GTAW knife edge.

Learning Objectives

1. Demonstrate proper preparation techniques for the repair of a tool or die.
2. *Perform a weld using the proper techniques for the repair of a tool or die 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.





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Criteria	Points	Information	Grade
Follow Safety Rules for Project	10		
Welding Machine was Set Correctly	10		
Followed Instructions Given	10		
Correct Assembly and Fit-up	10		
Visual Inspection of Weld	10		

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

Welding Projects:

1. Pad Build Up
2. Line Build Up
3. Knife edge build-up
4. Shaft Build-up





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NOTES:
PAD BUILD UP
GTAW PROCESS

SEE NOTES

TITLE:
CIMWD-221 Project 1

SIZE DWG. NO. REV
A PART 15 D

SCALE: 1:1 WEIGHT: SHEET 1 OF 1

UNLESS OTHERWISE SPECIFIED:	NAME	DATE
DIMENSIONS ARE IN INCHES	J.SIBERT	5/5/15
TOLERANCES:		
FRACTIONAL: ±		
ANGULAR: MACH ±		
BEND ±		
TWO PLACE DECIMAL ±		
THREE PLACE DECIMAL ±		
INTERPRET GEOMETRIC TOLERANCING PER:		
MATERIAL:		
FINISH:		
DO NOT SCALE DRAWING		

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APPLICATION USED ON





CIMWD-221 Syllabus

Tool & Die Welding (GTAW)

Welding Procedure Specification

WPS Name	CIMWD-221 Project 1
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Weld Type	Pad Build-Up
Welding Process	GTAW
Position	Flat
Material	1/4" Steel
Joint Type	
Backing Option	
Backing Material	

Polarity	DC+
Electrode	ER70s-6
Transfer Mode	
Tungsten Electrode	2% Ceriated
Shielding Gas	100% Argon
Flow Rate	25 cfh
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
Pad		GTAW	ER70s-6	1/16"	130a	DC+			

Technique:
A pad build up using stringer beads. Looking for bead quality and bead placement. 2"x2"x1" high.





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Tool & Die Welding (GTAW)

Heat Treatment:

Preheat Temperature-

Post Heat Temperature-

Interpass Temperature-

Stress Relieving-

Additional Notes:

Show the instructor progress every 30 minutes minimum.





CIMWD-221 Syllabus

Tool & Die Welding (GTAW)

NOTES:
LINE BUILD UP GTAW

UNLESS OTHERWISE SPECIFIED:		NAME	DATE
DIMENSIONS ARE IN INCHES		J.SIBERT	5/5/15
TOLERANCES:		DRAWN	
FRACTIONAL ±		CHECKED	
ANGULAR: MACH ± BEND ±		ENG APPR.	
TWO PLACE DECIMAL ±		MFG APPR.	
THREE PLACE DECIMAL ±		Q.A.	
INTERPRET GEOMETRIC TOLERANCING PER:		COMMENTS:	
MATERIAL			
FINISH			
DO NOT SCALE DRAWING			

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SIZE DWG. NO. REV
A PART 14 D

SCALE: 1:1 WEIGHT: SHEET 1 OF 1





CIMWD-221 Syllabus

Tool & Die Welding (GTAW)

Welding Procedure Specification

WPS Name	CIMWD-221 Project 2
----------	---------------------

Weld Type	Line Build-Up
Welding Process	GTAW
Position	Flat
Material	1/4" Steel
Joint Type	
Backing Option	
Backing Material	

Polarity	DC+
Electrode	ER70s-6
Transfer Mode	
Tungsten Electrode	2% Ceriated
Shielding Gas	100% Argon
Flow Rate	25 cfh
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
Line		GTAW	ER70s-6	1/16"	130a	DC+			

Technique:
A Line build up using stringer beads. Looking for bead quality and bead placement. 2 1/2"x1" high.





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Tool & Die Welding (GTAW)

Heat Treatment:

Preheat Temperature-

Post Heat Temperature-

Interpass Temperature-

Stress Relieving-

Additional Notes:

Show the instructor progress every 30 minutes minimum.





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Tool & Die Welding (GTAW)

SEE NOTES

NOTES:
SHAFT BUILD UP
2 PIECES MADE
UTILIZING SMAW &
GTAW PROCESSES

DRAWN	CHECKED	ENG APPR.	MFG APPR.	G.A.	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					
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NAME		DATE		TITLE:	
J.SIBERT		5/5/15		CIMWD-221 Project 3	
SIZE DWG. NO.		SCALE: 1:1		SHEET 1 OF 1	
A PART 11 D		WEIGHT:		REV	





CIMWD-221 Syllabus

Tool & Die Welding (GTAW)

Welding Procedure Specification

WPS Name	CIMWD-221 Project 3
----------	---------------------

Weld Type	Worn Shaft Build-Up
Welding Process	GTAW
Position	Flat
Material	1/4" Steel
Joint Type	
Backing Option	
Backing Material	

Polarity	DC+
Electrode	ER70s-6
Transfer Mode	
Tungsten Electrode	2% Ceriated
Shielding Gas	100% Argon
Flow Rate	25 cfh
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		GTAW	ER70s-6	1/16"	130a	DC+			

Technique:

A worn shaft build up using stringer beads. Looking for bead quality and bead placement. Fill to just over thread dimension for machining after.





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Tool & Die Welding (GTAW)

Heat Treatment:

Preheat Temperature-

Post Heat Temperature-

Interpass Temperature- Air Cool for controlled temperatures

Stress Relieving-

Additional Notes:

Show the instructor progress every 30 minutes minimum.





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