

*WLD 260*  
*Beginning Fabrication*



## **Course Description**

Develops knowledge and skills in the selection and use of layout tools and equipment to assemble a beginning fabrication project from given specifications. Prerequisites: Department approval required. Audit available.

### **Addendum to Course Description**

This course allows the student to experience challenges that arise during the fabrication process, and develop necessary fabricating techniques that can be applied to multiple fabrication applications.

### **Intended Outcomes for the course**

Upon completion of the course students should be able to:

- Function safely in the PCC Welding Lab.
- Interpret blueprints and accurately layout, prepare, and fabricate project(s).
- Demonstrate beginner fabrication techniques.
- Demonstrate the proper use of common metal fabrication tools and equipment.
- Apply visual examination principles and practices in accordance with AWS D1.1.

### **Aspirational Goals**

Upon completion of this course the student will obtain the knowledge and skills to be an asset in the welding industry.

### **Course Activities and Design**

This is an outcome based course utilizing a lecture/lab format. This course includes classroom discussions and lab demonstrations covering technical skills. Course outcome will include the following: Following detailed verbal or written instructions, theoretical concepts, lay out, fabrication, welding, oxy-fuel cutting, safety, workspace maintenance, equipment and tool cleanliness and safe practices in the performance of daily duties.

### **Outcome Assessment Strategies**

At the beginning of the course, the course syllabus will identify the methods used to evaluate student progress and the criteria for assigning a course grade. The student will be evaluated on his/her ability to demonstrate the development of course outcomes and acceptable skill requirements. The methods of evaluation may include one or more of the following: oral or written examinations, quizzes and written assignments.

### **Course Content (Themes, Concepts, Issues and Skills)**

Function safely in the PCC Welding Lab.

- Understand and practice personal safety by using proper protective gear
- Understand and practice power tool safety
- Understand and maintain a safe work area
  - Recognize and report dangerous electrical and air/gas hose connections
  - Understand and practice fire prevention

Interpret blueprints and accurately lay out, prepare, and fabricate projects.

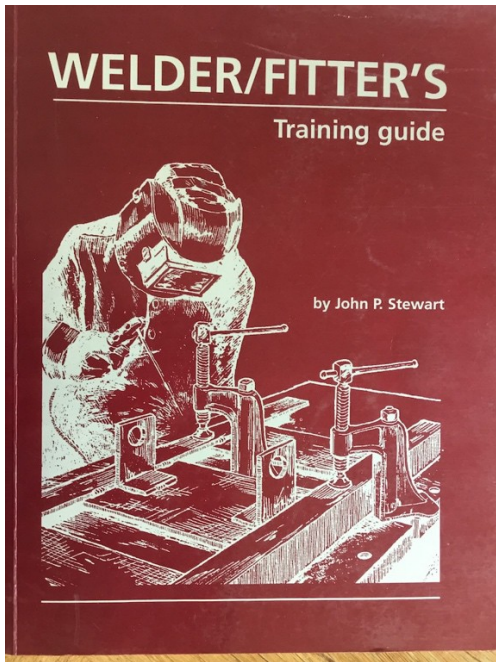
- Demonstrate use of squares, tape measure and levels
- Check for alignment utilizing a straight edge and a string line
- Check for parallel using a tape and string line
- Demonstrate the ability to find the center of various shapes

Identify and demonstrate the proper use of common metal fabrication tools and equipment.

- Squares
- Protractor
- Dividers
- Level
- Center punch
- Tape Measure
- Grinders
- Drill Motors
- Ironworker
- Band saw

Apply visual examination principles and practices in accordance with AWS D1.1

- Evaluate projects using appropriate inspection tools
- Assess dimensional accuracy and weld quality.



Read the **Fabrication Techniques and Practices** chapter in the Larry Jeffus Textbook  
Complete all review questions at the end of the chapter and hand them in to your instructor.

### Welder Fitter's Training Guide

The Welder/Fitter's Training Guide is an excellent book. For the beginning of this class we will work our way through some of the basic exercises. These may seem simple to some but they are important basic skills that we often need out in the field. Fitting something up properly before we weld it is a skill in itself, one we are usually expected to have.

Most of the tools required for these exercises can be checked out from the tool room. Most of these exercises can be drawn out on a large table in the Fabrication Bay.

1. Check the Fitter's guide out from the tool room for each class period it is needed.

Please perform the following exercises and have them inspected by your instructor.

**Many of the exercises call for a specific size plate or circle to be used.** You can simply lay these out on a table in most cases, or draw a rectangle, circle or square, instead of cutting one out.

## **LESSON 1: *Alignment with Basic Tools***

### **Exercise 1-2**

Using a steel square draw angles 45°, 60°, 30°

### **Exercise 1-3**

Using a steel square find the center of a 24" square plate (the square can be simply drawn on a table)

### **Exercise 1-4**

Using the square from the previous exercise mark the center with a center punch. (this should be a very accurate mark)

### **Exercise 1-5**

Check the trueness of a straightedge on a surface known to be true. This seems a bit odd but it is an issue that can occur. Check the edge of a framing square against the feed table of both shears.

### **Exercise 1-9**

### **Exercise 1-10**

### **Exercise 1-11**

### **Exercise 1-12**

(a steel scale is a ruler)

### **Exercise 1-14**

For this one try to locate four perfectly level surfaces in the shop.

## **LESSON 2: *Laying out Plate***

**For these exercises, you can modify the size of circles to allow them fit onto a welding table.**

### **Exercise 2-1**

You can use the soapstone compass from the tool room for this instead of trammels.

### **Exercise 2-2**

You can use dividers, trammels, or compass for this.

### **Exercise 2-3**

### **Exercise 2-4**

### **Exercise 2-7**

### Exercise 2-13

Scribe a center line on anything round using a center head on a combo square. Use the combo square scribe if you'd like.

### Exercise 2-17

We can do this one without the pipe. Draw a 14" circle on the table to represent the pipe

**Chalk Line Exercise:** (This one is not in the book).

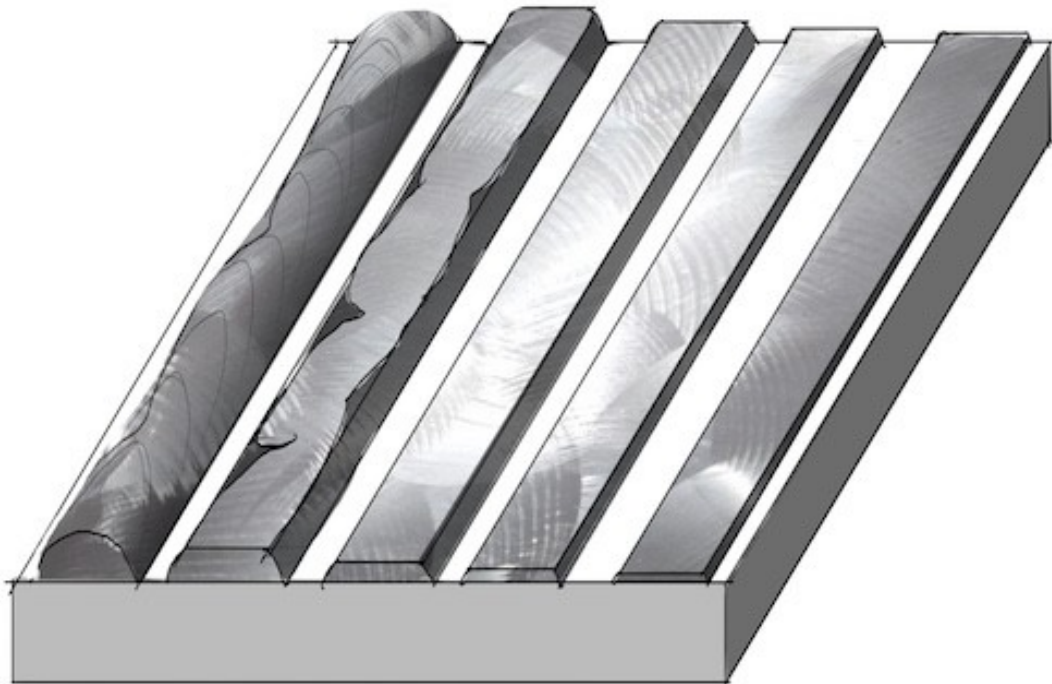
Snap a chalk line on the floor or a table. Using a tape measure and a straight edge draw a line parallel to the chalk line at 4", 8", and 12". These should be as accurate as possible

## Grinding and finishing

Grinding and finishing of metal is often an important skill required in our field. It may even be part of a weld test for employment. This simple exercise will help demonstrate how to properly grind a weld that needs to be finished and blended. We will not be sanding the welds flat for these exercises. Blending the welds will easily hide our mistakes.

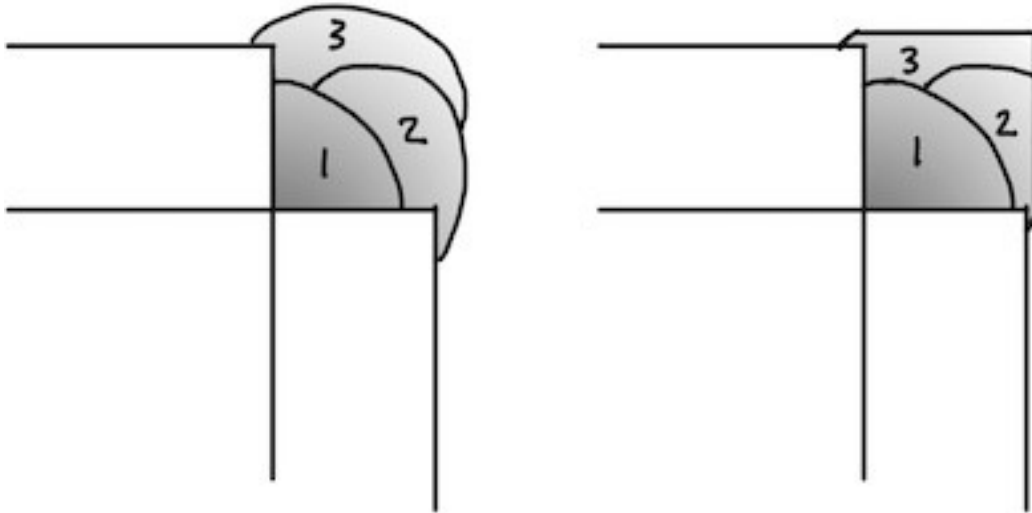
### Exercise 1

On a piece of scrap metal lay a bead with GMAW in the flat position. Using an angle grinder with a grinding stone, grind the weld down as close to the parent metal as possible **without touching** the parent metal. Repeat this until you can consistently bring the weld profile down to a minimum thickness without nicking the parent metal.



## Exercise 2

Using scrap metal, and any process you'd like, weld an outside corner joint with edge to edge fit-up. Using the technique used in exercise 1, grind both edges to as close to 90° as possible. This is worth repeating until you get it down.



## Exercise 3: Band Saw

Get a demonstration from your instructor on the proper use of the band saw.

## Exercise 4: Iron Worker

Get a demonstration from your instructor on the proper use of the iron-worker

## Exercise 5: Drill Motor and Drill Press, Slip Rolls, Break, Shear and plasma cutter.

Get a demonstration from your instructor on the proper use of these tools.

## Exercise 6: Tube Notcher

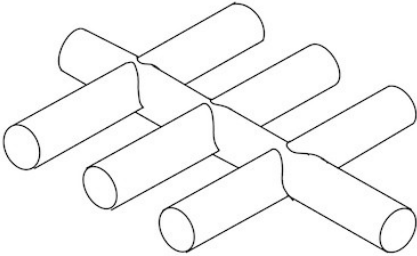
Get a demonstration from your instructor on the proper use of the Baliegh Tube Notcher.



### Exercise 7: Weld notched tubing

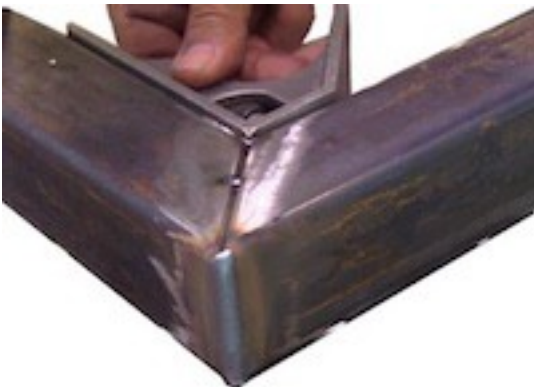
For this exercise, you will use the bands saw to cut a large amount of round tubing to 4 inches in length. Cut a few lengths of tubing at 12" also. Using the notcher, notch the short lengths of tubing. Tack the short lengths to the long lengths in a fashion similar to the drawing below. Experiment with leaving a slight gap in the fit-up vs no gap in the fit-up.

- A. Using the GMAW process, practice welding the saddles until you are producing quality welds.
- B. Using the GTAW process, practice welding the saddles until you are producing quality welds.



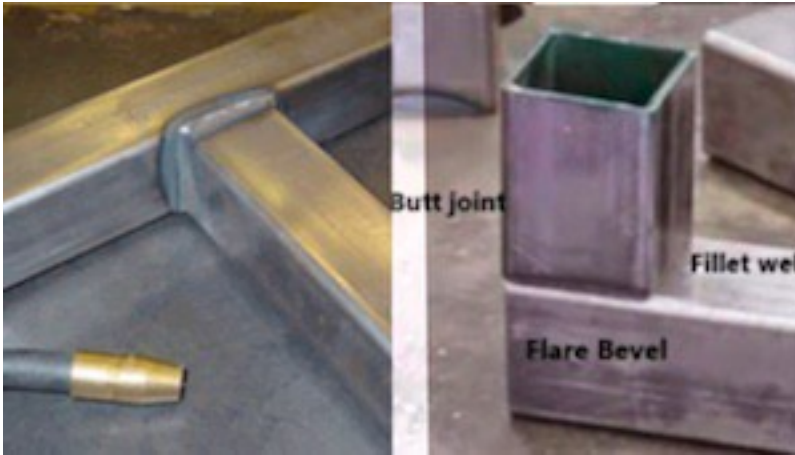
### Exercise 8: Square tubing mitered joint GMAW and/or GTAW

For this exercise, you will cut a quantity of square tubing at a 45° miter using the band-saw. Check that the band-saw is set to 45° using a combo square before making your cuts. The goal of this exercise is to assemble and fully weld the miter joint with a 90° angle being achieved by the finish. Experiment with gap vs no gap in your fit-up. Your weld progression will be the key to success as will trial and error.



### Exercise 9: Butt-Weld square tubing at a 90° angle. GMAW and/or GTAW

Similar to the last exercise only we are butting the material instead of mitering. Weld sequence is critical as always. Also experiment with how tight the fit-up is.



**Exercise 10: Tube to plate**

Cut short lengths of round tubing and weld to flat plate. Use scrap for the flat plate if available. Try this with both the GMAW and GTAW processes.





# WLD 260 Time Tracker

## Monday

## Tuesday

## Wednesday

## Thursday

Week

1	Hours/work done:	Hours/work done:	Hours/work done:	Hours/work done:
2	Hours/work done:	Hours/work done:	Hours/work done:	Hours/work done:
3	Hours/work done:	Hours/work done:	Hours/work done:	Hours/work done:
4	Hours/work done:	Hours/work done:	Hours/work done:	Hours/work done:
5	Hours/work done:	Hours/work done:	Hours/work done:	Hours/work done:
6	Hours/work done:	Hours/work done:	Hours/work done:	Hours/work done:
7	Hours/work done:	Hours/work done:	Hours/work done:	Hours/work done:
8	Hours/work done:	Hours/work done:	Hours/work done:	Hours/work done:
9	Hours/work done:	Hours/work done:	Hours/work done:	Hours/work done:
10	Hours/work done:	Hours/work done:	Hours/work done:	Hours/work done:
11	Hours/work done:	Hours/work done:	Hours/work done:	Hours/work done:
12	Hours/work done:	Hours/work done:	Hours/work done:	Hours/work done:

Write the hours for each day and a short description of what you did on that day.

Name: \_\_\_\_\_

Grading Sheet 260

**Lesson 1: Alignment basic tools**

exercise 1-2	
exercise 1-3	
exercise 1-4	
exercise 1-5	
exercise 1-9	
exercise 1-10	
exercise 1-11	
exercise 1-12	
exercise 1-14	

**Grinding and finishing**

exercise 1	
exercise 2	

**Tools**

Band Saw	
Iron Worker	
Hand Drill	
Drill Press	
Slip Rolls	
Break	
Shear	
Plasma	

**Lesson 2: Laying out Plate**

Exercise 2-1	
exercise 2-2	
exercise 2-3	
exercise 2-7	
exercise 2-13	
exercise 2-17	
chalklines	

**Tube Notcher :Saddle welds**

GMAW	
GTAW	

**Square tube welds**

90° Miter	
90°Butt	

**Round tube to plate**

GMAW	
GTAW	

Chapter Questions	
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