Tech Prep
In
Welding

A consortium of High School, Community College and University Departments

This document contains student competency requirements for the specialized area of:

Welding Basics
WELD 145
7 Credits

To receive up to four college credits in Welding, a student must complete at least 80% of the competencies. The high school instructor should initial each competency area that is completed by the student. By initialing these competencies, the instructor is verifying that the student has completed the required work at a level that should receive college credit.

Revision date: January 2008

High schools are required to coordinate with Mike Haggard, WWCC Welding Instructor, and provide weld samples for inspection prior to acceptance of college credit.
Welding Basics / WELD 145

COMPETENCY AREAS: 

<table>
<thead>
<tr>
<th>Credit Earned</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basic Skills.......................................................... □</td>
</tr>
<tr>
<td>Shielded Metal Arc Welding......................................... □</td>
</tr>
<tr>
<td>GMAW Welding ............................................................ □</td>
</tr>
<tr>
<td>Oxyacetylene/Oxy Fuel Welding ...................................... □</td>
</tr>
</tbody>
</table>

Student Name: ________________________________________________

High School: _________________________________________________

High School Grade Received: ________ (Grade of A or B required to receive college credit)

I hereby verify successful completion of a minimum of 80% of required competencies and awarding of a local grade of A or B.

___________________________________________
High School Instructor Signature

Date: ____________________
**Welding Basics**

**Rating Scale for Performance Tasks:**

*Tech Prep Welding Basics is an introduction to basic welding concepts in safety, measurement, phase of metal, electricity, employability, careers, shielded metal arc welding, oxyacetylene welding and GMAW welding. While achievement of identified competencies do not require the depth of knowledge a student would gain from a specialized ten-week course in the subject area, please note that all submitted weldment samples must meet professional standards.*

For individual competencies the following grading criteria will be observed.

<table>
<thead>
<tr>
<th>Grade</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 - Highly Skilled/Proficient</td>
<td>Student can complete the competency accurately. Student can direct others to do the competency. Student needs little supervision. Written tests, 90%</td>
</tr>
<tr>
<td>3 – Skilled/Performs with Minimum Supervision</td>
<td>Student can perform all parts of the competency. Student needs only completed work spot-checked. A student meets speed and accuracy requirements (if any). Student needs minimum supervision. Written tests, 80%</td>
</tr>
<tr>
<td>2 - Limited Skills/Performs with Close Supervision</td>
<td>Student can perform most parts of the competency. Student needs help with only the most difficult parts. Student needs close supervision. Written tests, 70%</td>
</tr>
<tr>
<td>1 – Exposure/Introductory</td>
<td>Student can do simple basics of this competency with very close supervision.</td>
</tr>
<tr>
<td>0 - No exposure/Not Taught</td>
<td>Student has had no exposure to this competency</td>
</tr>
</tbody>
</table>
WELDING BASICS

UNIT 1: Basic Skills (1 Credit)

The student must be familiar with the following topics and pass an exam on the following:

1.1 Shop equipment.

1.2 Potential hazards present in the high school shop and in the professional welding environment.

1.3 Significant OSHA Regulations relevant to welding.

1.4 The student must use the following devices to accurately measure within 1/16\textsuperscript{th} of an inch.
   
   1.4a Ruler.
   1.4b Tape Measure
   1.4c Framing Square

1.5 The student must observe phase change in metals when metals are subject to heat and must be able to state how to apply the knowledge of phase changes in practical applications in the welding of metals.

1.6 The student must define melting point, thermal conductivity and grain structure.

1.7 The student must define voltage and amperage.

1.8 The student must describe the application of voltage and amperage.

1.9 The student must identify appropriate welding applications for alternating and direct current.

1.10 The student must define electric current.

1.11 The student must state the difference between conductors and insulators.

1.12 The student must demonstrate an understanding of the importance of a positive work ethic and its value in the work place.

1.13 The student must demonstrate an understanding of the importance of safety practices and safe equipment operations in the welding work environment to include active daily demonstration of eye safety, welding appropriate clothing and appropriate physical contact in the welding work environment.
UNIT 2: Shielded Metal Arc Welding (1 Credit)

Weldments must meet AWS inspection standards according to AWS D1.1 specifications.

2.0 Student must successfully arc weld mild steel as follows:

2.1 Flat Bead.

2.2 Butt Weld.

2.3 Lap Weld.

2.4 Corner (outside) Weld.

2.5 T (Fillet) Weld.

2.6 Vertical Up and Down Bead

2.7 Horizontal Bead.

2.8 Overhead Bead.

UNIT 3: MIG (GMAW) (1 Credit)

Weldments must meet AWS inspection standards according to AWS D1.1 specifications.

3.0 Student must use GMAW equipment to weld mild steel as follows:

3.1 Flat Bead.

3.2 Butt Weld.

3.3 Lap Weld.

3.4 Corner (outside) Weld.

3.5 T (Fillet) Weld.

3.6 Vertical Up and Down Bead

3.7 Vertical Up (Fillet) Weld.

3.8 Horizontal Bead.

3.9 Overhead Bead.
UNIT 4: Oxy-Acetylene (1 Credit)

4.0 Student must demonstrate proper use of Oxy-Acetylene equipment to:

4.1 Sweat Beads.
4.2 Filler Rod Beads.
4.3 Butt Weld.
4.4 T (Fillet) Weld.

Student must use the Oxy-Acetylene cutting equipment to:

4.5 Make Straight Cuts.
4.6 Make Circle Cuts.
4.7 Make Pipe Cuts.

Student must demonstrate the following Oxy-Acetylene weld processes:

4.8 Lap Braze.
4.9 T (Fillet) Braze.

The student shall submit weldments for inspection that demonstrate the following welds:

Note: It is not required that each weld be a separate item and it is recommended that instructors design a weld project for submission. The project submission(s) may include as many of the required welds as is deemed appropriate but all required welds must be demonstrated in some manner.

**Shielded Metal Arc Examples** (Note: arc shielded metal arc welds shall be completed with E6011 or E6010 rods and shall use 3/16 “ mild steel stock or the approximate equivalent)

1. Butt weld / Horizontal
2. Butt weld / Vertical
3. Butt weld / Overhead
4. T-Fillet weld / Horizontal
5. T-Fillet weld / Vertical
6. T-Fillet weld / Overhead

**MIG (GMAW) weld examples**

7. Butt weld / Horizontal
8. Butt weld / Vertical
9. Butt weld / Overhead
10. T-Fillet weld / Horizontal
11. T-Fillet weld / Vertical
12. T-Fillet weld / Overhead

**Oxy Acet Weld / Cutting examples** (Note: O2 Acet welds shall be completed on 16 gauge mild steel stock or the approximate equivalent) (complete all cutting on ¼” thickness or greater mild steel stock)

13. Lap Braze
14. Fillet Braze
15. Lap weld / mild steel filler rod
16. Fillet weld / mild steel filler rod
17. Straight Cut
18. Circle Cut