**CHAMP Course Map**

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| **Course Name:** WEL224:Advanced Gas Tungsten Arc Welding |
| **Instructor Name:** Doug Cash | **Date:** August 2014 |
| **Course Competencies:**1. Follow shop safety practices.
2. Maintain a clean and safe work area.
3. Follow guidelines prescribed in course progress chart.
4. Perform safety inspections on GTAW equipment.
5. Prepare carbon steel, stainless steel and aluminum plate.
6. Prepare carbon steel pipe.
7. Identification of proper filler rod and diameter.
8. Set up arc welding equipment.
9. Select proper current, polarity and amperage.
10. Perform welds on tee, lap, corner and butt-joints in the flat, horizontal, vertical and overhead positions on carbon steel.
11. Perform welds on tee, lap, corner and butt-joints in the flat, horizontal, vertical and overhead positions on stainless steel.
12. Perform welds on tee, lap, corner and butt-joints in the flat horizontal, vertical and overhead positions on aluminum.
13. Perform welds on carbon steel pipe in the 1G, 2G, 5G up, 5G down and 6G positions.
14. Identify surface discontinuities and suggest corrective measures.
15. Perform minor troubleshooting on cutting equipment.
16. Interpret weld symbols.
17. Do assigned course book work.
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**Course Materials (Text, Edition and any other publisher items)**

**Textbooks and/or Resources:**

**Resources:**

**Rubrics:** Rubrics and specific grading criteria for EACH assessment should be included at the end of the course map.

| **Module # and Title** | **CCNS Competencies and Measurable Objectives** | **Content, Activities or Challenges****(Learner Interaction** **& Engagement)**  | **Assessments, Rubrics (Feedback)** |
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| Start Here |  | CC BY Attribution; Course Competencies; Desire2Learn Navigation Tips; WEL 224 LAB PROCEDURES; Miller-TIG-Handbook; WEL Rubric |  |
| Welding Safety Review | 1. Follow shop safety practices.
2. Maintain a clean and safe work area.
3. Follow guidelines prescribed in course progress chart.
4. Perform safety inspections on GTAW equipment.
5. Do assigned course book work.
 | 1. WEL 100 Safety for Welders webpage: "Workplace Safety"
2. WEL 100 Safety for Welders webpage: “Personal Safety”
3. WEL 100 Safety for Welders webpage: “Lifting Safety”
4. WEL 100 Safety for Welders webpage: “Welding Standards and Procedures”
 | * Workplace Safety Challenge Test
* Personal Safety Challenge Test
* Lifting Safety Challenge Test
* Welding Standards and Procedures Challenge Test
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| GTAW welding on plain carbon steel, Tee-Joints, Lap-joints, corner joints, butt-joints |  I.      Follow shop safety practices.  II.     Maintain a clean and safe work area.  III.    Follow guidelines prescribed in course progress chart.  IV.     Perform safety inspections on GTAW equipment.  V.      Prepare carbon steel, stainless steel and aluminum plate.  VI.     Prepare carbon steel pipe.  VII.    Identification of proper filler rod and diameter.  VIII.   Set up arc welding equipment.  IX.     Select proper current, polarity and amperage.  X       Perform welds on tee, lap, corner and butt-joints in the flat, horizontal, vertical and overhead positions on carbon steel.  XIII.   Perform welds on carbon steel pipe in the 1G, 2G, 5G up, 5G down and 6G positions.  XIV.    Identify surface discontinuities and suggest corrective measures.  XV.     Perform minor troubleshooting on cutting equipment.  XVI.    Interpret weld symbols.  XVII.   Do assigned course book work.  | 1. Textbook reading Chapter 8, GTAW welding. Lab work, Tee-joints on plain carbon steel.
2. View the video, [Tig Welding Techniques Steel Lap Joint and Butt Joint](https://www.youtube.com/watch?v=6_CM4uA4aRY" \t "_blank) (opens in new window)
3. Read the webpage [Selecting electrodes, shielding gas, and filler metal for GTAW](https://www.mwsco.com/kb/articles/19990330g.htm) (opens in new window)
4. In class discussion on GTAW welding of steel tee-joints, lap joints, steel corner joints, butt-joints.
5. Complete the Lab: GTAW welding Tee-joints on plain carbon steel in all positions.
6. Complete the Lab: GTAW welding Lap-joints on plain carbon steel in all positions.
7. Complete the Lab: GTAW welding Corner-joints on plain carbon steel in all positions.
8. Complete the Lab: GTAW welding Butt-joints on plain carbon steel in all positions.
9. Complete the Carbon Steel GTAW welding Quiz before the due date.
 | * In class discussion on GTAW welding of steel tee-joints, lap joints, steel corner joints, butt-joints.
* Welding Inspections on GTAW welding Tee-joints on plain carbon steel in all positions.
* Welding Inspections on GTAW welding Lap-joints on plain carbon steel in all positions.
* Welding Inspections on GTAW welding Corner-joints on plain carbon steel in all positions.
* Welding Inspections on GTAW welding Butt-joints on plain carbon steel in all positions.
* Carbon Steel GTAW welding Quiz
* Welding Rubric
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| GTAW Welding on Stainless Steel  |  I.      Follow shop safety practices.  II.     Maintain a clean and safe work area.  III.    Follow guidelines prescribed in course progress chart.  IV.     Perform safety inspections on GTAW equipment.  V.      Prepare carbon steel, stainless steel and aluminum plate.  VII.    Identification of proper filler rod and diameter.  VIII.   Set up arc welding equipment.  IX.     Select proper current, polarity and amperage.  XI.     Perform welds on tee, lap, corner and butt-joints in the flat, horizontal, vertical and overhead positions on stainless steel.  XIV.    Identify surface discontinuities and suggest corrective measures.  XV.     Perform minor troubleshooting on cutting equipment.  XVI.    Interpret weld symbols.  XVII.   Do assigned course book work. | 1. View the video, [Tig Welding Techniques Stainless Steel for Beginners](https://www.youtube.com/watch?v=Ds6cLG3ThDY&index=3&list=PLYJY8zATltMqi7z7WAWclArgWfAugDe8b" \t "_blank) (opens in new window)
2. Read the webpage [Selecting electrodes, shielding gas, and filler metal for GTAW](https://www.mwsco.com/kb/articles/19990330g.htm)
3. In class discussion on Stainless steel Tee-joints, Lap-joints, corner joints, butt-joints.
4. Complete the Lab: GTAW welding Tee-joints on stainless steel in all positions.
5. Complete the Lab: GTAW welding Lap-joints on stainless steel in all positions.
6. Complete the Lab: GTAW welding Corner-joints on stainless steel in all positions.
7. Complete the Lab: GTAW welding Butt-joints on stainless steel in all positions.
8. Complete the Stainless Steel GTAW welding Quiz before the due date.
 | * In class discussion on Stainless steel Tee-joints, Lap-joints, corner joints, butt-joints.
* Welding Inspections on GTAW welding Tee-joints on stainless steel in all positions.
* Welding Inspections on GTAW welding Lap-joints on stainless steel in all positions.
* Welding Inspections on GTAW welding Corner-joints on stainless steel in all positions.
* Welding Inspections on GTAW welding Butt-joints on stainless steel in all positions.
* Stainless Steel GTAW welding Quiz
* Welding Rubric
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| GTAW welding on Aluminum Plates |  I.      Follow shop safety practices.  II.     Maintain a clean and safe work area.  III.    Follow guidelines prescribed in course progress chart.  IV.     Perform safety inspections on GTAW equipment.  V.      Prepare carbon steel, stainless steel and aluminum plate.  VII.    Identification of proper filler rod and diameter.  VIII.   Set up arc welding equipment.  IX.     Select proper current, polarity and amperage.  XII.    Perform welds on tee, lap, corner and butt-joints in the flat horizontal, vertical and overhead positions on aluminum.  XIV.    Identify surface discontinuities and suggest corrective measures.  XV.     Perform minor troubleshooting on cutting equipment.  XVI.    Interpret weld symbols.  XVII.   Do assigned course book work. | 1. Complete the Lab: GTAW welding Tee-joints on aluminum plates in all positions.
2. Complete the Lab: GTAW welding Lap-joints on aluminum plates in all positions.
3. Complete the Lab: GTAW welding Corner-joints on aluminum plates in all positions.
4. Complete the Lab: GTAW welding Butt-joints on aluminum plates in all positions.
 | * Welding Inspections on GTAW welding Tee-joints on aluminum plates in all positions.
* Welding Inspections on GTAW welding Lap-joints on aluminum plates in all positions.
* Welding Inspections on GTAW welding Corner-joints on aluminum plates in all positions.
* Welding Inspections on GTAW welding Butt-joints on aluminum plates in all positions.
* Welding Rubric
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| GTAW Welding on Steel Pipe  | I.      Follow shop safety practices.  II.     Maintain a clean and safe work area.  III.    Follow guidelines prescribed in course progress chart.  IV.     Perform safety inspections on GTAW equipment.  V.      Prepare carbon steel, stainless steel and aluminum plate.  VI.     Prepare carbon steel pipe.  VII.    Identification of proper filler rod and diameter.  VIII.   Set up arc welding equipment.  IX.     Select proper current, polarity and amperage.  XIII.   Perform welds on carbon steel pipe in the 1G, 2G, 5G up, 5G dn and 6G positions.  XIV.    Identify surface discontinuities and suggest corrective measures.  XV.     Perform minor troubleshooting on cutting equipment.  XVI.    Interpret weld symbols.  XVII.   Do assigned course book work. | 1. View the video, [TIG Welding 6G Pipe Root Pass](https://www.youtube.com/watch?v=UKaPIpxIneE) (opens in new window)
2. In class and online discussion on GTAW pipe welding.
3. Complete the Lab: GTAW welding on plain carbon steel pipe in the 1G, 2G, 5G up, 5G down, and 6G positions
 | * In class discussion on GTAW pipe welding.
* Welding Inspections on GTAW welding on plain carbon steel pipe in the 1G, 2G, 5G up, 5G down, and 6G positions
* Welding Rubric
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## Welding Rubric

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|  | **Unacceptable****1 pts** | **Needs Improvement****2 pts** | **Acceptable****3 pts** | **Very Good****4 pts** |
| **Safety Practices**  | No welding helmet worn.No safety glasses worn.Student will not be allowed to continue the assignment.  | Two or more of the following safety practices violated:No welding gloves worn.Incorrect shoes worn.Incorrect clothing worn.Hot metal carried in gloved hand(s).  | No more than one safety practice NOT followed. The following safety practices were followed:Proper welding gloves worn.Proper shoes worn.Proper clothing worn. | All of the following safety practices were followed:Proper welding gloves worn.Proper shoes worn.Proper clothing worn.Pliers, etc. used to carry hot metal.  |
| **Bead Width**  | Bead unsuccessfully made.  | Bead narrower or wider than width of two electrodes used.  | The majority of the bead is equal to the width of two electrodes used.  | Bead width equals the width of two electrodes used |
| **Bead Shape**  | Bead unsuccessfully made.  | Bead does not form the acceptable shape - has one of following problems.Too flatToo high and does not blend into the base metal at the weld toes.  | Proper bead shape is not consistent for the entire length of the bead.  | Bead has an acceptable shape for the entire weld.  |
| **Weld Start & Finish**  | Bead unsuccessfully made.  | Bead has both of the following problems:Bead is rough, narrow and high.Weld crater is not filled in.  | Bead has one of the following problems:Bead is rough, narrow and high.Weld crater is not filled in.  | Bead has neither of the following problems:Bead is rough, narrow and high.Weld crater is not filled in.  |
| **Weld Defects**  | Bead unsuccessfully made.  | More than two of the following defects are present:Excess spatter is present.Bead is not uniform.Weld ripples are long and pointed.  | 1 of the following defects are present:Excess spatter is present.Bead is not uniform.Weld ripples are long and pointed.  | No weld defects are present.  |