Course Syllabus

WLDG1206 - Fundamentals of Gas Tungsten Arc Welding

Catalog Description: Fundamental principles of Gas Tungsten Arc Welding (GTAW) Includes setup and safe use of GTAW equipment as well as instruction in flat positions on joint designs.
Lecture Hrs = 3, Lab Hrs = 2

Prerequisite(s): None
Semester Credit Hours: 2
Lecture Hours per Week: 1
Lab Hours per Week: 3
Contact Hours per Semester: 64
State Approval Code: 4805080000

Course Subject/Catalog Number: WLDG 1206
Course Title: Fundamentals of Gas Tungsten Arc Welding

Course Rationale:
A student completing this class will be able to and know how to safely use GTAW equipment and learn that flat positions on joint designs.

Instructional Goals and Purposes:
The purpose of this course is to provide the learners with the basic knowledge of Gas Tungsten Arc Welding (GTAW)

Learning Objectives:
After completing this course, the student should be able to safely use GTAW equipment and understand the flat positions on joint designs.

Specific Course Objective:
Upon completion of this course, the student should be able to safely demonstrate and explain the following:

Gas Tungsten Arc Welding Equipment, Setup, Operation, and Filler Metals
I. Introduction (1ai, 1aii, 1aiiv, 1bi, 1bii, 1biv, 1bv, 1ci, 1cii, 1civ, 1cv)
a. inert gas
II. Tungsten (1ai, 1aii, 1aiiv, 1av, 1bi, 1bii, 1biii, 1biv 1bv, 1ci, 2ai, 2aii, 2di, 2ci, 2ciii)
a. collet
III. Types of Tungsten Electrodes (1ai, 1aii, 1aiii, 1bii, 1biv, 1ci, 1civ, 2ai, 2aii, 2di)
a. tungsten
b. pure tungsten
c. thoriated tungsten
d. zirconium tungsten
e. cerium tungsten
f. lanthanum tungsten
g. alloy not specified

IV. Shaping the Tungsten (1ai, 1aii, 1aiii, 1aiiv, 1bi, 1bii, 1biii, 1biv, 1bv, 2ai, 2aiii)
   a. grinding
   b. breaking and re-melting
   c. chemical cleaning and pointing
   d. pointing and re-melting

V. Welding Equipment (1ai, 1aii, 1aiii, 1aiiv, 1bi, 1bii, 1biii, 1biv, 1bv, 2ai, 2aiii, 2aiii)
   a. torches
   b. hoses
   c. nozzles
   d. flow meter

VI. Types of Welding current (1ai, 1aii, 1aiii, 1aiiv, 1bi, 1bii, 1biii, 1biv, 1bv, 2ai, 2aii, 2aiii)
   a. cleaning action
   b. frequency
   c. spark gap oscillator

VII. Shielding Gases (1ai, 1aii, 1aiii, 1aiiv, 1bi, 1bii, 1biii, 1biv, 1bv, 2ai, 2aii)
   a. helium
   b. hydrogen
   c. nitrogen
   d. hot start
   e. pre-flow and post-flow
   f. gas flow rate

VIII. Remote Controls (1ai, 1bi, 1bii, 1ci, 2ai)

**Gas Tungsten Arc Welding of Plate**

I. Introduction (1ai, 1aii, 1aiii, 1aiiv, 1bi, 1bii, 1biii, 1biv, 1bv, 1ci, 1cii, 1civ, 1cv)

II. Torch Angle (1ai, 1aii, 1aiii, 1aiiv, 1bi, 1bii, 1biii, 1biv, 1bv, 1ci, 2ai, 2ei, 2eii, 2eiii)

III. Filler Rod Manipulation (1ai, 1aii, 1aiii, 1aiiv, 1bi, 1bii, 1biii, 1biv, 1bv, 1ci, 2ai, 2ei, 2eii, 2eiii)

IV. Tungsten Contamination (1ai, 1aii, 1aiii, 1aiiv, 1bi, 1bii, 1biii, 1biv, 1bv, 1ci, 2ai, 2ei, 2eii, 2eiii)
   a. surface tension
   b. oxide layer

V. Current setting (1ai, 1ci, 1civ, 2diii)

VI. Experiments (1ai 1aii, 1aiii, 1aiiv, 1bi, 1bii, 1biii, 1biv, 1bv, 1ci, 1civ, 2ai, 2aii, 2aiii, 2bii, 2ci, 2ei)

VII. Gas Flow (1ai, 1aii, 1ci, 2ai, 2ci 2dii, 2eii)

VIII. Practice Welds (1ai, 1aii, 1aiiv, 1av, 2bi, 2bii, 2biii, 2ci, 2cii, 2dii, 2ei 2eii, 2eiii)
   a. low carbon and mild steels
   b. stainless Steel
   c. aluminum
   d. metal preparation

**Gas Tungsten Arc Welding of Pipe**

I. Introduction (1ai, 1aii, 1aiiv, 1bi, 1bii, 1biv, 1bv, 1ci, 1cii, 1civ, 1cv)

II. Practices (1ai, 1aii, 1aiii, 1bi, 1ci, 1ciii, 1civ, 1cv, 2ai,)

III. Joint Preparation (1ai, 1aii, 1aiii, 1bi, 1bii, 1biii, 1ci, 1cii, 2ai, 2aiii, 2ci, 2dii)

IV. Root (1ai, 1aii, 1aiii, 1bi, 1bii, 1biii, 1ci, 1cii, 2ai, 2aii, 2ci, 2dii)
   a. penetration
   b. reinforcement
   c. incomplete fusion
   d. concave root surface
      1. Concavity
   e. excessive root reinforcement
      1. Grapes
      2. Stress points
   f. root contamination

V. Backing gas (1ai, 1aii, 1aiii, 1ci, 2ai, 2aiii, 2ci, 2di, 2dii, 2ei, 2eii)
VI. Filler Metal (1ai, 1aii, 1aiii, 1biv, 1bv, 1ci, 2ai, 2aii, 2dii, 2diii, 2eiii)
   a. consumable inserts
VII. Hot Pass (1ai 1aii, 1bi, 1bii, 1biii, 1biv 1ci, 2ai)
VIII. Filler Pass (1ai 1aii, 1bi, 1bii, 1biii, 1biv 1ci, 2ai)
IX. Cover Pass (1ai 1aii, 1bi, 1bii, 1biii, 1biv 1ci, 2ai)

Grading Policy:
Your Grade will be determined from:

1. Assignments (10%)
2. Lab work (30%)
3. Quiz’s (10%)
4. Attendance (20%)
5. Exams (30%)

Textbook and Supplies Requirement:

1. Pen and Pencil
2. Notebook
4. Welding hood
5. Welding gloves
6. Safety Glasses
7. Boots
8. Welding shirt
9. Pliers
1. BASIC SKILL COMPETENCIES

A. Basic Skills
i. Reading: Locate, understand and interpret written information in prose and in documents such as manuals, graphs and schedules.
ii. Writing: Communicate thoughts, ideas, information and messages in writing, and create documents such as letters, directions, manuals, reports, graphs, and flow charts.
iii. Arithmetic & Mathematical Operations: Perform basic computations and approach practical problems by choosing appropriately from a variety of mathematical techniques.
iv. Listening: Receive, attend to, interpret, and respond to verbal messages and other cues.
v. Speaking: Organize ideas and communicate orally.

B. Thinking Skills
i. Creative Thinking: Generate new ideas.
ii. Decision Making: Specify goals and constraints generate alternatives, consider risks and evaluate and choose the best alternative.
iii. Problem Solving: Recognize problems and devise and implement plan of action.
iv. Visualize ("Seeing Things in the Mind's Eye"): Organize and process symbols, pictures, graphs, objects, and other information.
v. Knowing how to learn: use efficient learning techniques to acquire and apply new knowledge and skills
vi. Reasoning: Discover a rule or principle underlying the relationship between two or more objects and apply it when solving a problem.

C. Personal Qualities
i. Responsibility: Exert a high level of effort and persevere toward goal attainment.
ii. Self-Esteem: Believe in one's own self-worth and maintain a positive view of oneself.
iii. Sociability: Demonstrate understanding, friendliness, adaptability, empathy, and politeness in group settings.
v. Integrity & Honesty: Choose ethical courses of action.
2. WORKPLACE COMPETENCIES

A. Resources:
   i. **Time:** Select goal-relevant activities, rank them, allocate time, and prepare and follow schedules.
   ii. **Money:** Use or prepare budgets, make forecasts, keep records, and make adjustments to meet objectives.
   iii. **Material & Facilities:** Acquire, store, allocate, and use materials or space efficiently.
   iv. **Human Resources:** Assess skills and distribute work accordingly, evaluate performance and provide feedback.

B. Interpersonal Skills:
   i. **Participate as Member of a Team:** Contribute to group effort.
   ii. **Teach Others New Skills.**
   iii. **Serve Clients/Customers:** Work to satisfy customers' expectations.
   iv. **Exercise Leadership:** Communicate ideas to justify position, persuade & convince others, responsibly challenge existing procedures & policies.
   v. **Negotiate:** Work toward agreements involving exchange of resources, resolve divergent interests.
   vi. **Work with Diversity:** Work well with men and women from diverse backgrounds.

C. Information:
   i. **Acquire and Evaluate Information.**
   ii. **Organize and Maintain Information.**
   iii. **Interpret and Communicate Information.**
   iv. **Use computers to process information.**

D. Systems:
   i. **Understand Systems:** Know how social, organizational and technological systems work and operate effectively with them.
   ii. **Monitor & Correct Performance:** Distinguish trends, predict impacts on system operations, and diagnose deviations in systems' performance.
   iii. **Improve or Design Systems:** Suggest modifications to existing systems and develop new or alternative systems to improve performance.

E. Technology
   i. **Select Technology:** Choose procedures, tools or equipment including computers and related technologies.
   ii. **Apply Technologies to Task:** Understand overall intent and proper procedures for setup and operation of equipment.
   iii. **Maintain and Troubleshoot Equipment:** Prevent, identify, or solve problems with equipment, including computers and other technologies.