

COURSE OUTLINE

Gas Tungsten Arc Welding

Course Description

WE 215 Gas Tungsten Arc Welding. 3 hours credit. Prerequisite: A score at a pre-determined level in reading, writing, and math on a diagnostic instrument selected by the department. This course will enable the student to develop proficiency in gas tungsten arc welding fundamentals. The student will study fundamentals of welding steel and aluminum in various positions with the gas tungsten arc process, as well as prepare metals prior to the welding process. Safety practices are emphasized.

Course Relevance

The principles learned in this course will allow the student to understand how proper fundamental skills in gas tungsten arc welding and process analysis will prepare a worker for a position in a career of welding. A career in welding offers many options for employment and personal development. From industry production lines, to the laboratory, to research and development, to national defense, to sales and repair, the varied welding industry virtually every industry.

Required Materials

Althouse, A. D. (2004). *Modern welding*. Tinley Park, IL: Goodheart-Willcox Company, Inc.

Learning Outcomes

The intention is for the student to be able to

1. Demonstrate safety in the use of gas tungsten arc welding
2. Demonstrate basic gas tungsten arc skills
3. Explain the fundamentals theories of gas tungsten arc welding

Primary Learning PACT Skills that will be DEVELOPED and/or documented in this course

Through the student's involvement in this course, he/she will develop his/her ability in the following primary PACT skill areas:

1. Critical Thinking
 - Through the analysis of proper welding fundamentals, the student will recognize and understand the role these fundamentals play in obtaining a high quality weld.
2. Problem Solving
 - Through the analysis of the gas tungsten arc welding process the student will be able to identify strengths and/or limitations associated with this process and make decisions regarding the applications of the gas tungsten arc process based on that knowledge.
3. Field-Related Technology

- Through the use of current industry standards and technology the student will be able to perform basic welding functions with a high level of proficiency.

Secondary skills (developed but not documented):

Health Management
Reading

Major Summative Assessment Task(s)

These learning outcomes and the primary Learning PACT skills will be demonstrated by

1. Exhibiting the ability to perform specific weld profiles using the gas tungsten arc process

Course Content

- I. Themes – Key recurring concepts that run throughout this course:
 - A. Safety
 - B. Quality
- II. Issues – Key areas of conflict that must be understood in order to achieve the intended outcome:
 - A. The force of gravity in relation to molten metal and various welding positions
 - B. The impact of critical welding fundamentals in relation to proper weld profiles
- III. Concepts – Key concepts that must be understood to address the issues:
 - A. Heat Selection
 - B. Proper joint preparation
 - C. Process analysis
 - D. Terminology
 - E. The principles of electrode manipulation
- IV. Skills/Competencies – Actions that are essential to achieve the course outcomes:
 - A. Perform a fillet weld on a sheet of metal in the flat position using the Gas Tungsten Arc Welding process
 - B. Perform a field strip and name all consumable parts of a Gas Tungsten Arc welding gun
 - C. Demonstrate the ability to change out the shielding gas cylinder on a Gas Tungsten Arc welding station

Learning Units

- I. Safety in the welding shop
 - A. Accidents
 - B. General shop safety
 - C. Safety in the welding environment
 - D. Oxy-fuel Gas Welding and cutting safety
 - E. Arc Welding and cutting safety
 - F. Resistance welding safety
 - G. Safety around welding robots
 - H. Special welding process safety

- II. GTAW and GMAW equipment and supplies
 - A. The Gas Tungsten Arc Welding station
 - B. Arc Welding Power Sources for GTAW
 - C. Balanced and unbalanced AC waves
 - D. Shielding gases used with GTAW
 - E. Electrode leads and hoses used for GTAW
 - F. GTAW torches
 - G. Tungsten electrodes
 - H. Fillers metals used with GTAW
 - I. The Gas Metal Arc Welding station
 - J. Arc welding power sources of GMAW
 - K. Wire feeders used with GMAW
 - L. GMAW shielding gases
 - M. The GMAW welding gun
 - N. GMAW electrodes
 - O. Smoke-extracting systems
 - P. Flux Cored Arc Welding (FCAW)
 - Q. The Flux Cored Arc Welding station
 - R. Flux Cored Arc Welding electrode wire
 - S. Accessory devices
 - T. Filter lenses or use when gas-shielded arc welding
 - U. Protective clothing

- III. Gas Tungsten Arc welding
 - A. Gas Tungsten Arc Welding principles
 - B. GTAW power sources
 - C. Setting up the GTAW station
 - D. Preparing metal for welding
 - E. Methods of starting the arc
 - F. Gas Tungsten Arc Welding techniques
 - G. Shutting down the GTAW station
 - H. Welding joints in the flat welding position
 - I. Welding joints in the horizontal welding position
 - J. Welding joints in the vertical welding position
 - K. Welding joints in the overhead welding position
 - L. Semiautomatic welding
 - M. Automatic and mechanized GTAW
 - N. GTAW troubleshooting guide

Learning Activities

Learning activities will be geared towards designed hands-on exercises in both booth and shop. Classroom lecture is designed to enable the student to understand the key principles in process analysis, welding fundamentals, and correct use of associated equipment.

Grade Determination

The student will be graded on completion of assessment tasks, learning activities, adequate participation (discussion) and the final project.