STARK STATE COLLEGE

GENERAL SYLLABUS

Course Information

Course Name: 3G and 4G Welding Certification Exam Preparatory
Course Number: MST136

Required Materials

Textbook(s): ISBN: 9780357377659 Title: Welding: Principles and Applications Publisher: Cengage Author: Larry Jeffus Edition: 9th Copyright Year: 2021
Required Readings: None
Additional Materials: None

Course Outline/Calendar

The date of coverage and order of coverage may be modified based on the faculty member and events beyond the control of faculty members that interfere with class times and teaching.

16-Week Course Calendar

Week	Chapter/Topic/Lab
1	Introduction and orientation to the course and a discussion of course policies, procedures and requirements, A review of welding safety and the equipment used for the course. Begin reviewing and understanding the various tools used for alignment and proper fit-up.
2	Using proper cutting techniques cut and prepare coupons for 3G position welding. Cut plate to be used for backing strips, Setup coupons for 7018 in a 3G position - Fit up joints using plate, backing strips, and fit-up tools. Use fit-up gauges and measuring devices to check joint fit-up. All welds must be made based on AWS and ASTM codes and standards.
3	Setup coupons for 7018 in a 3G position - Fit up joints using plate, backing strips, and fit-up tools. Use fit-up gauges and measuring devices to check joint fit-up. All welds must be made based on AWS and ASTM codes and standards, Review for Exam 1.
4	Exam 1, Setup coupons for 7018 in a 3G position - Fit up joints using plate, backing strips, and fit-up tools. Use fit-up gauges and measuring devices to check joint fit-up. All welds must be made based on AWS and ASTM codes and standards and according to the assigned gap.
5	Setup coupons for 7018 in a 4G position - Fit up joints using plate, backing strips, and fit-up tools. Use fit-up gauges and measuring devices to check joint fit-up. All welds must be made based on AWS and ASTM codes and standards. Review for Exam 2.
6	Exam 2, perform 3G weld with backing using 7018 filler
7	Perform 3G weld with backing using 7018 filler

Week	Chapter/Topic/Lab
8	Perform 3G weld with backing using 7018 filler, perform inspection processes
9	Perform 4G weld with backing using 7018 filler
10	Perform 4G weld with backing using 7018 filler
11	Perform inspection processes, review Oxy/fuel set up and safety. Hand cut coupons or use a bandsaw.
12	Perform groove welds with 7018 filler in the 3G position
13	Perform grove welds with the 7018 filler in the 3G position
14	Perform groove welds with 7018 filler in the 3G position
15	Complete unfinished welds
16	Final Exam

8-Week Course Calendar

Week	Chapter/Topic/Lab
1	Safety and Fundamentals - Classroom: Introduction to welding, shop safety, proper use of Personal Protective Equipment (PPE), and the safe operation of equipment like grinders and cutting torches. Introduction to welding terminology and symbols. Lab: Equipment setup and shutdown procedures. Practice oxy-fuel or plasma cutting operations and basic metal preparation. Initial practice with striking an arc and running stringer beads in the flat (1G) position using E6010 and E7018 electrodes.
2	Joint Preparation and 3G Introduction - Classroom: Discussion on base metal preparation (beveling, root gap, land) for V-groove welds and proper fit-up techniques, adhering to AWS D1.1 specifications. Introduction to the vertical (3G) position. Lab: Prepare practice plates (typically 3/8" thick with a 22.5° bevel and 1/4" root gap). Practice running stringer beads in the vertical-up (3G) position.
3	Vertical Position (3G) Fillet Welds- Classroom: Focus on the techniques for welding in the vertical position, discussing proper amperage settings, arc control, and weave patterns for vertical progression. Lab: Practice making vertical fillet (3F) welds (lap and T-joints) using E7018 electrodes, focusing on uniform bead appearance and fusion.
4	Vertical Position (3G) Groove Welds and Backing- Classroom: Discussion on multi-pass welding procedures for groove welds in the 3G position, including root pass with E6010, hot pass, fill, and cap with E7018. Lab: Practice 3G V-groove welds on plates with a backing strip. Focus on achieving proper penetration and a clean, consistent finished weld.
5	Overhead Position (4G) Introduction and Fillets- Classroom: Introduction to the overhead (4G) position, emphasizing differences in technique, body positioning, and strategies for controlling the molten puddle against gravity. Lab: Practice running stringer beads in the overhead position. Begin practicing overhead fillet (4F) welds on T-joints using E7018 electrodes
6	Overhead Position (4G) Groove Welds with Backing- Classroom: Discussion of multi-pass groove welding in the 4G position, covering root, hot pass, fill, and cap techniques. Lab: Practice 4G V-groove welds on plates with a backing strip, applying the learned techniques for overhead welding and aiming for sound, defect-free welds.
7	Destructive Testing and Code Review - Classroom: Review of the AWS D1.1 code requirements for welder performance qualification, including visual inspection criteria and destructive testing methods (e.g., bend tests). Discussion of common weld discontinuities and failures. Lab: Continue practicing 3G and 4G groove welds. Instructors will prepare and test student plates using guided bend tests to provide feedback on weld quality and technique.
8	Qualification Exams - Classroom: Final of safety protocols, code requirements, and job-readiness skills (e.g., blueprint reading, employability skills).