

Grade 11B Basic GMAW (MIG) Procedures (30S)

Course Code: 8474

Credit: 1.0 Credit

Program: Senior Years Technology Education Program (SYTEP)

School: Swan Valley Regional Secondary School

Program Cluster: Welding Technology

Course Length: Approximately 110 instructional hours (one semester)

Instructor: Mr. Jeremy Hicks

Course Description

Basic GMAW (MIG) Procedures (30S) develops foundational skills in semi-automatic wire feed welding and visual quality inspection.

Students learn to select and inspect equipment, shielding gases, electrodes, and consumables; establish appropriate machine settings; prepare and fit joints; and produce consistent welds in basic positions. Practical work emphasizes safe setup, bead control, flat and horizontal fillet welds, troubleshooting, and correction of common discontinuities.

Instruction reflects the updated Manitoba curriculum and Apprenticeship Manitoba Level 1 outcomes for weld processes, quality inspection, and semi-automatic wire feed welding.

Course Goals

Upon successful completion of this course, students will:

- Demonstrate safe work practices for GMAW equipment, shielding gases, tools, and materials.
- Explain the basic principles, terminology, equipment, and applications of semi-automatic wire feed welding.
- Select suitable electrodes, shielding gases, polarity, and machine settings for assigned work.
- Set up, inspect, operate, troubleshoot, and shut down GMAW equipment.
- Prepare, fit, tack, and weld basic joints in the flat and horizontal positions.
- Control work angle, travel angle, contact-tip-to-work distance, travel speed, and bead placement.
- Identify the causes and corrections for common weld discontinuities.
- Inspect completed welds and demonstrate consistent workmanship and workplace professionalism.

Course Content

GMAW Safety and Shop Procedures (8 Hours)

Students review electrical, arc-radiation, fume, fire, compressed-gas, pinch-point, hot-metal, and grinding hazards. They apply required PPE, ventilation, equipment inspection, and housekeeping procedures.

GMAW Principles and Terminology (10 Hours)

Students examine the operating principles, current types, polarity, modes of metal transfer, applications, advantages, limitations, and terminology associated with GMAW and related semi-automatic wire feed processes.

Equipment, Shielding Gases and Consumables (10 Hours)

Students identify power sources, wire feeders, guns, liners, drive rolls, contact tips, nozzles, work leads, regulators, flowmeters, shielding gases, solid wires, and classifications used for mild-steel welding.

Machine Setup, Parameters and Troubleshooting (12 Hours)

Students inspect and assemble equipment, load wire, connect shielding gas, set polarity, establish voltage and wire-feed speed, verify gas flow, and troubleshoot common feeding, electrical, and shielding problems.

Flat-Position Beads and Technique Development (12 Hours)

Students develop consistent starts, stops, stringer beads, overlapping beads, travel speed, work angle, travel angle, and contact-tip-to-work distance on mild-steel plate.

Flat-Position Fillet Welds (18 Hours)

Students prepare and weld lap joints, T-joints, and corner joints in the flat position. Emphasis is placed on fusion, leg size, profile, tie-in, crater filling, and consistent bead placement.

Horizontal-Position Fillet Welds (16 Hours)

Students perform horizontal fillet welds using appropriate parameters and manipulation while controlling bead placement, undercut, overlap, and distortion.

Basic Groove Welds and Joint Assembly (10 Hours)

Students prepare, align, tack, and weld basic square-groove or prepared-groove joints as appropriate, using clamps, fixtures, and sequencing to maintain alignment.

Quality Inspection, Repair and Final Assessment (14 Hours)

Students use visual-inspection criteria and measuring tools to identify discontinuities, determine likely causes, make appropriate parameter or technique changes, repair welds when permitted, and complete final practical assessments or a small welded project.

Assessment

Student achievement will be evaluated using the following categories:

- **Classwork:** 20%
- **Practical Skill Demonstrations:** 30%
- **Tests and Quizzes:** 30%
- **Projects:** 20%

Assessment emphasizes both theoretical knowledge and practical skill development. Students are expected to demonstrate safe work habits, active participation, improving technical skill, and quality workmanship throughout the course.

Required Personal Protective Equipment

Students are required to wear appropriate PPE during all shop activities. If a student does not have the following PPE, it will be provided to them.

- CSA-approved steel-toe boots or toe caps
- Safety glasses
- Hearing protection
- Welding gloves
- Appropriate protective clothing and welding helmet as required

Students who do not wear the required PPE may not be permitted to participate in shop activities.

Student Expectations

Students are expected to:

- Attend class regularly and arrive on time.
- Follow all shop safety rules, safe work procedures, and teacher instructions.
- Wear required PPE before entering the shop.
- Respect classmates, instructors, equipment, materials, and facilities.
- Maintain a clean and organized work area.
- Participate fully in classroom and shop activities.
- Demonstrate responsibility, teamwork, communication, and professionalism.
- Complete assignments, weld samples, tests, and projects to the best of their ability.

Unsafe behavior may result in removal from shop activities until safety expectations have been met.

Cell Phone Policy

To maintain a safe and focused learning environment, students are required to place their cell phones in the classroom phone lockbox at the beginning of each class. Phones will remain securely stored for the duration of the class and will be returned at the end of the class period.

Students do not require personal cell phones during Welding Technology. School-issued laptops and classroom resources will be provided for online learning, research, quizzes, drawings, documentation, or other educational tasks.

This policy minimizes distractions, promotes engagement, and supports a safe working environment in the welding shop.

Curriculum Alignment

This course addresses learning outcomes from the updated Manitoba Grade 11B Basic GMAW (MIG) Procedures curriculum and is aligned with selected Apprenticeship Manitoba Level 1 technical-training outcomes.

Primary Apprenticeship Manitoba units addressed include:

- A8 Weld Process and Quality Inspection I
- A12 Semi-Automatic Wire Feed Welding I

Supporting outcomes related to trade safety, career education, trade communication, trade mathematics, tools and equipment, materials and consumables, and workplace professionalism are integrated throughout the course.