**Course:** **A Practical Certificate in Welding 101**

**Contact Hours:** **30**

**Pre-requisite:** **Basic Mathematics and Science**

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## Abstract

This course will introduce individuals to various welding techniques by providing the technical and practical knowledge required to carry out basic welding using various processes such as Manual Metal Arc (Stick) welding, Metal Inert Gas (MIG) welding and Oxy/Fuel welding.

In order to ensure that the learner fully understands the concepts relating to these various welding processes, the course content was structured to maximized the contact hours allocated for practical work. This course will be delivered through a combination of classroom theory and practical activities in our fully equipped welding workshop.


## Target Audience

This course is ideally suited for anyone who is new to welding and would like to learn the basics. It will provide you with the skills to complete that small fabrication or repair project and will lay the foundation for progression to more intermediate and advanced training and certification in welding.

## Learning outcomes

On completion of this course, learners will be able to:

1. Perform basic welding using the Manual Metal Arc Welding process (MMAW)
2. Perform basic welding using the Manual Inert Gas Welding process (MIG)
3. Perform basic welding using the Oxyacetylene (Oxy/Fuel) Welding process (OAW)
4. Assemble/Fabricate basic components

## Course Content

1. **Perform basic welding using the Manual Metal Arc Welding process (MMAW)**

   *Safety:* PPE (Headshield, Filter lens, cover lens, Light reactive filters, protective footwear, eye protection, flame retardant overalls, leather apron, skull cap, leather jacket); Welding fumes (Types of fumes (visible (particulate), invisible (gaseous), carbon monoxide), Electrical shock hazards; Arc Radiation (visible light, infra-red, ultraviolet, screening types and purpose), Avoiding hazards (Hot metal, slag, sparks).

   *Equipment Used*: Arc Welding machine (AC/DC), Welding leads (welding, return, earth), Welding current and Polarity; Electrodes (Cellulosic, rutile, basic); Electrode holders (fully insulated, partially insulated), Preparing and finishing equipment (grinders, files, chipping hammer, wire brushes, chop saw, vice, sand bucket).

   *Applications:* Produce standard welded joints while observing sequence and safety rules in preparing the equipment (amperage, length of arc, speed of travel, type of electrode, angle of electrode, welding techniques, positioning of materials).

2. **Perform basic welding using the Manual Inert Gas Welding process (MIG)**

   *Equipment Used*: Welding machine (AC/DC), Welding leads (construction, supply to gun, return, earth), Gun (goose neck, pistol, push, push-pull, reel-on-gun, water cooled, air cooled), Preparing and finishing equipment (grinders, files, chipping hammer, wire brushes, chop saw, vice, sand bucket).

   *Applications:* Produce standard welded joints while observing sequence and safety rules in preparing the equipment (Electrodes – solid wire/cored wire, welding current and polarity, welding voltages, types of shielding gases, welding positions – flat/horizontal/vertical/upwards, welding techniques); Post welding activities (cleaning, slag removal, spatter removal, wiring brushing, removal of excess weld metal where required).

3. **Perform basic welding using the Oxyacetylene (Oxy/Fuel) Welding process (OAW)**

   *Safety:* PPE (googles, Headshield, Filter lens, cover lens, protective footwear, eye protection, flame retardant overalls, leather apron, skull cap, leather jacket); Hazards (sources of combustion, storage and handling of compressed gas cylinders); Avoiding hazards (Hot metal, slag, sparks).

*Equipment Used*: Cylinders (oxygen, acetylene); Pressure regulators (single stage, two-stage); flashback arrestors, hoses, hose check valves. Hose connectors, blowpipe/torch, nozzles (sizes, selection).

*Applications:* Produce standard welded joints while observing sequence and safety rules in preparing the equipment (filler rods – types and sizes, nozzle sizes, gas pressures), welding techniques, positioning of materials).

**4. Assemble/Fabricate basic components**

Produce basic fabricated steelwork assemblies safely (brackets or frames)

## Assessment Criteria

| In order to achieve Learning Outcome… | The Learner must… |
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| 1 Perform basic welding using the Manual Metal Arc Welding process (MMAW) | 1.1 Identify and describe the Personal Protective Equipment used in Manual Metal Arc welding.<br>1.2 Identify the health and safety hazards associated with Manual Metal Arc Welding.<br>1.3 Identify and describe the function and safe use of the welding equipment and tools.<br>- Select type of electrode<br>- Select size of electrode based on material thickness and type of joint<br>- Select welding current & polarity<br>- Apply current range to electrode size<br>1.4 Apply standard welding techniques to produce standard welded joints safely.<br>1.5 Visually check welds for defects/flaws. |
| 2 Perform basic welding using the Manual Inert Gas Welding process (MIG) | 2.1 Identify and describe the function and safe use of the welding equipment and tools.<br>- Wire feed unit/wire reel<br>- Wire feed speed control<br>- Select size of electrode based on material thickness and type of joint |

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| | - Select welding current & polarity<br>- Shielding gas supply, type, pressure regulation and flow.<br>2.2 Apply standard welding techniques to produce standard welded joints safely.<br>2.3 Visually check welds for defects/flaws. |
| 3 Perform basic welding using the Oxyacetylene (Oxy/Fuel) Welding process (OAW) | 1.6 Identify and describe the Personal Protective Equipment used in Oxy/Fuel welding.<br>1.7 Identify the health and safety hazards associated with Oxt/Fuel Welding.<br>1.8 Identify and describe the function and safe use of the welding equipment and tools.<br>- Select filler rod type and size based on material thickness and type of joint<br>- Select nozzle size based on joint thickness<br>- Select operating gas pressure based on application<br>- Function of flux<br>1.9 Apply standard techniques to cut material safely<br>1.10 Apply standard welding techniques to produce standard welded joints safely.<br>1.11 Visually check welds for defects/flaws |
| 4 Assemble/Fabricate basic components | 4.1 Produce basic fabricated steelwork assemblies safely (brackets or frames) |

**Essential Learning Resources:**

- **Websites**: Learners will be provided with a range of various websites relating to welding. These may include: publications, data sheets and supporting videos. These additional resources would be directed during the delivery of this course.

- **Textbook**: Practical Welding (Motivate Series) by Gibson, Stuart W. published by Macmillan Education