RENOWN ENGINEERING LTD

# FABRICATION AND WELDING

***A Short Guide***

Fabrication and welding are extremely common process in mechanical engineering. They allow for metal structures to be manufactured in a wide range of shapes and sizes, for various applications.

### Fabrication

Metal fabrication refers to the building of metal structures through a variety of processes including cutting, bending, profiling, welding and assembling.

Raw materials such as steel, aluminium, ferrous and non-ferrous are all used in fabrication processes. They are usually procured by the fabricator in raw form, then cut, bent and formed to the required sizes in preparation for welding.

### Welding

The welding is the most important stage of fabrication, as the prepared parts are welded together using a variety of different techniques and procedures.

Typically, welding processes include Arc, a welding technique that uses a welding power supply to create an electric arc between an electrode on the welding rod and the material - the current creates enormous heat to melt the base material.

Common welding processes include:

- **SMAW** shielded metal arc welding (SMAW), also known as Manual metal arc welding (MMA), is one of the most common Arc welding processes. SMAW uses a consumable flux-coated electrode that protects the weld area from oxidation and contamination by producing carbon dioxide ($CO_2$) gas during the welding process.

- **GMAW** MIG (Metal inert gas), a semi-automatic or automatic process using a continuous wire feed. Since the electrode is continuous, welding speeds are greater for GMAW than for the abovementioned SMAW.

- **GTAW** Gas tungsten arc welding or TIG (Tungsten inert gas), using a semi-inert gas mixture is a manual welding process that uses a non-consumable tungsten electrode, an inert or semi-inert gas mixture, and a separate filler material. TIG welding is usually requires a high level of operator skill and is especially good for welding thin materials. The process is relatively slow, but can produce high quality welds.

- **FCAW** (flux-cored arc welding) Uses similar equipment but uses wire consisting of a steel electrode surrounding a powder fill material. This cored wire is more expensive than the standard solid wire and can generate fumes and/or slag, but it permits even higher welding speed and greater metal penetration.

### Examples of use for metal fabrication and welding

Metal fabrication and welding can be applied in most industries: construction, engineering, marine, civil engineering, onshore or offshore. It is applicable to any scenario where metal material is required to be manipulated and joined to specific designs.

### Useful links and further information

The Welding Institute

British Stainless Steel Association

City and Guilds—fabrication and welding courses and qualifications

British Standards Institute—welding