



The influence of shielding gas quantity on GMAW weld quality

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Abstract

Shielding gas is required in gas metal arc welding (GMAW) systems at adequate flow rates to provide sufficient protection for the weld joint area from the surrounding atmosphere which could cause the formation of internal weld joint defects, reduce weld joint shear strength or cause the formation of objectionable surface splatter. To ascertain optimum gas flow rates, it is important to probe weld quality with visual, destructive and non-destructive weld tests. It was found that for the welding tasks investigated, which are typical of many welding activities under normal condition, the gas quantities required could be significantly reduced and quality still be preserved.

Key words: *GMAW, Shielding gas, Welding, Specimen radiographs, Weld splatter*

1. Introduction

The GMAW process accounts for 60% of all manufacturing related welding activity in North America, and thus has significant economic importance. The process equipment normally includes a wire feeder with a double drive roll system incorporating a wire feed speed control, current control, an arc voltage control, gas flow on/off control with a post flow and an amperage on/off control. Also normally included is a gas flow metering system comprised of a pressurized shielding gas storage bottle, gas flow regulator, inductance/slope control, gas hose feed and tip nozzle, as well as power conductors, welding gun, ground system, ammeter, volt meter and wire feed meter.

GMAW uses a special constant voltage power source, and involves feeding a small diameter wire from a spool to the welding head where it picks up the power and transfers it to the welding arc, which, along with the weld pool, is protected by a shielding gas from atmospheric contamination. The power supply ensures very small arc voltage variation regardless of current, and arc stability is maintained by keeping the wire feed speed highly constant, normally with a guided double drive wire feed system. One of the simplest and most representative models of the typical gas metal arc welding process is shown in Figure 1 (Materials Engineering Group, 2000).

A welding procedure in normal use for a girt plate clip fabricated in large quantities at the facilities of the Industrial Maintenance Services (IMS) company for