Appendix P: Twin Wire Welding Process

The Tandem wire metal inert gas (MIG) shielded welding process (sometimes referred to as "twin wire or double wire welding) employs two wires which are usually continuously fed simultaneously through a special welding torch and nozzle and are consumed to form a single weld pool. A typical system normally comprises two separate wire feed units and two power sources, so the wires can be operated independently i.e. with different wire diameters, amperage and arc voltage levels or operating modes (continuous or pulse). The two wires are electrically isolated from each other within the contact tip to enable two separately generated arcs to operate in close proximity to each other. Welding normally takes place with the two wires in line along the joint line, although the torch can be rotated across the joint to give a wider weld bead. The lead arc provides penetration, whereas, the trail arc controls weld bead appearance.

The Tandem MIG welding process offers high weld metal depositions rates together with substantially faster welding travel speeds when compared with the conventional single wire MIG welding process resulting in a significant potential increase in productivity and lower production costs. It also promotes superior weld quality by reducing the overall heat input (with a corresponding effect on distortion) , reduces the risk of burn through on thin materials, maintains low spatter levels, produces good penetration on thick materials, improves weld bead profiles and wetting at weld toes, reducing the incidence of undercut and has generally improved gap filling capabilities. It is also claimed that the Tandem MIG process reduces porosity because the elongated weld pool extends the degasification time before solidification occurs.

The Tandem MIG process has been applied in the automotive, shipbuilding, construction equipment, road and railway vehicles and vessel construction industry sectors welding lap and tee joints (fillet weld) and butt joints in aluminium alloys, structural carbon steels and other materials.

Due to the precision required in positioning the bulky torch, the process is primarily adopted for robotic or mechanised welding applications. Joint accessibility is also restricted because of the torch size.