GEP ALUMINIUM WELDING

Introduction:
Welding of aluminium requires certain special techniques to ensure successful outcomes. These guidelines will provide some important considerations to be applied.

1. Aluminium welding is mainly workshop based due to the important environmental conditions required for successful welding outcomes. We discuss for example the importance of not re-exposing prepared surfaces to oxygen. Aluminium forms a barrier oxide film when exposed to the atmosphere that is bonded strongly to its surface and, that if damaged, re-forms immediately in most environments.

2. Handling of aluminium sheets and other shapes in workshops requires much care. The hard oxide surface is susceptible to scratches which lead to stress concentrations and contribute to fatigue. Handling scratches and the use of scribes to mark out work pieces must be avoided.

3. As with all machining of all materials special considerations should be given to jigs, fixtures, tool materials, angles, speeds and feed rates to obtain optimum results. Selected guidelines follow. Consult as well with competent material suppliers and tool suppliers.

4. Preparation and cleaning for welding is important. Clean within four hours of welding (to avoid oxide re-build). Perform degreasing followed by stainless steel wire brushing down to the metal substrate over the area within 50mm of the weld to remove the oxide skin.

5. Avoid high humidity conditions – max 60-75%, to avoid surface moisture forming.

6. Preheating to a maximum of 180^0C can help maintain the weld-bubble and a more stable arc, and should thus be applied. Preheating also helps to drive off any surface moisture.

7. Protective shrouding must be used for - Argon inert gas flow to protect against atmospheric oxygen and hydrogen (argon assists to maintain an oxide free pool).

8. During welding a heat affected zone (25mm) is formed on each side of the weld. Also termed the HAZ, the material in this area can see a local strength reduction of 40-50% and thus in workshop welding with inert gas (MIG or TIG) is required.

9. Because of the HAZ effects gussets and web stiffeners are generally not favoured – clean lines give better resistance; designers also need to consider the position of welds carefully.

10. Accurate fit up for welding of aluminium is also very important. A gap tolerance of maximum 1,5mm is advised. Gaps in aluminium cannot be filled without affecting the parent material.