

Conventional Welding Classification

Welding processes usually divided into three main groups, solid state and liquid state welding, but there are third type namely solid/liquid state. With three types the materials are joined together with these methods cannot separate easily and achieved by pressure, pressure and heat, or heat only.

Solid-state Welding Processes; In solid state welding such as friction welding, forge welding, explosion welding, etc. The surfaces to be joined are brought into close proximity by heating the surfaces without causing melting and applying normal pressure and providing relative motion between the two surfaces, after stop the motion is applying high pressure without heating. In these processes the materials remain in solid state and welding is achieved through the application of heat and pressure, or high pressure only.

Liquid State (Fusion) Welding Processes; arc welding, resistance welding, oxy fuel gas welding, etc. There are two inherent problems with fusion welding, effect of localized heating and rapid cooling on the microstructure of the parent metals and effect of residual stresses developed in the parent metals due to restrained expansion or contraction.

Solid / Liquid State Bonding; In this state low temperature joining methods are used when the metal to be joined cannot withstand to high temperature, or complex sections are to be joined, or dissimilar metals are to be joined, or weldability of material is poor. Also in these methods, the gap between the metal pieces to be joined is filled with molten filler material after heating the base metal. Melting point of filler material is much lower than base metals. The bonding is not due to melting of parent metal.

Filler material is drawn into the gap between the metal pieces to be joined by capillary action and the bond formation is started when the molten filler metal comes to contact with the solid surface as in solid state welding. The nature of bond formed is much complex here, there is some of inter-solubility between filler and base metals to produced resulting alloy. This inter-diffusion at the base metal surface and resulting alloy has a strength which is very close to that the base metal.

Also for a good joint strength the liquid filler metal; must flow into the gap between the metal pieces to be joined and cover the entire surface area, without gaps or blow holes. Usually to good bonding are doing the following:

- Clean base metal surfaces
- Maintain optimum gap.
- Heat the joining area above melting temperature of the filler material.
- Use fluxes for welding of base metal surfaces.

Welding which is the process of joining two components for the desired purpose, can be defined as the process of joining two similar or dissimilar materials components with the application of heat, with or without the application of pressure and with or without the use of filler metal. Heat may be obtained by chemical reaction, electric arc, electrical resistance, frictional heat, sound and light energy etc.