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PLASTIC WELDING TECHNIQUE

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ABSTRACT: This paper provides an introduction to some important facts & developments in the plastic welding field for assisting the developments in future in plastic manufactured part are regularly used in many industries. The parts made of polymeric materials & polymeric composites fulfil very demanding criteria now-e-days. Plastic have good corrosion resistance, excellent strength to weight ratio & ability to take good finish. Plastic can be categorized as thermosets & thermoplastics. Only the thermoplastic is weld able among these two. A chemical reaction occurs during processing & curing in case of thermosets resin, that is, as a result of irreversible cross-linking reaction in mould. Both mould thermosets & vulcanized elastomer components cab not be reshaped by applying heat, because of the irreversible reaction that occurs. In this paper few selected welding process are discussed like hot gas welding , friction welding, hot plate welding etc.

KEYWORDS: Hot gas welding, Thermoplastics & Thermosets, Hot gas hand welding

I. INTRODUCTION

Plastic are day to day life for manufacturing of toys, utensils complicated part such as heart valve for medical use etc. Plastic parts are frequently use in many industries[2].

Plastic have ability to take good finish, excellent strength to weight ratio & good corrosion resistance. There are two types of plastics, thermosets & thermoplastics out of which only thermoplastic is able to be welded.

Welding of plastics is of practical importance in many automotive, medical 7 electronic packaging applications[4]. There have also been developments in textile joining, & in joining dissimilar materials (e. g, plastics to metals or ceramics).

The laser provides a heat source that is very controllable in the term of the amount of energy applied & the location or size of the applied heat. Moulded thermosets components cannot be reshaped by applying heat , Because of the irreversible reaction[7].

But, thermoplastics are able to be softened & remoulded by means of heating & each fusion welded. Therefore thermoplastics are able to be welded by following three methods-

- Thermal
- Friction
- Electromagnetic

Further the types of thermal plastics welding are (A) Hot air technique (B) Hot tool method (C) Laser beam heating (D) infrared heating

Hot Tool Welding

Hot tool welding is a technique in which surface to be joined by direct contact with a heated metallic tool. When it is required to join the pipes, the surfaces to be joined are flat hence the tool is a hot plate[10].

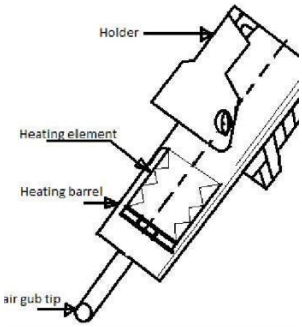

Fig. Basic elements of hot air gun[6]

headlamps, because of doubly curved joined interface is required complex tool that allow the hot surface to much the contours of the joint interface.

Hot Gas Welding

When the external heating method is applied the technique is called hot air technique. In the process of welding the welding rod & a weld groove are simultaneously heated with a hot gas stream unit they soften sufficiently to fuse tighter; then the welding rod is pressed into the weld groove to complete welding process. A steam hot air is directed towards the filler & the joint area using a hot air torch.

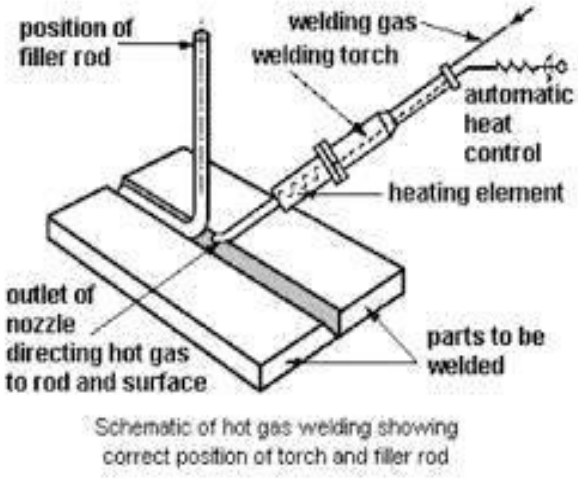

Fig. Schematic of hot-gas welding[6]

Table 1. process parameter for hot gas welding

Process parameter	Description
Temperature	Temperature of hot gas
Gas	Composition of hot gas (air, carbon dioxide, Hydrogen, oxygen or nitrogen)
Angle	Include angle between weldment and rod, angle Gas nozzle and weldment.
Gap distance	Distance between gas nozzle and workpiece
Weld joint	Butt joint and double strap fillet joint.
Pressure of hot	pressure of gas at which it coming out from
Air/Gas	Nozzle
Shoe	Design and size of welding nozzle

II. HOT GAS HAND WELDING NOZZLE MOTION & ROD ANGLE

Process background

Hot gas welding is a fabrication process for thermoplastic materials.

The process, invented in the mind 20th century, uses a stream of heated gas, usually air, to heat & melt both the thermoplastic substance material & the thermoplastics welding rod fuse to produce a weld[10].

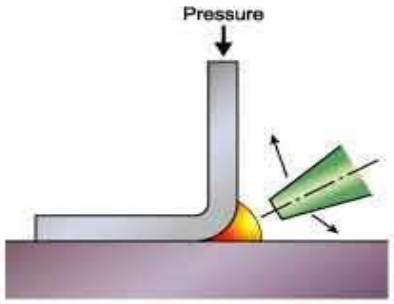

Fig. Hot gas hand welding nozzle Motion & rod angle.

Welding materials

There are two groups of plastic materials; thermoplastics & thermosets. The hot gas welding technique is only applicable to those plastic materials that can be heated & melted repeatedly, namely thermoplastics[7]. Thermosets area group of plastic materials in which the molecular chains from crosslinks. Although many thermoplastics can be welded by this process, the most common are polypropylene, polyethylene, PVC & some fluoropolymers such as PVDF, FEP & PFA.

Welding equipment

The equipment used for hot gas welding consists of an air supply, a handle with sturdy grip, a heating chamber with temperature control.

Fig. Hot gas hand welding[8]

Advantages

- Very fast process.
- Very clean process, litted to no weld flash.
- Relatively low cost of equipment's.
- A weld is permanent, which prevents tempering with the internal components[9].
- Plastic welds are much lighter than mechanical fasteners.
- High quality welding for a wide range of thermoplastics.

III. CONCLUSION

In the present paper the different techniques welding of plastics is reviewed with help of available compatible literature.

Now a days, it is the age of plastic.

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