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Impact of TIG welding on tensile and impact behaviour of aluminium alloy joints

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Abstract
Aluminium is a non-attractive, brilliant white, malleable and delicate metal which is the most plenteous metal. It likewise makes its reality as its composites in which aluminium is overwhelming metal. Aluminium composites are generally utilized in designing structure, segments and aviation fabricating where light weight and consumption opposition is required. TIG welding is an exact and quickest welding system ready to weld ferrous and non-ferrous metals. It is exceedingly controllable, fumeless and splash less spotless process needs next to no completing or at some point no wrapping up. The present work manages the distinguishing proof of best blend of welding parameters for TIG welding of AA7005. There are no. of welding parameters which influence the welding quality for again repeatability. Diverse parametric extents and their belongings are contemplated.

Keywords: TIG welding, AA7005, welding current, welding speed, impact strength

Introduction

Welding is a process which is changeless attaching process used to join diverse ferrous and non-ferrous materials like metals and amalgams at their reaching surfaces by utilization of warmth as well as weight. Welding are of different types like TIG welding and MIG welding. Welding is used to join two metals by the help of filler metal or electrode. It can be temporary or permanent.

TIG Welding

A bend welding process used to weld material with a non-consumable tungsten anode. The terminal is associated with a required power source and protecting gas is additionally utilized through welding weapon. For the most part Argon or Helium is utilized as protecting gas to shield welding surface from environment. The utilization of filler metal is discretionary relies on the sort of weld or prerequisite. Tungsten Inert Gas welding is utilized for assortment of materials to give brilliant welding with the blend of warmth produced by an electric circular segment set up between a tungsten cathode and the meta. The terminal is non-consumable. This offer ascent to the arrangement of vapour and gases while dissolving the work piece and filler pole to frame a weld. The latent gas 1. shield the welding region from air, counteract oxidation 2. exchanges the warmth amid welding 3. begins and keep up a steady circular segment because of low ionization potential

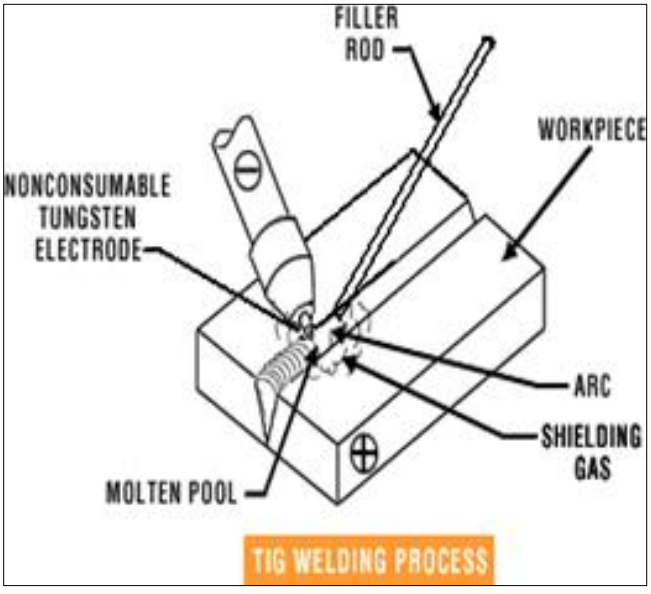

Fig 1

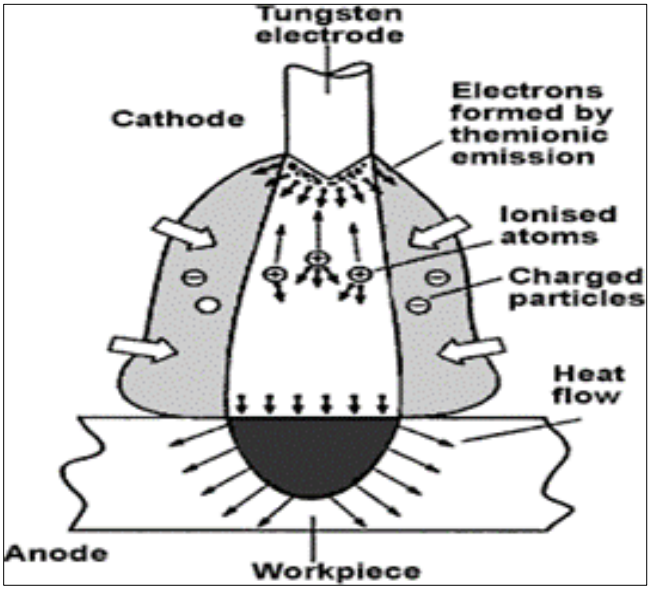

Fig 2

Welding of aluminium alloys

Most ventures who are associated with transportation like car businesses basically worried on decrease of mass, which has turned out to be very helpful in light of fuel sparing, decrease of outflow and recyclability. Subsequently it has turned out to be more transcendent to centre around lightweight materials like aluminium and magnesium. Warm conductivity of aluminium is very high; in this manner warm is effectively led far from the welding zone. Coefficient of warm extension of aluminium is likewise high contrasted with steel. Aluminium is a responsive metal that rapidly shapes an oxide layer at first glance and quality of the weld region wind up feeble. Subsequently welding of aluminium by ordinary curve welding process is turned out to be troublesome. The properties of AA7005 are given below:

Table 1: Chemical Composition of AA7005

Al	Mn	Mg	Cr	Zn	Ti	Zr
93.3%	.45%	1.4%	.13%	4.5%	.04%	.14%

Table 2: Physical Properties of AA7005

Phase	Atomic Weight	Melting Point	Boiling Point	Density
Solid	26.9AMU	630^0C	2470^0C	2.78gm/cm^3

Table 3: Mechanical Properties of AA7005

Properties	Value	Condition
Poisson's Ratio	2.6-2.8	25^0C
Elastic Modulus (GPa)	70-80	25^0C
Tensile Strength (MPa)	193	25^0C
Yield Strength (MPa)	83	25^0C
Elongation (%)	20	25^0C
Shear Strength (MPa)	140	25^0C

Literature Review

TIG welding is profoundly exact and clean welding procedure yet the control and execution of various welding parameters is very important for fruitful result. The diverse welding parameters are chosen by the administrator dependent on his experience or from writing study. Al plates with thickness fluctuating 3 -5mm were utilized for this reason. From the examination of photomicrograph of welded precedent it has been found that, weld stores are outline co-centre point dendrite little scale structure towards the blend line and malleable break happen near mix line of weld store. After-effect of the trial demonstrated that heartbeat present, base current, beat obligation cycle and recurrence assumes noteworthy job on microstructure and mechanical properties of weld, however beat current assumes the more prominent job i.e. 52.55 %. In this examination, beat current of 120A, foundation current of 80A.

Conclusion

Literature survey reveals that work has done on TIG welding of aluminium alloys. The research work has been found in literature for TIG welding of aluminium alloys and based on past work the following conclusions are drawn:

1. The range and selection of parameters depend upon type of material, strength required and specifications of welding machine used.
2. Welding strength and welding profile is greatly influenced by selection of welding material and welding technique.
3. For better strength and cleanliness in TIG welding of aluminium, AC power source is mostly preferred.
4. Design of experiment can be determined by Taguchi method, Response Surface Technology and full factorial design.
5. Minitab software is an important application for the evaluation of result.
6. Microstructure investigation at different zones of element gives an comparative outcome between TIG welding and base material to differentiate the effect of temperature distribution.

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