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IMPROVE WELD PRODUCTIVITY AND QUALITY OF TIG WELDING BY USING PULSED TIG WELDING

Description of Gas Tungsten Arc welding (GTAW) process

Gas Tungsten Arc Welding (GTAW) or more frequently called as Tungsten Inert Gas (TIG) welding process is an arc welding process, which is normally used for good quality and precision welding. It uses a non consumable tungsten electrode to produce the weld. The weld area is protected from atmospheric contamination by a shielding gas (usually an inert gas like argon) and a filler metal is normally used, though some welds do not require any filler metal. It is a very neat and clean welding process where heat input required is relatively less, thus resulting in lesser Heat Affected Zone (HAZ) and distortion as well as good weld bead finish. It is normally used when good quality welding with good finish is desired particularly for thin sheets/pipe welding etc. However, this welding process is less productive and thus costlier than other processes.

TIG welding process require welding equipment with Constant Current (CC) characteristics and all metals except Aluminum, Magnesium and their alloys can be welded using a DC power

Product Update

TIGINOX

Solid Stainless Steel Wires for TIG Welding

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ADOR Institute of Welding Technology

source, whereas Aluminum, Magnesium and their alloys can be welded by using an AC power source.

Pulsed TIG welding

Pulsed TIG welding is normally used when precision TIG welding is to be done, for example for thin sheet or tubes particularly when the process is automated. The problem of excessive heat build up, like joint fit up distortions, widening of weld bead, burn through in extra thin jobs, and bigger HAZ in case of normal TIG welding , can be completely avoided by using pulsed TIG welding process. In pulsed TIG welding, the welding current rapidly alternates between two levels. The higher current is called Peak current (Ip) while the lower current is called Background current (Ib). During peak current job fusion and penetration takes place and during background current, the weld pool is cooled and gets solidified. Thus the heat gets dissipated from the weld zone before next peak current is applied. The filler metal is added at the peak current. The average electric power and thus heat input are controlled resulting in lesser HAZ and distortion. The micro processor based electronic controller which is built in with the power source, enables the setting of Peak current (Ip), Background current (Ib), Peak time (Tp) and Background time (Tb) depending on the job and weld joint design and it's fit up. It is also possible to decide and program the pulse frequency using above mentioned micro controller.

Advantages of Pulsed TIG welding

This welding process results in the following advantages:

1. Joint fit up distortions are minimized due to controlled heat input
2. Better bead shape, penetration is achieved with relatively less skill of welder
3. Heat Affected Zone (HAZ) is reduced
4. Positional welding is possible without any difficulty of drooping down of molten metal

5. Permits welding of sheets as thin as 1 mm which is difficult with normal TIG welding
6. Requires less operator skills
7. Is suited to mechanization / automation
8. Higher speed of welding compared to normal TIG welding, leading to increased productivity
9. Weld porosity is eliminated and a thorough root fusion is achieved due to the pulsing action

Applications of Pulsed TIG welding

Pulsed TIG welding is preferred in following applications:

1. Pipe welding
2. Light and precision fabrication jobs where distortions in the joint fit up can not be tolerated
3. Is ideally suited for critical applications such as root passes of pipes, joining dissimilar thicknesses
4. Automatic orbital welding of tube to tube and tube to tube sheets

Welding equipment for Pulsed TIG welding - Features and advantages

Ador Welding Limited Pulsed TIG equipment range includes integrated units with built in DC as well as AC / DC power sources of different current capacities. The salient features of AWL Pulsed TIG equipment are:

1. Various metals such as mild steel, alloy steel, stainless steel, copper, titanium, aluminum and magnesium can be welded
2. Micro processor controlled technology permits ease of various operations - ChampTig 220 M.
3. Equipment can be used for normal TIG welding as well as pulsed TIG welding; some models have manual metal arc welding mode in addition
4. Advanced soft switching Inverter Technology
5. Adjustable pre flow, post flow, up slope and down slope

6. Built in high frequency
7. Digital displays - for ChampTig 220M - DC TIG welding, Analog display for ChampTig 300AD - AC/DC TIG welding
8. High power factor and efficiency - Resulting in power savings up to 30% over conventional power sources
9. Low volume and weight - Easy mobility on shop floor

Specifications of popular AWL Pulsed TIG welding equipment are given below

Model	Type of Current	Max kVA Rating	Weld Current range (Amps)	Weight (Kgs)
ChampTig 300AD	AC/DC	MMA-10.8	MMA 10-250	50-Power source 14-Water cooling unit
		DC TIG-11.0	DC TIG 10-300	
		AC TIG-12.0	AC TIG 25-300	
ChampTig 220M	DC	MMA/TIG-8.4 @35% duty cycle	DC TIG 5-220	25-Composite unit with Gas cooled torch

AWL has also a wide range of conventional TIG welding equipment, which uses combination of following High Frequency units with standard Welding Rectifiers or Transformers for DC or AC TIG welding application.

HF Units

1. HF 2000 / 2000AD
2. HF 2001
3. HF 3000 / 3000AD

Welding Rectifiers

1. Thyroluxe 401
2. Choprec 401

Transformers

1. RED 403
2. RED 503

Please click on the model described above to view detailed specifications and features.

For assistance in improving quality of TIG welding jobs, please write to cmo@adorians.com

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