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A Review on Defect Minimization in MIG Welding

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Abstract: ***In this study, Metal insert gas welding (MIG) is a joining process which is used to many years due to its advantages such as low heat input, higher welding speed and little loss of allowing material. MIG welding can be used to join different types of ferrous and non ferrous metals that cannot be welded by non traditional welding process. In this paper we have identified the pinhole and porosity defect in MIG welding and find out the some process to reduce this effect and controlling the density of pinhole detect using failure assessment diagram(FAD) and extended finite element method (XFEM) and we will observed that the black spot of pinhole to controlling the organic light emitting diodes (OLED). Result the various technique used in optimization of welding parameters such as FAD,XEFM. In this paper we study of all aspects to relative in improvement for pinhole and porosity defect and improve welding quality and strength.***

Key Words: pinhole, porosity, MIG welding

I. INTRODUCTION

Metal inert gas welding(MIG)is a joining and fabrication process. MIG welding can be used to join different types of ferrous metals and non ferrous metals that can not be welded by non traditional welding process.This welding process parameters was used during joining of metals. Parameter such as welding current gas flow rate wire feed rate. In MIG welding their is higher welding speed, greter deposition rate and their is no slag is produced during welding process. In this paper it was observed that pinhole and porosity defect are majorly observed. It was found that an optimal rate of current, voltage speed and gas flow rate which control the weld quality and strength. In cu foils the surface roughness and pinhole defect density are observed and the identified the origine of pinhole defects in the graphene method due reduce their density. The extended finite element method and failure assessment diagram are find out the failure defect in the MIG welding. The increasing value of voltage and GFR (gas flow rate) increase the effectiveness of process such as tensile strength and hardness while the decreasing the value of electric current. The duplex current feeding which is enable to control wire feeding speed and welding current. Duplex current feeding welding can feed larger current than conventional welding. This one of factors to improve the welding quality such as penetration.

II. LITRETURE SURVEY

A. In the paper "optimization of welding process parameter to minimize defect in welding of sheet" The Author Arshad A. Sheikh , Prashant D. Kamble has stated that , Defect minimize of sheet by using SMAW & to optimize SMAW process used D.O.E. technique of the Taguchi Method and also for improve quality of weld. On the behalf of process perform & testing conclude defects are eliminate & increase welding quality . The porocity is minimized by 63.19 % & incomplition fusion minimized by 73.72 % & pin hole minimized by 30.31 % .

B. In the paper "corrosion of bursting pressure result of LPG Tank using Experimental & finite element method " The Author M.Egmen Aksoley, Babur Ozcelik , Ismail Bicon has stated that , The resistence of liquified petroleum gas (LPG) produced by different thickness of carbon steel sheet metal . It investigated by bursting pressure experiments & non-linear finite element (FEM) by increasing internal pressure valve .This test perform by increasing thickness of LPG tank sheet between 3 to 2.8 mm. Im the general simulation model observe more definitely than real structure. Production of manufacturers by selecting thinner steel provide for established control wall thickness decrease at deep drawing phase & they develop their gechnologies with respect to that.

C. In the paper "Corrosion resistence in FSW & in MIG welding techniques of AA6XXX" The Author Stefano Maggiolino, & Chiara Schmid. The author stated that, The Frictional Stir Welding (FSW) represents a possible solution. In this solid state process, The working temperature is high enough to plasticize the material but not to melt it. The main problems are related to the properties of Aluminium that is high thermal conductivity high chemical reactivity with oxygen. It cause presence defect on the weld bead. After complition & process better behavior concerning the pitting corrosion than that in MIG welded sample does. The more critical zone are the interfaces around the thermal affected zone that forms this welding process. The corrosion rate are criticism is enhanced by the low area extension of the interfaces.

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D. In the paper Failure investigation of LPG cylinder using FAD and EXEM"the Author S.Kingklang, W.Daodon, V.Uthaisangsuk has stated that, the crak like flaws in material of cylinder such as leakage and gas explosion. The study of failure assessment diagram (FAD) was determined the crak of cylinder. Metallographic analysis, tensile test and fracture mechanics test are using the specimen to find the crak. In tension test and DCPD method were performed the critical J-intrigal crack are investigated and the simulation coupled with extended finite element method (XFEM) are conducted to decribe the crak proportion of cylinder.

E. In the paper Controlling the density of pinhole defects in monolayer graphen synthesized via chemical vapor deposition an copper" the author Sumit Singha Roy, Robert M.Jacobberger has stated that, the pinhole defects present at densities greter than 1 mm2 and the implementation of graphene in electronics diffusion cu thin films using CH4. In cu foils the surface roughness and pinhole defect density are observed and the identified the origine of pinhole defect in graphene method to reduce their density. The pinhole defect in graphene during CVD at density depends on roughness of the duration of grouth reducing pinhole defect density on cu foils.

F. In the paper Sub-micron pinhole detection in the cathode of organic light emitting diodes"the author Hylke B.Akkerman,Peter Van de Weiner, Emile J.K.Versteyen,Hans H.G.Bolten has stated that, the technique is tracing the sub micron pinholes and accurately locate nano defects or pinhole in centre of black spots of various sizes or even centimetre scale and pinhole are investigated in organic light emitting diodes (OLED). Defects in the Ba-Al cathode of solution processed polymer LED and pinholes in the Lif-Al cathode of thermally evaporated and small molecules organic LED are investigated.

G. In the paper "Experimental study and Analysis of weld parameters by GRA on MIG welding". The author Vijay Sankar , Daniel Lawrence, Jaybal has stated the effect of welding parameter such weld voltage, weld current and gas flow rate on the weld joints were determined. Experimental procedure derived by design of experiment and effects are identified through grey relational analysis. The increasing value of voltage and gas flow rate improves the effectiveness of the process variables such as tensile strength and hardness while the decreasing value of electric current.

H. In the paper "Experimental investigation of microstructure and mechanical properties of IS2602 - EN31 MIG welded joint". The author M.Bala Chennaiah, P. Nanda Kumar, K Prabhala Rao has stated experimental investigation carried out on IS2602 - EN31 dissimilar MIG weldments and influence zones of welded structures. Low heat input [5.7238 kj/mm],high heat input [6.714 kj/mm] conditions are selected and with help of these heats input conditions made of 8 mm thickness defect free weldments are prepared. The defect free dissimilar welded joint is obtained by lower heat input condition and process parameter are current (160 A) and voltage (26 V) are recommended for 8 mm thickness joint from the ammount of 5.7238 input heat/lenght of the weld (kj/mm).

I. In the paper"Development of novel MIG welding process with Duplex Current Feeding". The author Atusuhito Aoki,Shinichi Tashiro,Hideaki Kurokawa, Manabu Tanaka has stated as pure argon welding is difficult to be applied practically to welding structure because of arc instability as well as low wettability and shallow penetration of weld bead. For solving the above problem,a novel MIG welding process with a duplex current feeding has been developed. The DCF-MIGW enable to control the wire feeding speed and the welded current near the wire tip. The DCF-MIGW can feed larger current than conventional MIG welding.This one of the factors to improve the welding quality such as penetration and shape of bead. The multi layer welding using the DCF-MIGW enables to avoid the weld defect in practical work.

J. In the research paper "Experimental study of the effect of hydrogen in argon as a shielding gas in MIG welding of austenitic stainless steel" The auth or "Behçet Gülença, Kaya Develib, Nizamettin Kahramanc, Ahmet Durgutlua" experimental study about 304L stainless steel was bonded by MIG welding. Welding was carried out under different shielding media and current. Hardness test results showed that base metal gave a higher hardness value than HAZ and weld metal. The author found in this experiment that "The sample that was welded under 1.5% H2 Ar shielding media and with a welding current of 240A was found to be the best tensile strength and The best toughness value". The author also Visual examine of the bended specimens did not show tearing, cracking or any other defect.

K. In the research paper "Optimization of MIG welding process to predict maximum yield strength in AISI 1040" The author "Ajit Hooda1, Ashwani Dhingra and Satpal Sharma" in this research work an attempt was made to develop a response surface model to predict tensile strength of inert gas metal arc welded AISI 1040 medium carbon steel joints. The process parameters such as welding voltage, current, wire speed and gas flow rate were studied. The author observed that in experiment The similar weld joint was developed effectively with MIG welding with selected range of input variable parameters. The longitudinal yield strength is greater than the transverse yield strength.

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L. In the research paper "Decision tree based weld defect classification using current and voltage signatures in GMAW process". The author "A Sumesha, Binoy B Nairb, K Rameshkumarc, A Santhakumarid, A Rajae, K Mohandasf" In this paper, an attempt has been made to establish an empirical correlation between the current and voltage signatures for the good weld and weld with defects using decision trees. Experiments were conducted on carbon steel plates. Current and voltage signals were captured using data acquisition system for the experimental conditions producing good weld, burn through, and porosity. The results obtained by using the decision tree algorithm for weld defect. Further studies may be taken-up by integrating decision tree algorithm with a suitable controller for an on-line weld process monitoring / controlling system.

M. In the paper "Experimental and thermomechanical analysis of the effect of tool pin profile on the friction stir welding of poly(methyl methacrylate) sheets." The author is Hamed Aghajani Derazkolaa, Abdolreza Simchib. has started work the employing pins with a low contact sarface area from macrocracks and voids along the joint line edged type of pin locally stir the polymer and cause tunnel defects which are formed at the root of joints. The effect of tool geometry in three configurations of conic, quadricand triangle on the lap joint FSW of PMMA was studied. Experimental analysis included observation of material flow and evaluation of the strength of the weldments through tensile, impact, and hardness testing.

N. In the paper "Optimization of process parameters of metal inert gas welding with preheating on AISI 1018 mild steel using grey based Taguchi method." The author is Sudhir Kumar , Rajender Singh has started work from Welding processes form an integral part of manufacturing industries and construction works. In this research work, AISI 1018 mild steel samples have been welded in V-butt joint configuration using MIG welding. The design of experiment is Taguchi based Orthogonal Array (L9). Effect of process parameters such as current, voltage and preheat temperature has been studied and welds are examined using X-ray radiographic tests. To check the weld quality of different specimens on the basis of UTS and percentage elongation, tensile tests have been performed on Universal Testing Machine.

O. In the paper " A review on sensor based monitoring and control of friction stir Welding process and roadmap to industry 4.0." The author is Debasish Mishra ,Rohan Basu Roy, Samik Dutta, Surjya K. Pal, Debashish Chakravarty In this research work from the various techniques and methodologies applied to sensor based monitoring of the quality and control of defects in an advanced joining process named friction stir welding (FSW). The implementation of sensors into the existing FSW machine the information about the process in real time, and subsequently helps in controlling the process and there by ensures product quality and precision. There have been numerous experimental works in the field of FSW, a portion of which is in the direction of monitoring and control.

III. CONCLUSION

We have studied different paper and found that many result in each paper they performed. Different experimental process on different material by varying parameter such as heat input, weld current, weld voltage and using taguchi for optimization. It is found that mostly the increasing value of voltage gas flow rate which is improve tensile strength of weld and defect free dissimilar welded joint is obtained by lower heat input condition.

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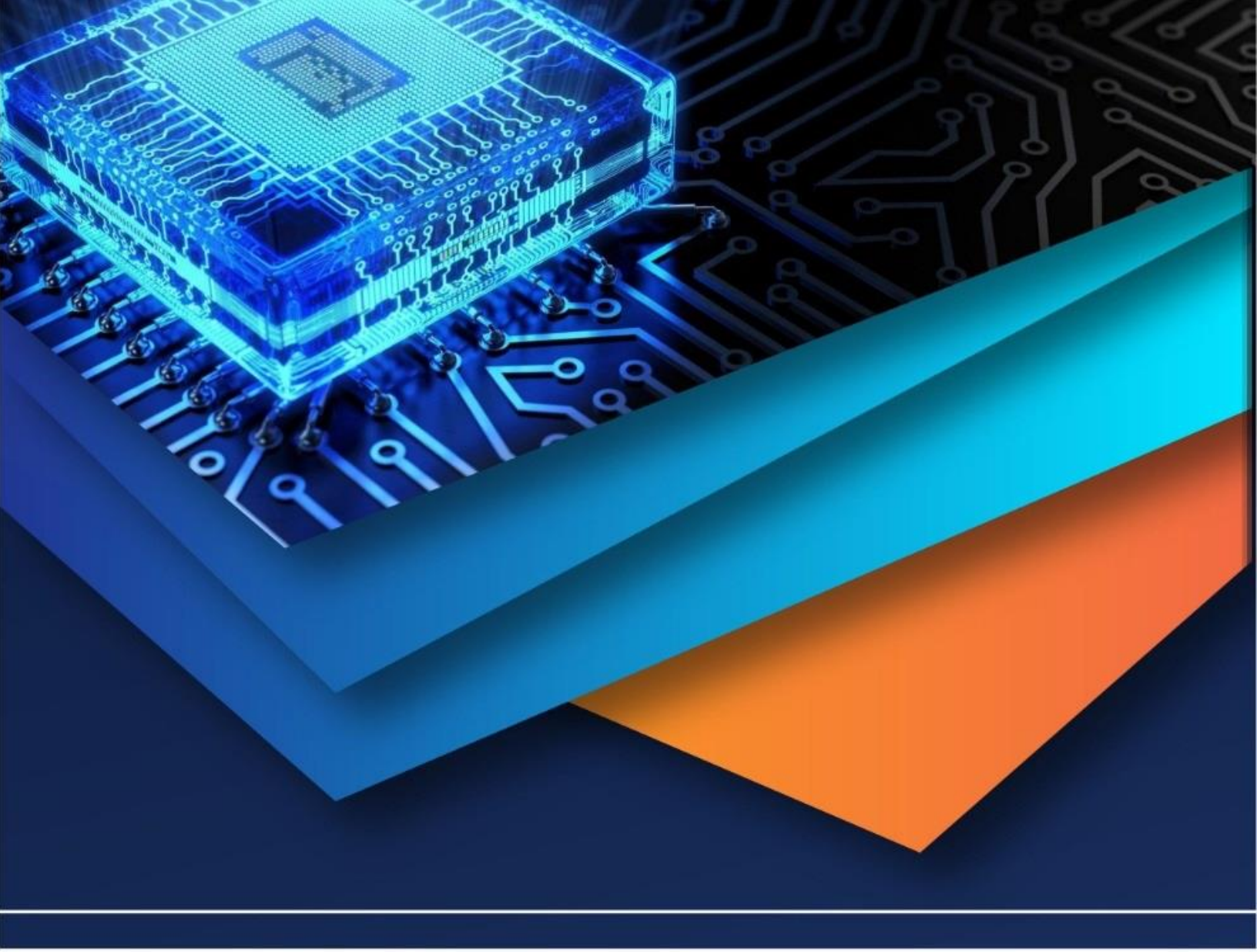
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