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AN EXPERIMENTAL ANALYSIS OF PRODUCTION OF BIOGAS FROM ALGAE IN A FLOATING DIGESTER

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Abstract

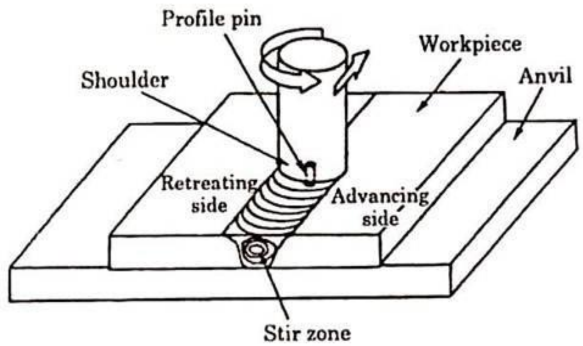
The threat of decline of fossil fuels due to continuous use, change in climate conditions and search for alternate resources points towards bio-fuels. Use and production of biogas is one of them. But production of biogas depends upon types of waste and food-crops used. To reduce the dependency on food crop for bio-fuels, there is a need of energy crop e.g.; rapeseed methyl ester, maize, jatropha and algae are some options which can help in this direction. Algae from all of these have some attractive characteristics like high lipid content, high yield of biomass, low area requirements. So production of biogas from algae is a good option for sustainable production of bio-fuel from an energy crop. Biogas is the bio-energy derived from biomass. It has potential to reduce the effect of climate change by absorbing carbon dioxide during biomass production period. It has possibilities of being integrated into existing infrastructure and is one of the few renewable technologies which can satisfy an array of end use energy requirement. This paper highlights a unique method of assessing the potential of bio energy from algae biomass by producing biogas, observing the hurdles and their remedies. So by removing these difficulties for production of biogas is a better choice for bio-fuels. With the concept of getting energy from pure energy crop (algae), it is a good initiative in the direction of bio-fuel production.

1. Introduction

Joining of dissimilar materials and alloys has importance in many industries like aerospace, shipbuilding industries, nuclear and power plant industries. Joining of two dissimilar material is important because there is a advantage over here, we can use properties of different material in single hybrid structure .hybrid materials are the materials which are made up of materials. For e.g. material made up of metal and ceramics. In today's trend industries wants to make a structure which has high strength to weight ratio. so it can be done by joining of two different materials one which has strength and the second one which has a light weight. For e.g. joining of aluminium and steel.

Joining of dissimilar materials cannot be done using conventional welding processes like MIG, TIG etc. Because these kind of welding are fusion welding technique, in these welding technique materials to be welded has to be melted first and cool afterward. As different material has different melting point and this will leads to distortion, cracking etc. Also different materials at high temperature can form intermetallic compounds which is very hard and brittle.

So to overcome this problem a new method of joining of materials has been evolved known as friction stir welding. In this method there is no melting of materials occur. In this technique materials are stir together at the joining interface and materials mix together and materials joins together. In this this process no melting of materials occur only plastic deformation of materials occur .so this process reduces the welding defects which generally occurs in conventional welding process.



1.1Schematic diagram offriction-stir-welding.

Diagram of friction stir welding process is shown in figure. As shown the tool penetrates at the joining interface and advances along the joint interface. The materials to be welded mixes up due to tool and weld due to plastic deformation. There are two sides of tool advancing side and retreating side.

1.1Thermophysical Properties of Some Pure Metals (Mills, 2002)

Metals	Density at 25° C (kg/m3)	Coefficient of Thermal Expansion (1/K)/1026 at 25°C	Heat Capacity (J/(K-kg)) at 25° C	Thermal Conductivity (W/(m K)) at 25°C	Melting Point (°C)
Al	2702	28	905	91	660.2
Co	8862	16.7	425	100	1495
Cu	8930	19	380	400	1084.6
Fe	7874	14.5	450	73	1538
Mg	1710	30	103	157	650
Ni	8900	17.3	426	90	1455
Si	2330	3.8	712	140	1414
Ti	4540	11	525	21	1668
Zn	7140	30	390	120	419.4

1.2 Factors affecting quality of welding.

Weld quality of friction stir welding depends upon the various factors which should be considered before doing actual welding. There are various factors listed below.

1. Welding speed.
2. rotational speed of tool .
3. tool tilt angle.
4. Work piece and joint design.
5. Tool geometry.

Thesefactors has been found out by different researchers.

Takehiko Watanabe et al (2006) successfully obtained a butt joint between aluminium alloy and steel and it has been found out that tensile strength of that joint is about 86% of aluminium base alloy.

Ghosh et al. (2010) welded A356 and 6061 aluminum alloys by friction stir welding under tool rotation speed of 1000-1400 rpm and transversing speed of 80-240 mm/min keeping other parameters same. In the investigation it was found that the joint fabricated using lowest tool transversing and rotational speed, exhibits superior mechanical properties with respect to other

Firouzdor and Kou (2009) were selected two materials 6061Al and AZ31Mg to join then using FSW and it has been found that position of AL and MG alloy with respect to tool greatly affect the quality of weld.

Amancio-Filho et al. (2008)done study on the mechanical property and microstructure of joining of two dissimilar material aluminium alloy (2024-T531) and 6056-T4 by varying rotational and welding speed kept other parameters constant.it was found that, good weld joints can be obtained with rotational speed of 800 rpm and welding speed 150 mm/min.

Duo Liu et al. (2011) done study on welding of dissimilar Mg alloys AZ31 and AZ80 and it was found that to obtained a good quality joint , alloy of high deformablity should be at retreating side and alloy of low deformablity should be at advancing side.

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2. DESIGN OF TOOL FOR FRICTION STIR WELDING

Friction stir welding machine tool mainly has two parts , shoulder and probe. Probe is used to stir and to generate localized heat between materials to be welded. Probe is connected to shoulder. The tool shoulder restricts metal from flowing out and applies forging pressure to consolidate the material right behind the moving pin (Mishra and Mahoney, 2007)

Tool designing is very important part of friction stir welding process because materials to be welded has different physical and chemical properties.

3. CONCLUTION

This study shows that there are many research paper are available which shows that joining of two dissimilar material can be made feasible by selecting appropriate parameters of friction stir welding.

4. SCOPE FOR FUTURE WORK

This study shows that joining of two dissimilar material can be made feasible by selecting proper parameters
Of FSW. So scope in this field is to design a friction stir welding setup and also a joint design for the joining of three dissimilar material in single pass using friction stir welding.

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