

# Similar Metals Of Al6082 Are Welded By using En19 Taper Square Tool



B. Subbareddy, B . Srinivasulu, M. Sreenraju, Bhanu Pratap Pulla, B. Ashok Kumar

**Abstract:** FSSW is used a lot of area which are from marine to aerospace industries. alloy has a lot of advantages of the other materials. FSSW is effected with tool rotational speed, tool transverse speed, dwell time and tool plunge depth. One of them is weight. With the reference to the research work In this paper two flat plates of similar metals (Al6082-Al6082) of 2.2 mm thickness & 36.2mm width are subjected to a solid state welding at 900rpm using the EN19 tool. The tensile-shear test results showed that the FSSW specimens are better than the specimens welded by the conventional FSSW process at all tool rotational speeds with using different tool pin profiles. The minimum tensile shear load obtained from the conventional friction stir spot welds was an ultimate load value of 2.040KN.

**Keywords :** Solid state welding, Similar metals, EN1, Ultimate load

## I. INTRODUCTION

Friction stir spots welding (FSSW) produces weld for adjacent function from a rotating, non-consumable welding device, enabling the device to 'stir' the joint surfaces between friction and heat generated from plastic work. The

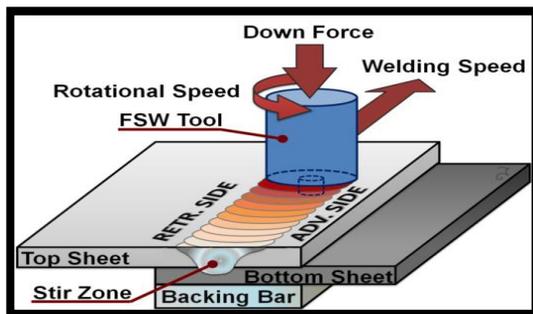


Figure 1: Tool Rotation

Depression on friction and plastic work for summer causes the block to necessarily melting in the work piece, stay away from some problems emerging from a different situation in the state. In the device, two-speed rate is to be considered while friction welding; How the pin swings and how quickly it navigates on the welded interface can be seen in Fig 1. The material on the weld piece shows the flow crossword which was given by Kumar et al. (2010) seen in Fig 2. On the strategy for the physical currents used in and around the device, the previous examination made increased use of one more overall, with an optional multidimensional nature for normal content through a microscope, with an ultimate objective , Where the material was transferred as, with a final purpose to make it understandable.

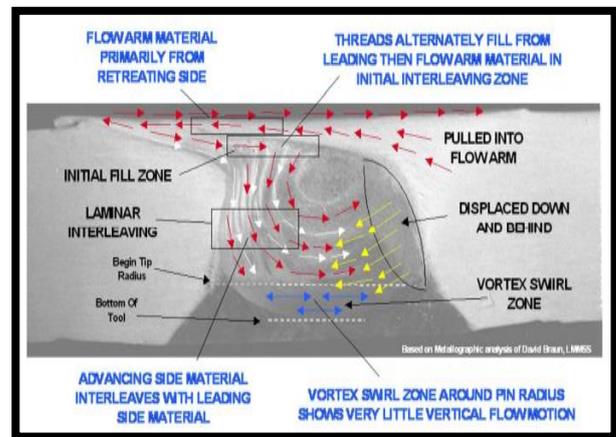


Figure 2: Material Flow

Aluminum is a soft, light weight, flexible and durable metal that is running from luminous to dull gray, contagious on surface degradation. Aluminum is non-attractive and non-beginner. In the same way it is insoluble in alcohol; Although it can very well be solvent in specific structures of water. Aluminum is approximately 33% in comparison to steel with thickness and thickness. It has been cast, pulled and expelled, praised and effectively. Erosion inhibition can be unreliable due to a flimsy surface layer of aluminum oxide which avoids adequately oxidation on the metal when presented in the air. Due to galvanic reactions with alloy copper, the degradation of most of the frozen aluminum alloys is very small. The quality of aluminum alloys crosses the quality of light steel. The compulsory factor in choosing aluminum and its alloys is their high solidarity-weight ratio, protection from corrosion by many chemicals, high thermal and electrical conductivity, non-toxicity, reflection, appearance, and simplicity of formality, mechanization, and their non-magnetic nature .

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## II. LITERATURE REVIEW

Neckett Dapar (2017) - Friction Stretch Spot Welding (FSSW) is determined as a different process of friction stir welding (FSW), for the industry to be involved in the inspiration behind the same application and the new Solid state allows finding solutions, it is quite natural companion and surprisingly effective cost. Considering the increasing automotive market difficulties, FSSW is raising its ground because as time goes on, there is another developed technique with personal favorable conditions. This paper underlines many ideal parts of FSSW by the exhibition of dissatisfied applications, for example, Al-MG and Al-Steel, where bonding unfolds the process points of interest to illustrate, where freedom of design in the near future and Mild objectives are required. Kaushal Singh, Indraj Singh (2017) - Resistance spotted welding is one of the most important welding systems. It is being modernized in a phased manner. In the earlier days we used to make spots weld using the manual spots welding machine, although at this point we use the pneumatic spot welding machine. A great deal of research is done in the field of tidy up your criteria. There is an exceptionally comprehensive application of stainless steel welding of 300 arrangements. 300 series Austenitic stainless steel is Austenite as its required stage (cubic crystals centered on the face). They are all mixed with chromium and nickel, and once structured around molybdenum and nitrogen. Type of iron 302 piece, 18% chromium and 8% nickel. Assessment is the alloy for high temperature strength, pouch and corrosion resistance of the hole with molybdenum (~ 2 -3%).

Kai Chen, Zoon Liu, Jun Ni (2016) - Friction Stretch Spot Welding (FSSW) process is effectively linked to aluminum alloy 6061 to join TRIP 780/800 steel. The effect of time on the speed of the instrument and the strength of the weld was influenced by the analysis of experiments and the analysis of variance. It is displayed that resident time is an increasingly heavy parameter to influence the strength of the weld compared to speed of dip. Scotty Martin et al. (2016) - Worked on the quality evaluation of versatile net-based AISI 304 stainless steel resistance spacing welding joints. At work, the quality of Resistance Spot Welding (RSW) Joints of 304 Austenitic Stainless Steel (SS) was surveyed with its Tensile Shear Weight Limit (TSLBC). The results showed that the fault of the presenter The friction stir spot welding process methodologies allowing joining of difficult to weld lightweight alloy grades which might have not experience a wider application simply due to the lack of an appropriate technology to weld them. As much as possible, much work needs to be done to understand the spot welding process more easily.

## III. EXPERIMENTAL SETUP

The toolsets and the modules help to design any model of the requirements with user friendly platform. So in this project the EN19 tool with taper square profile is designed for the tool fabrication. The design is illustrated in the Fig 3. The Table I & II give the information about the tool composition and its properties.

**Table I: Chemical composition of EN 19 Alloy Steel**

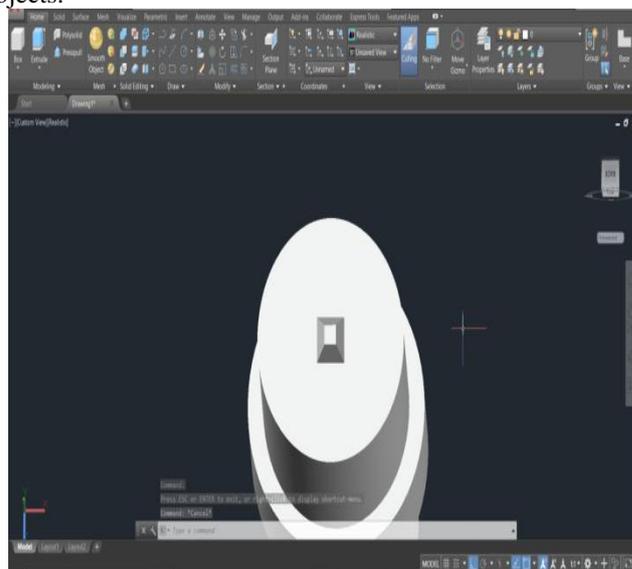
C	Mn	Cr	Mo	Si	S	P
0.35-0.45	0.5-0.8	0.9-1.5	0.2-0.4	0.1-0.35	0.05	0.035

**Table II: Mechanical Properties of EN 19 Alloy Steel**

Tensile N/mm2	Yield N/mm2	Elongation %	IZOD KCV J	Hardness Brinell
850-1000	680	13	50	248-382

### Tool Design using AutoCAD

AutoCAD is the software which helps the engineer to design 2D and 3D models with solid, surfaces and mesh objects.



**Figure 3: Design of Taper Square Profile**

### Fabrication of Tool

Fabricated of tools are done by using the Tool sharpening machine which is shown in the fig 4



**Figure 4: Sharpening Machine for Tool Fabrication**

The EN19 tool with Taper square profile is fabricated with the help of tool sharpening machine and the fabricated tools are shown in Fig 6



Figure 5: Taper Square

Process Parameters of Vertical Milling Machine

The vertical milling machine used for the experimental purpose is supported by Sri Venkateshwara Industries, Hyderabad with the following machine specifications.

**Table III: Specifications of Vertical Milling Machine**  
The experiments are carried out with the EN19 tools by affixing to the collect of the vertical milling machine.

Type of Machine	FN2V
Overall Dimensions (L x W)	1520 x 310 mm
Clamping area (L x W)	1350 x 310 mm
Power operated table traverses	800 mm
Longitudinal	265mm 400 mm
No of Speeds	18
Main Motor	5.5 kW/1500 rpm

Tensile Test :

The specifications of the UTM used for Tensile Test is shown in Fig 6.

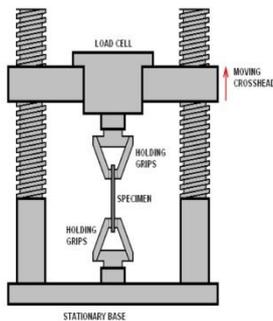


Figure 6: Tensile Testing Machine (UTM)

**Table IV: Specifications of Tensile Testing Machine (UTM)**

Measuring Cap. (kN)	400
Measuring range	0-400
Least count (kN)	0.04
Load range in kN with Accuracy of measurement ± 1%	8 to 400
Resolution of Piston movement (mm)	0.1
Max. tensile clearance at fully decended piston position	50 to 700
Maximum clearance for Compression test (mm)	0-700
Distance between columns (mm)	500
Piston Stroke (mm)	200
Maximum straining speed at no load (mm/min)	150

IV. RESULTS

The 2.2 mm thickness Al6082 plates are welded using FSSW at 900rpm with EN19 Square tapped profile tool. The joint was obtained as desired which can be seen in Fig 7.



Figure 7: Al6082-Al6082 Welded Specimen

The welded joints are subjected for tensile test. The tensile test was carried on an UTM at the Hyderabad Engineering Labs. The result obtained is the maximum tensile load obtained for the joint is 2.040KN. The graph is shown in Fig 7.

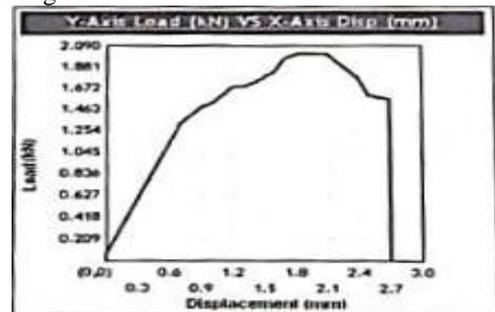


Figure 7: Load Vs Displacement

V. CONCLUSION

The research work helped to test the maximum load of 2.040KN for the FSSW of similar Al6082 metals where it is welded at a speed of 900rpm with square taper profile tool. In light of the experience raised in this research, proposals proposed for future work are recommended. Although different weld efforts have been tried in different parameter combinations, especially for encouraging improvement in amphibious heat treatment between FSSW, the examination of the micro structural changes was not done much. Some performance tasks in TEM, DSC and bustling area would be good to understand the difference between the effect of the paint-back cycle on various parameter combinations and properties, because with the contribution of heat the speed and spread of alloy will change.

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