

# EXPERIMENTAL WORK ON AL7075 USING FSP USING MWCNT

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**Abstract:** Aluminum alloys are promising for structural applications due to their high strength to weight ratio, resistance to corrosion and light weight, Light Weight. Aluminum is a very light metal with a specific weight of 2.7 g/cm<sup>3</sup>, about a third of that of steel. Aluminum alloy Matrix composites reinforced with particles like ceramic possess higher strength and hardness, using aluminum 7075 as parent metal powder particles as reinforcement, most important benefit of 7075 aluminum is its high strength. FSP technique has been used for fabrication of surface composites. While it doesn't have the same level of corrosion resistance or weldability that other common alloys due, its resistance to stress and strain makes it highly useful in aerospace applications where it allows for weight savings over steel, multi walled carbon nanotubes produced by the catalytic carbon vapour deposition (CVD) process, MWCNT improves the mechanical performance thermal conductivity, electrical conductivity, and permeation barrier properties of a range of composites and formulations. Processing parameters are have been set. FSP for AL 7075 is successfully done with reinforcement 3 percentage of MWCNT. The result workpiece is cut into tensile specimen according to ASTM standard using wire cut EDM. This result suggests that the friction stir processing is a useful method as microstructure refinement for the 7075-aluminum alloys. In this paper, the mechanical properties of the friction stir-processed materials at room and high temperatures are briefly discussed. The mechanical properties of the unprocessed materials are also compared with those of the processed materials

**Keywords:** Friction stir processing, aluminium 7075, aerospace application, high strength.

## 1. INTRODUCTION

Friction stir processing (FSP) is a procedure by which extreme, localized plastic deformation changes the properties of a metal. This deformation is created by physically putting into the workpiece a non-consumable tool and moving the tool in a stirring motion as it is forced horizontally into the workpiece. Friction stir welding, the precursor of this method, is used to join multiple metal pieces without creating the heat-affected zone typical of fusion welding.

### 1.1 Reason to choose AL 7075

The most notable feature of the aluminum 7075 is its high power. While it does not have the same degree of corrosion resistance or weldability as other traditional alloys, its stress and strain resistance makes it particularly useful in aerospace applications where it allows steel to save weight.

### 1.2 Benefits

FSP has advantages where combining two materials is required. FSP is a one-step manufacturing short path, solid state processing method that achieves densification and homogeneity in microstructural refinement. FSW helps change products such that there is no need for metaling down or dramatically altering the content. For example, FSP may quickly alter the shape of a piece of material as sheets of metal where it would have had to be melted down before and placed into a mold for cooling and shaping before it. By optimizing tool design, FSP parameters and active cooling/heating, the microstructure and mechanical properties of the processed region can be precisely monitored. Through the appropriate alteration of the instrument, the same sheet of metal may be changed to accommodate different conditions. FSP has been shown to allow bendable metallic alloys where an alloy modified with FSP, for example, will be able to bend to 30 degrees as before it could only bend to seven.

2. EXPERIMENTAL PROCEDURE

Friction stir processing (FSP), a process, derived from the friction stir welding (FSW) process, is an emerging novel, green and energy efficient processing technique to fabricate surface composite. In the present investigation, FSP technique has been used for fabrication of surface composites, using aluminium 7075 as parent metal powder particles as reinforcement. , most important benefit of 7075 aluminum is its high strength. While it does not have the same level of corrosion resistance or weldability that other common alloys due, its resistance to stress and strain makes it highly useful in aerospace applications where it allows for weight savings over steel, Multi Walled Carbon Nanotubes produced by the catalytic carbon vapour deposition (CVD) process ,MWCNT improves the mechanical performance, thermal conductivity, electrical conductivity, and permeation barrier properties of a range of composites and formulations. We selected the rotational speed as 1200 RPM, 30 mm/mins as processing speed , with the hexagonal tool profile and 26 KN as axial load. The FSP for AL 7075 is successfully done with reinforcement 3% MWCNT. The resultant work piece is cut into Tensile specimen according to ASTM standard using wire cut EDM. The result is achieved as 180 MPa which is higher compare to base AL 7075. So the result is achieved as expected.

Table.1. Sample Table format

Process Parameters	1	2
Rotational Speed (RPM)	800	1200
Processing speed (mm/min)	8	10
Tool Profile	Square	Pentagon

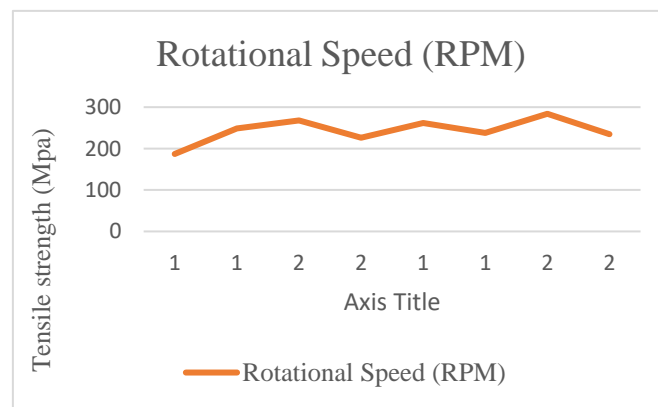
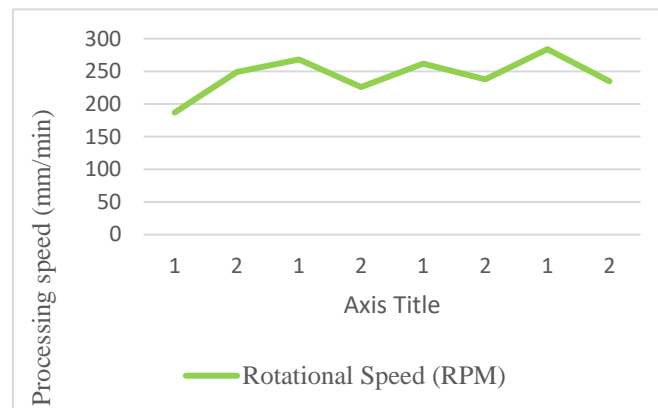


Chart.1. Level of Factors



### CONCLUSION

This experiment mainly focuses on improving and strengthening the lifetime of aeronautical and mechanical applications. It is very much useful for modern science and technology since it enhances wear, tear resistance and also durability of the component. Since this material lifetime is strong the amount which is put into the application will get reduced.

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