

Determination of White Layer Characteristics on Machining Process

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Abstract: Now a day's industries requirement as light weight and high wear resistance component. The component used as a various industrial application areas. The material also high self lubricant material also need. In this work we was used aluminium matrix composite with added in a CNT as a Nano materials. The materials has used to a high wear resistance and it is act as a self lubricant material also the material carry out different percentage and casting used in a stir casting method. The casting sample cut by a testing sample by used in an EDM wire cut machine. The sample carried out the result and plots the graphs. And the samples are carry out wear test using pin on disc method. The result shown in graph. And the sample machining study also did by EDM Wire cut machine. Finally carry out the white layer of the material. The study discussed with the paper. In this research work used in a light weight and self lubricant material needed area

Keywords: About four key words or phrases in alphabetical order, separated by commas.

I. INTRODUCTION

In this work the aluminum metal matrix composite has been used. The test result are concluded. The material used for light weight application. And wear resistance was performed in this work¹. In this work aluminum 6063 material was used. The material added with Tic material. The material for used in a light weight application. And the material carry out of the wear resistance also². In this work the aluminum nano material with added in a TiC material. The Tic different volume percentage were used. In this material carry out by the wear resistance and a machining parameter were studied. Finally the white layer study was done the work.³ In this work zirconium based composite material was studied. The composite material was used in a light weight application. And the material having in a higher wear resistance material. The material used in a excellent machining study were used.⁴ In this aluminum Sic composite were prepared in a different weight percentage. And the different loading wear tested were carry out. The result also discussed. Finally the aluminum oxide was added in the material because high oxide resistance they have used⁵. In the work the composite material was machined by EDM. And the machining parameter was studied. The peak current was changed

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frequently. Finally the result was studied⁶. In this research work was studied machining parameter of the material. The material machining by various parameter. The voltage and flux current keep on change. The result also discussed in the graphs⁷. In this work different machining parameter was studied. And finally they have used the parameter using in a taguchi method for machining parameter optimization parameter. Finally the studied will be optimized.⁸. In this work the machining parameter are studied. But the material has inconel material. the material have higher strength. So the MRR will be decreased. The optimized parameter once help for the to give MRR⁹. In this research work was used in a EDM fluent was added in a Sic material. When added the material the MRR will be increase. And tool wear will be decreased.¹⁰

II. METHODOLOGY

The material was prepared by stir casting method. The vacuum gases are produced in remove blow holes. And the different composite material was used. The material was prepared as per tables. The stir casting are used in a casting the samples. The stirrer runs by normal speed. The pouring the material as per dies. The solidification material was tested as per ASTM standards.

Table 1: Composition of Matrix and Reinforcements

| Samples | AA6061 (%) | SiC (%) | CNT (%) |
|---------|------------|---------|---------|
| 1 | 97 | 2 | 1 |
| 2 | 96 | 2 | 2 |
| 3 | 94 | 3 | 3 |
| 4 | 92 | 4 | 4 |
| 5 | 90 | 5 | 5 |

III. TESTING OF MECHANICAL BEHAVIOUR OF COMPOSITESA) TENSILE TEST

The material were prepare as per ASTM standards. The D8 ASTM standard were prepared as per EDM Machining. The machining samples were tested as per standards.

B. Compression Test

The material were prepare as per ASTM standards. The D12 ASTM standard were prepared as per EDM Machining. The machining samples were tested as per standards.

C Impact Testing

The material were prepare as per ASTM standards. The D5 ASTM standard were prepared as per EDM Machining. The machining samples were tested as per standards.

IV. RESULTS AND DISCUSSIONS

Table 2: Various Result of Mechanical Testing

| Sl. No. | Sampl es | Compressi on load (kN) | Tensile strength(MP a) | Hardne ss in HBW | IMP ACT (J) |
|---------|----------|------------------------|------------------------|------------------|-------------|
| 1 | Sample 1 | 81.21 | 165.25 | 52.11 | 6 |
| 2 | Sample 2 | 81.51 | 188.24 | 55.7 | 5 |
| 3 | Sample 3 | 80.76 | 182.57 | 56.15 | 5 |
| 4 | Sample 4 | 80.24 | 188.24 | 49.5 | 6 |
| 5 | Sample 5 | 81.7 | 188.52 | 55.8 | 6 |

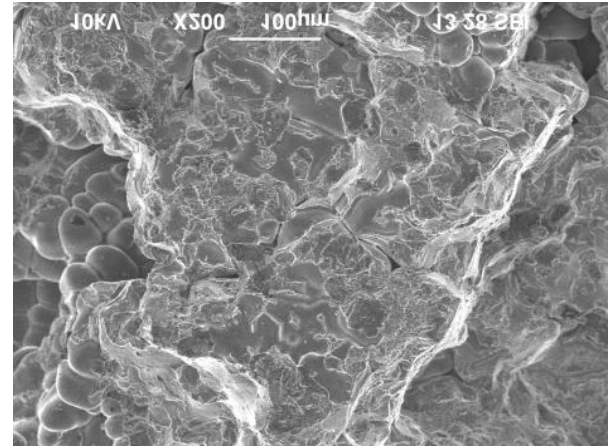


Fig 2. The Fracture surface image shown in a Tensile and impact fracture

The SEM image shown as a ductile fracture surface formed. Hence the material shown as dimples formed. The SEM image magnification 100 X the Mechanical Characterisation Result shown that the ductile fracture was formed. Hence the SEM image showed the ductile fracture surfaces.

V. RESULTS OF WIRECUT-EDM PROCESS:

Table 3: Results For Wire-Edm Process For L16 Taguchi Array

| EXP .NO. | Curren t (A) | Po n (µs) | Pof f (µs) | Wire Tensio n (N) | MRR (cm ³ /min) | Surface Roughnes s (µm) |
|----------|--------------|-----------|------------|-------------------|-----------------------------|-------------------------|
| 1 | 37 | 9 | 9 | 2 | 0.0064 | 1.08 |
| 2 | 37 | 11 | 11 | 3 | 0.0065 | 1.5 |
| 3 | 37 | 13 | 13 | 4 | 0.0078 | 2.4 |
| 4 | 37 | 15 | 15 | 5 | 0.0112 | 2.8 |
| 5 | 39 | 9 | 11 | 3 | 0.0084 | 1.38 |
| 6 | 39 | 11 | 9 | 5 | 0.0108 | 2.45 |
| 7 | 39 | 13 | 15 | 2 | 0.0123 | 2.85 |
| 8 | 39 | 15 | 13 | 3 | 0.0137 | 3.15 |
| 9 | 41 | 9 | 14 | 5 | 0.0092 | 3.2 |
| 10 | 41 | 11 | 15 | 2 | 0.0096 | 3.45 |
| 11 | 41 | 13 | 9 | 1 | 0.0124 | 3.8 |
| 12 | 41 | 15 | 11 | 2 | 0.0135 | 3.72 |
| 13 | 44 | 9 | 15 | 3 | 0.012 | 3.25 |
| 14 | 44 | 11 | 13 | 3 | 0.0135 | 3.45 |
| 15 | 44 | 13 | 11 | 4 | 0.0156 | 4.2 |
| 16 | 44 | 15 | 9 | 5 | 0.0157 | 4.12 |

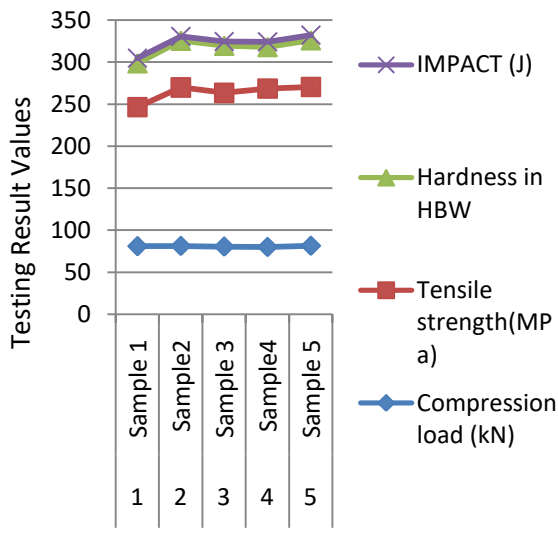
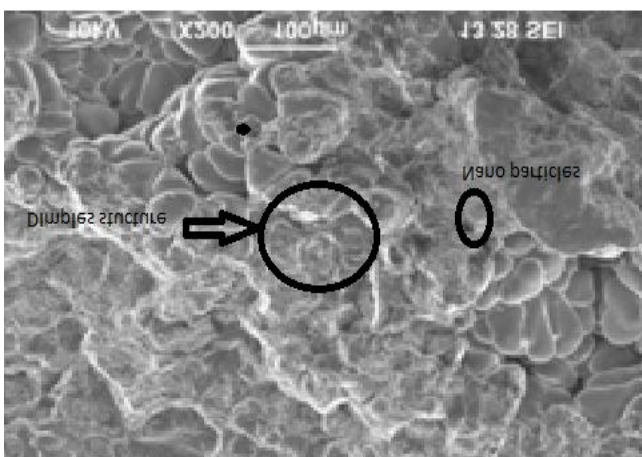


Fig 1: Mechanical Result shown in a Various Test Results.

The graph shown was the various result shown in picture. In the graph was shown in a low compression value. Hence corresponding the hardness value as increased. The hardness value increased the porosity also increased. The porosity was shown in the SEM fracture surface. Hence the data as predicted the sample as ductile fracture surface as formed.



The table show in L16 orthogonal arrays. The input parameter taken as a current pulse and pulse off, hence the table shown that the coefficient of pulse wire tension and MRR,surface roughness. When L16 Orthogonal array increased the accuracy of the result increased. The surface roughness was show in lower values. Hence machining characteristics will be possible in the material. The white layer of the image was discussed with SEM Images.

VI. WHITE LAYER IMAGE ANALYSIS

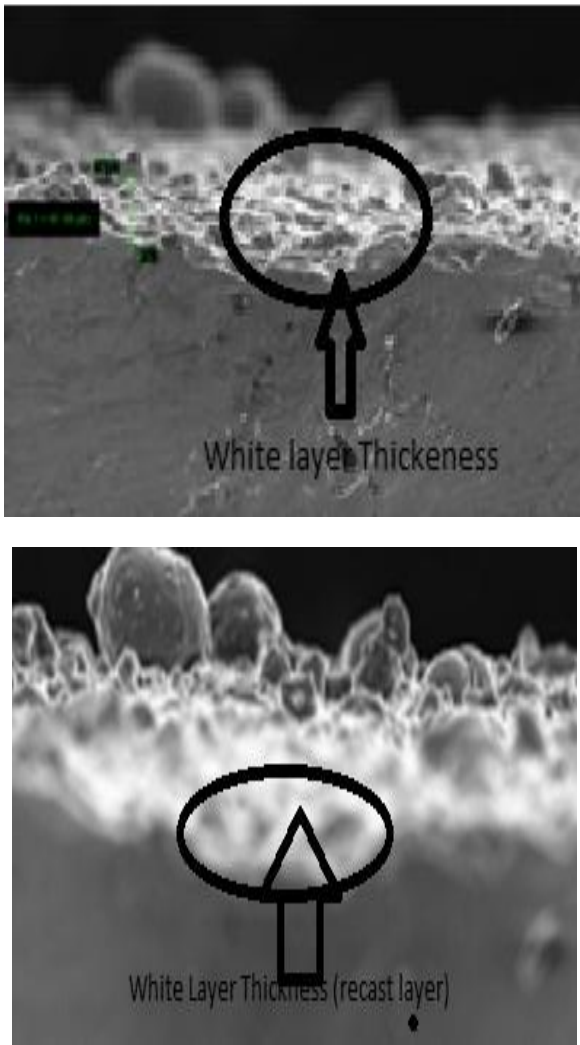


Fig 3: White layer SEM image shown in a Machining surface of the Machining Samples

The SEM image shown in a White layer thickness when a EDM Machining parameter. Actually White layer is called Recast layer of the Machining surface. It is an unwanted layer. The thickness of white layer was measured in a SEM images. The thickness was very low. Hence Recast layer was in a limit. The recast layer was formed in machining surface hence it is created a corrosion problem.

VII. CONCLUSION

The aluminium composite with CNT material was prepared was stir casting method. The stir casting component was machining by EDM machining. And mechanical testing were done as per ASTM standards. The Wear and machining parameter was done. The result are discussed with graphs. The sem images shown in a fracture surface and wear surface of the materials. The white layer study also done. The result are discussed was done

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