An Detailed Investigation of Metal Composite Material with Synthetic Resin

Sethubathi Jagadeesan
Department of Mechanical Engineering,
Erode Sengunthar Engineering College,
Perundurai, Erode - 638057

Arulmanikandan K
Department of Mechanical Engineering,
Erode Sengunthar Engineering College,
Perundurai, Erode - 638057

Aswanth S
Department of Mechanical Engineering,
Erode Sengunthar Engineering College,
Perundurai, Erode - 638057

Udhayakathir U
Department of Mechanical Engineering,
Erode Sengunthar Engineering College,
Perundurai, Erode - 638057

Vallarasu S
Department of Mechanical Engineering,
Erode Sengunthar Engineering College,
Perundurai, Erode - 638057

Abstract:- Composites are substances made of more than one sort of substance having unmistakably unique compound or actual qualities. Composites offer various advantages, including being lightweight, impervious to erosion, having low creation costs, and having high strength and firmness. This study explored the creation of composite materials utilizing the type of particles of Metal waste (Burs) and Copper particles. Additionally, the review looked to learn how the cycle was influenced by molecule size, material proportion, and submersion time. In this exploratory review, a work is attempted to decide the effect of this composite as built up particles on the mechanical qualities of composites made utilizing polyester resin. Examination of the mechanical way of behaving of different composite material blends is finished utilizing a few investigations, including malleable, pressure, and Effect tests. In the long run, it has been accounted for that the mix of tamarind dust with the flexural twist test has better worth.

Keywords:- *Synthetic Resin; Metal Matrix; Mechanical Behaviour; Tensile test; Compression Test.*

I. INTRODUCTION

Metal matrix composites (MMCs) represent a cutting-edge class of advanced materials that have garnered significant attention in various engineering and industrial applications. These materials are engineered to overcome the limitations of conventional metals by combining them with reinforcing materials, often in the form of ceramic or organic compounds. The resulting synergy creates a material that exhibits superior properties compared to its individual components, making MMCs a fascinating area of research and development.

II. EASE OF USE

Metal composite materials depends on various factors, including the specific type of composite, its intended application, and the experience and skill level of the user. Metal composite materials typically consist of two or more metal layers or a metal layer combined with other materials such as polymers or ceramics. Here are some considerations regarding the ease of use for metal composite materials:

A. Fabrication Techniques

- *Casting*

Some metal composites may be cast into specific shapes. The ease of use in casting depends on the melting points and properties of the metals involved.

- *Rolling and Extrusion*

Metal composites can often be processed using traditional metalworking techniques like rolling or extrusion, making them suitable for a wide range of applications.

- *Machinability*

The ease of machining metal composites depends on the hardness, abrasiveness, and other material properties. Some composites may require specialized tools or cutting techniques.

- *Application-specific Considerations*

The ease of use can vary based on the intended application. For example, a metal composite used in aerospace applications may have different requirements compared to one used in architectural or automotive applications.

➢ *Cost and Availability*

The cost of materials and the availability of processing technologies can influence the practicality and ease of use. Some advanced metal composites may require specialized facilities or equipment.

III. EXPERIMENTAL WORK

A. Material Selection

We choose the base material as metal waste (powder form) and copper burs. Here we used LY556 resin and HY951 hardener.

B. Material Preparation:

The mould box has been prepared by acrylic sheet by the help of CNC laser cutting machine. Using the Glass jar for prepare the epoxy solution. Resin and hardener is the ratio of 10:1. We used EN8 Metal powder and copper burs as the mixing material to the epoxy.

C. Mechanical Testing

The mechanical property of the material has been calculated by the help of universal testing machine. Conduct tensile, compressive, and shear tests to evaluate the mechanical properties (strength, modulus, ductility, etc.) of the composite.

D. Tensile Testing

Tensile testing helps in understanding how a material responds to axial loading and provides important information about its strength, ductility, and other mechanical properties.

E. Comprerssion Testing

This type of testing helps identify how well a system can handle and respond to various loads.

F. Flextural Testing

Flexural testing, also known as bending testing, is a material testing method used to determine the flexural or bending properties of a material. This test is particularly important for materials like ceramics, composites, metals, and polymers, where the ability to withstand bending loads is crucial in real-world applications.

G. Impact Testing

Assess the material's response to impact loading through impact tests (Charpy or Izod tests). This is crucial for applications where the material may experience sudden impacts.

IV. CONCLUSION

The conclusion for a discussion on metal composite materials would depend on the specific points and arguments presented in the context of your discussion. However, here is a general conclusion that can be drawn for metal composite materials:

In conclusion, metal composite materials represent a promising and innovative class of materials that offer a wide range of benefits in various industries. Their unique combination of different metals and other materials provides enhanced properties, including superior strength, lightweight characteristics, corrosion resistance, and improved mechanical performance. As technology continues to advance, the development and application of metal composites are likely to expand, opening new possibilities for manufacturing, aerospace, automotive, and other sectors. While challenges such as cost and production processes exist, ongoing research and engineering efforts are addressing these concerns. The versatility and performance of metal composites make them a valuable asset in the pursuit of more efficient, durable, and sustainable materials for the future.

A. Figures

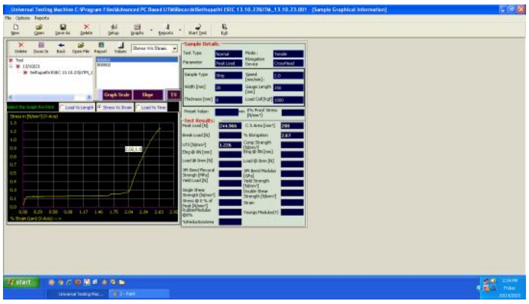

Fig. 1. Tensile Stress

Fig. 2.

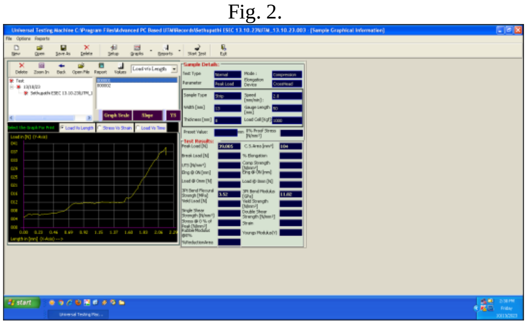

Fig. 3. Flextural Load

Fig. 4.

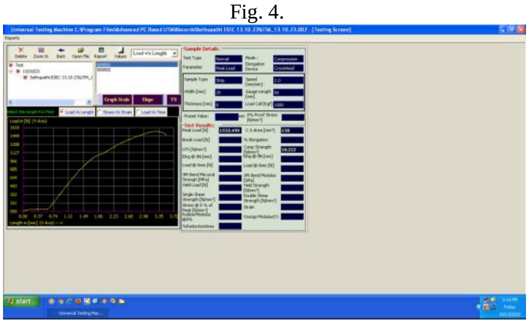

Fig. 5. Compression Load

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