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Fatigue properties of value added composite from Aluminium, Si, Mg, Woodhusk Ash nano particles.

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Abstract: Metal matrix composites reinforced by nano-particles are very promising materials, suitable for a large number of applications. These composites consist of a metal matrix filled with nano-particles featuring physical and mechanical properties very different from those of the matrix. The nano-particles can improve the base material in terms of wear resistance, damping properties and mechanical strength. Different kinds of metals, predominantly Al, Mg and Cu, have been employed for the production of composites reinforced by nano-ceramic particles such as carbides, nitrides, oxides as well as carbon nanotubes. The main issue of concern for the synthesis of these materials consists in the low wettability of the reinforcement phase by the molten metal, which does not allow the synthesis by conventional casting methods. Several alternative routes have been presented in literature for the production of nano-composites. This work is aimed at reviewing the most important manufacturing techniques used for the synthesis of bulk metal matrix Nano composites. Moreover, the strengthening mechanisms responsible for the improvement of mechanical properties of nano-reinforced metal matrix composites have been reviewed and the main potential applications of this new class of materials are envisaged.

The fatigue properties of AMCs are affected by poor toughness ,low ductility, and resistant to crack growth which is attributed to the reinforcement particles, sizes, and shapes, because the crack growth rate behavior of the composite displays a markedly higher sensitivity to the applied stress intensity (*K*) than observed in most metals. The use of nano-sized ceramic particles has been reported to strengthen the metal matrix, while maintaining good ductility, high temperature creep resistance, and better fatigue. Based on this background, fatigue properties of Al-Si-Mg/palm kernel shell ash nanoparticles (PKSAnp) was investigated. Sol-gel method was used in the production of the PKSAnp; 4 wt% of PKSAnp was added to Al-7%Si-0.3%Mg alloy to produce A356/4 wt% PKSAnp composites; fatigue properties were determined as per ASTM E466; microstructure of the composite was determined using a scanning electronic microscope; ANSYS bench work software was used determined the factor of safety and fatigue life. The presence of PKSAnp in the alloy has great influences that alter the number of cycles obtained for the composite even at higher temperature. The presence of PKSAnp shifted the curve to a higher number of cycle before failure. The result shows that failure of the alloy will occur before the design life is reached since the minimum value obtained for the alloy is less than one.

I. INTRODUCTION

This project about Fatigue properties of value added composite from aluminium , si mg/woodhusk ash nano particles. We are used casting process in project. And alloy of iron used on place of material. We are used on place of mix material like WOODHUSK. And invent new composite material. Metal matrix composites reinforced with nano-particles, also called Metal Matrix nano-Composites (MMnCs) are being investigated worldwide in recent years owing to their promising properties suitable for a large number of functional and structural applications. The reduced size of the reinforcement phase down to the nano-scale is such that inter-raction of particles with dislocations becomes of significant importance and, when added to other strengthening effects typically found in conventional MMCs, results is improvement of mechanical properties . The main issue to be faced in the production of MMnCs is the low wettability of ash nano-particles with the molten metal matrix, which do not allow the production of MMnCs by conventional casting processes. Small powder aggregates are in fact prone to form clusters, losing their capability to be homogeneously dispersed throughout the matrix for an optimal exploitation of the strengthening potential. For this reason, several alternative methods have been proposed in order to overcome this problem. The production methods can be categorized into two major groups: manufacturing and testing. The first synthesis route consists of adding nano-reinforcements(Si, Mg Wood husk Ash) to the powdered metal, while in situ processes refer to those methods leading to the generation of ceramic nano compounds by reaction during processing.

II. Then mix it properly with nano particle of Si, Mg, Ash (Wood husk) and make a specimen with the help of casting process, after that take a specimen and clean or remove unwanted material for fulfill size & dimension of specimen.

III. And finally a new component material testing on fatigue testing machine.

For this study secondary data has been collected. From the website of KSE the monthly stock prices for the sample firms are obtained from Jan 2010 to Dec 2014. And from the website of SBP the data for the macroeconomic variables are collected for the period of five years. The time series monthly data is collected on stock prices for sample firmsand relative macroeconomic variables

ADVANTAGES OF THE PROJECT:

1. FREEDOM TO TAILOR THE STIFFNESS AND STRENGTH OF A PART BY VARYING THE THICKNESS AND FIBRE ORIENTATION;

2. Light weighting – Our first objective while making this material was that we should keep the weight of it to a minimum and from what we have added things in it, it will reduce its weight in comparison to the material.

3. Reduced part count and assembly costs: in some components, the various parts can be integrated into a single part, thereby reducing assembly costs. Household utensils and home appliances are its good exams, which we always want for those with light weight.

4.Such metal mixed with such aluminium and other nano particle matrix material will not be affected by rust and at some point, its cost will also be reduced.

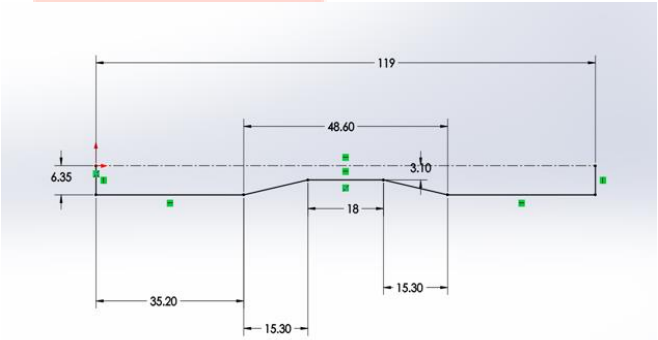
5.Because by adding a natural composite, (wood husk ash) the structure of this metal will be complex geometries, which is very beneficial for its strength. Several automated techniques, such as knitting.

TOOLS & TECHNOLOGY USED

We have something to build our project. We will use tools and two three machine gate testing, machine, first of all we will make our project using casting. For this we will need some tools such as sand and molding box furnace, fuel material, after that we will prepare our project by casting after that they will finish the dimension of their project on the lathe machine. After that we will test on the cutting machine and we will get the result.

So the machine and tool is something like this:

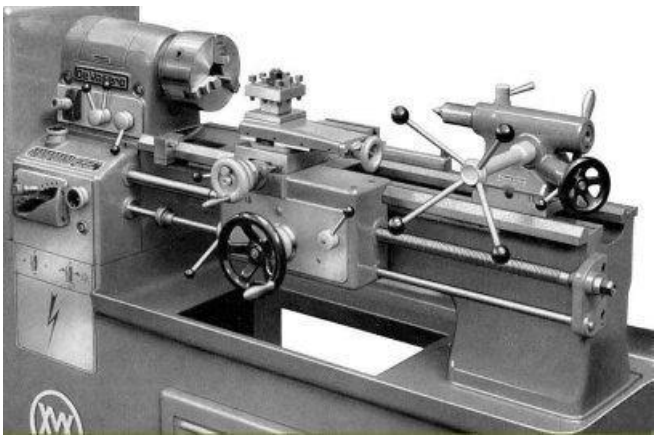
1. LATH MACHINE
2. FATIGUE TEST MACHINE



LATH MACHINE:

The main part of lathe machine headstock, tailstock, and a tool post. Work pieces are hold by headstock and rotate different speed and rpm. Tailstock is used to hold the work piece or job to align with the center of Chuck (work holding device on headstock) if the work piece is long. It is also used to hold attachments for various operations. Tool post is present at the middle of headstock and tailstock and can slide on X and Y axis. Operation tool should be fixed in lathe machine like cross slide, carriage.

Wood and iron should be shaped by lathe machine.



FATIGUE TEST MACHINE:

In this fatigue test machine we can conduct test by providing the force put on them and increase the force at point where sample break.

Material durability is defined by the elongation percentage ,modulus of elongation and yield these are the factor.

TYPE OF COMPONENT ARE USED:

- **ALUMINIUM:**

Aluminium is soft, ductile, corrosion resistant and has a high electrical conductive material. It is widely used for foil and conductor cables, but alloying with other elements is necessary to provide the higher strengths needed for other applications.

Mechanical Properties of Aluminium

Aluminium can be severely deformed without failure. This allows aluminium to be formed by rolling, extruding, drawing, machining and other mechanical processes. It can also be cast to a high tolerance.

Alloying, cold working and heat-treating can all be utilized to tailor the properties of aluminium.

The tensile strength of pure aluminium is around 90 MPs but this can be increased to over 690 MPa for some heat-treatable alloys.

COMPONENT02:

- **MAGNESIUM:**

Magnesium is a chemical element and his atomic no. is 12. It is used to make strong lightweight alloys.

It is a mixtures of magnesium with other metals (alloy), like aluminum, zinc, manganese, silicon, copper, rare earths. Magnesium is the lightest structural metal. This is a hexagonal lattice structure that which affects the fundamental properties of these alloys.

The Physical Properties of Magnesium are as follows:

Color: Silvery-white metal.

Phase: Solid.

Crystalline structure: Hexagonal.

Ductility: It can be beaten into extremely thin sheets.

Malleability: Capable of being shaped or bent.

Luster: Exhibits a shine or glow.

Hardness: Relatively soft.

COMPONENT 3:

- **SILICON:**

Silicon is also chemical element and his atomic no. 14. It is used to making an electronic circuit, cylinder heads, engine blocks. Silicon is widely used in computer chips and solar cells. The brown amorphous powder is found, it is usually a grey crystalline solid. It is a tetravalent metalloid and semiconductor.

PROPERTIES OF SILICON

Silicon is a hard, in crystalline form is very brittle. The melting point and boiling point of silicon is 1410*c and 3265*c. The silicon does not react with water, oxygen and most acids in solid form. The oxide and as silicates as silicon occurs mainly in nature.

COMPONENT 4:

Two waste products, dust and chips, form at the working surface during woodworking operations such as sawing, milling and sanding. These operations both shatter lignified wood cells and break out whole cells and groups of cells. Shattering of wood cells creates dust, while breaking out of whole groups of wood cells creates chips. The more cell-shattering that occurs, the finer the dust particles that are produced. The physical and chemical properties of wood ash, which determine its beneficial uses, are dependent upon the species of the wood and the combustion methods that include combustion temperature. Wood dust is a form of particulate matter, or particulates. Research on wood dust health hazards comes within the field of occupational health science, and study of wood dust control comes within the field of indoor air quality engineering.

PROCESS:

The first synthesis route consists of adding nano-reinforcements(Al, Si, Mg Wood husk Ash) to the powdered metal, while in situ processes refer to those methods leading to the generation of ceramic nano compounds by reaction during processing.

Then mix it properly with nano particle of Si, Mg, Ash (Wood husk) and make a specimen with the help of casting process, after that take a specimen and clean or remove unwanted material for fulfill size & dimension of specimen.

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CONCLUSION

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Result

We are work on Fatigue properties of value added composite from aluminum, si mg/wood husk ash nano particles.

Mixing material: wood husk

Me and my team are working on this project with some procedures . First of all we will decided mixing material (wood husk) after that make a specimen with mixing of wood husk by casting process , manufacturing work is done.

Then the specimen will be tested by fixed it on the Fatigue machine. This machine is available in our Lab.

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