Analysis on Mg Mmc Reinforced With Titanium And Copper For Automobile Structural Applications

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Abstract*- This investigation is to study the magnesium alloys will be used in the automobile instead of aluminum alloys in the frame. Magnesium is the light structural material in recent times. It is used in automobile, aerospace, electronics and energy industries. Magnesium is 34% lighter than aluminum and 50% lighter than titanium. By replacing magnesium for aluminum with adding some additives like Mg-4Zn-5Cu-5Ca (wt. %). The mechanical testing's for this paper are compress, tensile, creep, corrosion and flexural. Using XRD (X-Ray Diffraction) and SEM (Scanning Electron Microscope).*

Keywords- Zn, Mg, Ti, Ca.

I. INTRODUCTION

Magnesium naturally occurs in crystal rocks and it's was the first isolated pure material which was done by electrolytic method. Later they have identified sodium, calcium and potassium as pure material. It was protected against further oxidation by a thin impermeable layer of oxide. Magnesium alloys were to be converted into magnesium lattice by dissolving large amounts of oxygen atoms. Using titanium oxide the nanoparticles in the magnesium to be melt at 720'C. Magnesium has been trending of late of automobiles and aircrafts. Using magnesium they have reduced the weight of the tyres and increases fuel efficiency and reduced the cost. They have reduced the weight by using nanoparticles (Y203). The light weight of Mg alloy was used to reduce the transportation sector and increase greenhouse emission and energy consumption.

The most important organizations are cooperative research center for cast metal manufacturing in Australia. The magnesium alloys was established part of the Australia common wealth governance corporative research center's program and commenced operating in 1993.The area is mainly focused on understanding the corrosion behavior of magnesium alloys and solving practical corrosion problems relating to the applications of magnesium alloys. In cast research effect the world, future research direction in this field can be initiated.

The lower strength and poor ductility hinder the engineering applications. Magnesium alloys was the lightest material and it was slightly lighter compared to titanium and steel. And Mg alloy possess good strength and limited cold workability and a high susceptibility to corrosion. Presently most of the automotive industries are used to reduce the vehicles structural mass.They have used aluminum alloys to reduce the weight of vechicles.In this paper they used Mg because it is the lightest components among others. Magnesium is the lightest metal and has density which has more than aluminum and has potential to improve its performance and provide more energy to automobile and aerospace industries. Magnesium is the lightest material and the transportation sector and the structural materials to improving the fuel efficiency by weight reduction. Mg has provided good age hardening characteristics. Mg alloys have the ability to perform high performance and for the greater performance. They are currently used in automotive such as seeing wheel and manifold etc. Magnesium has been widely used in automotive industries because of the benefits of low density and higher strength ratio and high specific toughness. The performance of Mg alloys provides greater strength compared to aluminum.

"A FLASH OF MAGNESIUM" (Paul Knochel)

The most common elements on a earth (the sixth in an order of weight abundance). In crustal rocks the magnesium normally occurs. In this process the magnesium will be obtained directly in the earth core rock. In the earth's core rock the large amount of magnesium content will be found by using the following magnesium content the objective of the product will be commonly achieved. The alternation composition of the product by changing the material parameters or entirely changing the element that already used in the existing product (aluminum to magnesium).

"MULTI-FUNCTIONAL MAGNESIUM ALLOYS CONTAINING INTERSTITIAL OXYGEN ATOMS" (H.Kang, J.Choi)

A magnesium alloys has been improved by mixing large amount of oxygen atoms into a magnesium lattice (Mg-O). The magnesium alloy is the mixture composition of oxygen atoms and magnesium is commonly known as magnesium alloy. The aluminium will be easily replaced by the magnesium because it has less weight and it is the easily available material. And it will be done by the help of adding copper and titanium to use in the car rim.

A STRONG AND DEFORMABLE IN SITU MAGNESIUM NANOCOMPOSITE IGNITING ABOVE 1000OC (Manoj Gupta)

Magnesium is the trending element that used in the automobile, aero planes, depends, sports, electronics and biomedical these are the applications of magnesium.

MAGNESIUM; APPLICATIONS AND ADVANCED PROCESSING IN THE AUTOMOBILE INDUSTRY (MARKRSTOUDT)

Automotive industry is used to improve the fuel economy and used to reduce the weight of the vehicle without compromising safety. Magnesium alloys will replace with the aluminium in order to provide the reduced weight and it will be replaced by using in the car rim and offers less cost.

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II. MECHANICAL TESTING

COMPRESSIVE

Plastic deformation exists only on compressive test. Because it allows large deformation without the fracture of the specimen. Aluminum exists only on compressive strength. The most tests are used yield stress, strain to failure and work hardening rate. In material the both sides of the forces are acting together in the material is denoted as compressive strength.

TENSILE TEST

Tensile test is also known as tension

Testing. Tensile test used for ultimate tensile strength, breaking strength, maximum elongation and reduction in area. It is used to predict how the material will perform use. It is also used for requirements of specification, regulation or contacts are met.

CORROSION TEST

Corrosion test is used for conduction of the order to solve in laboratories. It is used to prevention of the problems in medicate of the corrosion. It is used in industrial materials and infrastructure products. It is also used for the failure analysis.

The salt spray test is one of the most wide spread and long established corrosion tests. Corrosion test is the fundamental to understanding how materials perform under simulated service condition and help to ensure that will reach there projector decide life.

CREEP TEST

Creep testing measures the creep tendency of a material being subjected to high level of stress. It is a device that measures the alteration of the material after it has been put through different forms of stress. It is the tendency of a solid material to move slowly or deform permanently under the influence of mechanical stresses.

FLEXURE TEST

Flexural is also known as the modulus of rupture or bend strength or transverse rupture strength is a material property, defined as the stress in a material just before it yields in a flexure test. It is generally used to determine the flexural modulus or flexural strength of a material.

MATERIAL AND METHODS FABRICATION AND THERMOMECHANICAL PROCESS

They used co2 and sf6 mixture to melt the molten alloy by using temperature to be set at 750'c. Using graphite they have produced IC alloys by melting at 900'cunder an atmosphere of co2 and sf and that were cast into copper mould.

FABRICATION PROCESS

Using gravity testing method Mg alloys was fabricated and identified magnesium as the pure component by the mixture of C02 and sf6.

COMPOSITION USED

S.NO	MATERIAL	WGT %
1	Magnesium	Balance
2	Copper	4%
3	Titanium	4%

PRIMARY PROCESSING

Melting magnesium by using Nano composite Mg-1.8Y TO find the purity of the Mg turnings

X-RAY DIFFRACTION

Using Co-k radiation macro textured were measured by using a broker D8 texture to find the purity of Mg and that was done by X-ray diffraction.

MATERIAL SYNTHESIS

Disintegrated melt deposition which includes melting and decomposition to determine the light weight of the alloy Mg by using the 8mm connecting rod.

X-RAY DIFFRACTION

XPS-X-RAY photo electron spectroscopy was used to determine the surface composition of optimized alloys and determine Mg as the purest metal and possess good strength.

TESTING DYNAMIC COMPRESSION TESTING

This test was used to determine the silicone grease to minimize friction and find the purity of Mg using the Split Hopkinson Pressure bar at ambient temperature (298k).

MECHANICAL TESTING

In this test they used electric motors to improve the efficiency of the wheel and used magnesium alloys in the wheel rim to reduce the weight of the tyre and provide greater compatibility.

XRD TEST

Conducted XRD diffraction test they have evaluate Mg-O Alloy as the pure metal and this materials was examined by using XP

III. CONCLUSION

Using XRD diffraction they have analyzed light weight of Mg alloy was to reduce the transportation sector and increase the greenhouse emission. XPS (X-ray photoelectron spectroscopy), they have determined Mg is the lightest material to possess good stability and cold workability and has the ability to perform as the purest material. Now a day's most of the vehicles are used aluminium to protect the rim of the wheel. We use aluminium instead of magnesium to reduce the weight of the rim and it will lower cost. In this paper, compared to aluminium the magnesium provide greater flexibility and they have provide greater performance and to improve the fuel efficiency

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