

Finite Element Analysis To Determine Static And Dynamic Properties Of Al-Alloy-7075 By Sipc Composite Material

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ABSTARCT:

E research hollow spheres of aluminum alloy A356 filled with silicon carbide (sichs) for quasi-static (3/10 image -1) And high strain rate (up to 1520 s⁻¹ properties) pressure. This vehicle closed cell foam, called The syntactic foam, are of interest in structural weight sensitive applications. This work focuses on Understanding the mechanism of pressure failure and link them with the microstructure of the material. The He found himself on the strengths and syntactic foam pressure plateau 163 and 110 sichs be MPa, respectively. measured properties are much higher than the aluminum matrix fly ash filling existing CenosphereThe syntactic foam. failure mechanisms studio A356 pressure / sichs

syntactic foam and direct evidence It is obtained from an overwhelming hollow sphere at the end of the flexible areas.Forecasts compressive strength Obtained from the current model is validated with experimental results. A thorough analysis of data open and closed cell foams complete that contain a porous gas and syntactic foam. There is a clear advantage in terms of reduced observed high elasticity limit and the A356 / syntactic foam sichs compared with another foam density. yield point aluminum foam in different strain rates at high pressure can be compared with the semi-fixed values, but most The foam is strong evidence of the sensitivity of the compression ratio in the high speed system does not appear deformation.



1. Introduction

Aluminum (in the Common English Wealth) or aluminum (in American English) is a chemical element boron in the group with the code base and atomic number 13. It is a non-magnetic soft silvery white metal, ductile. Aluminum is the third most abundant in the earth's crust (after oxygen and silicon) element, and more abundant minerals. aluminum accounts for about 8% of the dough crust, but is less common in the mantle below. Aluminum metal is so chemically reactive that local specimens are rare and limited to extreme environments limit. Instead, it has been found to be integrated in more than 270 different minerals. Prime bauxite ore aluminum.

Aluminium is remarkable for the low mineral density and its ability to resist corrosion by the phenomenon of passivation. Aluminum and its alloys are vital to the aviation industry and is important in the transport infrastructure, such as building facades and window frames. Oxides and sulphates are most useful aluminum compounds. Despite its spread in the environment, any form known life aluminum salts used metabolism, but aluminum is well tolerated by plants and animals. [8] due to the abundance, and the

possible existence of a vital for the continued interest and further studies paper.

characteristics:

material:

Aluminum is a relatively soft, durable, lightweight, ductile and malleable metal with appearance ranging from silver to graybaht, depending on the surface roughness. It is not magnetic fire easily. A new aluminum film as a good reflector (approximately 92%) of visible light and an excellent reflector (as much as 98%) than average and far infrared. yield pure aluminum is 7 to 11 MPa, while aluminum alloys have a yield strength of 200 MPa ranging from 600 MPa. Aluminum has about one third of the density and hardness of steel. And easily machined, cast and extruded loop. Aluminium is a good thermal and electrical conductor, which has 59% of the conductivity of copper, both thermal and electrical, whereas only 30% of the density of copper. Aluminum is capable of superconductivity, with a critical temperature of 1.2 Kelvin superconducting critical magnetic field of about 100 gauss (10 millitesla).

chemistry:

Corrosion resistance can be excellent in that the thin surface layer of aluminum oxide

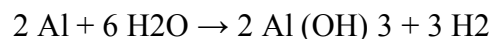


when exposed to metal in the air, effectively preventing further oxidation, passivation in a process called. Stronger aluminum alloy is less resistant to corrosion due to galvanic reactions with alloyed copper. And reduce corrosion resistance largely salts from water, especially in the presence of various metals. In acidic solutions also, aluminum reacts with water to form hydrogen, and those highly alkaline aluminate to form a passivation protection under these conditions is negligible. First because it corroded by the dissolved chlorides such as sodium chloride is common, it did not provide residential aluminum pipes.

However, due to the resistance to general corrosion, aluminum is one of the few metals that retains silver reversal in the form of a fine powder, which is an important component of silver paints neck. aluminum mirror finish has the highest reflection of any metal in the 200-400 nm (UV) and 3,000 to 10,000 nm regions (including infrared); in the visible range 400-700 nm and reached some tin and silver in 700-3000 nm (near infrared) of silver, gold and copper.

The aluminum is oxidized by water to a temperature below 280 degrees Celsius to

produce hydrogen, aluminum hydroxide and heat:



Applications:

Use:

Aluminum is the most widely used on a large scale nonferrous metal. World production of aluminum in 2005 was 31.9 million tons. It exceeded that of any other metal except iron (837.5 million tonnes). The forecast for 2012 42-45000000 tons, driven by the increase in Chinese production. It is almost always a mixture of aluminum, which significantly improves the mechanical properties, especially when tempered. For example, common aluminum cans alloy and 92% to 99% of the aluminum foil. The main alloying agents are copper, zinc, magnesium, manganese and silicon (e.g., duralumin) with other metal levels in a few percent by weight.

Some of the many uses for aluminum metal:

- transport (cars, planes, trucks, railcars and marine vessels, bicycles and space vehicles, etc.), sheet, pipe, and casting.
- packaging (cans, foil, frame, etc.).
- Food containers and beverages because of its corrosion resistance.
- Construction (windows, doors, siding, building wire, packaging, roofing, etc.).

- a wide range of household items, from cooking utensils to baseball bats, watches.
 - streetlights, masts of sailboats and walking sticks.
 - outer layers and boxes of consumer electronics products and photographic equipment.
 - electrical transmission lines power distribution ("creep" and oxidation are not issues in this application, such as termination and usually multiple standing "crimps" enclosing all sides of the connector with a tight gas) sealing.
- MKM • Alnico magnets and steel.
- Super purity aluminum (SPA, 99.980% to 99.999% Company), used in electronics and CDs, as well as wiring / cables.
 - heatsinks for transistors, CPUs, and other components in electronic devices.
 - substrate material coated copper segments basic metals used in high brightness LED lighting.
 - light reflective surfaces and paint.
 - Firearms and solid fuel rockets, and termites.
 - The production of hydrogen gas through interaction with hydrochloric acid or sodium hydroxide.
 - In the magnesium alloy components to aircraft and other transportation agencies.

- pots due to their corrosion resistance and light.
- coins minted in countries like France, Italy, Poland, Finland, Romania, Israel, and the former Yugoslavia aluminum or aluminum alloy and copper.
- musical instruments. Some aluminum plates guitar models sport on the surface of diamond instruments, usually chrome or black. Kramer Travis Bean guitars and both are known to have produced guitars with necks aluminum, which gives the machine a very distinctive voice. Aluminum is used to make some of the resonators guitar and some electric guitar speakers.

LITERATURE SURVEY:

K. Radhakrishna [1] et al, he had used aluminium with copper and fly ash as reinforcements and concluded that up to 15% the reinforcements are successfully dispersed in the matrix and hardness, wear resistance increases upto 15 wt% addition of reinforcements.

Beinias [2] et al, used aluminium with fly ash as reinforcements and stated with the addition of fly ash brittleness increases and corrosion increases as it form sporsosity. Sudarshan.

M.K. Surappa [3] et al, have synthesized A356 Al-fly ash particle

composites. They studied mechanical properties and dry sliding wear and come into brief idea that The damping capacity of composite increases with the increase in volume fraction of fly ash. The 6% of fly ash particles into A356 Al alloy show slow wear rates at low loads (10 and 20 N) while 12% Offaly ash reinforced composites show lower wear rates compared to the unreinforced alloy in the load range 20–80 N. At higher load, subsurface delaminating and thermal softening is the main mechanism in both the alloy as well in composites’.

C. Mishra [4] et al, and co workers has studied on Aluminium – fly ash composite produced by impeller mixing and came into a brief idea that Up to 17wt% fly ash reinforcement can be reinforced by liquid metallurgy route. The addition of magnesium into the aluminium melt increase the wet ability and thus increase in the mechanical properties such as hardness, tensile strength and the wear resistance is observed.

GanesanPandi [4] et al experimentally investigated the machining and tri biological behaviour of hybrid aluminium

composites. In this study, Silicon carbide

G Rajesh Babu et al [5] carried out the static and dynamic analysis of banjo type rear axle housing by using FE method for two different materials like cast-iron and mild steel. The induced deformation in cast-iron housing is greater than mild steel housing and also the natural frequencies of the cast iron are lower than the mild steel. Also observed that the stress induced in the cast iron is lower than the mild steel and concluded that the cast iron is preferred for production of rear axle housing.

Muhammad najib bin abdulhamid [6] conducted the experimental analysis on drum brake and FEA analysis and concluded that improved material performs better.

Nam Ho Kim [7] et al conducted FE analysis and experimentation on metal/metal wear in oscillatory contact and concluded that These results from the block on ring experiments and the finite element simulation are close, supporting the possibility of using finite element analysis coupled with specimen-level test data to estimate wear. A systematic approach to numerical modelling, simulation, and

validation for metal-on-metal wear is developed using both experimental and computational tools. Maximum wear depth predictions produced by finite element simulation of the block-on ring test agree to within 88% of the experimental measurements without using curve fitting.

CONCLUSION

In this project we analyses on al-alloy square and circular bars with 2Mpa pressure. And then observing results with variant materials like steel and al-a356 and al-7075 alloys. From all these results we can say al-7075 has been produced less stress (85.213Mpa) compare to other metals. If we observe here al-356 also produces same stress (85.213Mpa) like al-7075, but when we comparing strain energy and safety factor al-7075 so far better than al-356.

Material	Deformation(mm)	strain energy (mJ)	safety factor	stress(Mpa)
Steel	0.034379	0.78903	2.8885	86.549
Al-356	0.09473	2.1483	1.9363	85.213

Al-7075	0.095655	2.1692	5.9029	85.213
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After this study we conclude that the damping properties of square bar aluminium7075 are much better than the remaining metals, a hi grade damping can be obtained by al-7075.

The frequencies recorded during analysis are listed above in the table it clearly shows that aluminium7075 recorded less frequencies than al-356, because al-356 is much stiffer then aluminium-7075 But if the frequencies match with the natural frequencies the structure then the structure will fail so we should provide damping, and also the frequencies increase with increase in mode so we should reduce the modes by providing rigid supports and dampers. If damping is not possible then we should increase the natural frequency by redesigning the structure.

From all these results we can say al-7075 is having good strength to weight ratio when compare to other materials.

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