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Design and Structural (Buckling and Fracture Analysis) of Missile Container

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ABSTRACT

We have identified several causes of disturbances which damages the container such as internal pressure load, Stacking load, Braking load and lifting load. Efforts have been made to design and optimize the container for the above mentioned loads. Detailed finite element stress analysis is carried out to determine the static response of the designed composite missile container structure under mechanical loads. Ansys package has been employed to perform the structural analysis.

Introduction

Though the construct has nevertheless to seek out its massive break, defense contractors still expand on the concept of extremely mobile weapon systems that meet the dimensions and weight restrictions of ordinary shipping containers.

Fig:- container

In a maritime setting, the apparent edges of those systems square measure comparatively low price launchers and also the lack of would like for an obsessive missile-armed vessel. A system with this kind of vary might offer exactitude strikes and timely fireplace support deep into enemy territory while not the utilization of fixed-wing aggregation and also the risks that go along side it.

Fig:- missiles

A military may purchase solely a tiny low range of LORA systems and easily move them from ship to ship as necessary. counting on the defensive capabilities of the opponent, supply ships or different auxiliaries may suddenly become impromptu combatants, releasing up purposeful and higher defended warships for tasks in additional dangerous environments.

LITERATURE REVIEW

In this paper done by [1] Keerthi Shiva Krishna, K. Lalit Narayanand K. VenkateswaraRao, style improvement and structural analysis o missile instrumentation. Efforts

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are created to style and optimize the instrumentation for the higher than mentioned hundreds.Detailed finite component stress analysis is disbursed to see the static response of the designed composite issilecontainer structure underneath mechanical hundreds. Ansys package has been used to perform the structural analysis.

In this work done by [2] PrudviRaju. Devarapalli, style and Analysis of a Storage ContainerUsed in Missile. careful finite part stress analysis is applied to see the static response of the designed composite missilecontainer structure underneath mechanical masses. Ansys package has been used to perform the structural analysis.

In this paper by [3]R Nallappan, style and Analysis of a Missile Storage instrumentality UsingComposite Materials.In this investigation a instrumentality was designed that is employed for transportation and storage of missile. The analysisis disbursed to see the static properties of the designed composite missile instrumentality structure beneath the varied mechanical masses. Ansys softwarehas been accustomed perform the structural analysis.

PRINCIPLES OF MILITARY CONTAINER DESIGN

THE Gm-FACTOR

Gm = *a*/ *g*, g-units

Where,

a maximum allowable acceleration an object can safely withstand, ft/s2

g = acceleration due to gravity, 32 ft/s 2

IMPACT SHOCK

The physical relationship which defines this contention is expressed as:[4]

Ft = *mV*, lb·s

Where,

F = force of impact, lb

T=time interval required to dissipate the force *F*, s

m =mass of the container, lb·s2/ft

V =velocity of the container at moment of impact, *ftjs.*

G's DEVELOPED BY FREE-FALL IMPACT

For the analytical computations pertinent to the design of a prototype, useful values for maximum acceleration can be computed from the shock-rise time and drop height.

$$G = \frac{72}{t}\sqrt{h},$$

MINIMUM SHOCK-RISE TIME

$$t_m = \frac{72}{G_m}\sqrt{h}, \quad \text{ms}$$

BUCKLING

$$\sqrt{\frac{A}{T}} \geq 1.33$$

Where,

A = cross-sectional area of pad

T = thickness of pad

BEARING AREA

$$A_T = \frac{3Lwd}{\sqrt{L^2+w^2+d^2}}$$

Where,

L, w, and dare expressed in identical units. If the item is a cube, Eq. 7-4 reduces to:

$$A_T = 1.73\ L^2.$$

$$A_T' = \frac{S^2(d+w+L)}{\sqrt{d^2+w^2+L^2}}$$

Free-Breathing Containers

$$F = (\Delta P)RV$$

INTRODUCTION TO CAD

[5]Throughout the history of our industrial society, many innovations are proprietary and whole new technologies have evolved. maybe the only development that has wedged producing a lot of quickly and considerably than any previous technology is that the electronic computer. Computers ar getting used progressively for each style and particularization of engineering parts within the drawing workplace. Computer-aided style(CAD) is outlined because the application of computers and

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graphics software package to assist or enhance the merchandise design from conceptualization to documentation. CAD is most typically related to the utilization of AN interactive special effects system, said as a CAD system. systemsar powerful tools and within the mechanica design and geometric modelling of product and parts.

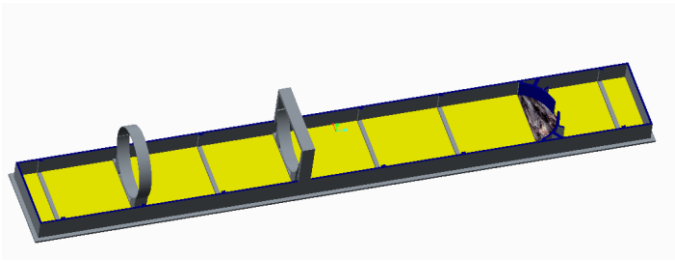

Fig:- missile container

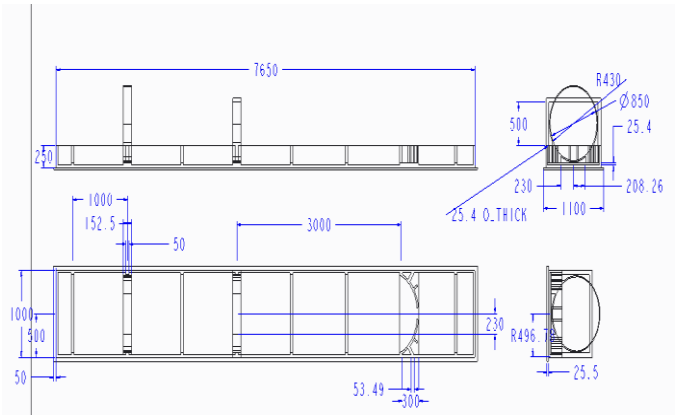

Fig:- drafting

INTRODUCTION TO ANSYS

ANSYS is general finite component analysis (FEA) code package. Finite component Analysis may be a numerical technique of deconstructing a posh system into terribly little items (of user-designated size) known as components. The code implements equations that govern the behaviour of those components and solves them all; making a comprehensive rationalization of however the system acts as an entire. These results then will be conferred in tabulated, or graphical forms. this kind of research is often used for the planning and optimisation of a system so much too advanced to investigate by hand. Systems which will match into this class ar too advanced thanks to their pure mathematics, scale, or governing equations.

STATIC STRUCTURAL ANALYSIS OF MISSILE CONTAINER

MATERIAL: - STEEL

Open ANSYS>Open work bench 14.5>select static structural >double click on it.

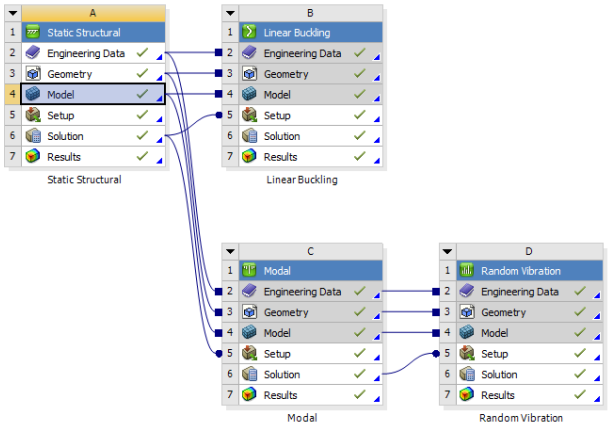

Fig:- ansys window

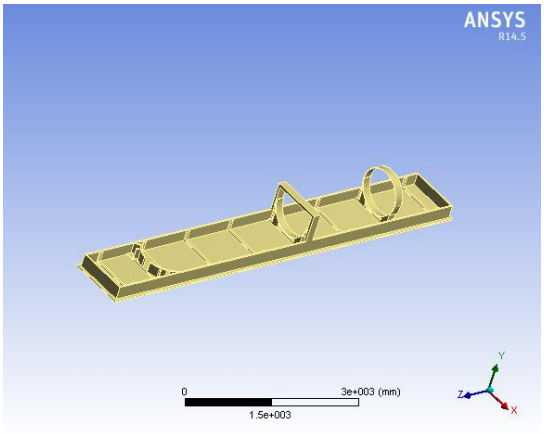

Fig: - Imported model

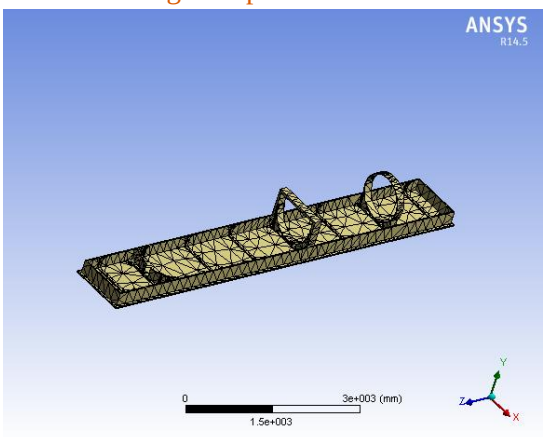

Fig: - Meshed model

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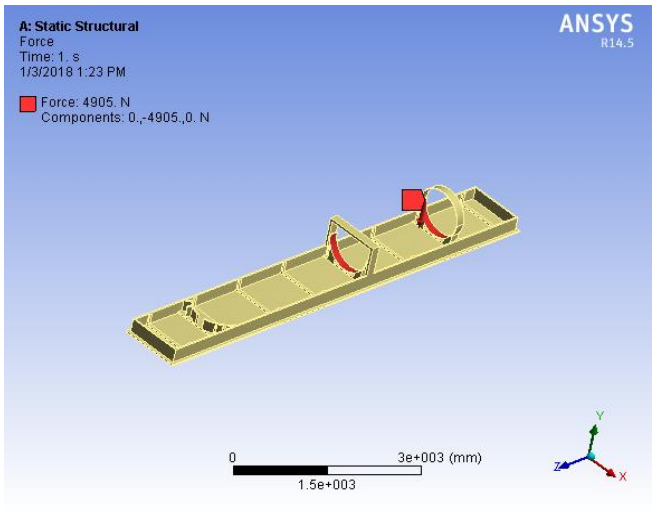

Fig: - Force

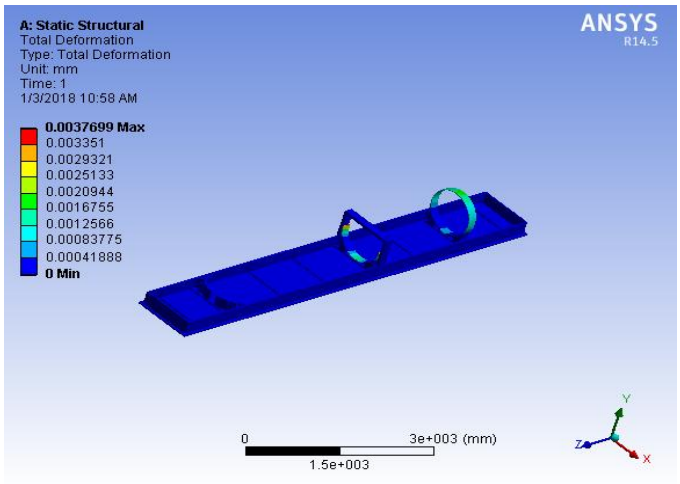

Fig: - Total deformation

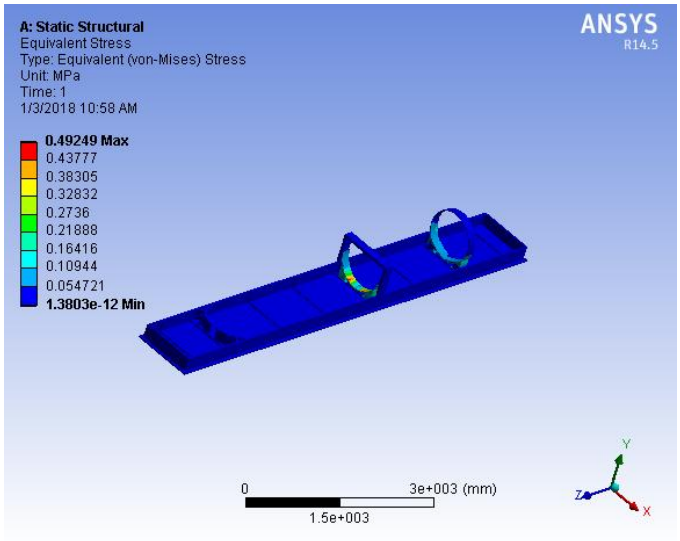

Fig: - Stress

BUCKLING ANALYSIS

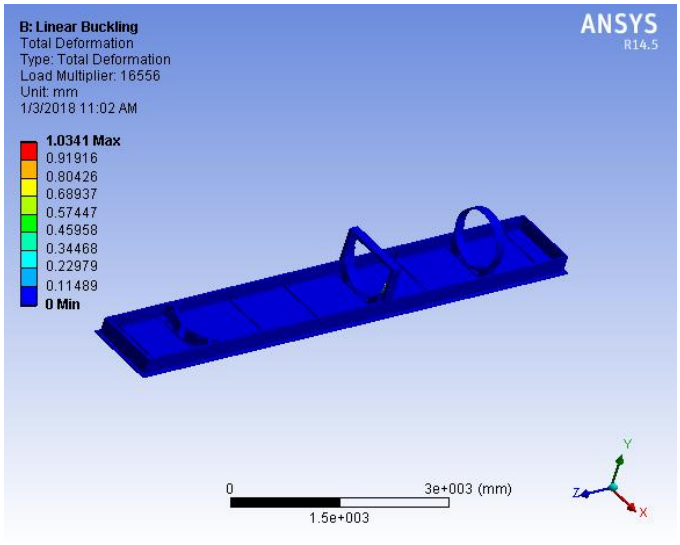

Fig: - Total deformation

FRACTURE ANALYSIS

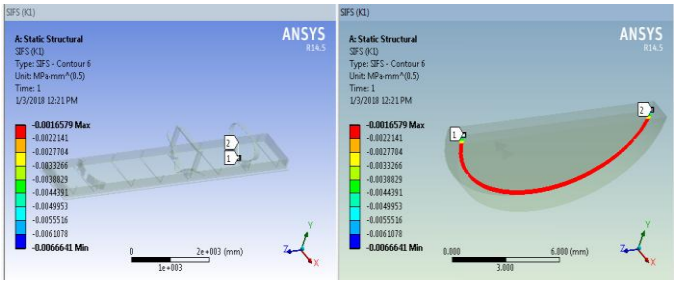

Fig: - SIFS

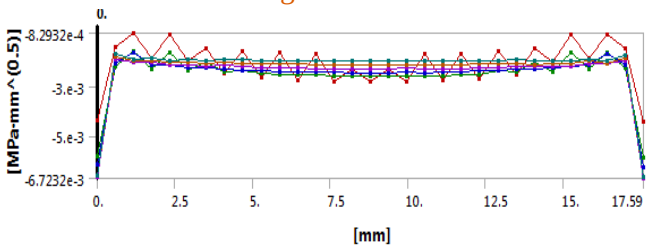

Fig: - SIFS Graph

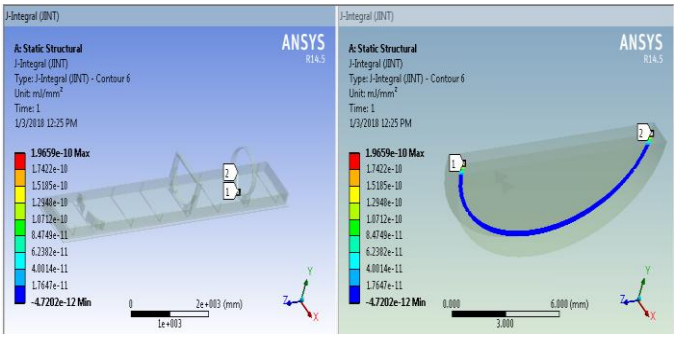

Fig: - j-integral

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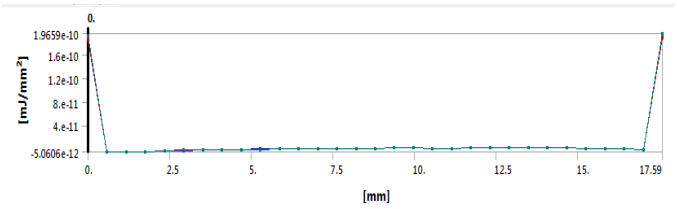
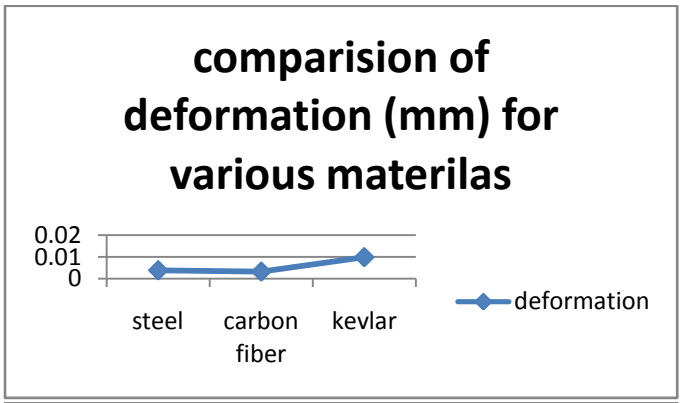
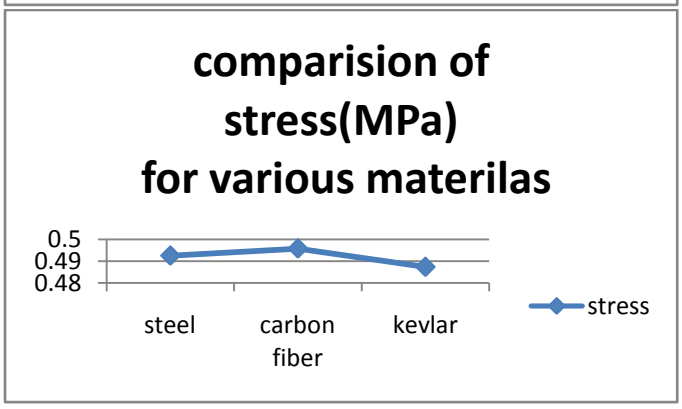


Fig: - j-integral Graph

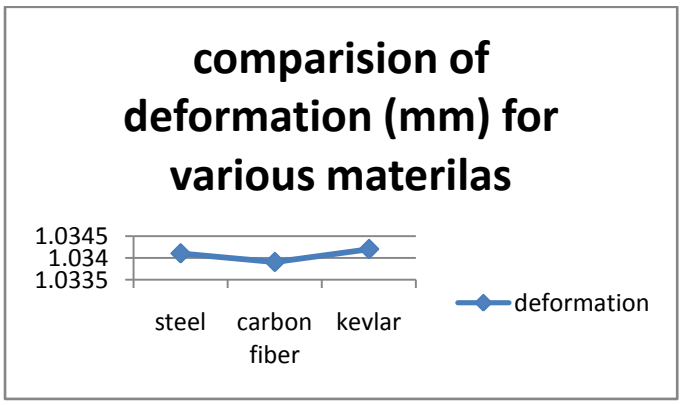
RESULTS AND GRAPHS

STRUCTURAL ANALYSIS





BUCKLING ANALYSIS



CONCLUSION

For structural analysis – the deformation is very less for carbon fiber due to its high strength. And stress point of view Kevlar getting less compare to other materials.

For buckling analysis – very less deformation is occure in the carbon fiber and also it explains that load multiplication is high.

For fracture analysis – j-integral is less for carbon fiber compare other materials.

So, By observing above results and graphs. We can conclude that, carbon fiber is better for this application of missile container.

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