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"DESIGN & STATIC ANALYSIS OF MANUAL PALLET TRUCK USING FEM METHOD BY ANSYS SOFTWARE"

Ratnesh Kumar [1], P. K. Sharma [2]
[1] M. Tech Scholar, Department of Mechanical Engineering, NIRT, Bhopal, M.P, India
[2] Professor, Department of Mechanical Engineering, NIRT, Bhopal, M.P, India

ABSTRACT

In this thesis, study has been carried out on the manufacturing process and functional activities of Manual operated pallet truck and came across with the various problems and handling in the current system. After thorough studies, careful static analysis and reviews of the various manufacturing systems and technologies. Manual Pallet Truck are robust in construction and are smooth in operations. Manual Pallet Truck are able to work efficiently for pallets on high rack, smooth control of precise lifting and lowering. By this project man power effort and time can reduce. We design and analyze of carriage fork. Our aim is design and develops a model of Manual Pallet Truck .This system has a significant importance in the equipment and material handling. 2 D and 3D modeling has done by SOLIDWORK software and simulation has done by ANSYS software.

***Keyword**: Manual Pallet Truck , manufacturing, pallet, lifting, static analysis, ANSYS*

I. INTRODUCTION

Material handling (MH) involves "short-distance movement that usually takes place within the confines of a building such as a plant or a warehouse and between a building and a transportation agency."[1]It can be used to create "time and place utility" through the handling, storage, and control of material, as distinct from manufacturing (i.e., fabrication and assembly operations), which creates "form utility" by changing the shape, form, and makeup of material. It is often said that MH only adds to the cost of a product, it does not add to the value of a product. Although MH does not provide a product with form utility, the time and place utility provided by MH can add real value to a product, i.e., the value of a product can increase after MH has taken place; for example: The value (to the customer) added by the overnight delivery of a package (e.g., Federal Express) is greater than or equal to the additional cost of the service as compared to regular mail service—otherwise regular mail would have been used. The value added by having parts stored next to a bottleneck machine is the savings associated with the increase in machine utilization minus the cost of storing the parts at the machine.. Electric Pallet Stacker is a thin, highly-versatile lift that compliments nearly any primarily indoor application. Balanced similar to a traditional forklift and without base legs, the Counter-Balanced Electric Stacker can fit into tight spaces. Extremely durable and budget friendly, the Toyota Counter-Balanced Stacker can help increase both your uptime and your bottom line.

Fig.1

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II. STACKER SPECIFICATIONS

Dimensions	Unit	Value
Capacity	Kg	1000
Max fork height	mm	90
Min fork height	mm	35
Lifting height	mm	55
Weight of unit	Kg	25

III. MODELING & SIMULATION

The full form of SOLIDWORK is Computer Aided Three-dimensional Interactive. SOLIDWORK V5 is a powerful software package yet has a relatively short learning curve. One of the reasons for the short learning curve is that it is fully Windows compatible and the processes are consistent across the workbenches, toolbars and tools.

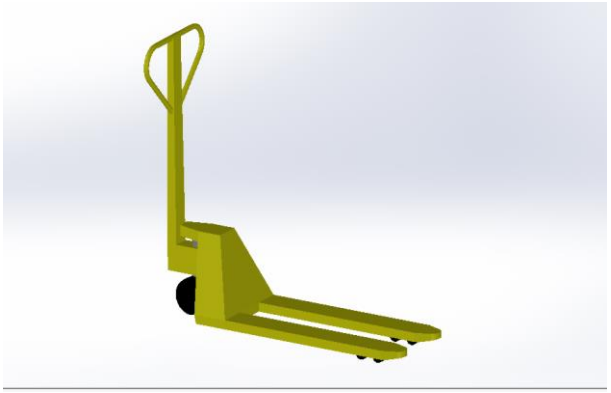

Fig.2 Solidwork Model of stacker

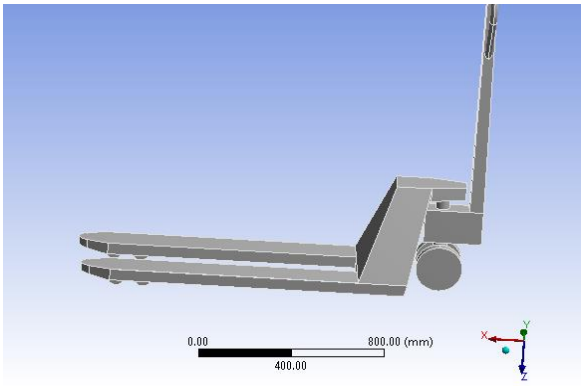

Fig.3 Import Geometry in ANSYS

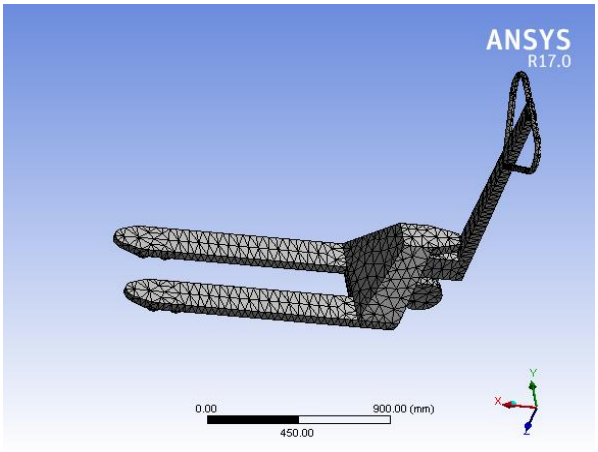

Fig.4 Geometry Meshing

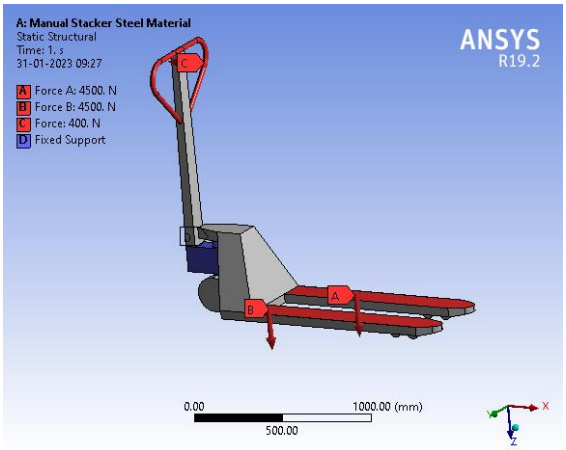

Fig.5 Boundary conditions (Structural Steel)

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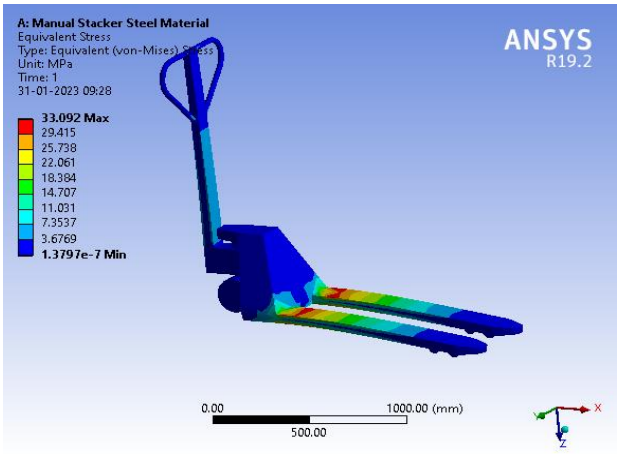

Fig.6 Equivalent Stress (Structural Steel)

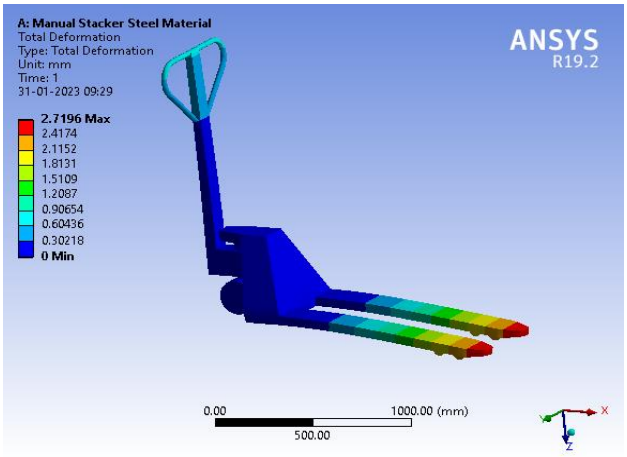

Fig.7 Total Deformation (Structural Steel)

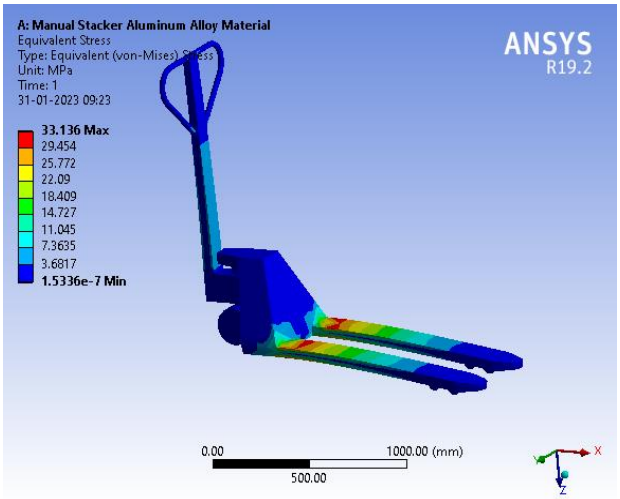

Fig.8 Equivalent Stress (Aluminium Alloy)

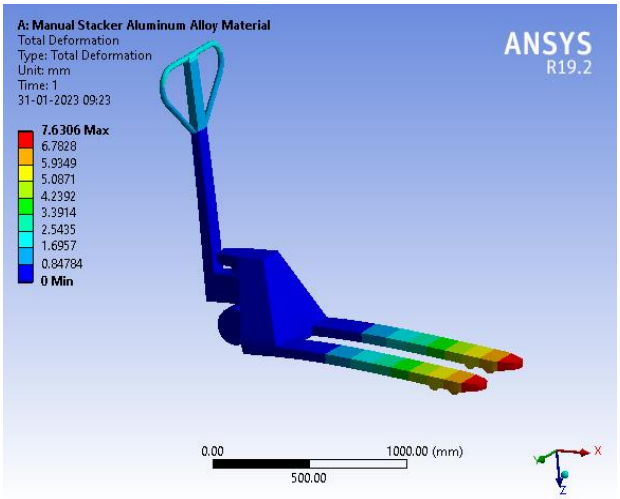

Fig.9 Deformations (Aluminium Alloy)

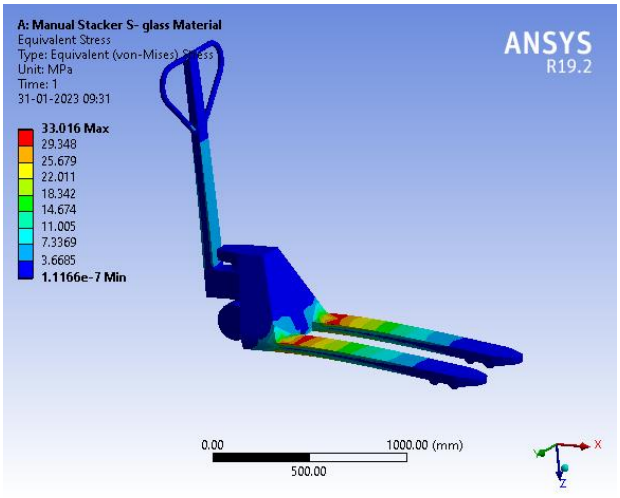

Fig.10 Equivalent stress (Magnesium Alloy)

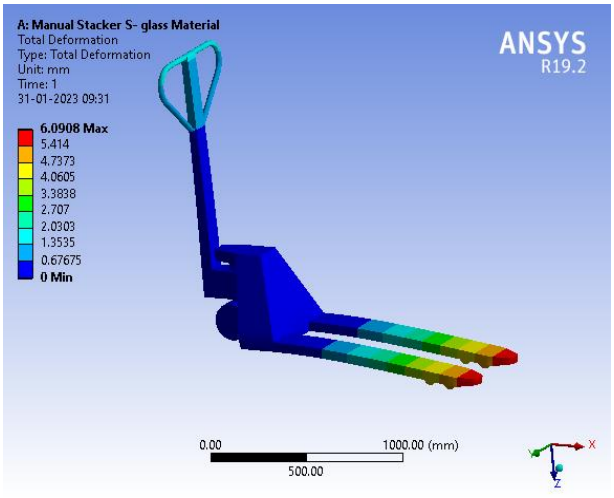

Fig.11 Equivalent Stress (Magnesium Alloy)

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IV. RESULT

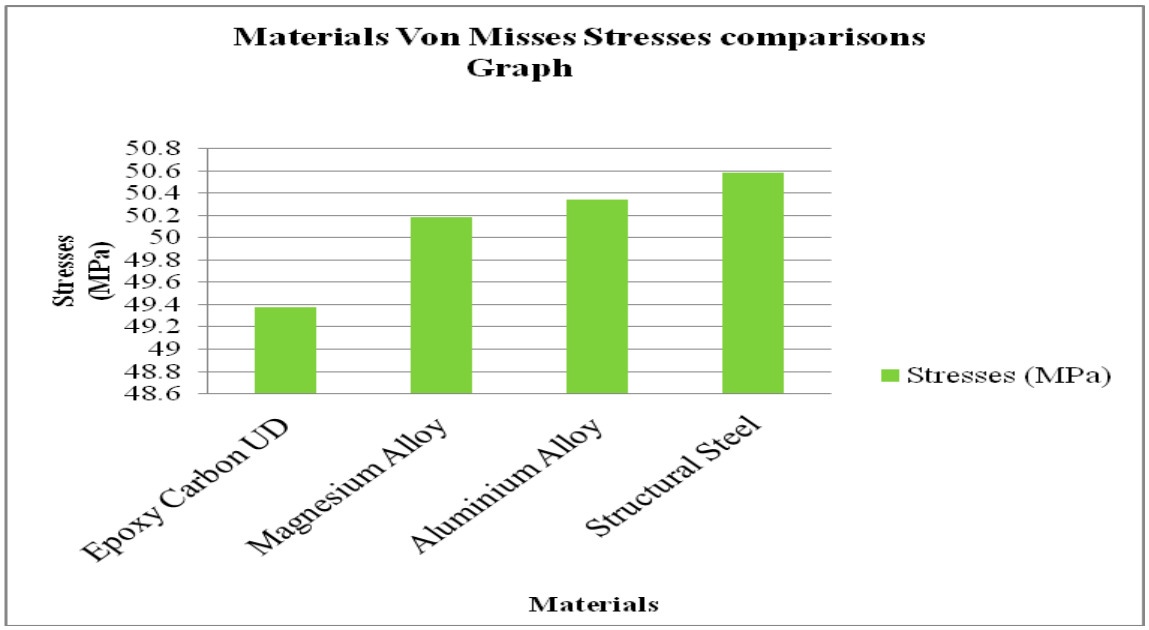

Fig.12 Stress comparison with different materials

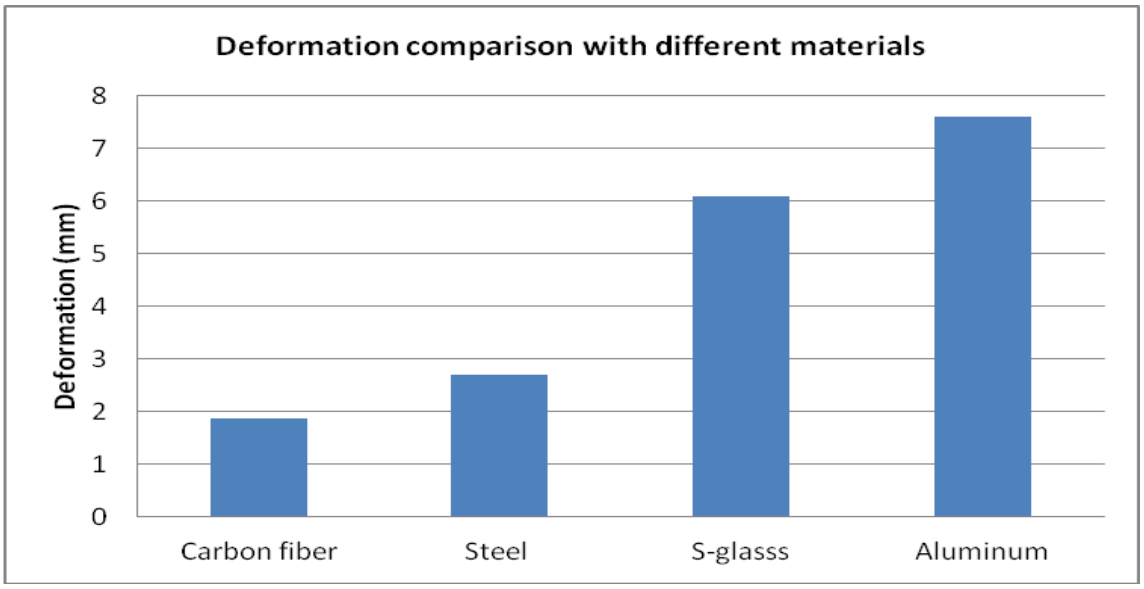

Fig.13 Deformations comparison with different materials

Hand pallet truck has a solid structure, smooth operation. Manual pallet trucks can work efficiently. Smooth controls for precise lifting and lowering. Through this project, labor effort can be reduced and working time can be shortened. And we designed and analyzed a trolley fork with different loads. This system is of considerable importance to equipment and material handling systems in terms of noise and vibration. The objective of this work is to present an improved method, based on numerical and empirical analysis; to evaluate the service life of the manual forklift system. It can improve industrial work. at the same time improve the processing equipment system. In recent years, material handling has become a new, complex and rapidly evolving science. To move materials in and out of the warehouse, a variety of equipment and systems are used, depending on the type of product and the volume to be handled. Equipment issued, during loading and unloading operations, to move goods over short distances. Material handling in the warehouse is limited to units, requiring smaller equipment. However, for bulk material handling at logistics nodes, a

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fully automated stacker can be used for the niche needs of an innovative industry. In this work, we find the stress values of S-460, aluminum alloy and carbon fiber vonmisses to be 33.09 MPa, 33.13 MPa, 33.09 MPa and 33,016 MPa, respectively.

And the total tension of these materials such as S-460, aluminum alloy and carbon fiber is 2.71mm, 7.6mm, 1.87mm and 6.09 respectively. Here we can see that we have used four different materials out of all the materials that we will choose Carbon Fiber Composite Material in addition because it is light and strong, the strain and stress range of it is significant in terms of load capacity of 1000 kg.

V. CONCLUSION

In this projects we can see that we have used four different materials in all materials we will be selected composite material to other than because it is light weight and heavy duty its deformation and stresses range are considerable under 1000 kg loading condition and its very light weight compared to other than materials here we have optimize the unit weight of Pallet Truck 30% and its simple in construction ,convenient lifting operating system and special design is available according to customers' requirements.

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