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Fea Analysis for Scissor Lifting Table

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ABSTRACT

The main goal of the project is weight analysis of scissor lifting table in the ware house, the scissor lifting table is a common device for all kind of peoples, we go to do the structural analysis of the scissor lifting table with the various human weights scissor lifting table modeled in Solid works software and structural analysis of human weights 50kg, 75kg, 100kg and 125kg done in ANSYS workbench software

Keyword: Scissor lifting table, human weight analysis, ANSYS, FEA Analysis.

I. INTRODUCTION

The objective of Lift tables design is to raise or lower goods and/or persons through relatively small distances. Its applications include pallet handling, vehicle loading and work positioning and help to reduce incidents of Musculo skeletal disorders by correctly re-positioning work at a suitable height for operators. Apart from above mentioned uses they can work in hostile environments, the material used for its design is stainless steel. Barriers, conveyors, turn-tables, and gates are the equipment necessary to assemble lift table.

In this research work design the lift table with proper dimensions using solid work and analyze that table with various human weights using FEM, while taking the stress, deflection and safety factor for different load condition we conclude the lift table system is safest for all load condition

II.MATERIALS AND METHODS

Steel

Steel is an alloy of iron with typically a few percent of carbon to improve its strength and fracture resistance compared to iron. Many other additional elements may be present or added. Stainless steels that are corrosion and oxidation resistant need typically an additional 11% chromium.

Table 1. Material Properties

	DENSITY (KG/M^3)	YOUNG'S MODULUS(GPA)	POISSON'S RATIO
STEEL	7850	200GPA	0.0.3

III. FINITE ELEMENT MODELLING

3D modeling of scissor lifting Table

The Scissor lifting table modelling done in Solid works Software with the part modeling for model the individual components by extrude boss, revolve options and all individual components are assembled.

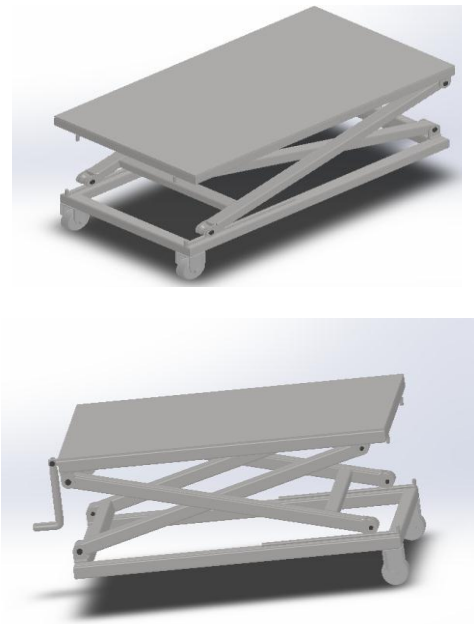


Fig 1. 3D Model of Scissor lifting Table

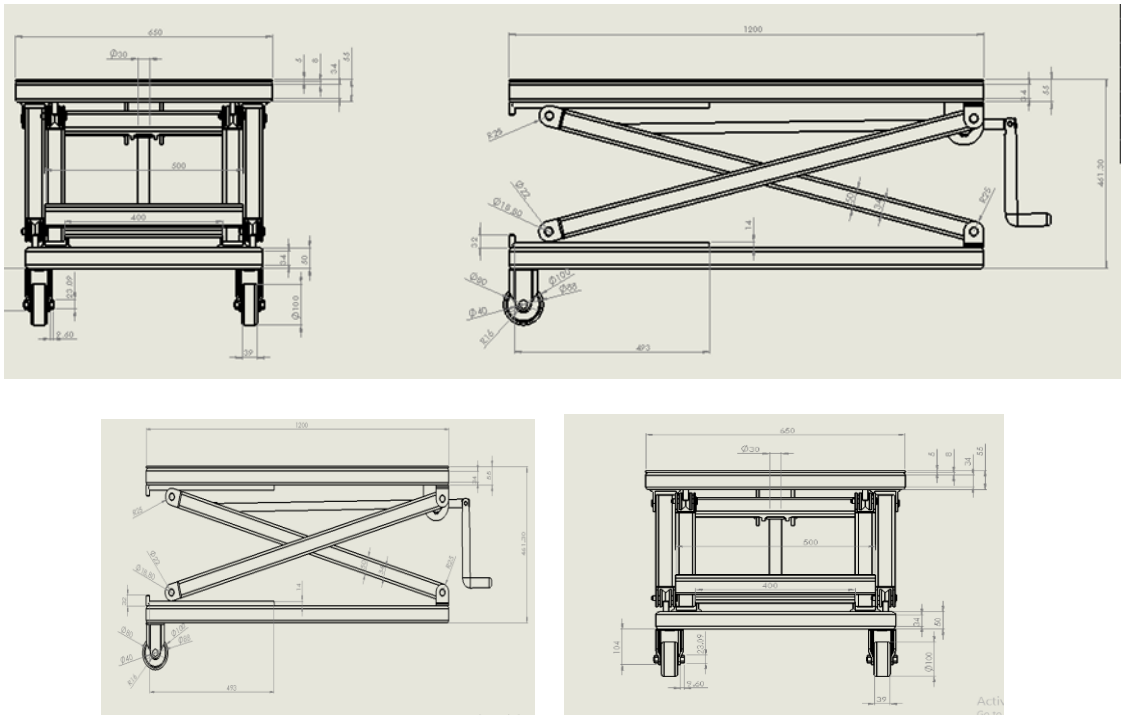


Fig 2. Drafting model of the scissor lifting table

Mesh and Boundary conditions

During the Finite element analysis grid independence check is done for better results with the nodes of 338754 and tetrahedral elements of 191641.The boundary conditions of this scissor lifting table analysis is various weight of 50KG, 75KG, 100KG and 125KG was given for this analysis

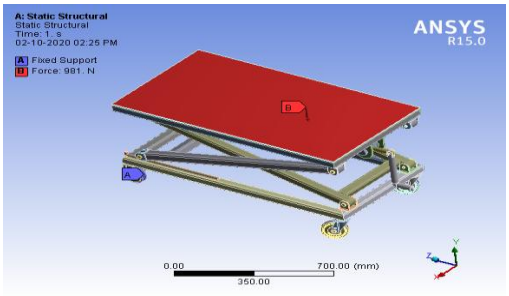
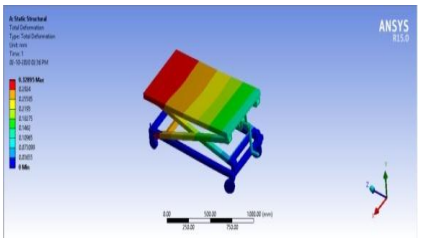


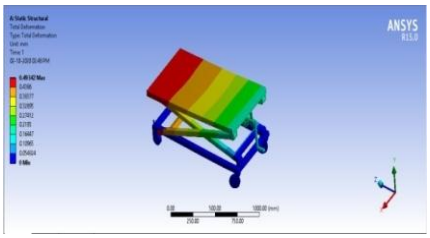
Fig1.Boundary condition for scissor lifting table

III. RESULT AND DISCUSSIONS

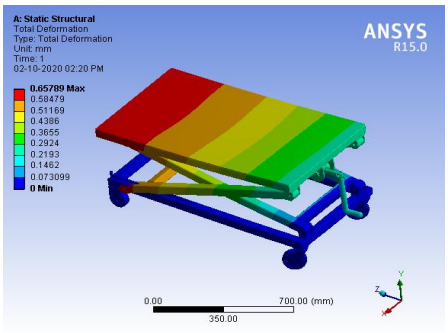
TOTAL DEFORMATION RESULTS



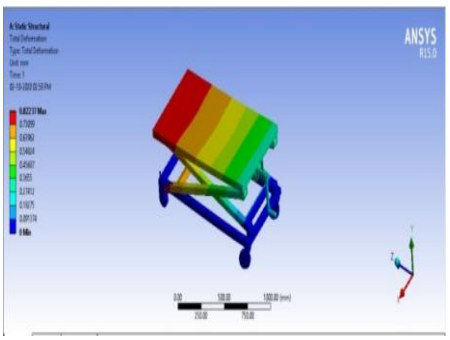
50KG



75KG



100KG

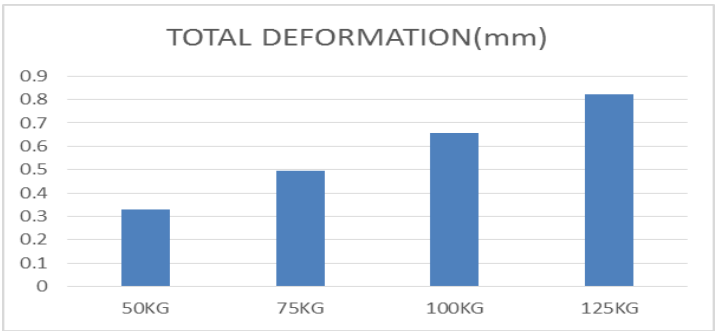


125KG

Fig2.total deformation results of scissor lifting table

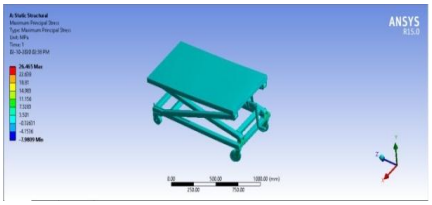
Table 2.total deformation results

TOTAL DEFORMATION	50KG	75KG	100KG	125KG
STEEL	0.32895	0.49342	0.65789	0.82237

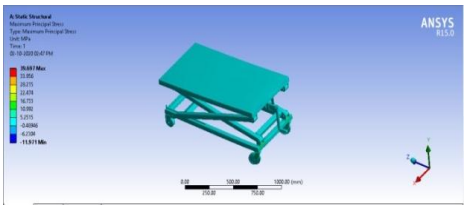


Graph 1.total deformation results

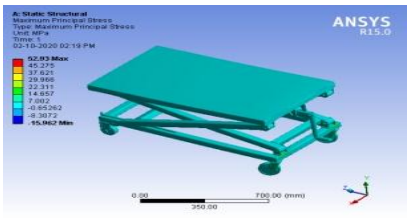
MAX PRINCIPLE STRESS RESULTS



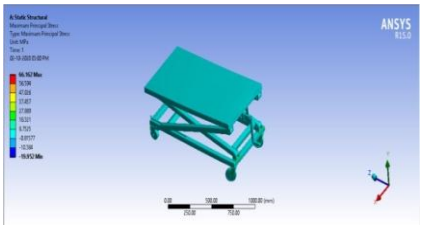
50KG



75KG



100KG

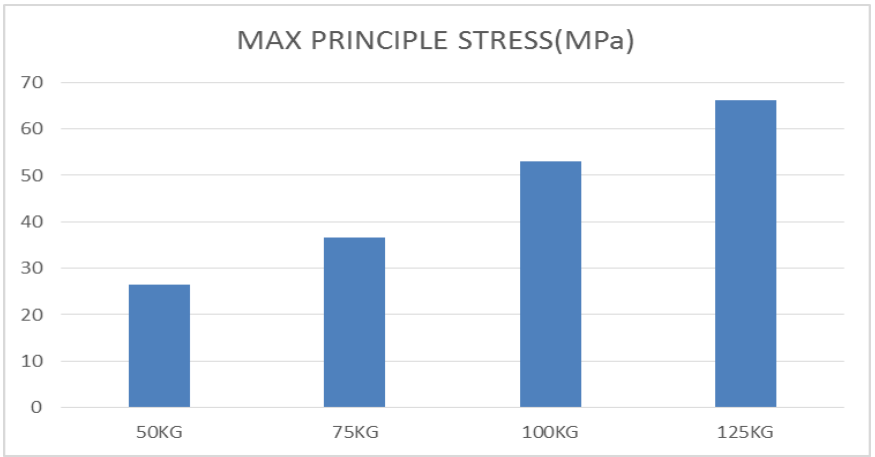


125KG

Fig3.maximum stress results of scissor lifting table

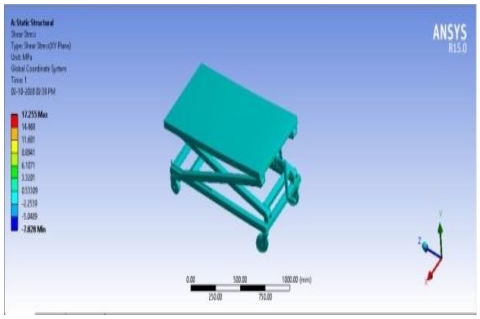
Table3.maximum principle stress results

MAX PRINCIPLE STRESS	50KG	75KG	100KG	125KG
STEEL	26.465	36.692	52.93	66.162

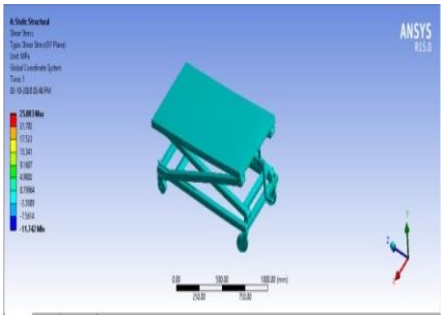


Graph2.maximum principle stress results

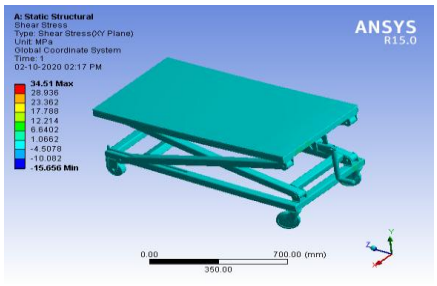
SHEAR STRESS RESULTS



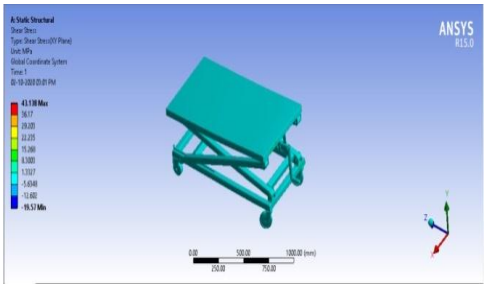
50KG



75KG



100KG

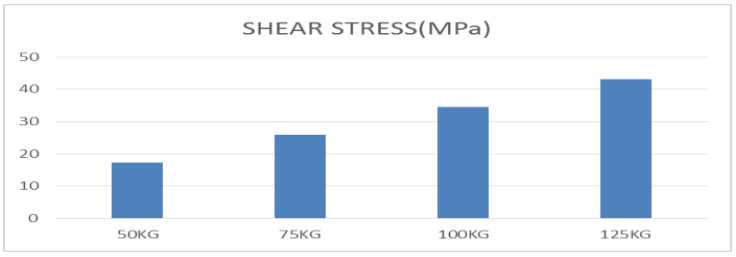


125KG

Fig4.shear stress results of scissor lifting table

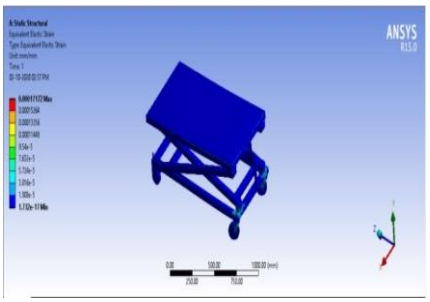
Table4.shear stress results

SHEAR STRESS	50KG	75KG	100KG	125KG
STEEL	17.255	25.883	34.51	43.138

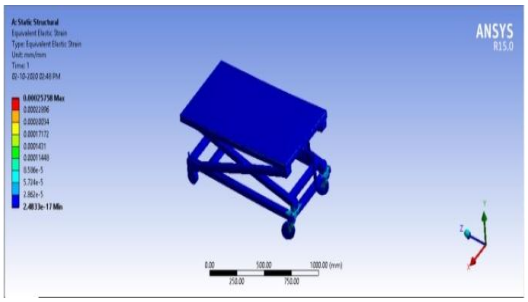


Graph3.shear stress results

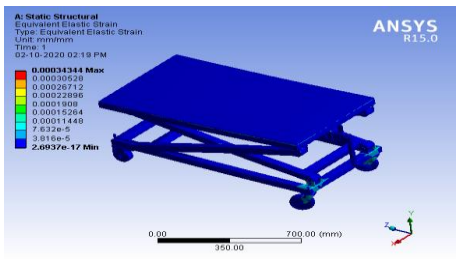
STRAIN RESULTS



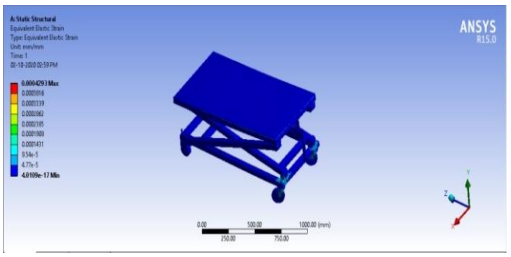
50KG



75KG



100KG

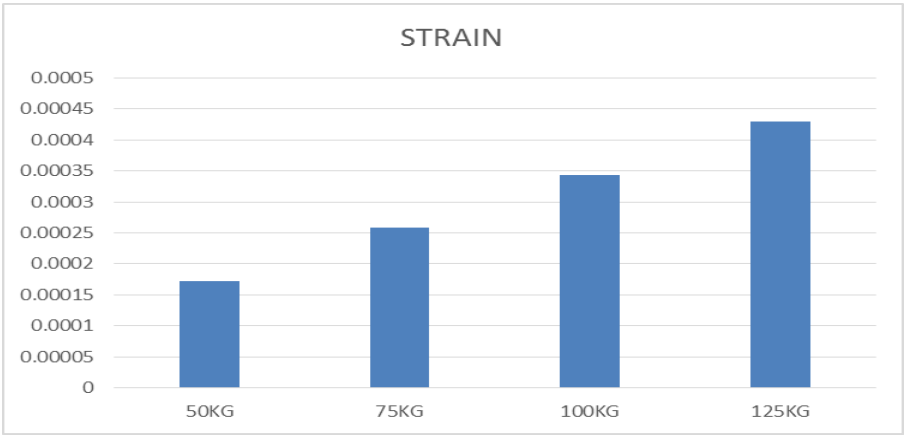


125KG

Fig5.strain results of scissor lifting table

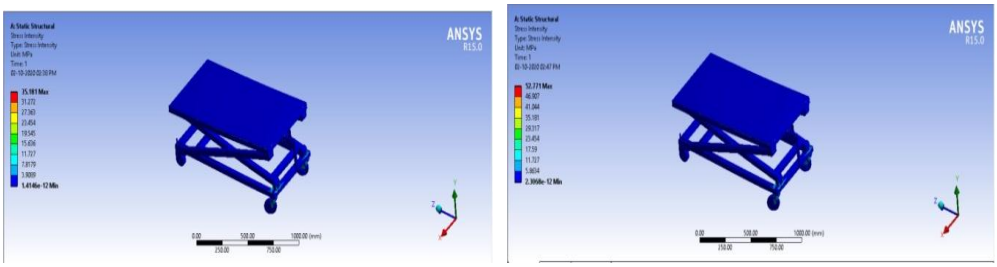
Table5.strain results

STRAIN	50KG	75KG	100KG	125KG
STEEL	0.000172	0.000258	0.000343	0.000429

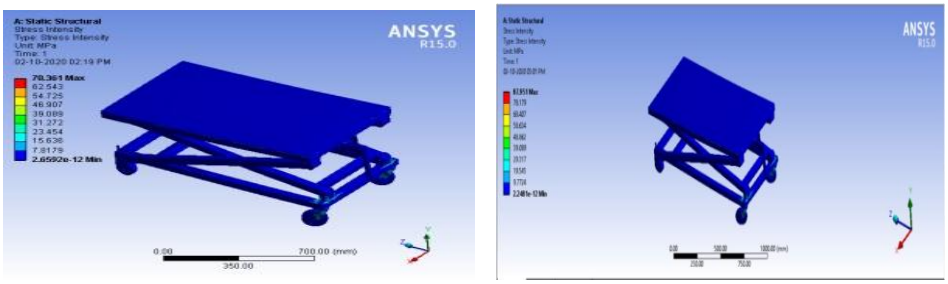


Graph4.strain results

STRESS INTENSITY RESULTS



50KG **75KG**



100KG **125KG**

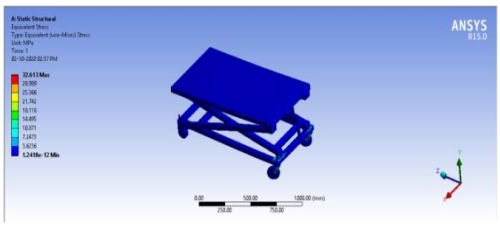
Fig6.stress intensity results of scissor lifting table

Table6.stress intensity results

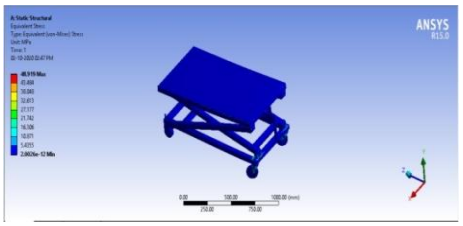
STRESS INTENSITY	50KG	75KG	100KG	125KG
STEEL	35.181	52.771	70.361	87.951

Graph5.stress intensity results

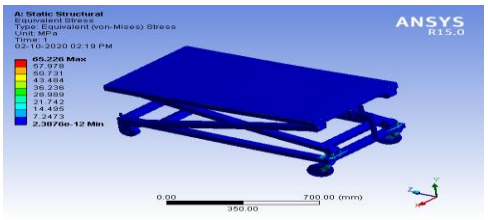
STRESS RESULTS



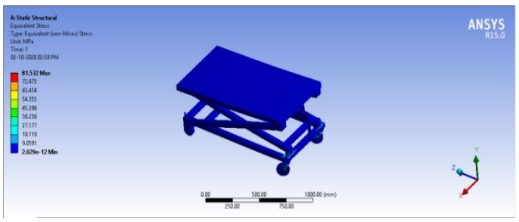
50KG



75KG



100KG

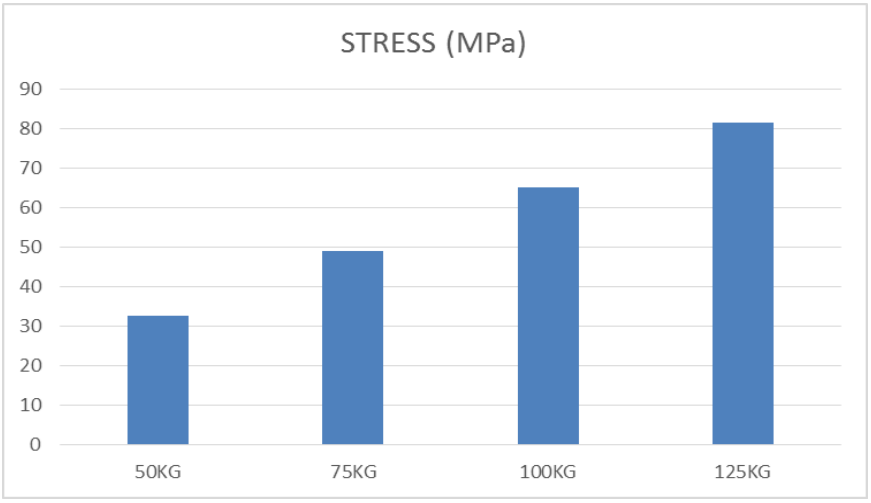


125KG

Fig7.stress results of scissor lifting table

Table7.stress results

STRESS	50KG	75KG	100KG	125KG
STEEL	32.613	48.919	65.226	81.532



Graph6.stress results

IV. CONCLUSION

The Scissor lifting table linear static analysis was done in ANSYS software with the various human weights of 50kg, 75kg, 100kg and 150kg. Modeling of Scissor lifting table done in Solid works software the structural analysis results of total deformation, stress, principal stress, shear stress and strain results are taken for various weights if the human weights increase the result values will be increase linearly.

V. REFERENCE

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