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Design ,Analysis and Fabrication of Passenger Lift

Prof. VaibhavBankar, AnirudhaWadikhaye

Assistant Professor, Department of Mechanical Engineering, Vidharbha Institute of Tech, Nagpur
M-TECH Scholar, Vidharbha institute of Tech, Nagpur

ABSTRACT: This work gives optimised solution to make feasible lifting application in heavy lifting and using it in construction sites and workshops. Gear assembly is to be designed to sustain high load capacity for lifting. Design is to be planned with double bar link mechanism interconnected with gears. With this assembly, it will optimise the lifting power as it can be operated manually to make loading conditions reliable considering maximum loads. Gear meshing and overall design of device is to be analysed in ANSYS 14.0 tool in variations. For designing purpose here Creo-Parametric 2.0 software will used. Finally conclusion will be opting to make fabrication possible. It will form few variants in design and compare results with each other. Finally the best gear design is to be found and from results it is to be found feasible in working also in its application areas.

KEYWORDS: Lifting mechanism, design, Creo-Parametric 2.0, ANSYS 14.0

1.INTRODUCTION

Basically, Lifting or carrying heavy loads, frequent bending or twisting and heavy physical work may cause low back disorders. Lifting or carrying heavy loads has been linked to low back disorders. There is no limit to the weight that humans can lift by sheer muscle power. Nor is there a limit to the height to which this weight can be lifted. But, starting more than 5,000 years ago, engineers designed a collection of machines that greatly enhanced the lifting power of an individual or a group of people. Lifting devices were mainly used for construction projects, but (later) also for the loading and unloading of goods, for hoisting sails on ships, and for mining purposes. Lifting operations in construction occur during transportation of material from the storage place to the place where it is being processed, and during the processing of materials. A load includes any material or people that are lifted or lowered by lifting equipment.

A.Manually Operated Lifting Device:

In many application areas, Lifting devices are used which work on electrical power or any hydraulic or pneumatic system. But in some concerned areas where these high cost devices are not required and where the lift needed is about a weight of human being, we can use this manually operated lifting device. In this device, with the use of gear drive arrangement, we use common shaft to operate manually for lifting operation. A device can be designed and analysed with respect to actual load conditions. The complete study of Design and analysis with structural behaviour model of manually operated lifting machine is to be done through the CAD/CAM/CAE Software Creo Parametric 2.0 and ANSYS, Inc. 15.

B.Creo Parametric 2.0

Creo Parametric is the standard in 3D CAD, featuring state-of-the-art productivity tools that promote best practices in design while ensuring compliance with your industry and company standards. Creo Parametric provides the broadest range of powerful yet flexible 3D CAD capabilities to help you address your most pressing design challenges including accommodating late stage changes, working with multi-CAD data and electromechanical design. A scalable offering of integrated, parametric, 3D CAD, CAID, CAM, and CAE solutions allows you to design faster than ever, while maximizing innovation and quality to ultimately create



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exceptional products. As part of the Creo product family, Creo Parametric can share data seamlessly with other Creo apps. This means that no time is wasted on data translation and resulting errors are eliminated. Users can seamlessly move between different modes of modeling and 2D and 3D design data can easily move between apps while retaining design intent. This results in an unprecedented level of interoperability and delivers break-through productivity gains throughout many product development processes.

C.Performance Criteria

- minimum waiting time
- comfortable acceleration
- rapid transportation
- smooth/rapid slowing
- accurate leveling
- rapid loading/unloading
- quick/quiet door operation
- good visual travel direction/floor indicators
- easily operated controls
- comfortable lighting
- reliable emergency equipment
- smooth/safe operation of mechanical equipment

D.Passenger Elevator Components

Traction Elevator

- car
- cables
- elevator machine
- controls
- counterweight
- hoistway
 - rails
 - penthouse
 - pit

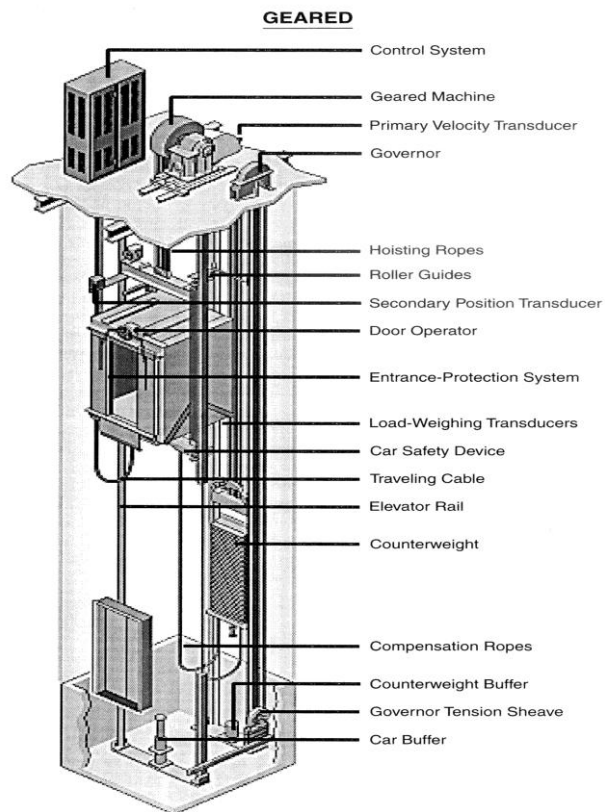


Fig: lifting machine with parts

E.CAD Design

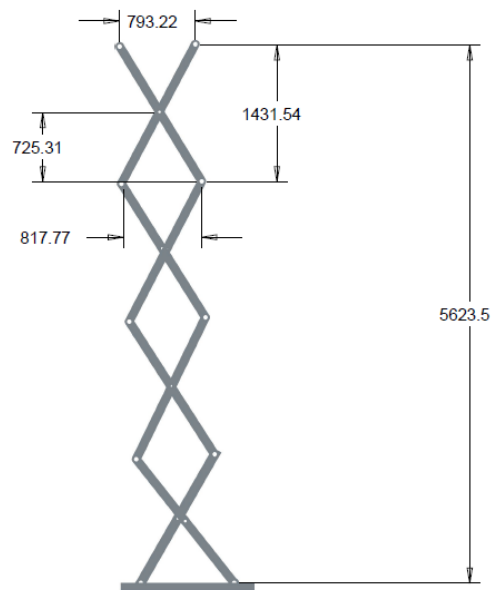


Fig: Scissor mechanism

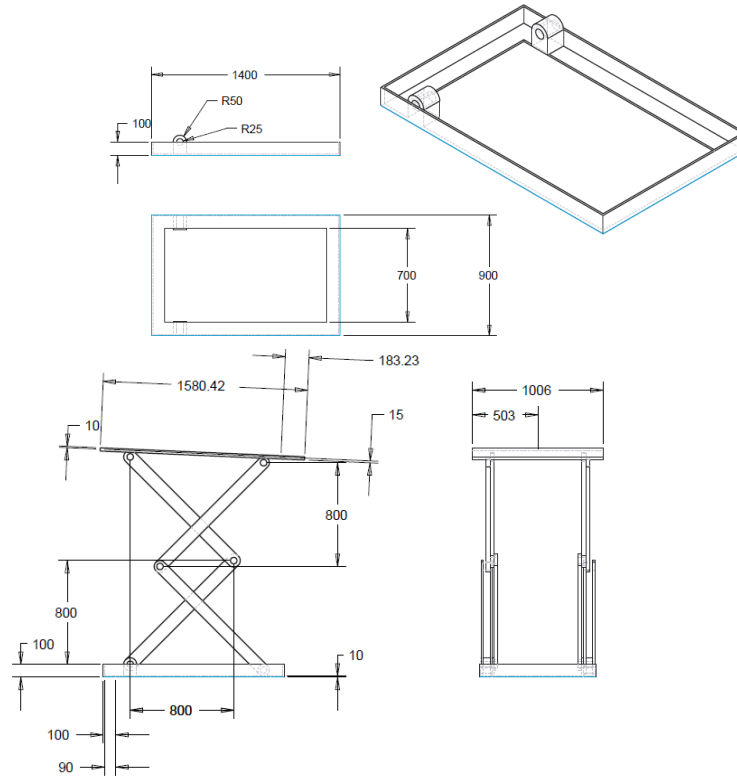


Fig: Orthographic Projection of Assembly

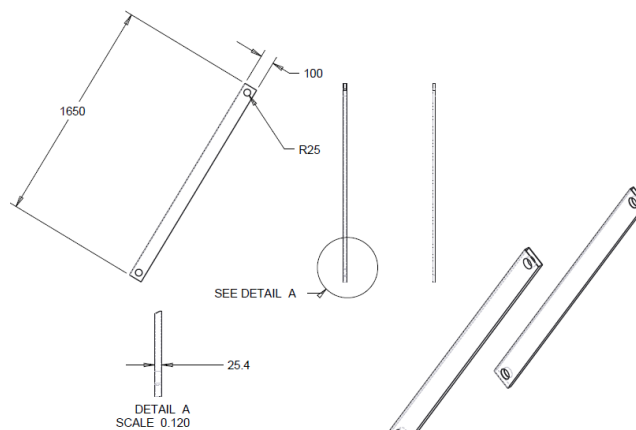


Fig: Link

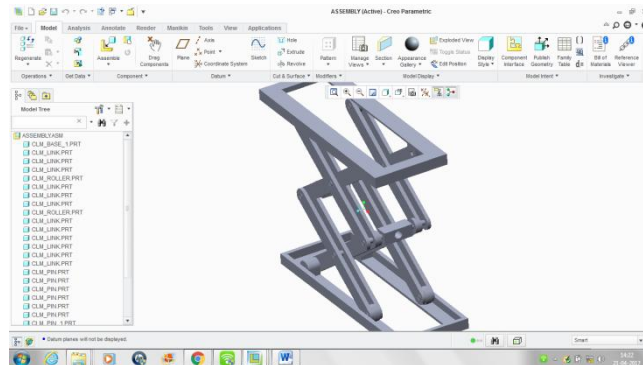
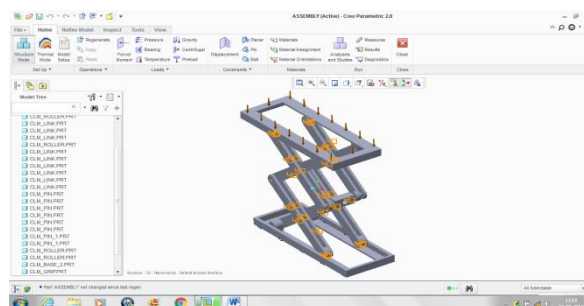


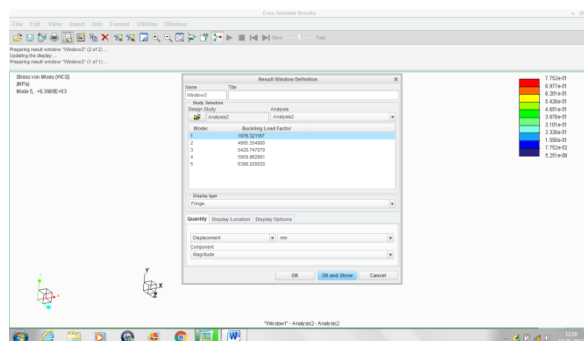
Fig: Isometric view of assembly

F.Buckling analysis(CREO SIMULATE 2.0)

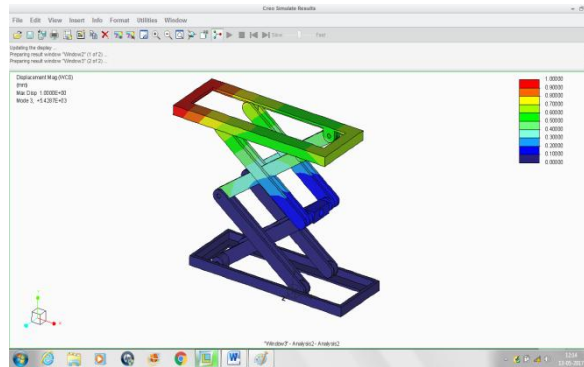
□ For 100 kg load
Boundary condition



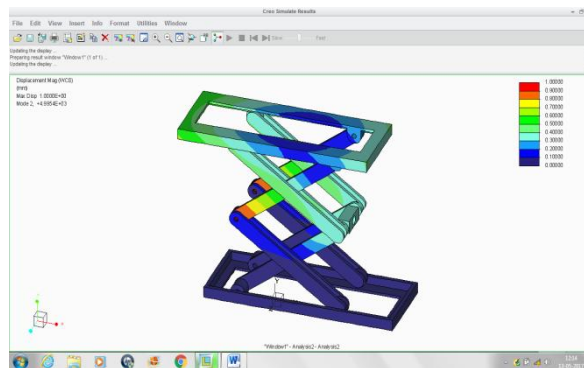
□ Buckling load factor for analysis



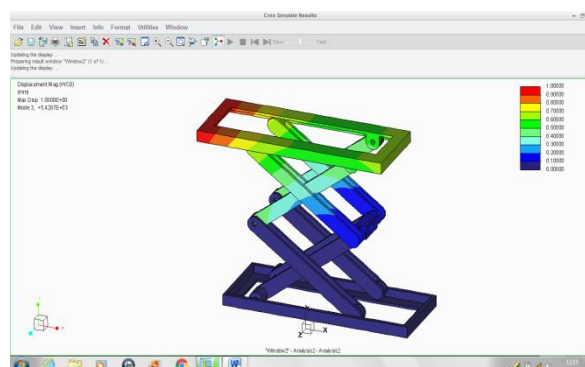
Displacement mode 1



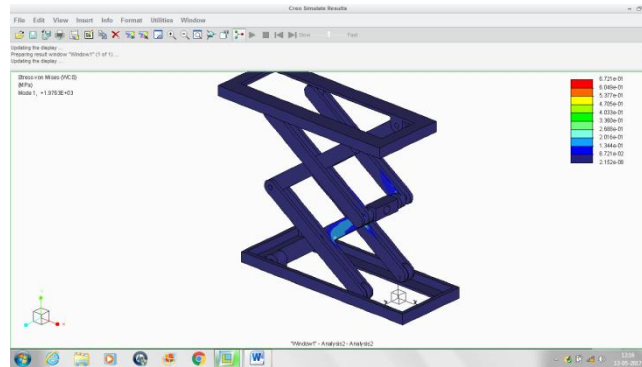
Displacement mode 2



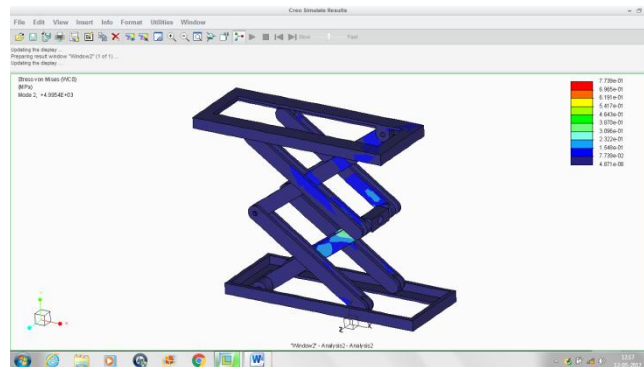
Displacement mode 3



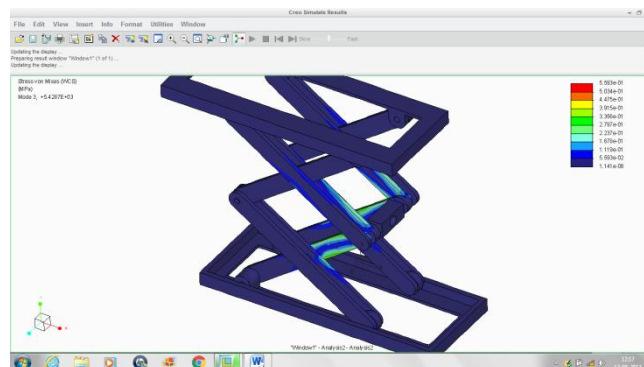
Stress mode 1



Stress mode 2



Stress mode 3



G.FABRICATION DETAILS



Fig: Hydraulic Jack



Fig: Links used in Assembly



Fig: Scissor Assembly



Fig: closed condition of Scissor



Fig: Actual Fabrication Photo

II. CONCLUSION

Implementation of this project is having very important aspect in terms of weighing heavy weight. For effective implementation obstacles must be taken care of before initiation and should be backed with action plan to overcome them. This Standard defines the safety requirements relating to the elements of design, operation, and maintenance of low lift and high lift powered industrial trucks controlled by a riding or walking operator, and intended for use on compacted, improved surfaces. Assembly modeling in CREO-PARAMETRIC 2.0 by using TOP DOWN APPROACH. Analysis using ANSYS 14.0 software for analysis purpose. Analysis using different parameters such as varying thickness, materials, shape of the existing design Dynamic analysis of whole assembly



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while running conditions. Analytical calculation using FEM method. Designing of lifting mechanism for small construction site. Time required for lifting from ground to upper floor is high because of manual handling. Manpower is required if lifting is not available. Time which is given for completion of the construction site project is not complete at mention time. To make proper design of Lifting mechanism for lifting operation with manufacturability and installation feasibility. To make sustainable gear drive which optimised ultimately drive configuration for High load conditions. To develop a fabricated model with analysed behaviour of lift fundamentals.

REFERENCES

- WANG Jiu-feng, XU Gui-yun, ZHU Jia-zhou, YANG Yan-chu, "Parametric Design and Finite Element Analysis of Main Shaft of Hoister Based on Pro/E", (China University of Mining and Technology, Xuzhou 221008, China).
- LUO Jiman, XING Yan, LIU Dajiang and YUAN Ye, "Modal Analysis of Mast of Builder's Hoist Based on ANSYS", (School of Traffic and Mechanical Engineering, Shenyang Jianzhu University, Shenyang China, 110168; 2. SIASUN Robot and Automation Co., Ltd., Shenyang China, 110016; 3. JIHUA 3523 Special Equipment Co., Ltd., Shenyang China, 110026).
- Yang Yuanfan, "The Study on Mechanical Reliability Design Method and Its Application", International Conference on Future Electrical Power and Energy Systems, Energy Procedia 17 (2012) 467 – 472.
- Taljaard and J.D. Stephenson, "State-of-art shaft system as applied to Palaborwa underground mining project", The South African Institute of Mining and Metallurgy, 2000. SA ISSN 0038–223X/3.00 + 0.00. First presented at the SAIMM conference Mine Hoisting 2000, Sept. 2000.
- Shuang Chen and [ShenGuo](#), "Stress Analysis of the Mine Hoist Spindle Based on ANSYS", Information and Computing (ICIC), Fourth International Conference, 2011.
- [HuYong](#) and [HuJiQuan](#), "Mechanical Analysis and Experimental Research of Parallel Grooved Drum Multi-layer Winding System", Wuhan University of Technology, 2013.
- Prof. Sham Tickoo and Prabhakar Singh, "Pro/Engineer (Creo Parametric 2.0) for Engineers and Designers", Dreamtech Press, Reprint Edition, 2014.
- Ibrahim Zeid and R. Sivasubramanian, "CAD/CAM Theory and Practice", McGraw-Hill Book Company, First edition, 2007.
- Zeinkiewicz O.C, Taylor R.L. "The Finite Element Method", McGraw-Hill Book Company, 1989.
- Chandrupatla T.R., "Introduction to Finite Elements in Engineering", Prentice –Hall, third edition (2001).