

ANALYSIS AND FABRICATION OF STAIRS CLIMBING TRI-WHEEL TROLLEY

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ABSTRACT

This research paper discusses the design, analysis, and fabrication of a tri-wheel trolley that is capable of climbing stairs. The main objective of this project is to provide an efficient and cost-effective solution for transporting goods up and down staircases. The tri-wheel trolley is designed to distribute the weight of the load evenly, allowing it to climb stairs with ease. The trolley is equipped with three wheels, two of which are large and fixed, while the third one is smaller and swivels, providing greater maneuverability. The trolley is also equipped with a handle that can be adjusted to accommodate different heights.

To ensure the safety and efficiency of the trolley, several tests were conducted, including stress and strain analysis and load testing. The results of these tests showed that the trolley can support a load of up to 200 kg and can easily climb stairs without causing damage or injury.

Keywords: Tri-Wheels, Steel Frame, Ball Bearing, Axial.

I. INTRODUCTION

Transporting goods up and down stairs is a challenging task that often requires a significant amount of effort and time. In many cases, this task is performed manually, which can be tiring and even dangerous for the operator. To address this issue, this research paper proposes a solution in the form of a tri-wheel trolley that can climb stairs with ease. The trolley is designed to be lightweight, durable, and efficient, making it an ideal solution for both commercial and residential use.

II. METHODOLOGY

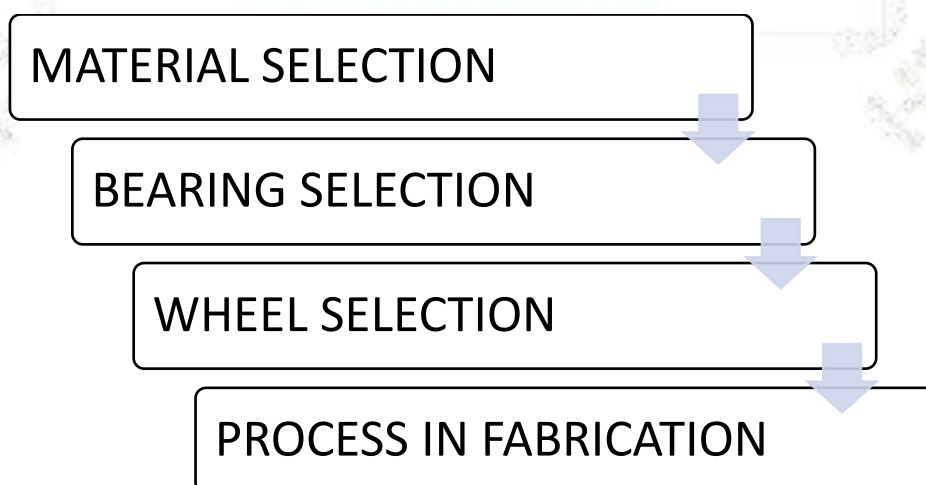


Figure 1 Roadmap of project

ANALYSING THE RESEARCH PAPERS: Collect all the relevant data about the problems and the research programs, which are happening around and the outcomes of them and evaluate them by comparing with the other research programs where to sort out the merits of Tri-wheel Trolley in a more effective way.

III. PREPARATION OF DESIGN:

The tri-wheel trolley consists of a frame made of steel tubing, which is welded together to form a sturdy structure. The trolley is equipped with three wheels, two of which are large and fixed, while the third one is smaller and swivels, providing greater maneuverability. The trolley is also equipped with a handle that can be adjusted to accommodate different heights.

The trolley is designed to distribute the weight of the load evenly, ensuring that the load is stable and does not tip over during transportation. The design of the trolley also allows it to be easily maneuvered through narrow spaces, making it an ideal solution for use in tight quarters.

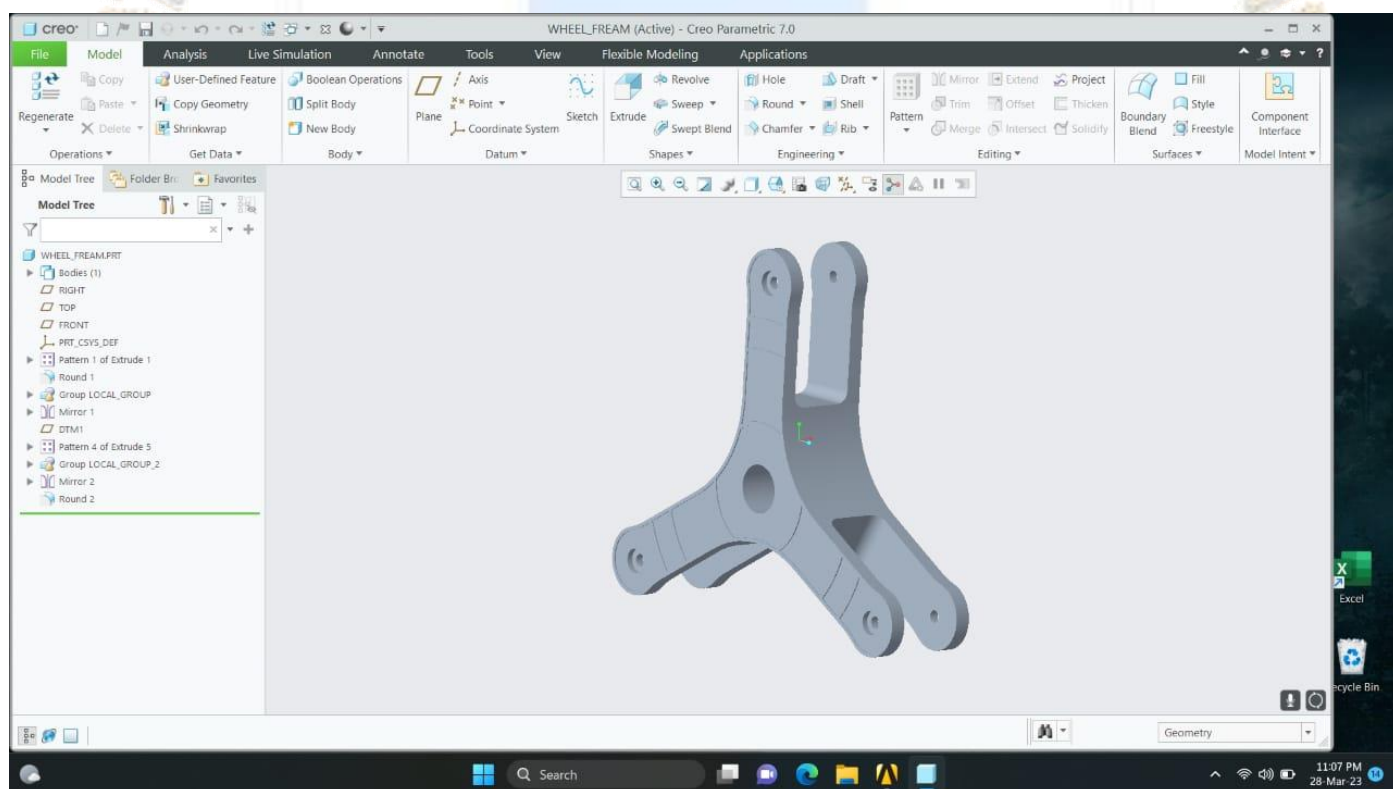


Figure 2 Tri-Frame

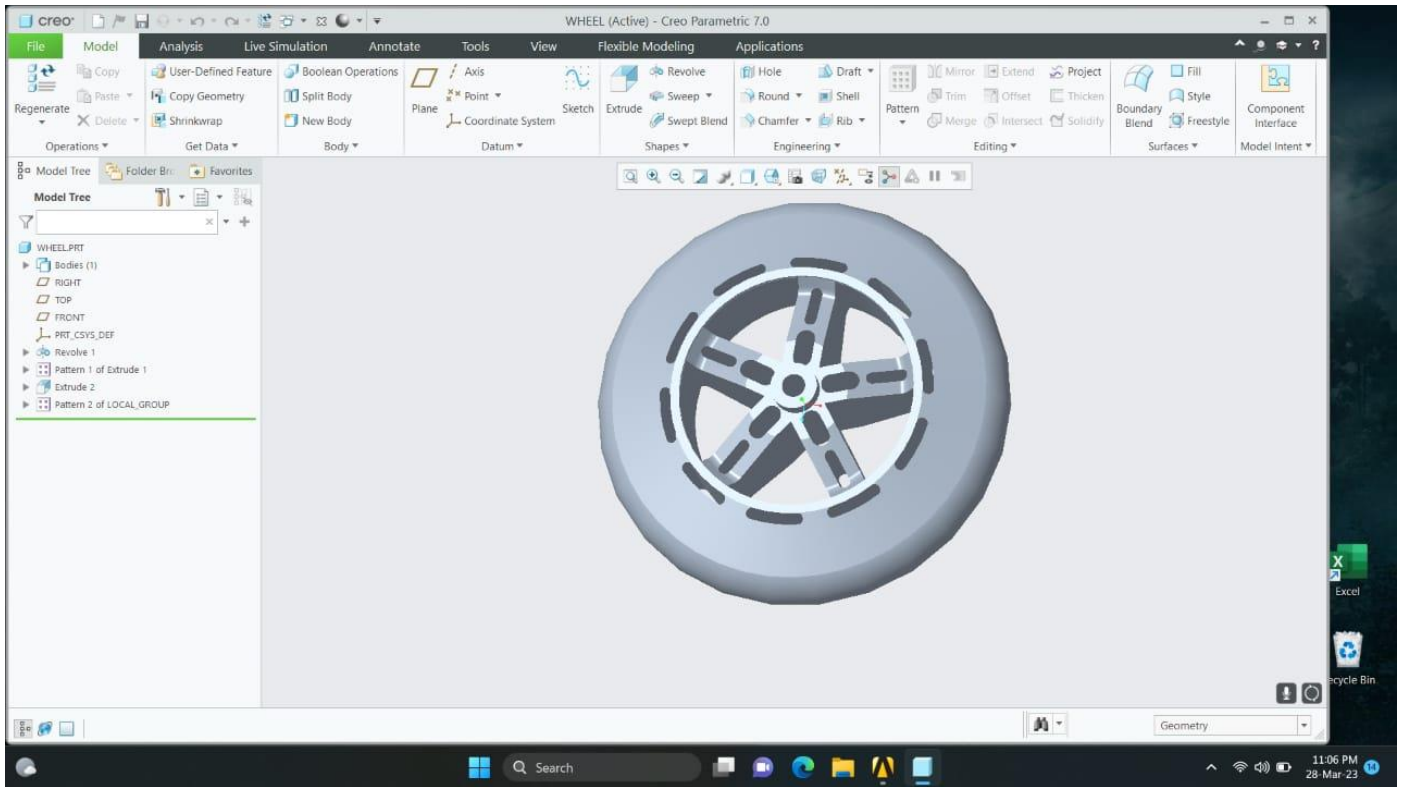


Figure 3 Wheel

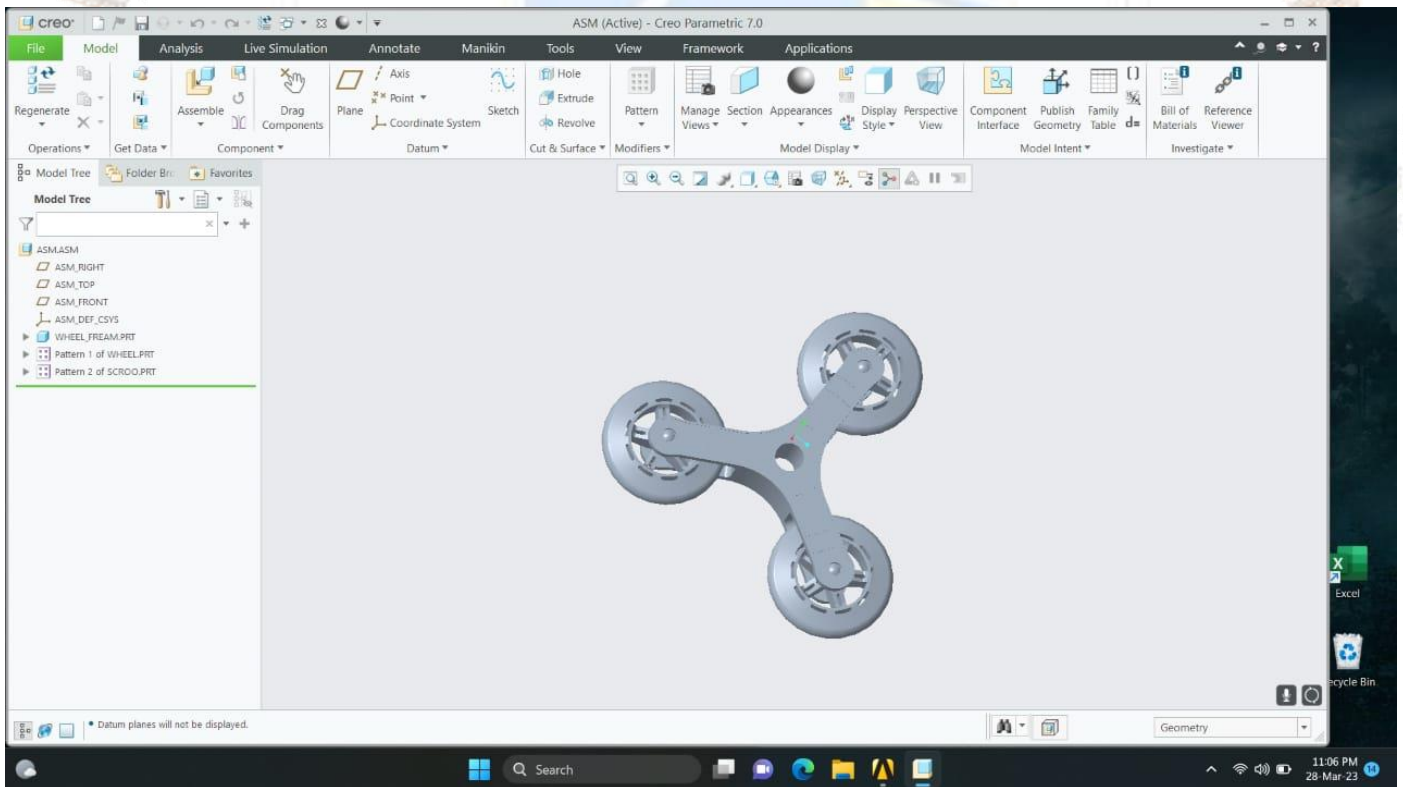


Figure 4 Design view

IV. RESULT

To ensure the safety and efficiency of the trolley, several tests were conducted, including stress and strain analysis and load testing. The stress and strain analysis was conducted to determine the maximum load that the trolley could support without causing damage or failure. The load testing was conducted to determine the maximum load that the trolley could support while climbing stairs.



Figure 5 Actual Product

The stress and strain analysis showed that the trolley could support a load of up to 50g without causing damage or failure. The load testing showed that the trolley could easily climb stairs while carrying a load of up to 35 kg.

The simulation results obtained on the structural Analysis of the designed trolley were confirmed by Physical testing. The purpose of performing the physical Test is to ensure the designed trolley can support 30 kg Loads while climbing the stairs. The testing was Conducted on the bottom floor staircase. Each step has a height Of 0.15 m and a depth of 0.3 m providing a slope of 30 Degrees. 20 kg loads were applied on the trolley while Climbing the stairs and the manual hand winch was used To lift them. The designed trolley well functioned over the stairs With 30 kg loads applied to it. No bending or Deformation was observed on the movable platform, Body, frame, and wheel of the designed trolley, which Further confirmed the simulation analysis result. The Hand winch was also physically tested to lift the loads That were placed on the movable platform.

V. CONCLUSION & FUTURE SCOPE

The tri-wheel trolley designed in this project provides an efficient and cost-effective solution for transporting goods up and down staircases. The trolley is lightweight, durable, and easy to maneuver, making it an ideal solution for both commercial and residential use. The trolley was tested for safety and efficiency, and the results showed that it can support a load of up to 35 kg and can easily climb stairs without causing damage or injury. Overall, this project demonstrates the importance of innovation and problem-solving in addressing real-world challenges.

As per literature survey and earlier discussion we have come up with a new concept of trolley to lift various Heavy loads. It is very easy and effortless while on ground surface minimum amount of effort is required when It is to be lifted on stairs. Also due to chain sprocket mechanism transportation of trolley is much easier than Normal. As load varies energy required to raise the factor additionally varies. Hence it reduces human effort and Time according to the design and which results in less labor work, etc.

Electric motor could be used to carry load at all types of surface . A sensor and steering wheel can be implemented to move around the stairs. A suspension system could be incorporated to reduce shocks and vibration

VI. REFERENCES

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