

DESIGN AND FABRICATION OF EMERGENCY FIRE RESCUE MACHINE

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Abstract - Building fires pose a serious risk to people, property and the environment. Numerous factors, such as human mistakes, electrical issues, heating systems, combustible items, might cause fire accidents. The effects of fire can be disastrous, resulting in accidents, fatalities, and significant building damage. Compared to fires in low-rise structures, high-rise building fire incidents pose numerous difficulties and a greater risk. High-rise building's vertical structures, greater resident capacity, and intricate infrastructure make fire fighters and evacuating residents more difficult to escape. It is essential to comprehend the causes, effects, and preventive strategies unique to high-rise fires in order to ensure occupant safety and reduce property damage. The disturbingly high rate of fire events, which are frequently brought on by inadequate fire prevention measures and damaged infrastructure, represent a serious threat to people's lives, their property, and the health of the economy. India can reduce the dangers connected with fire incidents in high-rise structures and guarantee the safety and well-being of its residents in the urban environment by giving priority to the implementation of appropriate rescue systems. So in this project we are going to develop such machine which can help humans to get escape in the case of emergency situation in high rise building.

1.INTRODUCTION

Safe escape in a high-rise building fire disaster is a worldwide insurmountable difficulty due to the intricate architecture of the building and the enormous number of people. Fires can destroy property and kill a large number of people. Those with mental, physical, and sensory impairments are at a higher risk of being hurt in a fire or becoming a fire victim. Over the past few decades, the development of high-rise structures has increased in India, a country that is fast developing and has a thriving urban environment. These modern marvels of

architecture represent advancement and progress, but they also present serious fire safety challenges. High-rise building fires have grown to be a serious problem, with disastrous effects on property, persons, and the environment. The purpose of this introduction is to raise awareness of the alarmingly high frequency of fire occurrences in India's high-rise structures and the urgent need for all-encompassing fire safety measures. Rapid urbanization, population expansion, and the need to effectively use the country's limited land resources are all factors that have contributed to the spread of high-rise buildings in India. Cities with high buildings housing office buildings, apartment buildings, and commercial businesses include Mumbai, Delhi, Bangalore, and Chennai. However, due to a number of issues, such as crowding, a lack of infrastructure, poor construction methods, and a lax enforcement of fire safety regulations, the vertical expansion has also increased the likelihood of fire mishaps. Numerous high-profile fire incidents in India's tall buildings have brought attention to the urgent need for prompt action. For instance, a fire at the Kamala Mills facility in Mumbai in 2017 that killed 14 people and revealed fire safety rules' flaws. Similar to this, a 32-year-old male was brought dead after the broke out in Andheri west area on Friday 29th July 2022 evening and prompted questions about how well-prepared such structures are to handle crises [2,4,5]. The Government of India and local authorities have started reviewing fire safety standards and regulations in order to address the growing concerns regarding fire accidents in high-rise structures. The stringent implementation of current regulations, including upkeep of fire-resistant building materials, installation of sufficient fire detection and suppression equipment, regular fire drills, and improvement of firefighting crew skill, is being pursued. Through educational initiatives and public involvement, the emphasis is also on raising awareness among building occupants and fostering a culture of fire safety [6]. So there is an urgent need to address fire safety issues given the expansion of high-rise buildings in India. The

alarmingly high rate of fire incidents in these buildings, which frequently result from ineffective fire prevention measures and damaged infrastructure, poses a serious risk to lives, property, and the stability of the economy. India can reduce the risks associated with fire accidents in high-rise buildings and guarantee the safety and well-being of its citizens in the urban environment of the future by giving priority to the implementation of strict fire safety regulations, improving building design, and fostering awareness among stakeholders.

2. Body of Paper

* Emergency can happen with anyone and situations became very critical if there is a fire incident, Time is very critical in a fire incident and delay in providing safe escape can lead to loss of life.

* Fire tenders faces many challenges in reaching the spot on time saving peoples one by one. The situation much more critical if the incident happens in a residential building, where there could be hundreds lives at risk during fire.

* Peace of Mind: Having Skysaver available in high-rise buildings can provide tenants with peace of mind by providing an alternative option for escape in the event of an emergency. It can reduce anxiety and boost trust in building safety procedures.

* Versatility Skysaver is portable and can be used in a variety of settings, including residences, office complexes, hotels, and other high-rise structures. Its adaptability makes it a valuable tool for emergency preparedness across different environments.

* To design and develop a Emergency Fire Rescue Machine.

* Selection of Brake, Governor and Transmission system.

* To perform structural analysis and validate all components using FEA tool.

* Experimental validation of developed model.

We are going to develop a pure mechanical system in which we are using mechanical components like brake governor bearing etc. So it is important to select or design the proper mechanical component which will be best suitable to fulfil the requirement of emergency fire rescue machine to get the best results.

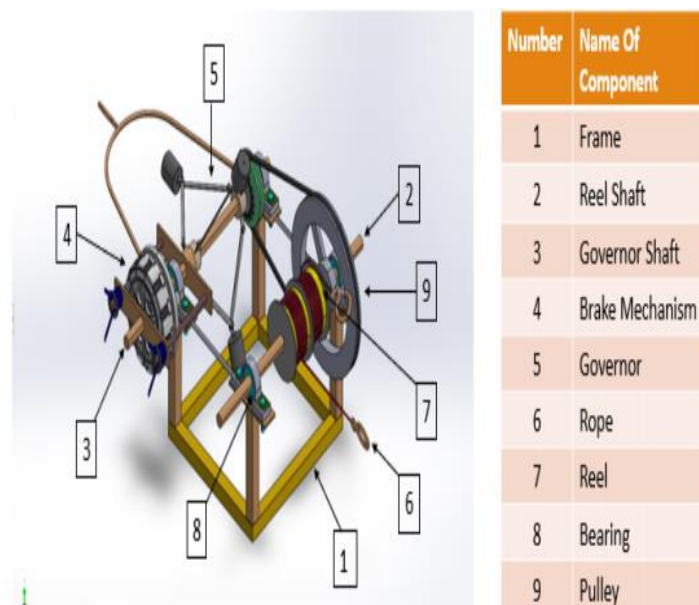


Figure: Emergency Fire Rescue Machine

After the designing of different components, we will carry out the Finite Element

Analysis wherein we will follow the sequential three steps i.e. pre-processing, post processing and final solution and analysed how a design reacts under real world conditions and will compare the results with theoretical values.

After the successful manufacturing of Emergency fire rescue machine, we are going to carry out multiple testing of the machine wherein we are going to mount the machine on the wall or slab and check it's effective operation for four floor building.

3. CONCLUSIONS

Emergency Fire Rescue machine's manufacturing is done by considering every single parameters, such that it should be cheap, affordable, effective operation, requires optimal time for safe landing of person and it aims to provide society a cost effective and safe solution over fire accidents. The resultsEmergency Fire Rescue machine's manufacturing is done by considering every single parameters, such that it should be cheap, affordable, effective operation, requires optimal time for safe landing of person and it aims to provide society a cost effective and safe solution over fire accidents. The results fetched from CAE software and the theoretical values consider for calculations are almost close to each other with accepted percentage error.

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Emergency Fire Rescue machine's manufacturing is done by considering every single parameters, such that it should be cheap, affordable, effective operation, requires optimal time for safe landing of person and it aims to provide society a cost effective and safe solution over fire accidents. The results fetched from CAE software and the theoretical values consider for calculations are almost close to each other with accepted percentage error. The cost of Emergency Fire Rescue Machine is Rs.12,360/- which is quite affordable for the society when compared with the skysaver technology whose cost is Rs. 75,000/-. The skysaver device is used only by single person and cannot be reused again but the developed Emergency Fire Rescue Machine is multiple use device which can be accessed by 2 person at a time and thus increasing the number of evacuates with safe landing from the rise-building. The taken by the Emergency Fire Rescue Machine for landing is in the range of 0.2m/s to 0.26m/s which is almost near to theoretical value i.e. 0.2m/s.

1. We have successfully designed and developed a Emergency Fire Rescue Machine operating for 4 floor building. 2. Selected Clutch Brake, Centrifugal Governor and Belt and Pulley Transmission system with its effective functioning. 3. We performed structural analysis and validated all components using FEA tool.

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