

## Design of helicopter fire rescue bridge (Prototype)

J.Dilipsingh\*, K.Jagatheesan

Department of Mechanical Engineering, Jeppiaar Engineering College, Chennai - 600 119.

\*Corresponding author: E-Mail: dilip1991singh@gmail.com

### ABSTRACT

Fire accidents are one of the worst incidents which can induce a large amount of damage to life and property. In the fire accidents, fire is not the only factor for the huge damage, but there are other factors like layout of the building, position of the floor above ground level which is caught in fire, improper escape routes, improper ventilation, inadequate fire safety equipment, etc.

**KEY WORDS:** Fire rescue ladder, Carlton tower accident.

### 1. INTRODUCTION

Because of the rapid growth of technology in civil engineering and the development of composite materials, nowadays the height of the buildings are going on increasing. The world's tallest building "burj Dubai" and the yet to be constructed buildings are build with latest technical developments. But in case of any fire accidents in these buildings, the lives of the peoples are still a question. Hence we have to develop a method to rescue the trapped people inside these tall buildings as soon as possible. Hence we devised a method for rescue the people who are trapped in a building which is caught in fire. In United States, apartments are constructed for reducing the congestion and land usage. But in case of a fire accidents, the fire department faced lot of problems like difficulty in rescue people who are above the floor which is caught in fire. Even the experienced fire fighters are not able to rescue the people under these circumstances. Hence for rescue the peoples under these types of accidents, the U.S fire department, requested to design a ladder for reaching the height of the building. Even after the development of such type of ladder, the fire fighters released that the rate of rescue is slow, since only one person will be rescued at a time. The people also fear of climbing down the ladder from the height of the building. Hence the ladder is replaced by a basket fitted on the free end of the long arm, which can able to reach the building top with the help of hydraulic cylinders. The design engineers are unable to increase the height of the fire rescue ladder, since it is impossible to increase the length of the vehicle which makes the vehicle unturnable in steep corners. Hence for saving the life of people who are trapped in high story buildings which is caught in fire, the civil engineers designed a fire proof room in every floor. These rooms are constructed with high fire resistant and heat resistant materials and painted with fire proof paint.

**Principle of Operation:** In this method we are going to use an helicopter for rescue the people who are trapped on the building which is caught in fire. There is a bridge made of a light weight material named duralumin. The one end of the bridge is fitted on the side of the helicopter in such a way that the bridge ends on the side door of the helicopter. The other end of the bridge is fitted with a swivel turret which is having a number of vacuum cups. Because of this during a rescue operation, the helicopter hovers to the floor where the people are peeping out of the window for help, and then the helicopter is moved forward to make a contact between vacuum cup and the building walls. The vacuum pump is switched on for making the vacuum cup to hold firmly to the walls of the building.



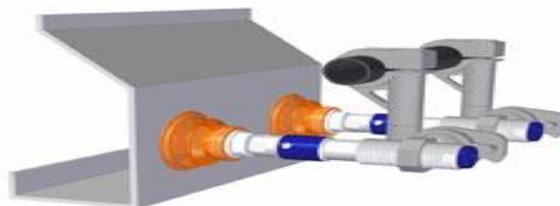
**Figure.1. Some photographs from Carlton tower accident-Bangalore**



**Figure.2. Photograph of Building Caught Fire**

At that time the people are rescued from the building to the helicopter through the bridge. During the rescue operation the helicopter may sway from side to side due to turbulence in air. This is compensated by shock observing springs of the vacuum cup and swivel base of the bridge. The one end of the bridge is fitted on the side of the helicopter in such a way that the bridge ends on the side door of the helicopter. The other end of the bridge is fitted with a swivel turret which is having a number of vacuum cups. Because of this during a rescue operation, the helicopter hovers to the floor where the people are peeping out of the window for help, and then the helicopter is moved forward to make a contact between vacuum cup and the building walls. The vacuum pump is switched on for making the vacuum cup to hold firmly to the walls of the building. At that time the people are rescued from the building to the helicopter through the bridge. During the rescue operation the helicopter may sway from side to side

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**Figure.3. Vacuum cups during operation**

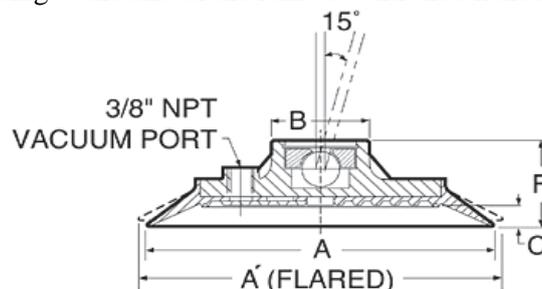
The vacuum cup selected should be capable of sticking to wet, oily surfaces since during a fire accident, there will be wet surface because of splashing of water from the fire engines and some chemical oils will be produced due to combustion of house hold utilities like plastic chair, plastic paints ,computer tables ,etc. By this we can rescue a lot of life without any delay and without any large fire rescue ladders, whatever the size and height of the building is. The dimensions of the bridge are different for different types of helicopter since each helicopter has its own lifting capacity, space for cargo, field of application, etc. We can use any type of cross section for bridge construction like channel, T-section, L-section, I-section, circular hollow section, hollow box section, etc My point is that, even though there is a fire proof room for the people, still there is a danger for people until the fire is extinguished. The fire proof rooms are installed only in very big sky scrapers and it is not built in many fifteen to twenty storey buildings. For example take the Carlton tower fire accident in Bangalore. The fire was started due to short circuit of electrical cables. The people above the floor which is caught in fire are unable to come out of the building through ground floor by stair case. The elevator is also not in operation due to short circuit.

## 2. EXPERIMENTAL SETUP

In our project, we are going to show the rescue operation in a small scale demo by using a remote controlled helicopter. We will attach the bridge in a small scale made of a light weight material, so that the remote controlled helicopter can be controlled easily. While demonstrating the rescue operation

**Objective function:** The objective of this paper is to devise a rescue method to rescue the people who are trapped in a fire accident as described above.

**Cost Estimation:** The cost of the project will be less, there is no fabrication in it. The only costlier component is the remote controlled helicopter. The cost of the helicopter will be around 5000 rupees. Then the other costs include making the bridge in plastic according to the size of the remote controlled helicopter.



## 3. CONCLUSION

From the above said method, we hope that we can save lot of life from the fire accident similar to that which took place in Carlton tower. The bridge is in the design stage and still requires several tests to ensure its safety during the rescue operation. We also have to ensure whether the bridge is affecting the balance of the helicopter if any. But if it is possible then we can save a lot of life from these types of fire accidents.

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