



Sri SAI RAM INSTITUTE OF TECHNOLOGY



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INNOVATION AND ENTREPRENEURSHIP DEVELOPMENT CENTRE (IEDC)

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SAFETY HELMET FOR FIRE FIGHTER



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IV YEAR MECHANICAL ENGINEERING

SRI SAIRAM INSTITUTE OF TECHNOLOGY



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DEPARTMENT OF
SCIENCE AND TECHNOLOGY

1. INTRODUCTION

Fire-fighting is often described as an “ultra-hazardous” activity. The likelihood of encountering high radiant heat environments contributes to the dangers inherent in this occupation. In order to provide adequate protection against personal injuries and burns to fire-fighters and to equip personnel to most effectively perform their job duties, personal protective equipment is designed to isolate the wearer from the hazards of his environment.

Adequate head protection equipment is particularly critical to fire-fighter safety and challenging to designers and engineers who invent such products.

2. HELMET DESIGN CONSIDERATIONS

The unique demands of fire-fighting require special considerations in the design of fire-fighting helmets. Potential exposure to high temperatures leads to material specifications that stipulate high melting temperatures and high flash points. The threat of direct flame contact dictates that all materials be flame retardant. Likewise, adequate thermal insulation must be present to protect the user from intense heat. The risk of falling objects mandates that fire-fighting helmets provide impact force attenuation and resistance to penetration by sharp projectiles. In addition, possible exposure to electrical power lines presents the need for good dielectric properties, electrically isolating the user from high voltage sources that may contact the helmet shell.

3. MATERIALS USED

The materials used for making the fire fighter helmet are as follows.



Kevlar-29 fiber



Epoxy resin



Double side silicon coated glass fabric



Visor

4. MANUFACTURING PROCESS

4.1 Fabrication of helmet

After the mould of the helmet is made, the fabrication process begins. The following steps prevailed the fabrication process in detail.

Step 1: First the inner side of the two half of the helmet is cleaned well and then it is coated with wax to prevent the adhesive of epoxy resin with the mould.

Step 2: Now the epoxy resin which is mixed with a yellow pigment along with the hardener is coated on the inner surface of the mould and made it to set.



Step 3: In the mean time, soak the Kevlar fiber in the epoxy resin and let it to dry for 5 minutes.



Step 4: Then the wet kevlar-29 fiber is placed on the two sides of the mould which is already coated with the epoxy resin.



Step 5: The calcium oxide powder is spread over the wet layer of the Kevlar-29 fiber which is placed over the mould, to speed up the setting process.

Step 6: After the Kevlar-29 fiber is set, cut the excess part of the fiber which is outside the mould.



Step 7: Then join the two halves of the mould and place the patch between them.



Step 8: After the patch is set, take the helmet out of the mould.



Step 9: After the shell of the helmet is made, the lining of the helmet is done and the visor is fixed.



5.CONCLUSION

The helmet we made is a good protecting gadget for our fellow countries firemen. It protects them from sudden impacts, thermal radiation and high heat during rescue missions and controlling of fire. Based on the experimental work and from the analyses of results obtained, the following conclusions were drawn:

- High thermal resistance, ranges from 551 k to 655 k.
- High impact resistance (i.e, 2.75 J).
- Provides safety to head and neck part of the fire fighters.

This project secured second prize in national level project contest -2016 at DHANALAKSHMI COLLEGE OF ENGINEERING – Chennai on October 7/10/2016 & 08/10/2016.

