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**SOME INVESTIGATIONS ON EFFECT OF FILLER
MATERIALS ON FIRE RESISTANCE OF POLYMER
MATRIX COMPOSITES**

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ABSTRACT

Polymer Matrix Composites are the modern materials substituting metals and alloys in many domestic and engineering applications. Tailoring property of composites has increased its applications. But basic polymer has poor fire resistance which limits its usage. The advanced technology has modifying the polymers structure by halogenation and treatment with phosphates. This technique helps in making the polymer as flame retardant, however on burning of these modified polymers releases toxic gases. Many works have been carried out on the addition of filler which enhances the mechanical and tribological properties of the composites, but less works has noticed on the effect of filler addition on the fire resistance of polymer composites. Hence in the present work, an attempt has been made to enhance the fire resistance of polymer matrix composites with the incorporation of inorganic fillers.

The aim of the addition of inorganic fillers (SiC and flyash) was to increase fire resistance of PMC's by arresting the flame spread travel. The work has employed for glass/epoxy and glass/vinylester composites and with inorganic filler, flyash and SiC_p. The fillers were varied as 5% and 10% volume fraction. The composite laminates were fabricated by hand lay-up technique. The specimens were cut and fire resistance was done in accordance with UL-94V/ASTM D 3801-06 standards. The parameters considered in the study were burning rate, mass loss rate, flame travel, time to fire extinguish.

The obtained results shown that unfilled glass/epoxy and glass/vinylester composites has poor fire resistance. Fire resistance increases with the incorporation of fillers and increases with increases in the filler volume fraction. However 10% filler reinforcement exhibits UL-94V-1 ratings and others tested materials fail to pass the UL-94V test. It was also observed that glass/vinylester composites shown better fire resistance than the glass/epoxy composites. The incorporation of inorganic fillers arrests the fire growth. In flyash particles, the phosphates and silicates help to increase fire resistance of composites. The ceramic SiC_p particles itself creates a barrier for the fire growth. Thus addition of filler increased the fire resistance of composites.