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The Effect of Post-Curing on Static Flexural Behavior in Carbon-Filled Laminating Epoxy Resins

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INTRODUCTION

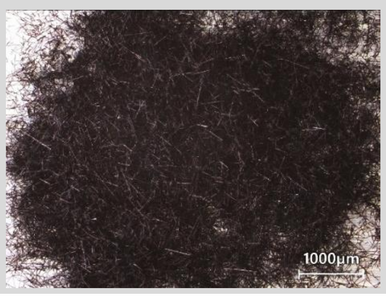
Epoxy composites are crucial for modern transport due to their lightweight and strength, with growing market demand for enhanced durability.

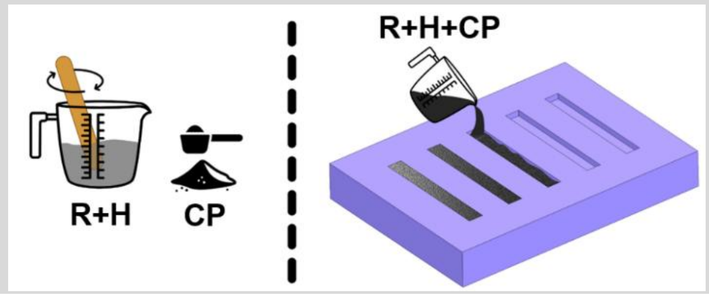
Inconsistent curing weakens composite strength, creating challenges for manufacturers, the transport industry, and aerospace engineers.

The study aims to optimize curing processes for carbon-filled epoxy resins, enhancing durability in transport and aerospace applications.

MATERIALS, METHODS & IMPLEMENTATION

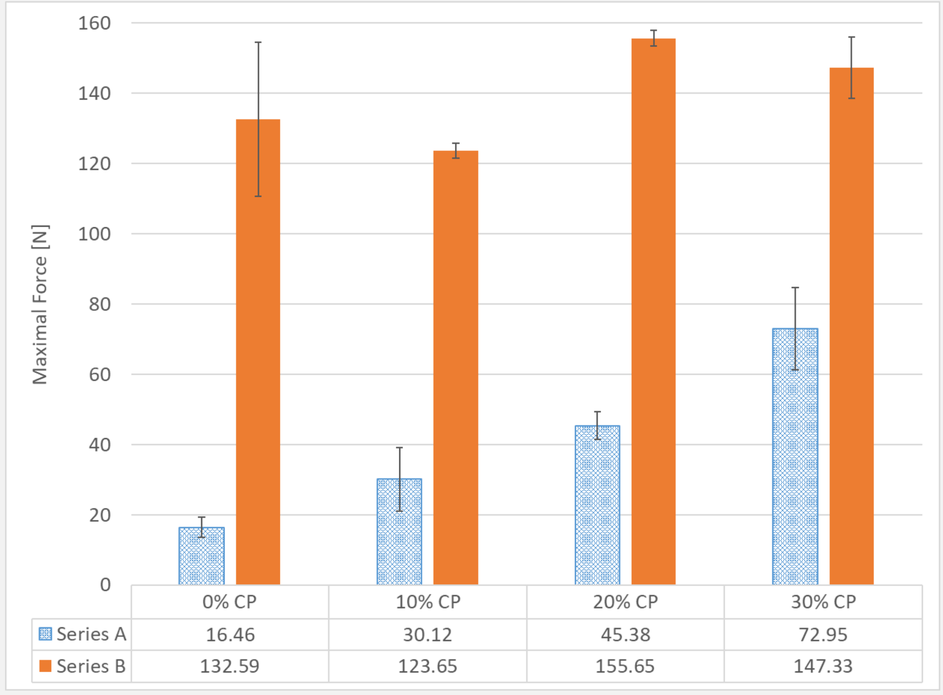
The research examines the flexural strength of epoxy composites by using carbon powder as a filler and comparing two curing methods: ambient curing and thermal post-curing.



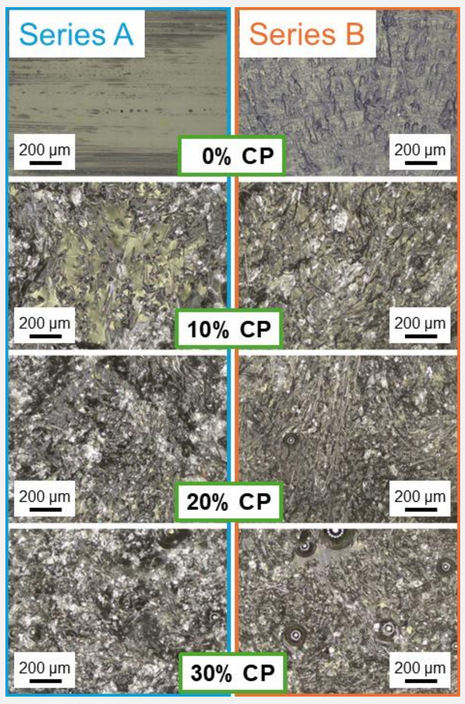


RESULTS

Thermal post-curing significantly enhances the flexural strength of carbon-filled epoxy composites, stabilizing mechanical properties and reducing dependency on filler content. In Series A (ambient curing), flexural force increased 350% at 30% filler, while in Series B (post-cured), strength peaked at 20% filler with a 30% improvement over unfilled samples. These findings highlight the critical role of curing parameters in optimizing composite performance for transport and aerospace.



	0% CP	10% CP	20% CP	30% CP
Series A	16.46	30.12	45.38	72.95
Series B	132.59	123.65	155.65	147.33



CONCLUSION & IMPLEMENTATION PATH

The research concludes that proper thermal post-curing significantly enhances the mechanical properties of carbon-filled epoxy composites, ensuring their reliability in transport and aerospace applications. Future studies could explore alternative fillers, advanced curing techniques, and long-term material durability.

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