

## MECHANICAL AND PHYSICAL PROPERTIES OF EPOXY COMPOSITES CONTAINING CFRP POWDER WASTES

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### INTRODUCTION

**CPW** → Carbon powder wastes obtained from the cutting process of laminate composites.

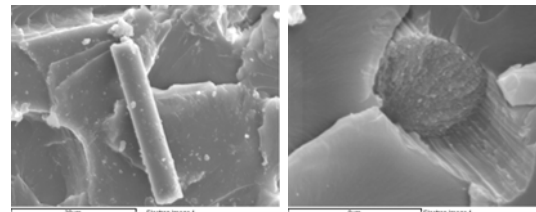


In this research, **carbon powder wastes** obtained from the cutting process of laminate composites have been **incorporated into epoxy matrix**.

### STUDIED MATERIAL

The epoxy resin was used with two different hardeners to maintain the viscosity.  
Wt. proportions: 100:25:10. Mixing: 8 minutes. 24 h at 22±5 °C + 6 h at 60±2 °C.

Code	Description	Epoxy	Hardener 1	Hardener 2	CPW
ER-0W	Epoxy resin	100.0	25.0	10.0	0
ER-10W	Epoxy resin with 10% waste	92.6	23.1	9.3	10
ER-20W	Epoxy resin with 20% waste	85.2	21.3	8.5	20



Analysis by SEM of the CPW: mean of length and diameter was found at 45 μm and 6 μm, respectively.

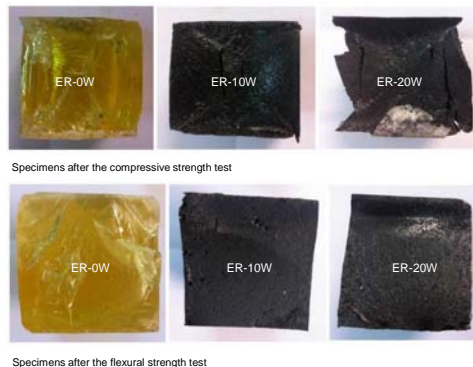
Percentage of pure carbon fibre in the CPW: between 15.1 and 15.8%

### RESULTS

Code	Bulk density [g/cm <sup>3</sup> ]	Compressive strength [MPa]	Flexural strength [MPa]	Compressive modulus [GPa]	Strain at compressive failure [%]
ER-0W	1,135	98.42	3.424	3.179	3,1
ER-10W	1,148	104.52	3.961	3.486	3,0
ER-20W	1,191	118.29	4.477	4.137	2,86

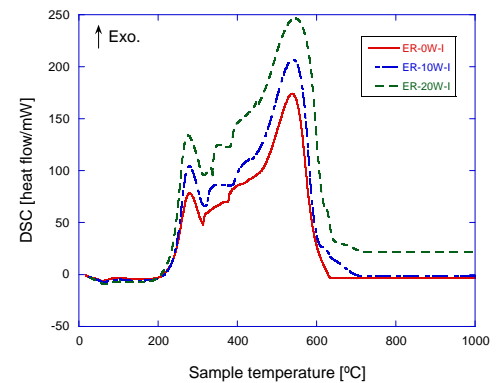
### MECHANICAL PROPERTIES

CPW addition increases all mechanical properties.  
More effective load transfer to the epoxy matrix.  
More rigid and stronger composite.  
Good bond between epoxy resin and the CPW.



### PHYSICAL AND THERMAL PROPERTIES

Slight increase in Bulk density.  
Discompose at 275 °C.  
Final decomposition between 600 and 800 °C.



### CONCLUSIONS

The CPW addition into the epoxy resin provides a increase in the density with a increasing temperature of total decomposition.  
The incorporation of CPW improves the compressive strength and flexural strength, which proportionally increased with the CPW addition.