EMPIRICAL MODEL FOR CURING CONDITIONS SELECTION LEADING TO THE OPTIMUM PROPERTIES OF CFRP

By

Ahmed Hatem Omar Abdel-Aziz Al-Khoribi

A Thesis Submitted to the
Faculty of Engineering at Cairo University
in Partial Fulfillment of the
Requirements for the Degree of
DOCTOR OF PHILOSOPHY

in
Metallurgical Engineering

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Under the Supervision of

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Mining, Petroleum, and Metallurgy Department
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Title of Thesis:

Empirical Model for Curing Conditions Selection Leading to the Optimum Properties of CFRP

Key Words:

Epoxy, carbon fiber, polymer, mechanical properties, thermal properties

Summary:

In this thesis, an attempt has been made to optimize the curing process of carbon fiber reinforced polymer laminates by selecting the optimum curing conditions that led to optimum properties of CFRP materials. The studied properties were mechanical, thermal, and physical properties. It was shown that curing at 180 ^{o}C or lower, applying furnace cooling, raising resin-to-hardener ratio, and avoiding wetting the bottom side have reduced data variability, lowered thickness, and residual stress. Also, it was shown that curing at 115 min/105 ^{o}C has improved overall mechanical properties while curing at 125 min/130 ^{o}C has improved overall thermal properties.

Disclaimer

I hereby declare that this thesis is my own original work and that no part of it has been submitted for a degree qualification at any other university or institute.

I further declare that I have appropriately acknowledged all sources used and have cited them in the references section.

Name: Ahmed Hatem Omar Date:

Signature:

To:

my father, my mother, and my sister

my nieces, Lena and Tala

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