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**Master Thesis Defense**

Entitled

*IMPACT OF DIFFERENT ENVIRONMENTAL CONDITIONS ON THE THERMO-MECHANICAL CHARACTERISTICS OF COMPACTED AND NON-COMPACTED CARBON/EPOXY PLAIN WEAVE WOVEN LAMINATED COMPOSITES*

by

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Date & Venue

5:30 pm

Monday, 30 November 2020

Microsoft Teams

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Abstract

Fiber reinforced polymeric composites used for aerospace applications are subjected to different environmental conditions during their operational life, such as moisture and temperature, which can adversely affect their performance over time. On the other hand, the standard fabrication process of these composite aircraft components requires a certain level of in-process vacuum compaction during the composite lay-up process to ensure the escape entrapped air between the composite layers to prevent the formation of voids. The aim of this study is to evaluate the effect of moisture and temperature on the integrity of plain weave woven carbon/epoxy laminated composites for both compacted and non-compacted groups. Twelve ply specimens were fabricated and immersed in water heating chambers maintained at different temperatures of 40°C, 70°C and 95°C for a period of time that varied from one to 10 months. Mechanical, physical and thermal properties were experimentally investigated, and the effects of temperature, moisture, and immersion time on the deterioration of the composite material were studied against both compacted and non-compacted groups. Results revealed that moisture and temperature have a deteriorative impact on the performance of the composite, it is observed that high temperature accelerates the degradation mechanism in the composites.

**Keywords:** Carbon / epoxy woven laminated composites; Effect of humidity and temperature; Mechanical and thermal properties; Comparison between compacted and non-compacted composites.