

Flexural properties of fiber reinforced composite using a vacuum/pressure or a manual adaptation manufacturing process.

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PURPOSE: This study investigated the influence of fiber content and water storage on the flexural strength of beams made of two fiber-reinforced composites (FRC), the Vectris and the FibreKor system. **MATERIAL AND METHODS:** A manual adaptation method (FibreKor, n=30) and a vacuum/pressure process (Vectris, n=30) were compared using 25x4x2mm(3) beams. One group of the Vectris (n=10) and the FibreKor beams (n=10) was stored in water for 24h, a further group was thermal-cycled (TC) 6000x5 degrees C/55 degrees C, and a third group was stored in water for 30days at 37 degrees C. All beams were then loaded to failure using a three-point bending test and the flexural strength was calculated. Finally, the fiber volume percent (vol%) was determined. **RESULTS:** Generally, the flexural strength decreased significantly with increasing storage time independent of the investigated fiber- and/or manufacturing system. With the parameters 24h/TC/30days, the mean of flexural strength for the Vectris beams was 618/579/545N/mm(2), and for FibreKor 585/534/499N/mm(2). A fiber content of 28.1+/-0.4vol% was assessed for the Vectris beams and 12.8+/-0.6vol% for the FibreKor beams. After 24h storage in water, the Vectris and the FibreKor beams demonstrated a statistically significant higher flexural strength than after 30days storage in water. **CONCLUSIONS:** A vacuum/pressure manufacturing process in contrast to manual adaptation, resulted in a markedly higher fiber content, but did not necessarily lead to significantly higher flexural strength. Not only the fiber content, but also matrix composition as well as the bond between fibers and matrix determined the properties of FRC.

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