

23rd International Conference on Composite Materials (ICCM23)



Behavior of Paperboard with Interacting Circular Holes Under Tensile Loading Using Three-Dimensional Digital Image Correlation

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Objectives

The experimental tests were performed to analyze the failure behavior including the crack propagation phenomena in perforated paperboard with different configurations of interacting holes such as one hole, two holes in the transverse direction, two holes in the longitudinal direction, and two holes in the diagonal positions subjected to tensile loading.
Fiber direction effects were analyzed on the tensile strength of paperboard and on the interaction of holes



A: One circular hole (1CH), B: Two horizontal holes (2HH), C: Two vertical holes (2VH), and D: Two diagonal holes (2DH)





The basic principle of Stereo-Image Correlation with a schematic illustration of reference and deformed subsets.



















Conclusions

> From the tensile test we find out the fiber direction and cross directs of the paperboard.

The fiber direction and number of holes in the specimens have effect on their strengths.

Øne central hole and two vertical holes almost same strengths and two horizontal holes showed minimum strength to

tensile loading.

> 0-degree fiber direction shows maximum strength for all cases and minimum is for the 90-degree samples.

> Fiber direction effect great effect on tensile strength and well predicted using 3D-DIC system.



Thank You!