Detecting Impact Damages In An Aramid/Glass Fiber Reinforced Hybrid Composite With Micro Tomography

By: Fidan, S (Fidan, Sinan); Sinmazcelik, T (Sinmazcelik, Tamer); Avcu, E (Avcu, Egemen); Bora, MO (Bora, Mustafa Ozgur); Coban, O (Coban, Onur)
Edited by: Yigit, F; Hashmi, MSJ

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Abstract
This paper utilizes the micro computerized tomography (micro-CT) as the NDI technique to characterize the initial matrix delaminations locations and sizes in an aramid/glass fiber reinforced hybrid composite test specimen after a low velocity impact tests. Further, to visualize the localized low velocity impact damage volumes; based on the specimen's micro-CT results; image analysis, geometric modeling and meshing softwares CtAn and CtVox were used. Finally, interpretation of damage mechanisms occurred in aramid/glass fiber reinforced hybrid composite after low velocity impact loading presented with accurate 3-D rendered models obtained from a series of micro-CT slices. 3-D rendered models gained from impacted specimens help to quantify the internal microscopic damage modes of complex material system such as aramid/glass fiber reinforced hybrid composite. It is very important to predict or determine composite materials response to an impact loading since impacts occur during manufacture, normal operations, maintenance, etc. After low velocity impact loading tests, investigation of damage zone will provide a better composite manufacturing process. For example, it is acknowledged that up to 80% of the cost of manufacture of a composite is fixed once the preliminary configuration had been finalised. Further detail changes afterwards can only make a small impact on the final cost of the manufacturing process.