Application Note POLYMER007

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POLYMER007: Orientation Analysis of Short Fibers in GFRP

Introduction

In designing the strength of fiber-reinforced resin, it is important to understand the disorder of fiber orientation that occurs during injection molding. It is difficult to capture the three-dimensional structure using X-ray transmission devices or microscopes. Micro X-ray CT enables nondestructive, three- dimensional visualization and quantification of fiber orientation and distribution, thereby improving the reliability of optimization of molding conditions and strength design.

Non-destructive imaging

Analysis:	Raw materials and parts products
Use:	Process control, failure analysis, quality assurance
Analyzed materials:	Glass fiber reinforced plastic (GFRP)
Analysis software:	VGSTUDIO MAX (fiber orientation analysis)

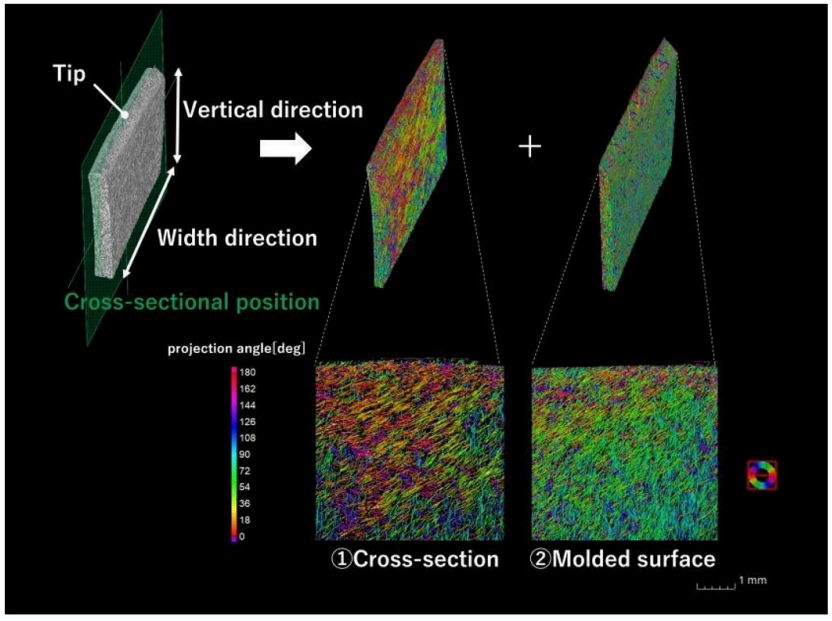

Figure 1: Cross-section of fan blade and fiber orientation on molded surface

Conclusion

A GFRP fan blade of approximately 0.6 mm thickness was cut to 10 mm width and CT imaging was performed at 3.6 µm/voxel for 17 minutes.
(1) In the cross-section, GF was colored red to yellow for about 4 mm from the blade tip, with a predominant orientation in the width direction. (2) On the molded surface, GF was blue to green over a wide area except for about 1 mm from the blade tip, indicating a predominance of vertical orientation.

Related products

CT Lab HX

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