

Siemens PLM Software

## Fibersim Documentation

Improving product quality and manufacturing throughput with advanced documentation

### Benefits

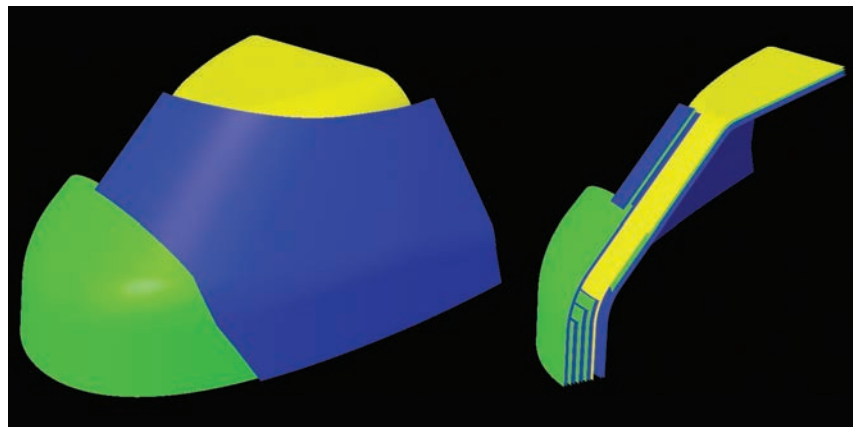
- Enables the efficient re-use of composites engineering data to automatically generate associative 3D and 2D documentation
- Provides up-to-date and accurate documentation by eliminating manual entry or change errors
- Increases quality and throughput of composite parts by communicating hand layup process for every ply that is placed on a tool

### Summary

Documenting composite products is required to communicate them throughout an organization and properly manufacture them. In comparison to traditional designs, composite designs contain an average of five times more data, both geometric and nongeometric, that must be conveyed to others throughout the value stream. What's more, design changes make it challenging to accurately and efficiently document a composite product.

While the use of composites is growing exponentially, the number of experienced workers has lagged this rate of growth, creating concern that product quality and manufacturing throughput may suffer. It is

therefore critical that documentation can be used to assist composites manufacturing technicians in understanding the layup method. Communicating the layup method



*Pictured is an automatically created and associative 3D cross-section derived from the Fibersim composite design. Plies displayed (draped curves) are schematic or draped representations with ply names and orientation colors (0° blue, 90° red, 45° green -45°).*

# Fibersim Documentation

## Features

- Facilitates automatic generation of associative surface representations
- Enables automatic generation of associative annotations
- Allows automatic generation of associative cross-sections
- Provides automatic generation of associative ply books and tables

ensures that the composite product can be consistently and rapidly manufactured in a repeatable manner.

The Documentation module in the Fibersim™ portfolio of software for composites engineering from Siemens PLM Software reduces documentation development time, decreases errors, improves

product quality and manufacturing throughput. By repurposing the composite design data already in the Fibersim portfolio, the Documentation module can be used to automate the generation of accurate manufacturing plybooks, ply tables and 3D data. The Documentation module supports NX™ software, CATIA V5, PTC Creo and Pro/ENGINEER.

Documentation types include:

### 3D documentation

#### *Annotations*

- Core sample
- Ply table
- Ply callout
- Material table

#### *Cross-sections (including core)\**

- Draped representations
- Schematic representations

#### *Flat pattern layout*

- Automated grid layout of flat patterns

#### *Exploded laminate*

- Ply-by-ply surface representation of laminate (including core)

### 2D documentation

#### *Ply book*

- Ply layup process documentation

#### *Engineering drawings*

- Capture annotations and cross-sections

#### *Ply tables*

- Customizable for desired outputs

#### *Material tables*

#### *Sequence charts*

\*Cross-sections are now included in the core Fibersim products beginning with V14.0.

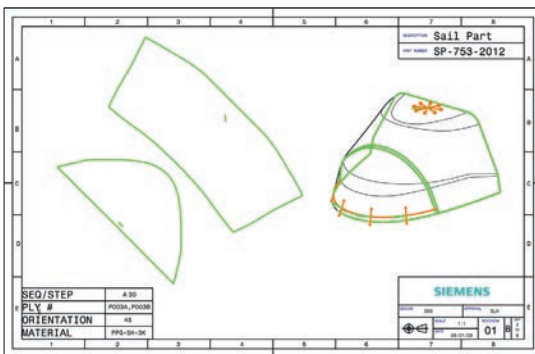
## Generating drawings that improve products

The Documentation module allows designs to be transitioned to the manufacturing floor quickly and reliably by automatically generating documentation. Flat patterns created with Fibersim are based on material simulation with respect to tool

geometry and the manufacturing process. Ply book documentation can communicate the manufacturing process used to create the flat pattern and provide guidance to the layup technician, making it possible to achieve repeatable quality and increased throughput.

### Enabling customizable drawings

The format of drawings and reports is easily customized to follow company drafting standards. Document templates are created using the familiar drafting tools of the computer-aided design (CAD) system, eliminating the need for expensive custom programming.

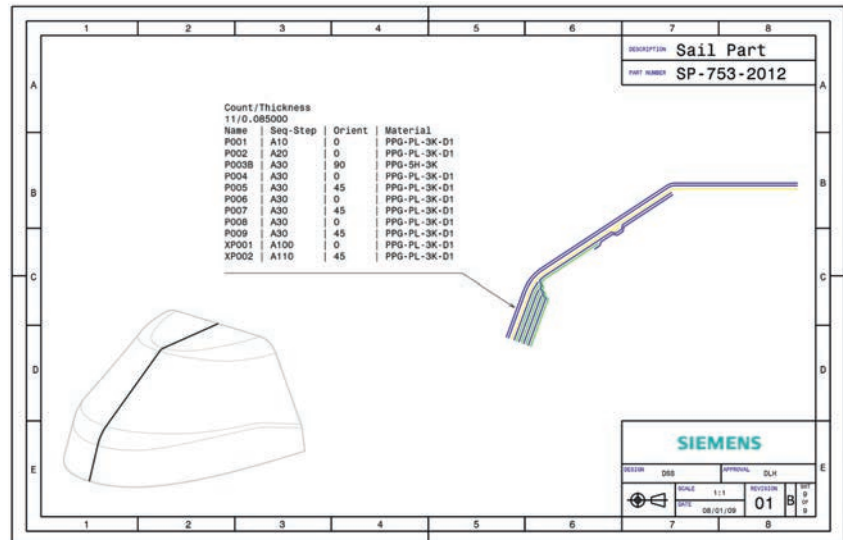


This ply book document demonstrates the layup process of two spliced plies. Ply P003-A is laid up using a radial process (orange radial arrows) at the top of the part and P003-B is laid up along an edge and then worked toward the middle (orange line along the nose of the part with arrows point toward the middle).

Once defined, the templates can be used to generate tailor-made documentation and drawings.

### Providing accurate and consistent documentation

The Documentation module provides an efficient, accurate and automated method for performing time-consuming, error-prone tasks. In addition, design changes are tracked and made apparent, ensuring that all documentation is quickly and easily updated. Whether it is 3D engineering documentation, such as annotations and cross-sections, or 2D manufacturing documentation, such as ply books, documentation can be easily generated, and kept current and accurate.



The cross-section and annotation within the drawing have been automatically generated from, and are associative to, the composite design in Fibersim. Cross-sections are generated with ply colors based on orientation (0° blue, 90° red, 45° green -45° red – not shown).

Contact  
Siemens PLM Software  
1 781 907 9800

[www.siemens.com/plm](http://www.siemens.com/plm)

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