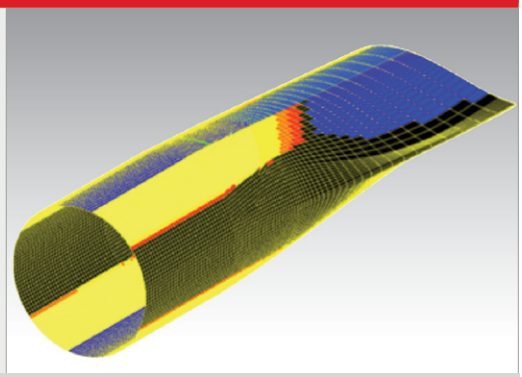
DATASHEET

Patran Laminate Modeler

Design and Optimize Laminated Structures with Confidence



Overview

Patran Laminate Modeler is an application module of Patran to aid engineers, designers and analysts with composites development process that requires tight integration between design, analysis and manufacturing disciplines from concept through manufacture. Designers benefit from an intuitive and quicker specification of laminate designs that accurately reflect the ply-based physical composition of the structure, while analysts can gain from improved communication of structural details and generation of the analysis model. The manufacturer can avoid trial and error prototyping and minimize material waste by identifying potential problems in the product prior to manufacturing.

Whether you are designing a wheel cover, aircraft panels, floor pans, wind turbine blade or yacht hull, Patran Laminate Modeler provides functionality that lets engineers take complete advantage of virtual product development and build composite structures at a lower cost, and in an efficient manner. Listed below are a few of the benefits that Patran Laminate Modeler can help you realize in your design and development process.

Size Zones Efficiently

Composites development process typically begins with zone sizing, often using formal optimization techniques needed to meet multiple constraints simultaneously. The Laminate Modeler provides integrated support for generating, evaluating and modifying optimization models of MSC Nastran where the thickness and orientation of individual laminate layers are varied. The user can also merge individual laminate layers to consolidate zones with similar properties.

Identify Problems before Manufacture

Material shears and fiber angles change markedly when plies are draped over curved surfaces which could lead to manufacturing difficulties. Patran Laminate Modeler incorporates a robust draping algorithm to simulate manufacturability in a short time. Identifying and dealing with manufacturing problems at the design state saves higher costs in downstream modifications. Realistic material quantities can also be estimated early in the design process.

Create and Interpret Analysis Models

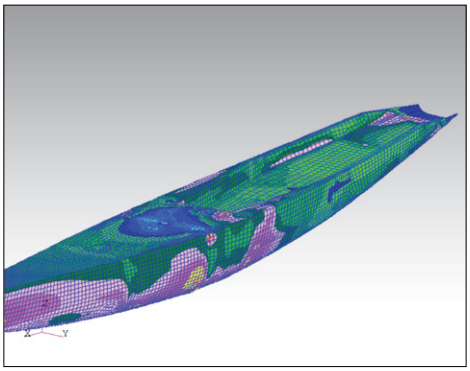
Conventional composite analysis techniques use simplified zone approximations of the ply laminate. These models do not represent the detailed structure of the component, and are time-consuming to produce. On the other hand, Patran Laminate Modeler calculates and stores fiber angle and shear data for every ply on every element of a finite element model. This is translated into a zone description required by the selected finite element code within seconds. This ensures that the analysis model closely resembles the design model. More importantly, any changes in the design model can be reanalyzed quickly.

Capabilities

- Calculate failure indices
- Optimize materials, plies and layups
- Size zones efficiently
- Simulate manufacturability with robust draping algorithm
- Calculate and store fiber angle and shear data for every ply on every finite element
- Interface with multiple analysis tools
- Generate manufacturing data

Benefits

- Develop optimized laminated structures
- Enable collaboration between designer, analyst and manufacturer
- Automate the design process
- Identify problems before manufacture
- Share composites design data with CAD products



Marine

MSC Software

Calculate Failure Indices

Failure modes of composite structures are complex due to the anisotropic nature of the ply materials and the microstructure of the laminate. Patran Laminate Modeler calculates failure indices using popular failure criteria including Maximum Stress, Tsai-Wu, Hill, Hoffman, Hankinson and Cowin methods. Users can also define custom failure criteria using PCL (Patran Command Language) functions. The failure analysis uses stress or strain results and material allowable stored in the Patran database. Margins of safety, failure indices, critical ply number and critical load components are calculated for each element and can be visualized using standard tools.

Generate Manufacturing Data

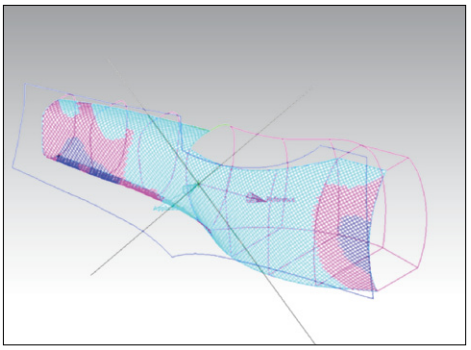
Reflecting the complex structure of a composites model compared to a homogenous component, a large amount of manufacturing data is required to construct a composite component. Laminate Modeler generates a sequential ply list and 3D draped pattern and 2D flat pattern for each ply. This eliminates trial-and-error draping methods and variability resulting from laminator discretion. Mold surface data that accounts for fabric thickening on shearing is also produced. This avoids resin starvation during mould filling in Resin Transfer Molding (RTM) processes. Patran Laminate Modeler helps achieve reality control in a manufacturing process.

Share Composites Data

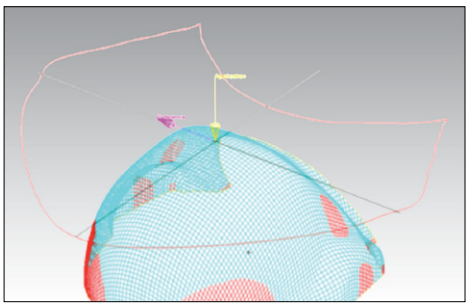
Patran Laminate Modeler shares the composite design data between different tools used in the composites development process. Ply data can be exported to CAD-based tools for detailed design and then imported back to allow for final certification analysis. This allows for enormous time savings compared with recreating the data manually in each environment.

Automate the Design Process

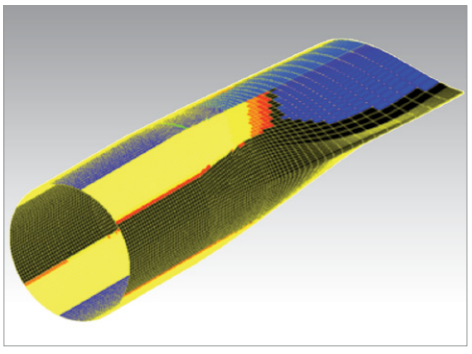
Patran Laminate Modeler is fully integrated within Patran's analysis environment and is fully programmable using PCL (Patran Command Language). This means that the design and analysis process can be automated for families of components enabling faster design studies and improved productivity.



Motorsport



Helmet



Wind turbine blade

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