

NEiAdvanced Composites

NEiAdvanced Composites (Composites Analysis)

Overview

NEiAdvanced Composites (Laminate Tools) by Anagraph Ltd. is a Windows application to aid engineers in the design, analysis and manufacture of laminated composite structures. For the designer, the software provides an intuitive means for quickly specifying laminate designs that accurately reflect the ply-based physical composition of the structure. Analysts benefit because NEiAdvanced Composites helps improve the communication of structural details and the generation of the analysis model. This saves time, which can now be applied to the process of design verification and optimization. For the manufacturer, this software highlights potential problems and provides accurate and complete manufacturing data, including the flat pattern shapes for each ply. This eliminates trial and error prototyping and minimizes material waste.

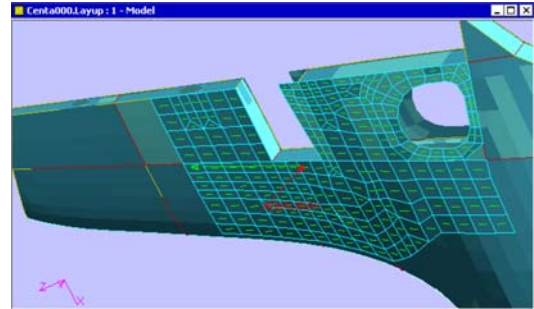
Features

Layup Surface Definition:

- Specify layup surface
 - Imported STL file
 - Imported shell mesh
- Define finite element model
 - QUAD4, TRIA3 shells
- Verify mesh topology
 - Branches
 - Normal Boundaries
 - Connectivities
 - Feature Angles
 - Material Orientations

Material Specification:

- Define manufacturing characteristics
 - Initial thickness
 - Initial warp/weft angle
 - Maximum shear
- Associate analysis material
 - Specified by user
 - Imported from analysis model
- Modify rapidly



Ply Specification:

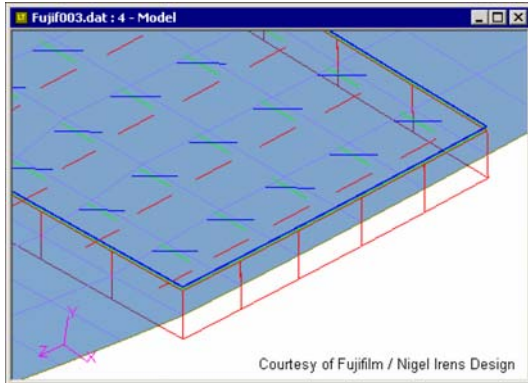
- Select appropriate application method
 - Painting (coatings or foams)
 - Projection
 - Draping (fabrics)
- Select flexible projection options
- Select flexible draping options
 - Woven or Unidirectional materials
 - Principal Axes: None, Geodesic, Planar
 - Extension Type: Geodesic, Energy, Maximum
 - Splits
 - Limit 2D Fabric Size
 - Specific order of draping
- Modify rapidly and retry simulation
- Import plies from external Layup/fml files and Nastran input files

Layup Specification:

- Add/Insert/Replace/Show/Delete plies
 - Define multiple ply instances
 - Control side of application
 - Define angular offsets
- Define laminate offsets
 - Multiple area
 - Top, Middle or Bottom offset
 - Arbitrary value
- Modify rapidly

Analysis Model Creation:

- Generate analysis models in Nastran format
- Select laminate orientation for analysis code
- Minimize data within a user-defined tolerance
- Ignore thickening for preliminary analysis
- Choose equally spaced thickness and orientation variables



Visualization:

- Verify plies
 - Material
 - Application direction
 - Reference direction
 - Selected area
 - Maximum strain
 - Warp and weft angles on each element
 - 3D Draped pattern with degree of shearing
 - 2D Flat pattern
- Verify layups
 - Orientation and separation of surface plies
 - Laminate surface
 - Stacking sequence on element
 - Cross section through arbitrary plane
 - Exploded ply view
 - Solid realistic representation
- Verify analysis model
 - Properties and laminates for elements
 - Layer orientation by vector plot
 - Layer thickness by model plot

Access Results:

- Read results from Nastran .f06 files and .OP2 files, and Femap .FNO files
- Display stress or failure results (text + graphics)
 - Per load case
 - Per layer
 - Per global ply
 - Per element, layer-by-layer
 - Worst element group

Failure Calculation:

- Use layered stress or strain results
- Select required criterion
 - Maximum
 - Tsai-Wu
 - Hill
 - Hoffman
 - Hankinson
 - Cowin
 - User-defined
- Define allowables
- Select required results
 - Reserve Factor
 - Margin of Safety
 - Critical Layer
 - Critical Component
 - Failure Index
 - Text Summary

Manufacturing Data Creation:

- Create ply book for one or more plies in lay-up
 - Text ply index
 - Images of plies on model
- Export 3D draped pattern shape for selected plies
 - IGES, DXF
- Export 2D flat pattern shape for selected plies
 - IGES, DXF
- Export Mould Surfaces
 - IGES

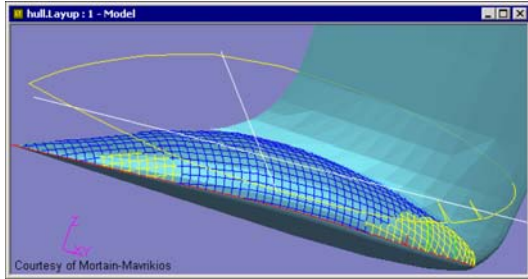
Data Sharing:

- Share data with composites tools
 - MSC.Patran Laminate Modeler Layup file
 - FiberSIM .fmd/fml files
- Share data with laminate analysis tools
 - Export materials, laminates and element loads

Key Benefits

Integrate Design, Analysis & Manufacture:

- Laminates defined in a manner acceptable to all parties
- Ply properties, including fiber orientations and patterns, stored in a single database
- Data readily exchanged with other composites tools during the development process



Identify Problems Before Manufacture:

- Robust draping algorithm to simulate producibility within seconds
- Modify the ply or insert a dart to reduce shear when permissible levels of shear are exceeded
- Realistic material quantities estimated early in the design process

Create and Interpret Analysis Models:

- Fiber angle and shear data for every ply on every element of a finite element model are calculated and stored
- Analysis model closely resembles the design model
- Any changes in the design model can be reanalyzed quickly

Optimize Materials, Plies and Layups:

- Rapid modification of the design and analysis models during the development process is allowed
- Design optimized comprehensively in the time previously required for a preliminary analysis

Usage Scenarios

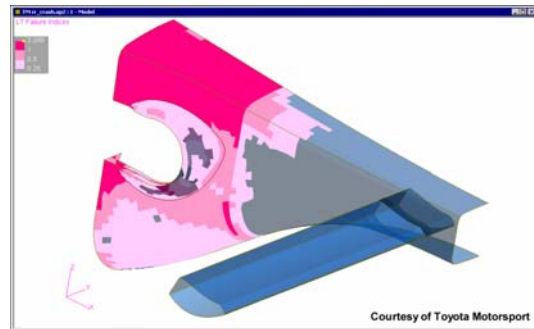
Aerospace:

- Many aerospace components are designed using FiberSIM and analyzed using Nastran with NEiAdvanced Composites

- Import ply layup data from FiberSIM and map it onto the analysis mesh
- Generate and write laminates to a Nastran input file for subsequent analysis
- Undertake failure analysis within NEiAdvanced Composites
- Check for failure across multiple load cases and failure criteria
- Visualize the plies to correctly audit the model

Motorsport:

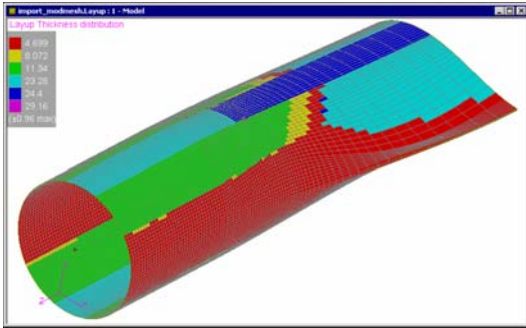
- Monocoques of Formula 1 cars are typically composed of over two thousand plies, with over one hundred thousand finite elements, and are analyzed in a two-week time frame
- NEiAdvanced Composites offers a faster development and optimization of an accurate ply-based model than a simplified model generated in the past using zones
 - Identify critical regions quickly using the failure analysis capabilities
 - Generate linear and crash analyses from the same composites model



Energy:

- Wind turbine blades of forty meters in length are produced using composite materials, and analyzed for flutter and local buckling; the most critical constraint is the cost
- With NEiAdvanced Composites
 - Materials, plies and layups are modified rapidly, and the performance of different solutions are compared, thus minimizing the cost
 - Run multiple analyses using different codes and a single composite model

- Produce manufacturing data to ensure that the analyzed model matches the final component



Unparalleled support:

- Leader in outstanding customer support
- Onsite and offsite training courses taught by experienced professional engineers
- Phone and email support staffed by a team of FEA specialists
- Optional consulting services available

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For more information about our company or our products, please contact:

Headquarters:

Noran Engineering, Inc

5555 Garden Grove Blvd., Suite 300
Westminster, CA 92683-1886
USA

Phone: 1.714.899.1220

Fax: 1.714.899.1369

Email: info@noraneng.com

Website: www.NENastran.com

Europe:

SmartCAE

Piazza della Gualchierina, 9
59100 Prato
ITALY

Phone: +39.0.574.404.642

Fax: +39.0.574.401.265

E-mail: info@smartcae.com

Website: www.smartcae.com

Asia/Pacific:

Digital Solutions

Kyoei Nakasuji Bldg., 3-7-18
Nakasuji, Asaminami-ku
Hiroshima 731-0122
JAPAN

Phone: +81.8.2850.2210

Fax: +81.8.2850.2215

E-mail: post@digital-sol.co.jp

Website: www.digital-sol.co.jp



NEiNASTRAN for Windows

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