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MAE 155: Fibersim Assignment

Chapter 1:

Summary

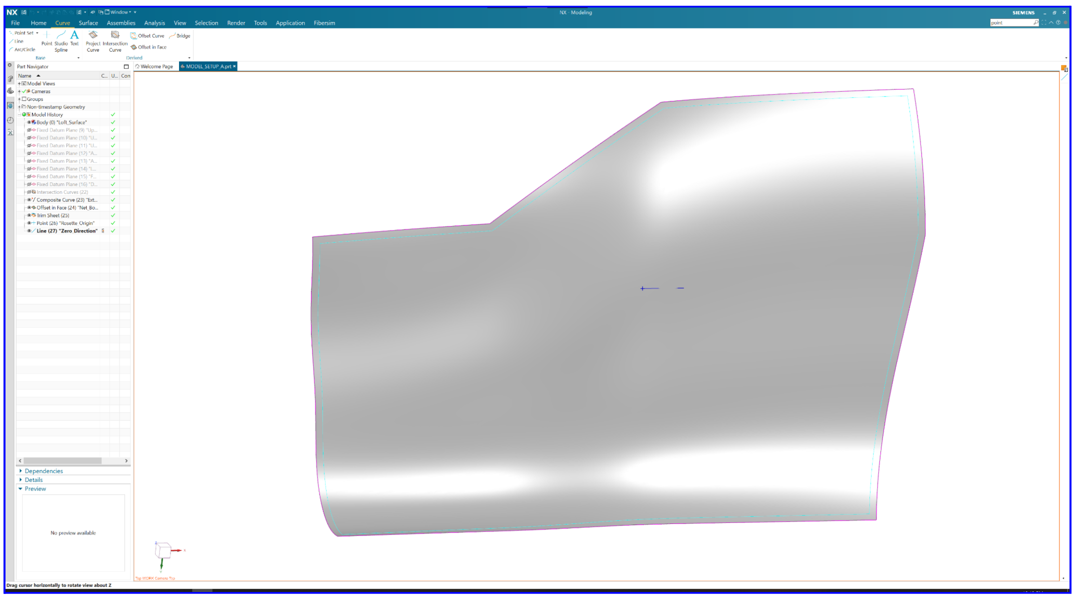
➔ Fibersim is used in tandem with NX Siemens, a CAD software, that allows engineers to define composite parts. The Fibersim interface will need to be 'called' using a shortcut or in the main window if NX Siemens. Through Fibersim, you are able to organize and find specific objects, or select only active laminates, and can highlight various contexts of your part. Finally, through Fibersim, pre-prepared actions are included such as a Ply Table.

Chapter 2:

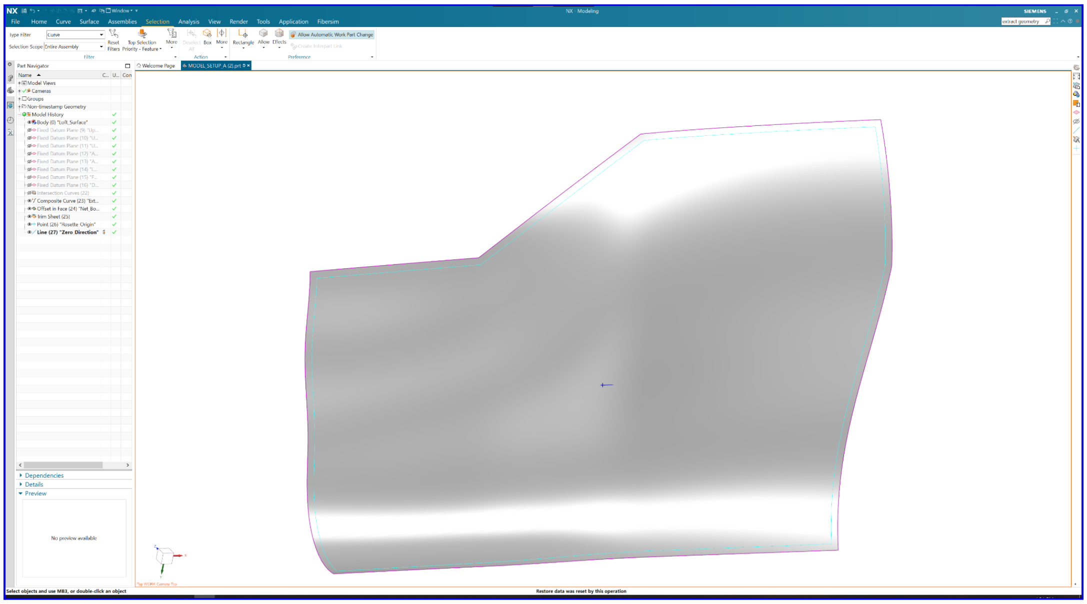
Example 2a/b: Create a Model from an Extended Surface and Planes

➔ Created net and extended boundary geometry, a tool surface, and rosette geometry.

FINAL SCREENSHOT OF PART A



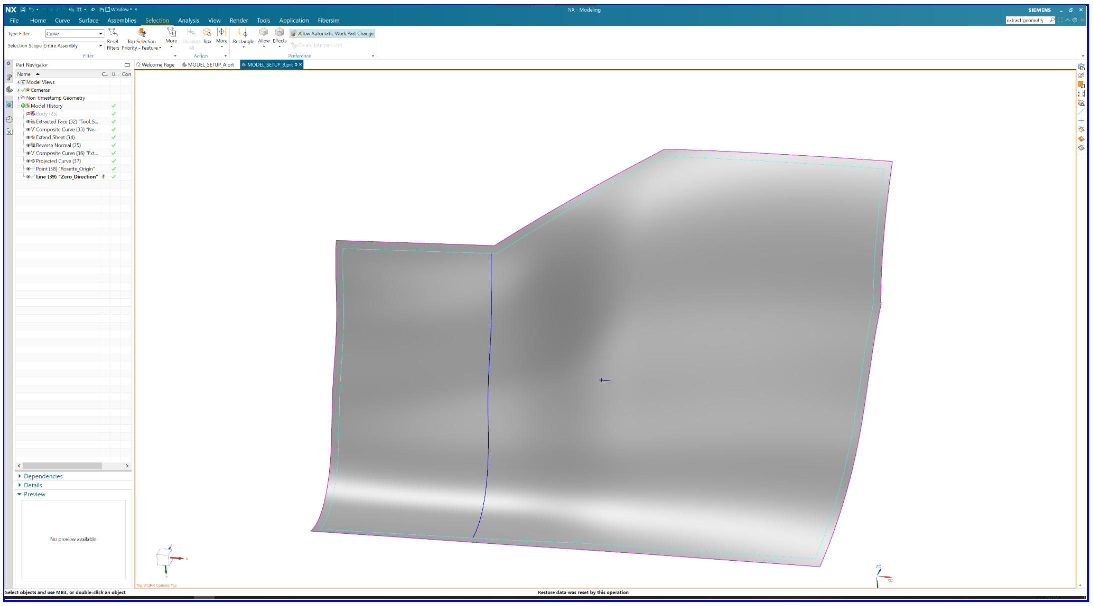
FINAL SCREENSHOT OF PART B



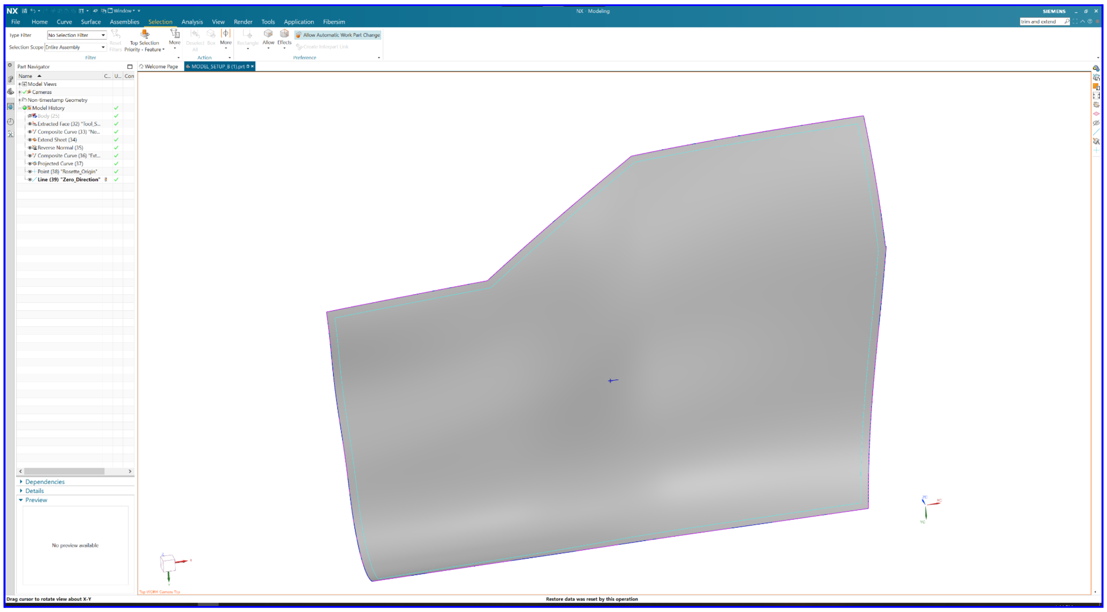
Example 2c/d: Create a Model from a Solid

➔ Extracted a tool surface from a solid, created a net and extended boundary geometry, extended a tool surface to account for manufacturing trim, extracted a ply edge from a solid, and created rosette geometry.

FINAL SCREENSHOT OF PART C



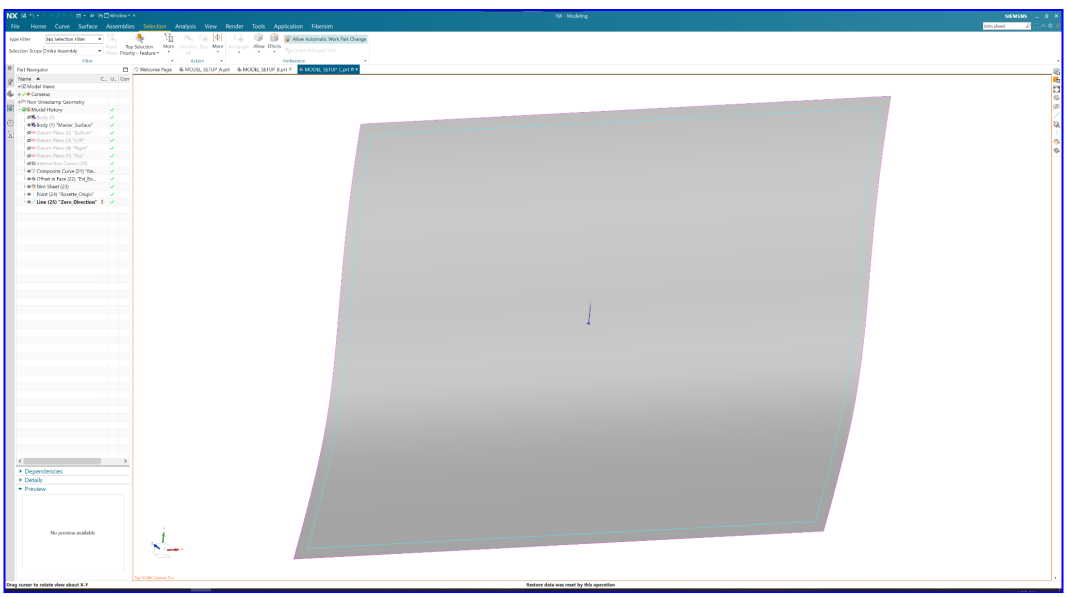
FINAL SCREENSHOT OF PART D



Example 2e: NX Model Setup from Planes and Surface

➔ Created net and extended boundary, tool surface, and rosette geometry.

FINAL SCREENSHOT OF PART

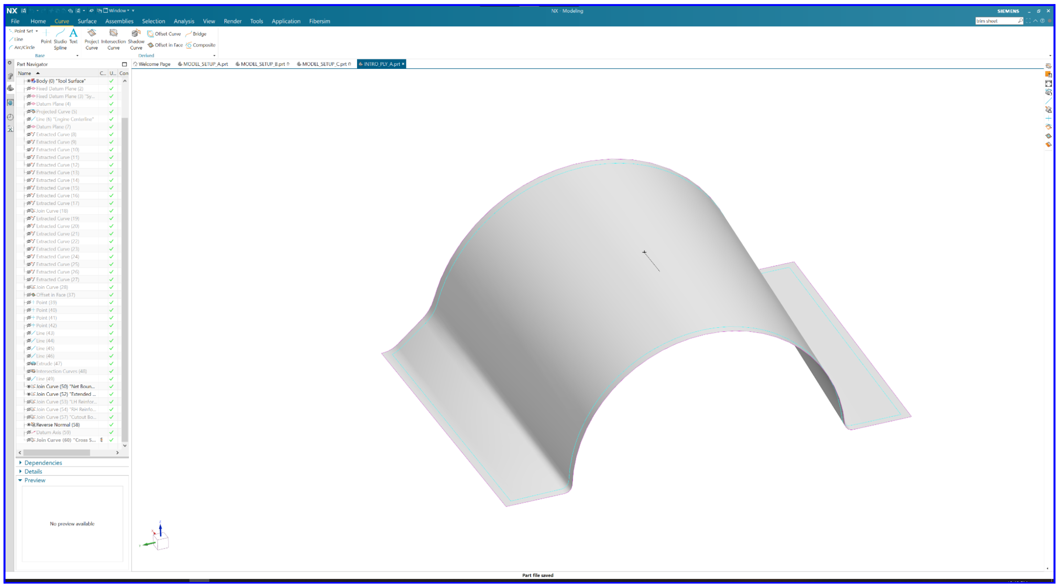


Chapter 3:

Example 3a: Basic Part with 8 Fill-body Plies

- ➔ Created a laminate, rosette, single full-body ply, 3 full-body plies simultaneously and mirrored four plies about the laminate neutral axis.

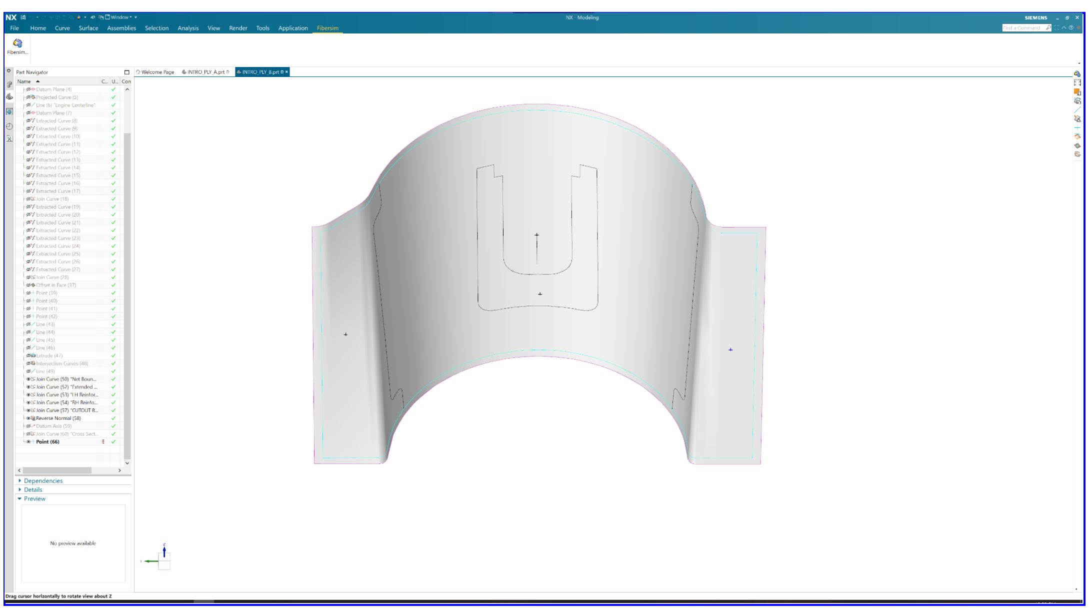
FINAL SCREENSHOT OF PART



Example 3b: Reinforcement Plies, Sequencing, and Cutouts

- ➔ Created reinforcement plies, used the composite sequence manager to interleave reinforcement plies, renamed the plies to match lay-up order, created design stations and ran a core sample analysis, created a cutout, and ran an analysis and verified the results.

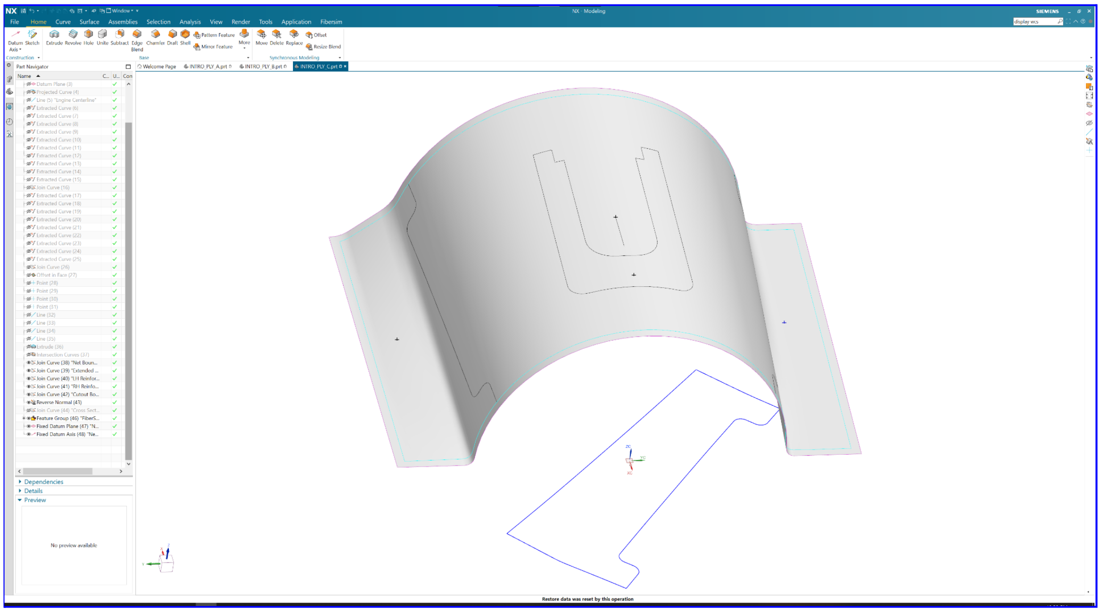
FINAL SCREENSHOT OF PART



Example 3c: Flat Pattern

➔ Ran producibility, generated a flat pattern, created the flat pattern placement geometry, set the flat pattern placement plane and orientation, and regenerated the flat pattern.

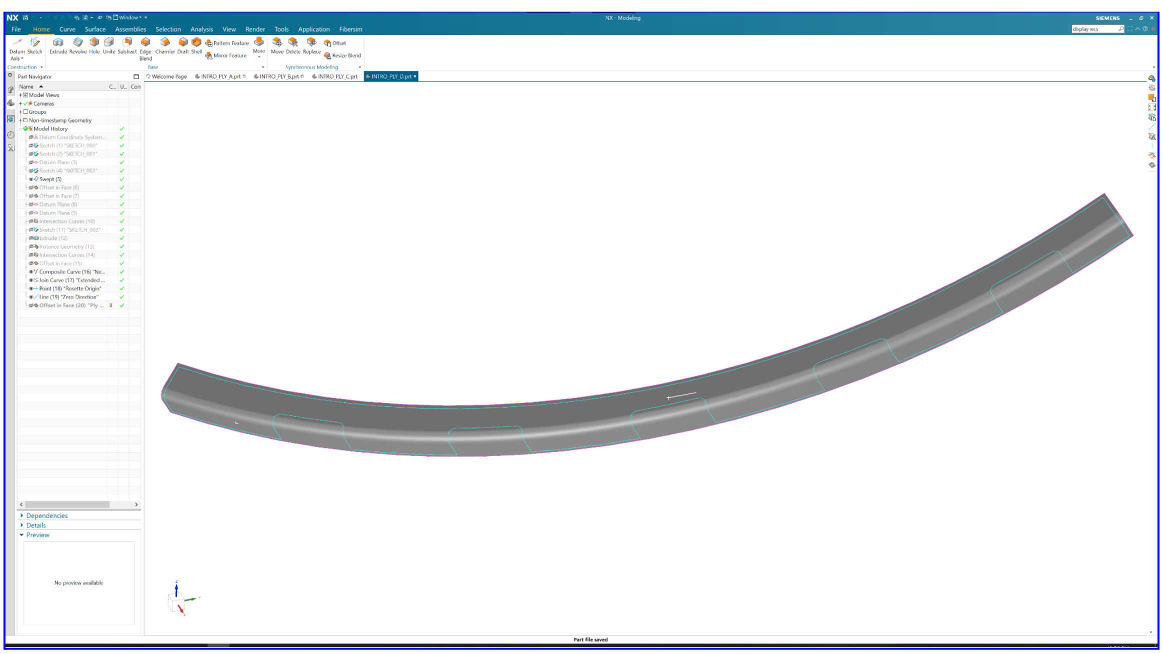
FINAL SCREENSHOT OF PART



Example 3d: Design to Extended

➔ Understood when to use the design to manufacture method vs the design to engineering method as well as created a laminate for the design to the manufacturing method.

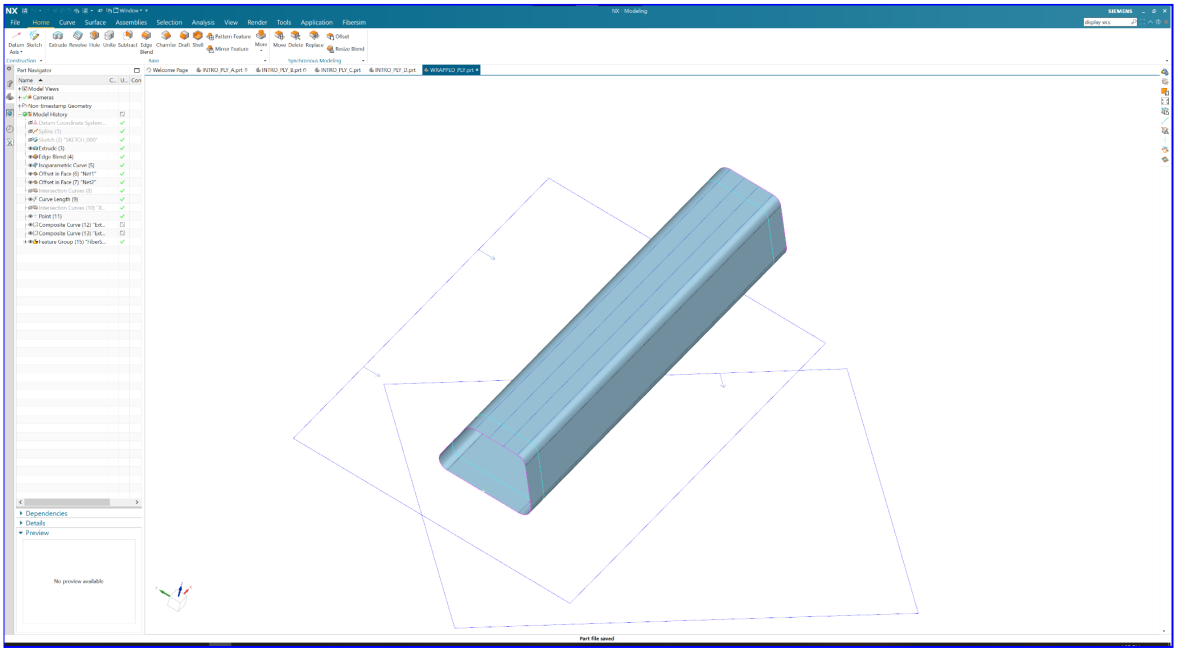
FINAL SCREENSHOT OF PART



Example 3e: Wrapped Ply

➔ Defined a play that overlaps itself, ran producibility and generated a flat pattern.

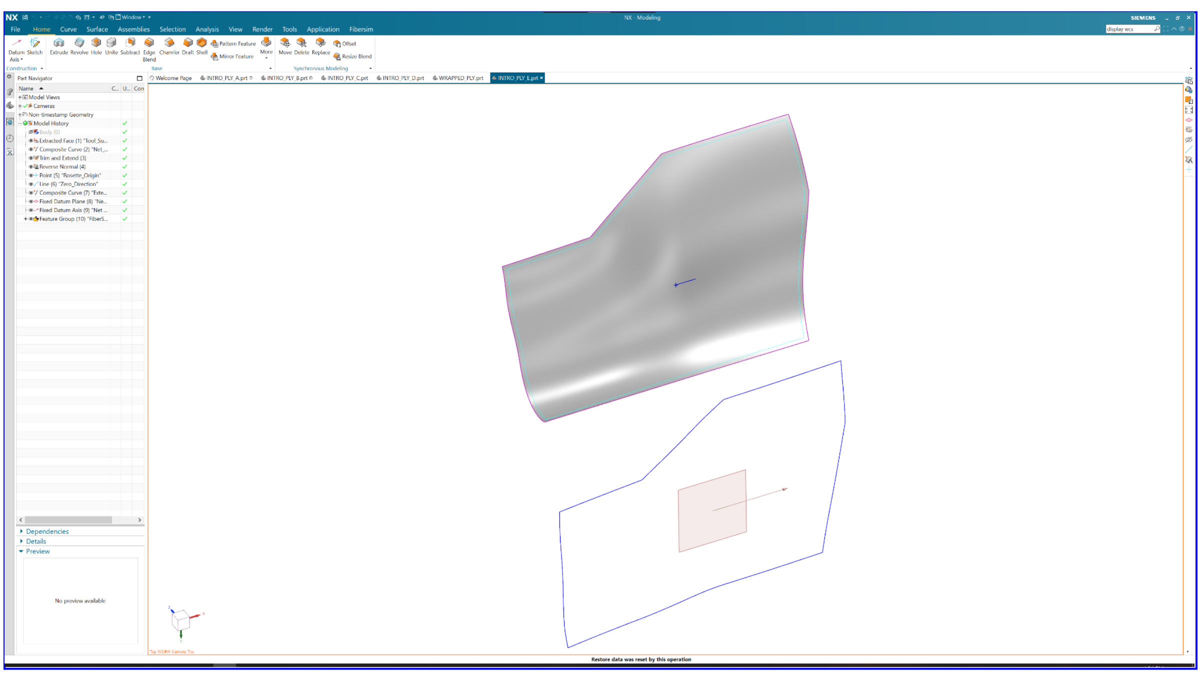
FINAL SCREENSHOT OF PART



Example 3f: Create a Basic Part

➔ Created a laminate, rosette, and four full-body plies, ran the producibility, generated a flat pattern, set the flat pattern placement plane and orientation, and regenerated a flare pattern.

FINAL SCREENSHOT OF PART

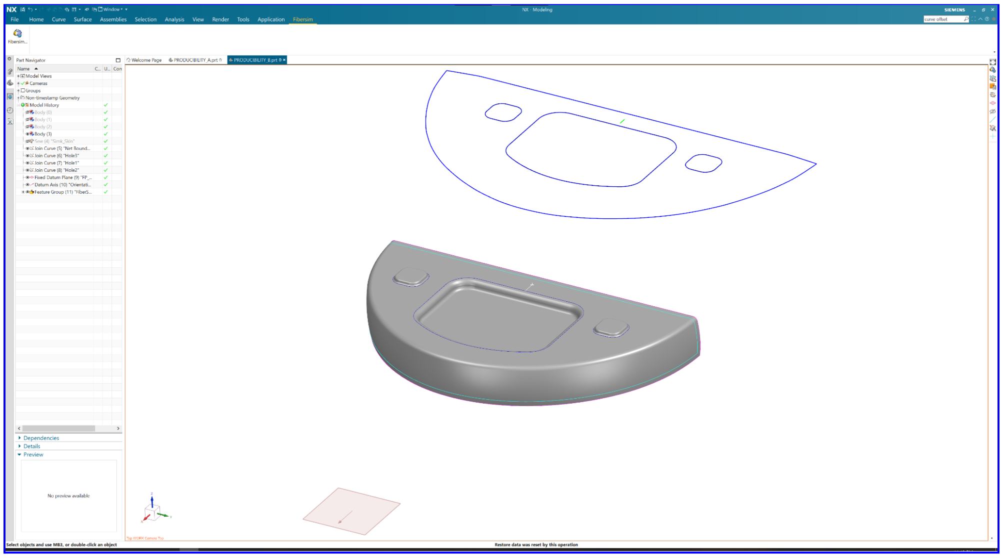


Chapter 4:

Example 4b: How Simulation Options Affect Producibility (Simulation Skin)

➔ Created a ply using a Fiber Spacing Factor, added holes to the ply and observe the impact on the Flat Pattern, set a Simulation Skin and observed the impact on the Flat Pattern

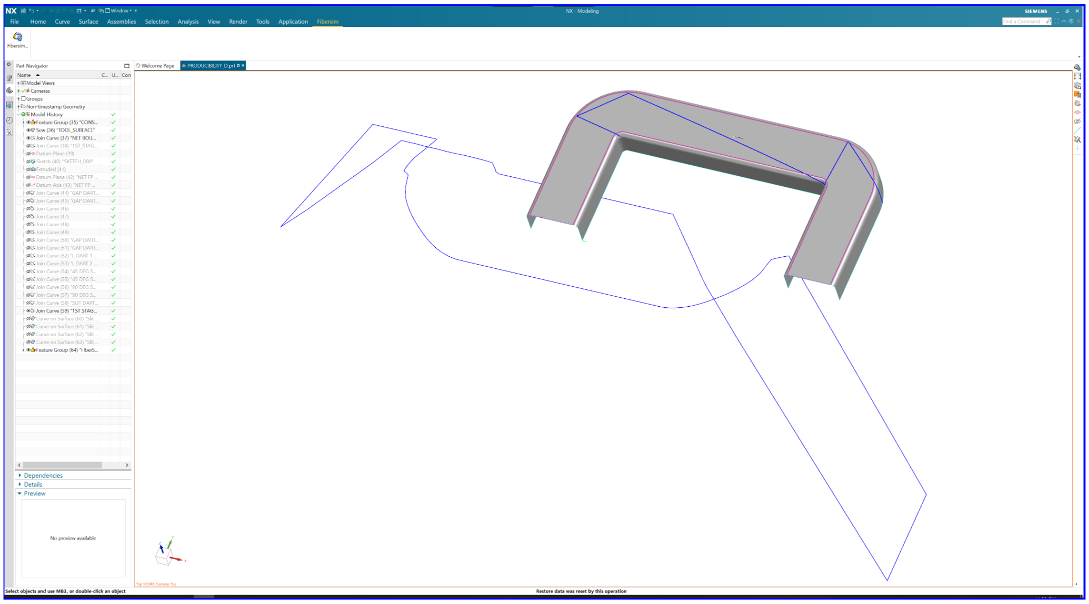
FINAL SCREENSHOT OF PART



Example 4d: Resolving Producibility Issues

➔ Set the Fiber Spacing Factor simulation option, compared the standard simulation to a Biased Geodesic simulation, added a First Stage Region, created V-Shape Darts to alleviate the inside corners and Slit Darts to alleviate the outside corners

FINAL SCREENSHOT OF PART

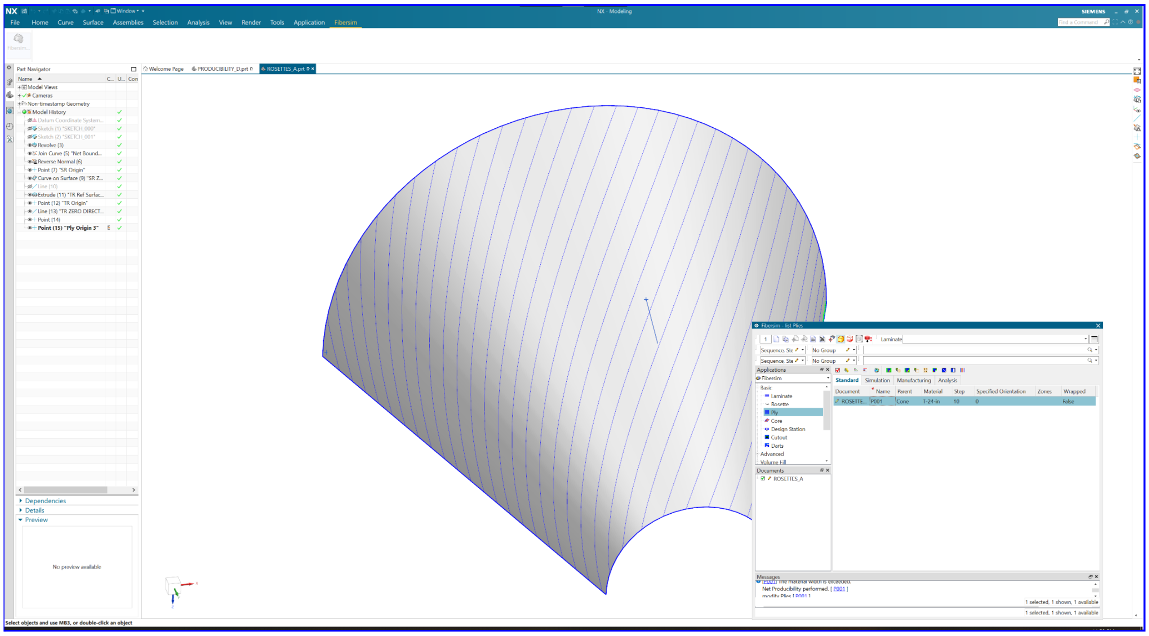


Chapter 5:

Example 5a: Translational Rosette

➔ Created a Translational Rosette, analyzed Producibility for Unidirectional Material and Fiber Deviation

FINAL SCREENSHOT OF PART

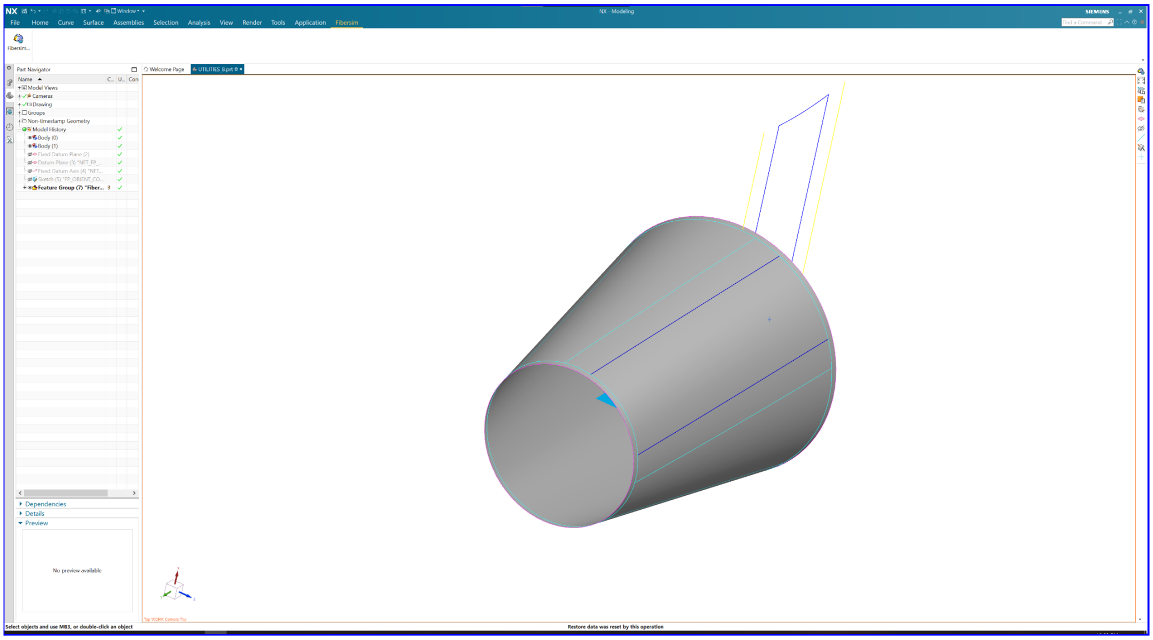


Chapter 6:

Example 6b: Fiber Path Curve

➔ Displayed fiber deviation for a ply, created a fiber path curve and a net flat pattern and added fiber path curves to a net boundary.

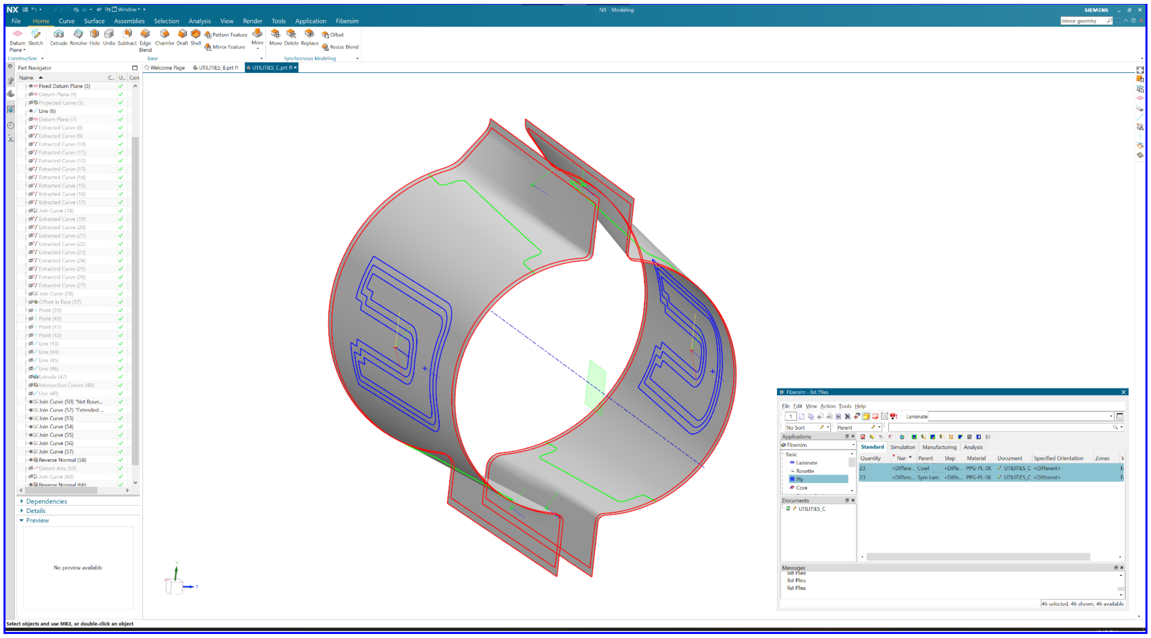
FINAL SCREENSHOT OF PART



Example 6c: Symmetric Laminate

➔ Created a symmetric laminate.

FINAL SCREENSHOT OF PART

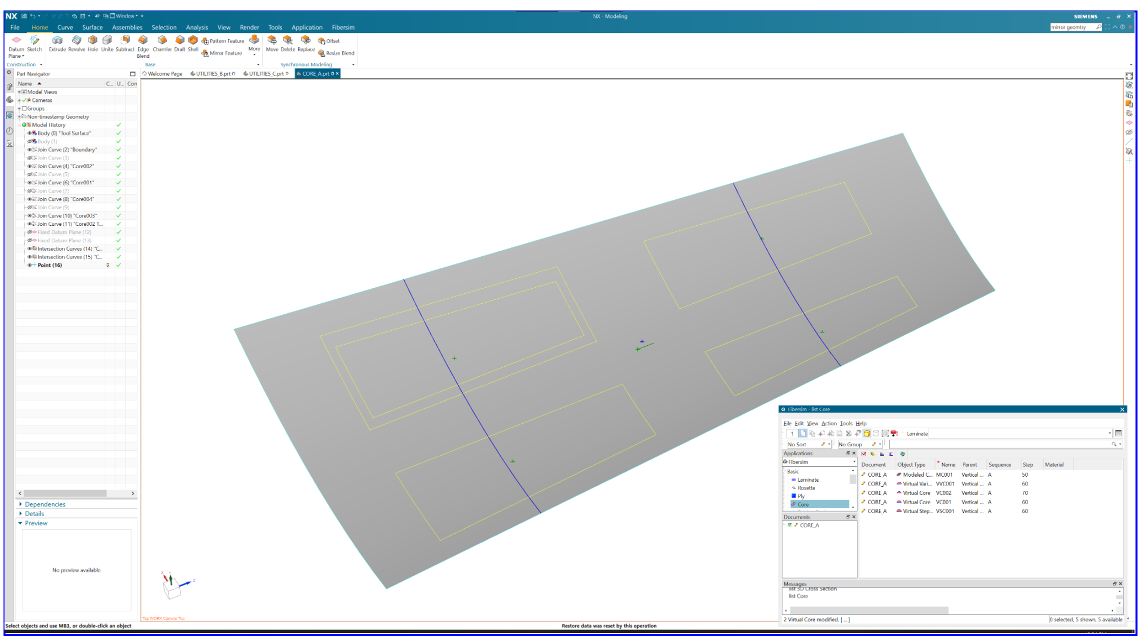


<u>Chapter 7:</u>

Example 7a: Core Types

➔ Created a virtual step core object, virtual variable core object, and virtual core object, then observed the differences between the different types of core using cross-sections.

FINAL SCREENSHOT OF PART

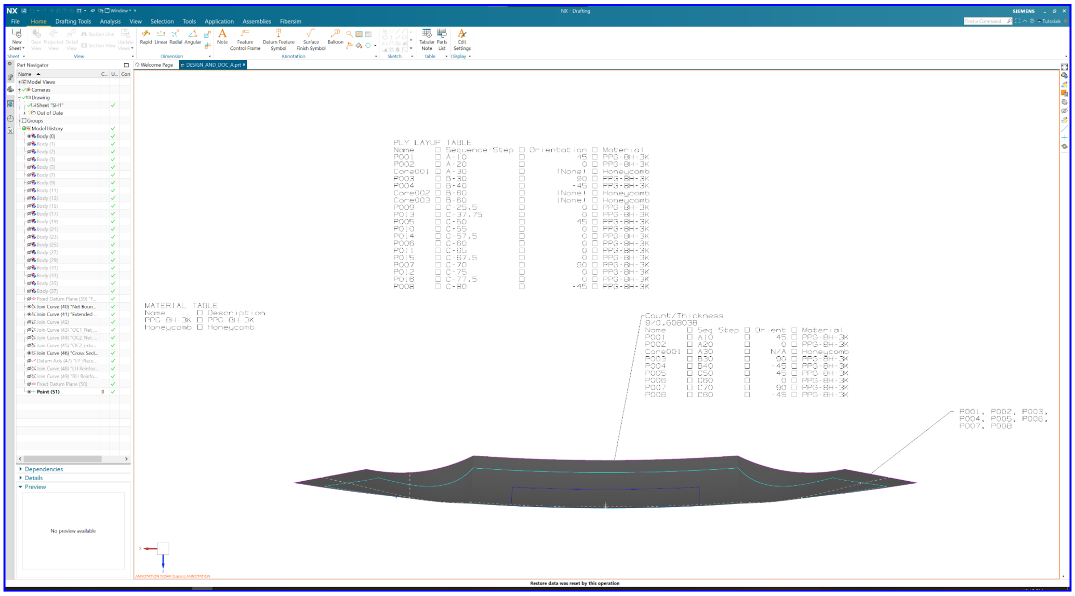


Chapter 8:

Example 8a: 3D Documentation

→ Generated and updated a 3D cross-section, ply table, and material table and created a core sample annotation and ply callout.

FINAL SCREENSHOT OF PART

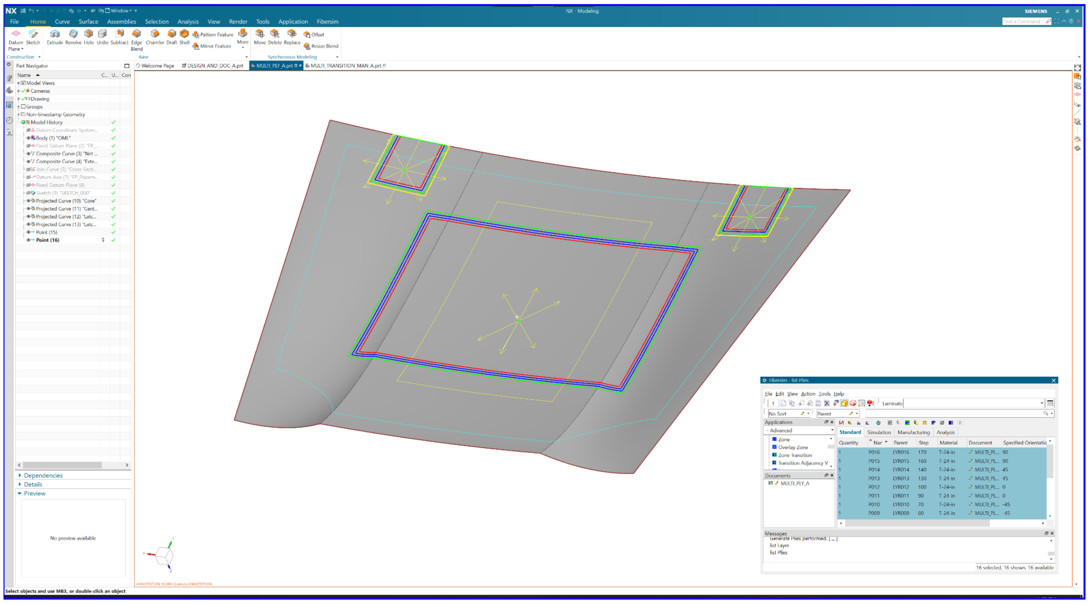


Chapter 9:

Example 9a: Basic Multi-Ply Design

→ Defined a simple overlay zone, generated layers from the overlay zone, and created material and laminate specification.

FINAL SCREENSHOT OF PART

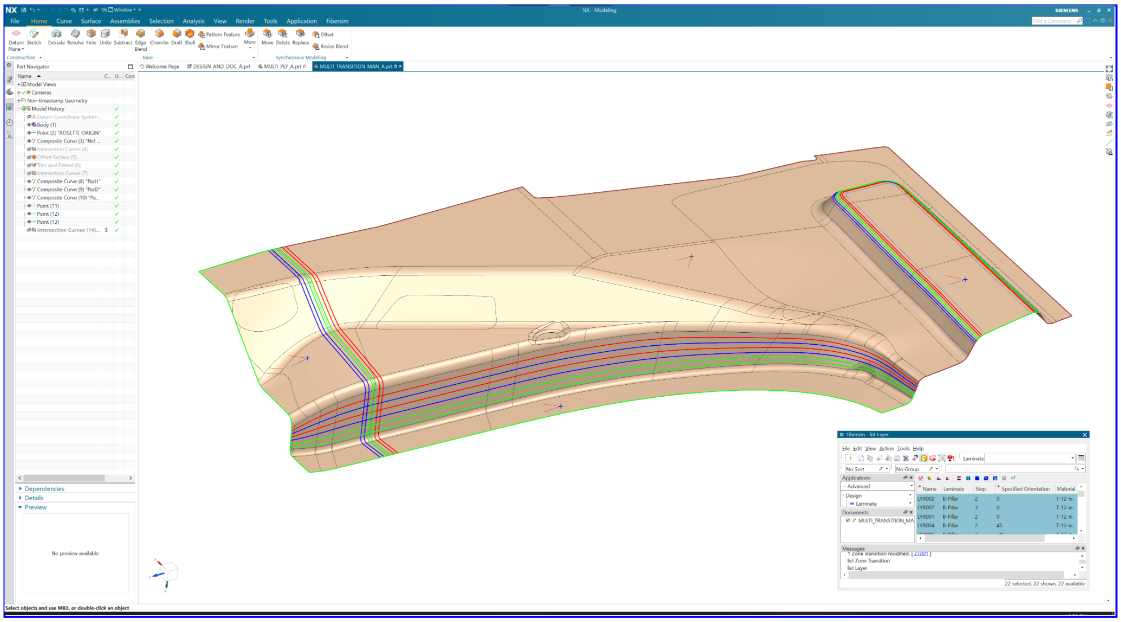


Chapter 10:

Example 10a: Basic Offset Specification Options

- ➔ Used initial offset to move the zone transitions, center-based offset to center the zone transitions, offset distance to modify the spacing of the zone transitions, and the fill to curve option.

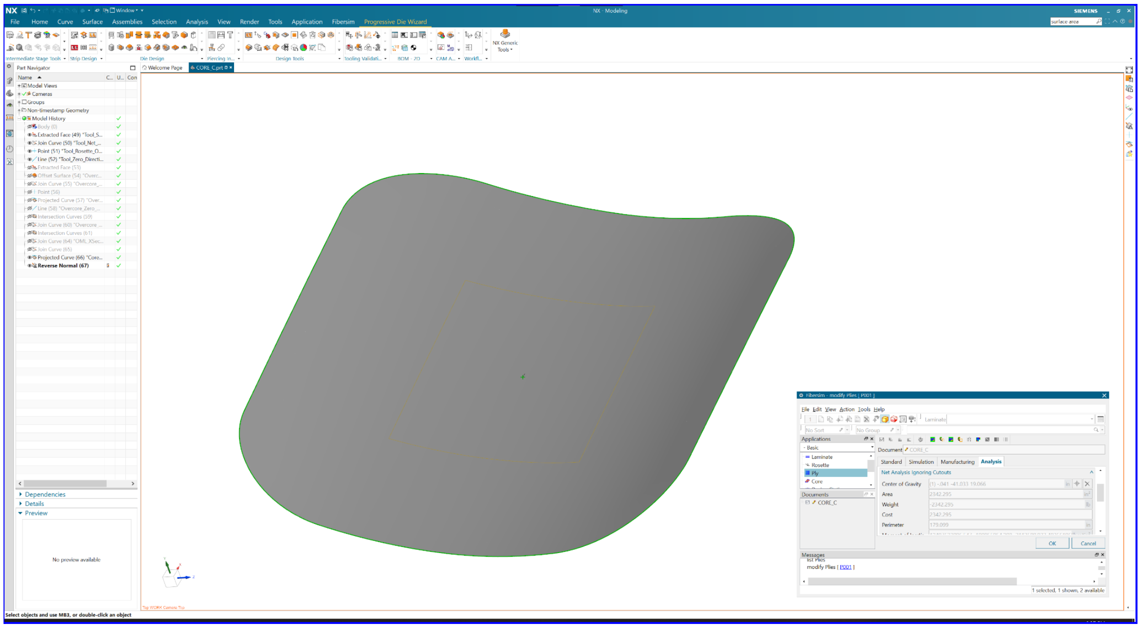
FINAL SCREENSHOT OF PART



Final Project:

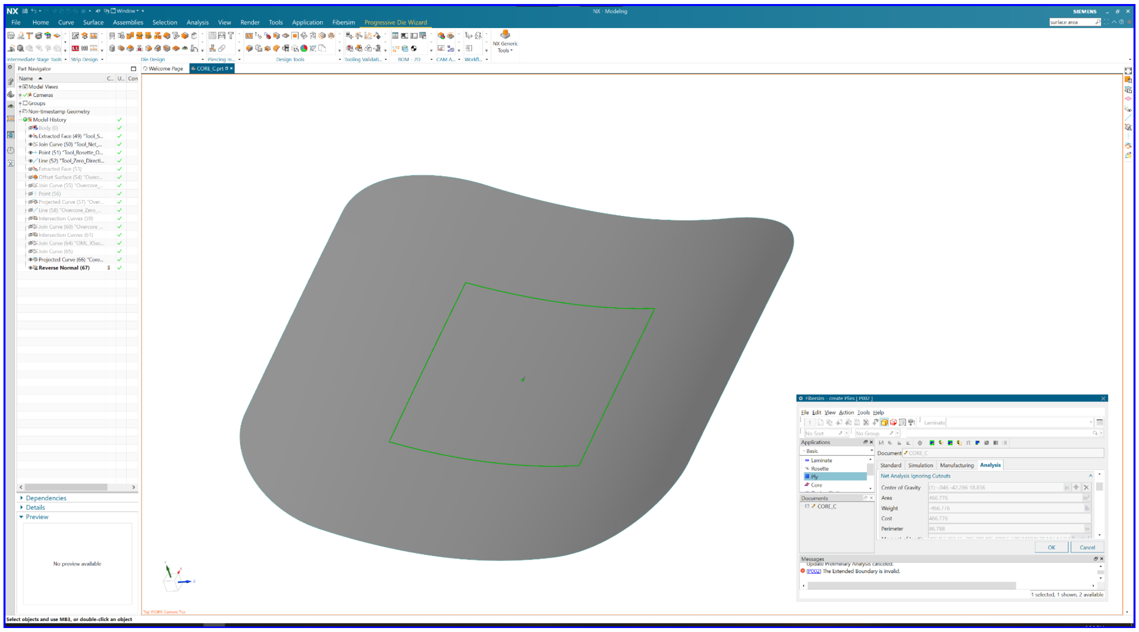
1) Calculate the area of All Regions.

   The area found for All Regions is 2342.295.

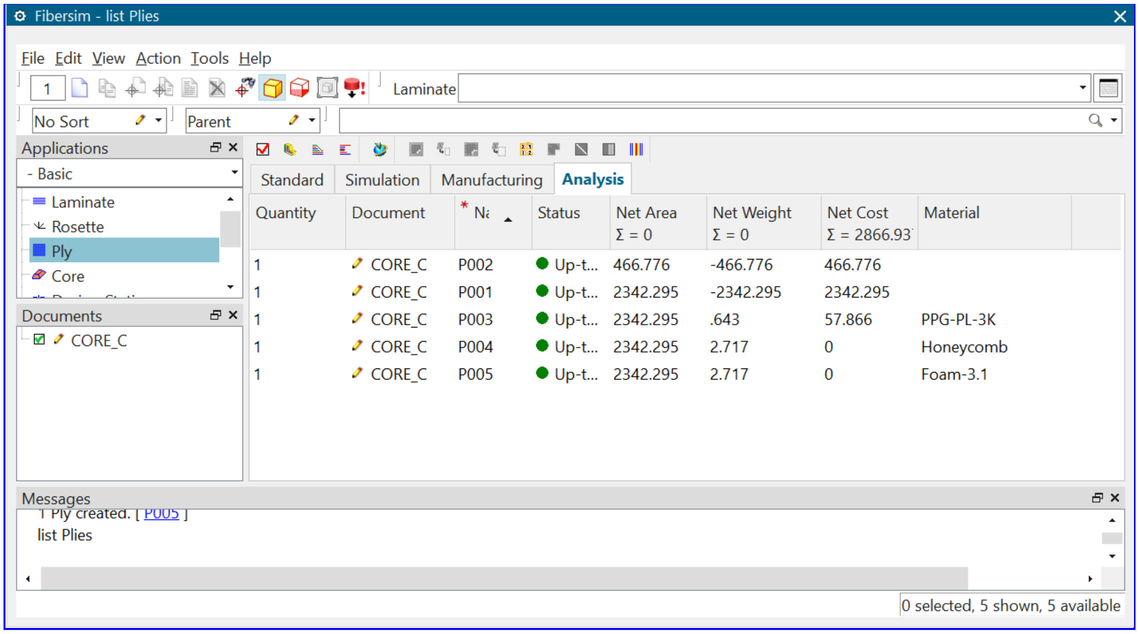


2) Calculate the area of the Inner Region.

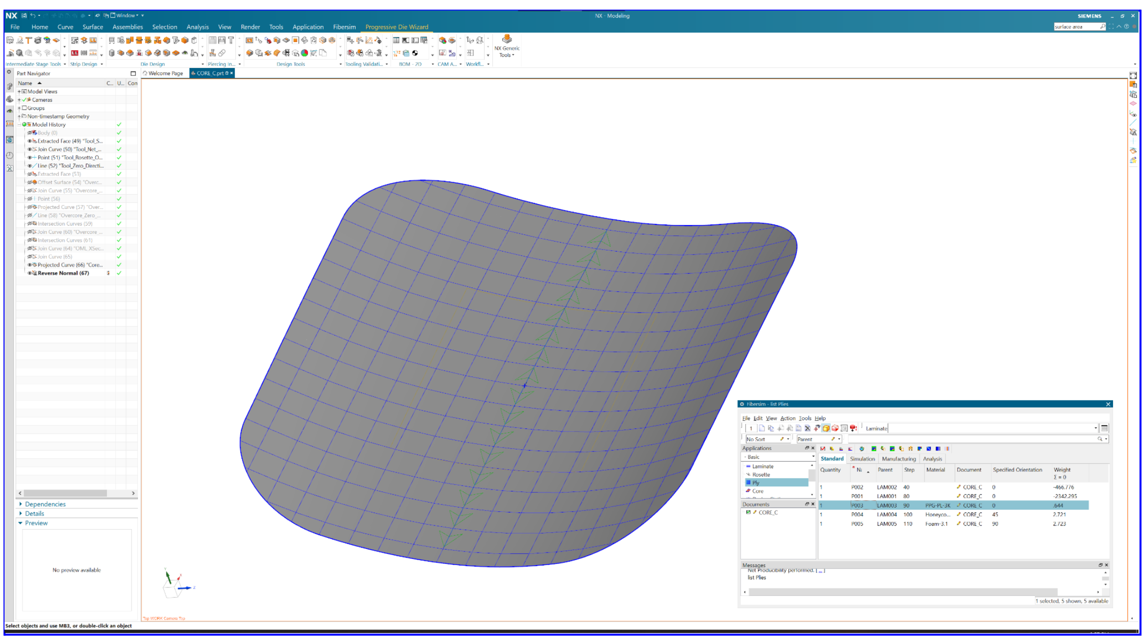
   The area found for the Inner Region is 466.776.



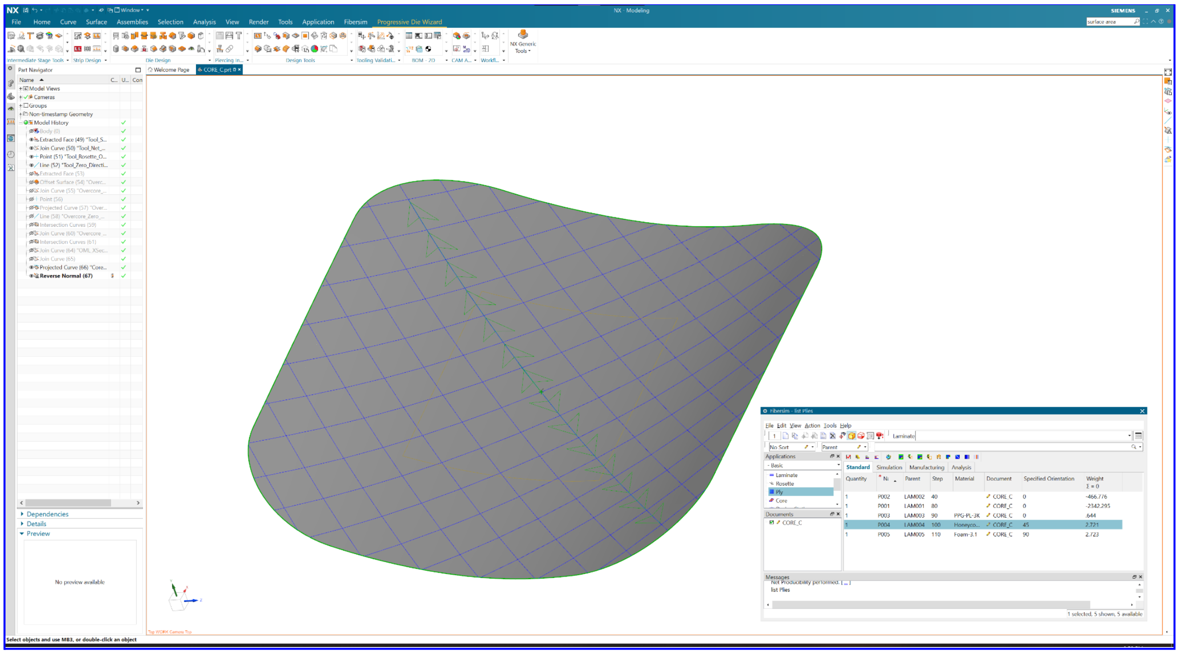
3) Calculate the weight of All Regions with materials: **ppg-pl-3k, honeycomb, foam-3.1**.
The areas for the following materials are: ppg-pl-3k = .643, honeycomb = 2.717, foam-3.1 = 2.717.



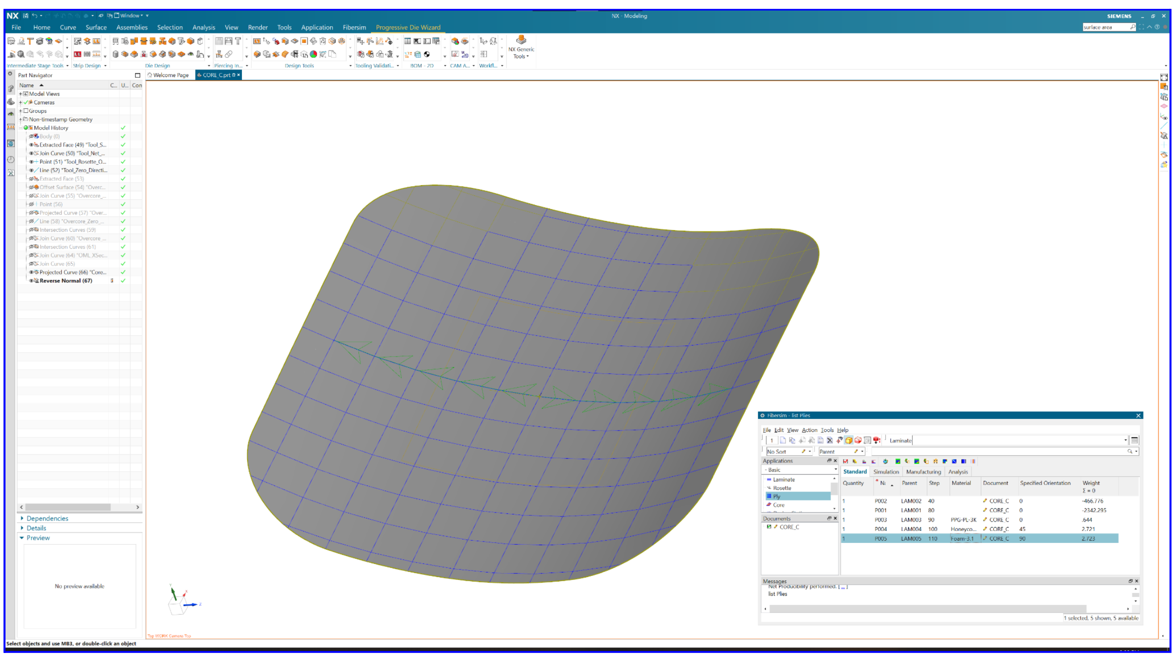
4) Make three plies with the materials mentioned above in All Regions in 3 different directions (**ppg-pl-3k = 0, honeycomb = 45, foam-3.1 = 90**) and show their differences in the figure.
For ppg-pl-3k = 0:



For honeycomb = 45:

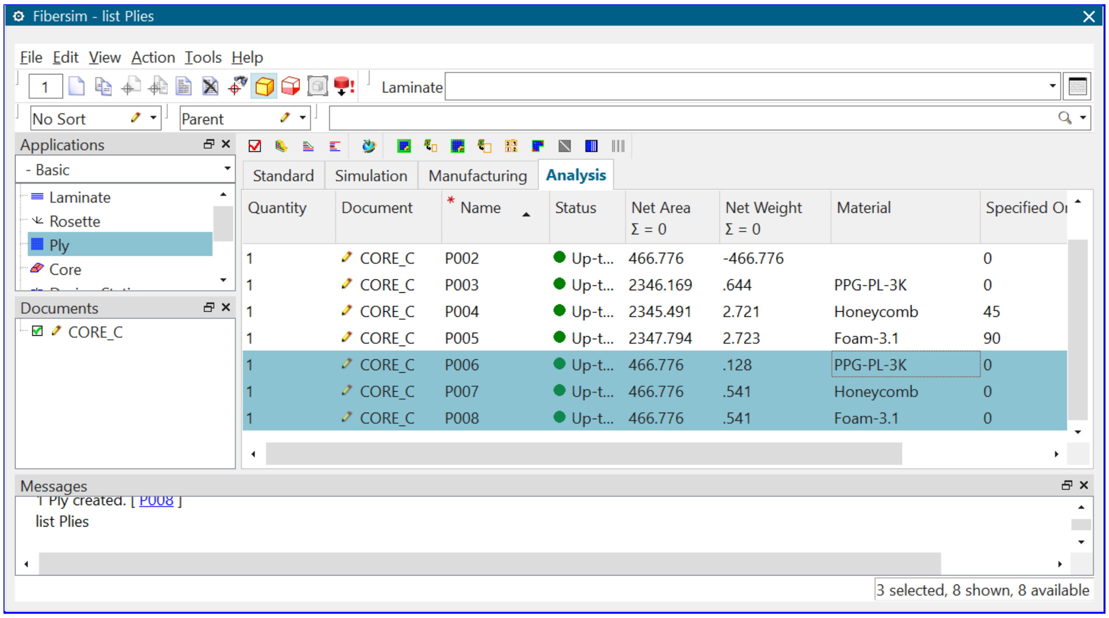


For foam-3.1 = 90:



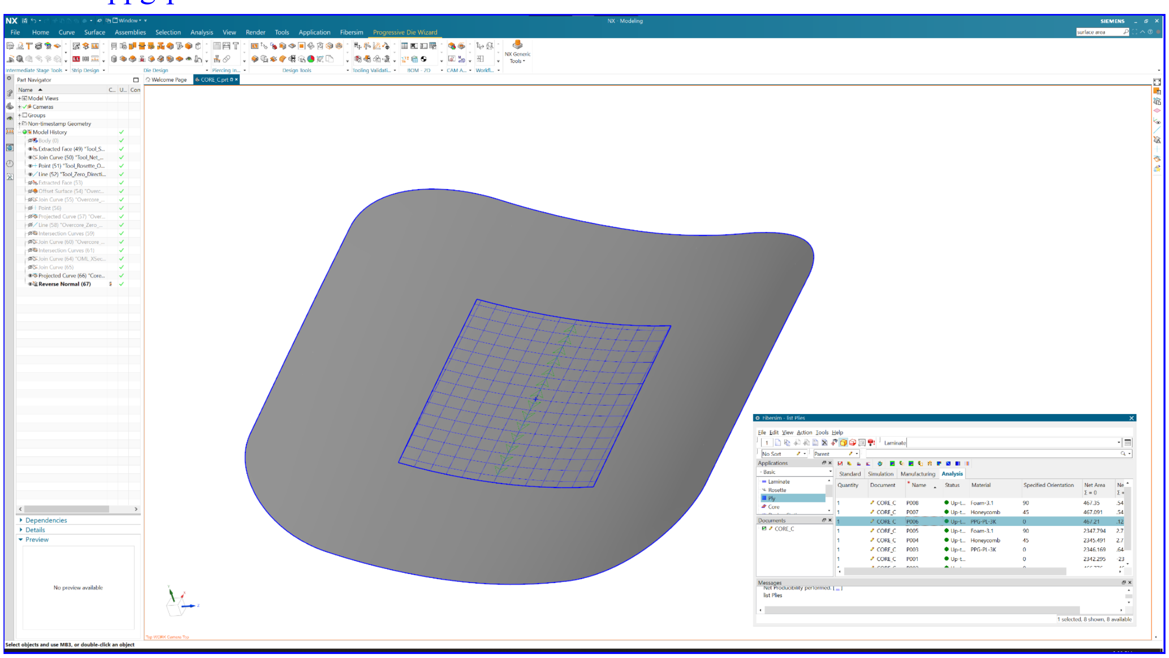
5) Calculate the weight of the Inner Region with the materials: **ppg-pl-3k, honeycomb, foam-3.1**.

The areas for the following materials are: ppg-pl-3k = .128, honeycomb = .541, foam-3.1 = .541.

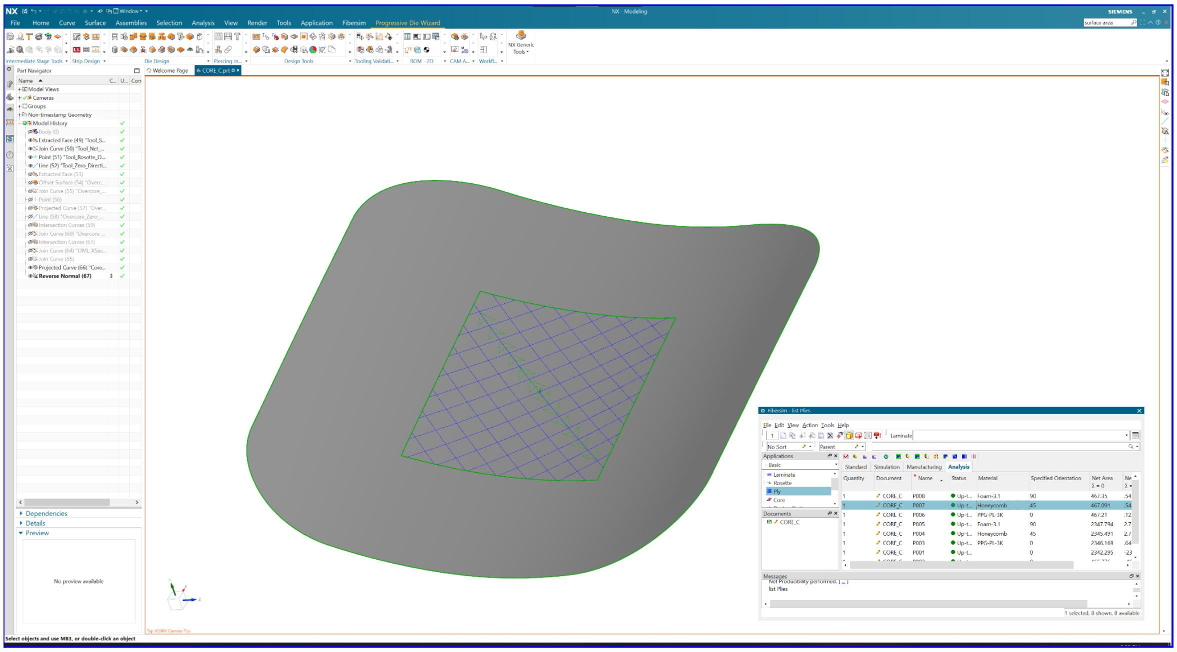


6) Make three plies with the materials mentioned above in the Inner Region in 3 different directions (**ppg-pl-3k = 0, honeycomb = 45, foam-3.1 = 90**) and show their difference in the figure.

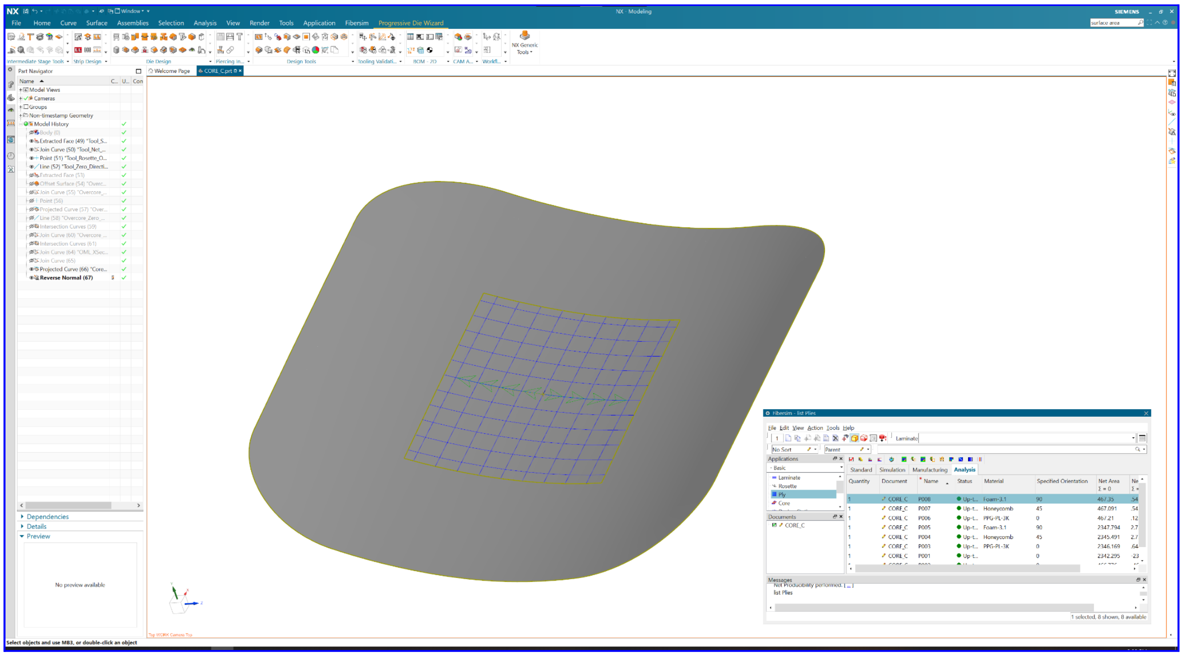
For ppg-pl-3k = 0:



For honeycomb = 45:



For foam-3.1 = 90:



7) Calculate the area and weight of the Outer Region using the information obtained in the previous steps.

Know that All-Region Area = 2342.295, Weights for ppg-pl-3k = .643, honeycomb = 2.717, foam-3.1 = 2.717 & Inner Region Area = 466.776, Weights for ppg-pl-3k = .128, honeycomb = .541, foam-3.1 = .541. Subtract the All Region by the Inner Region to get the Outer Region:

Area = 2342.295 - 466.776 = 1875.519

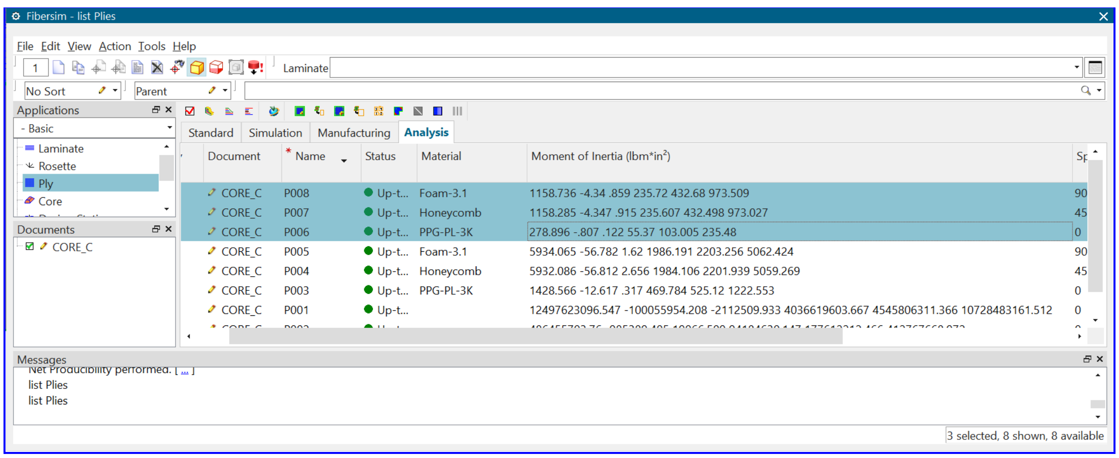
Weight for ppg-pl-3k = .643 - .128 = .515

Weight for honeycomb = 2.717 - .541 = 2.176

Weigth for foam-3.1 = 2.717 - .541 = 2.176

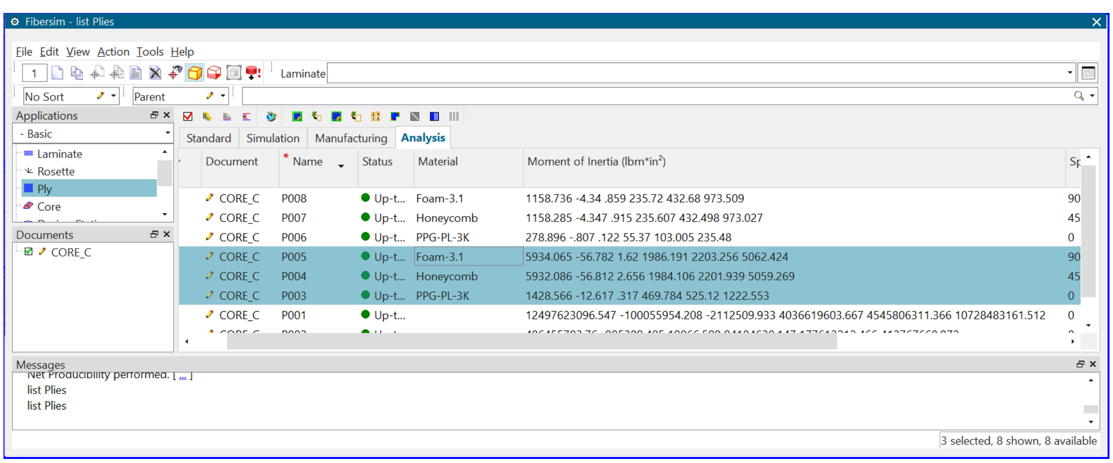
8) Calculate the moment of inertia for the Inner Region for the three different materials.

The moment of inertia for the following materials are: ppg-pl-3k = 278.896, -.807, .122, 55.37, 103.005, & 235.48, honeycomb = 1158.285, -4.347, .915, 235.607, 432.498, & 973.027, foam-3.1 = 1158.736, -4.34, .859, 235.72, 432.68, & 973.509.



9) Calculate the moment of inertia for All Regions for the three different materials.

The moment of inertia for the following materials are: ppg-pl-3k = 1428.566, -12.617, .317, 469.784, 525.12, & 1222.553, honeycomb = 5932.086, -56.812, 2.656, 1984.106, 2201.939, & 5059.269, foam-3.1 = 5934.065, -56.782, 1.62, 1986.191, 2203.256, & 5062.424.



10) Summarize all Area, Weight, and Moment of inertia numbers that you obtained for each region reported above.

INNER REGION	**AREA**	**WEIGHT**	**MOMENT OF INERTIA**
PPG-PL-3K	466.776	.128	278.896, -.807, .122, 55.37, 103.005, & 235.48
HONEYCOMB	466.776	.541	1158.285, -4.347, .915, 235.607, 432.498, & 973.027
FOAM-3.1	466.776	.541	1158.736, -4.34, .859, 235.72, 432.68, & 973.509
OUTER REGION	**AREA**	**WEIGHT**	**MOMENT OF INERTIA**
PPG-PL-3K	1875.519	.515	*N/A*
HONEYCOMB	1875.519	2.176	*N/A*
FOAM-3.1	1875.519	2.176	*N/A*
ALL REGIONS	**AREA**	**WEIGHT**	**MOMENT OF INERTIA**
PPG-PL-3K	2342.295	.643	1428.566, -12.617, .317, 469.784, 525.12, & 1222.553
HONEYCOMB	2342.295	2.717	5932.086, -56.812, 2.656, 1984.106, 2201.939, & 5059.269
FOAM-3.1	2342.295	2.717	5934.065, -56.782, 1.62, 1986.191, 2203.256, & 5062.424