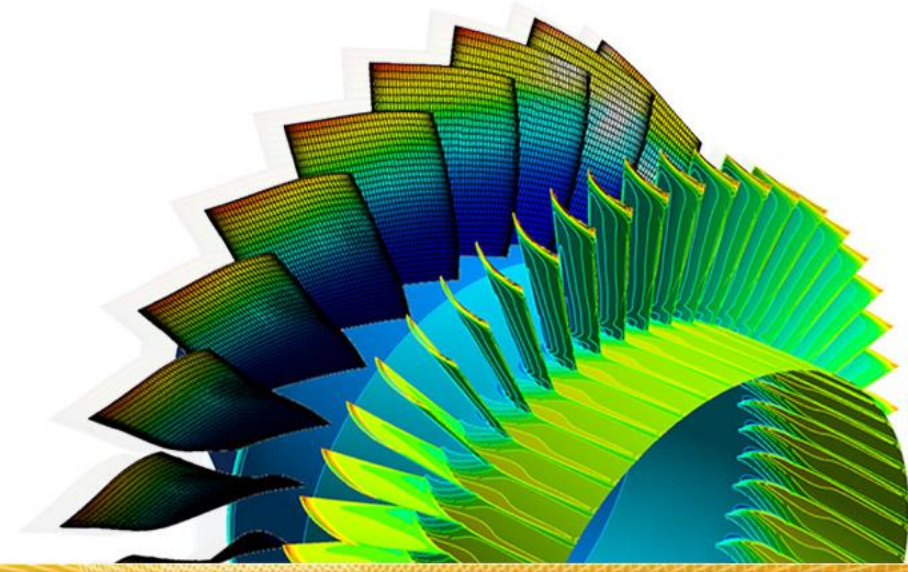
ANSYS Composite PrepPost 19.0

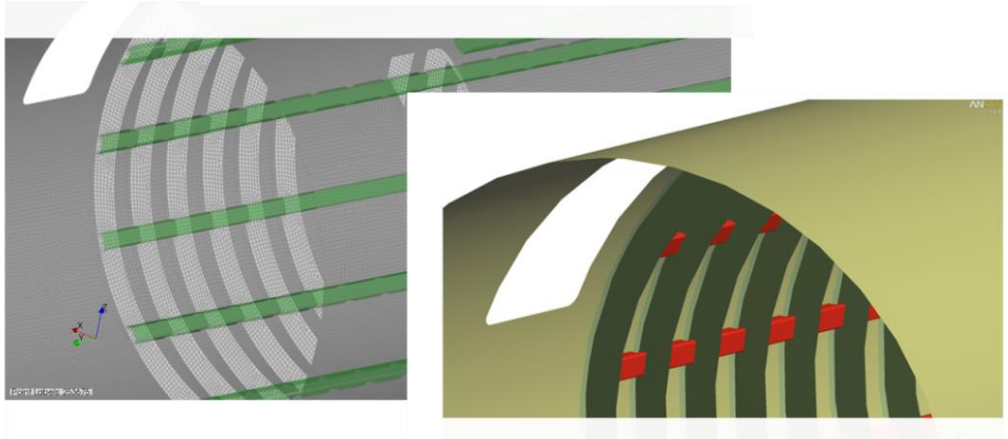
Workshop 05.1 – Rules



5 Rules

- The layup area of the oriented selection sets is usually defined by named selections.
- This requires modifications within the geometry when specific layup areas are necessary or when areas shall be modified to improve the composite design.

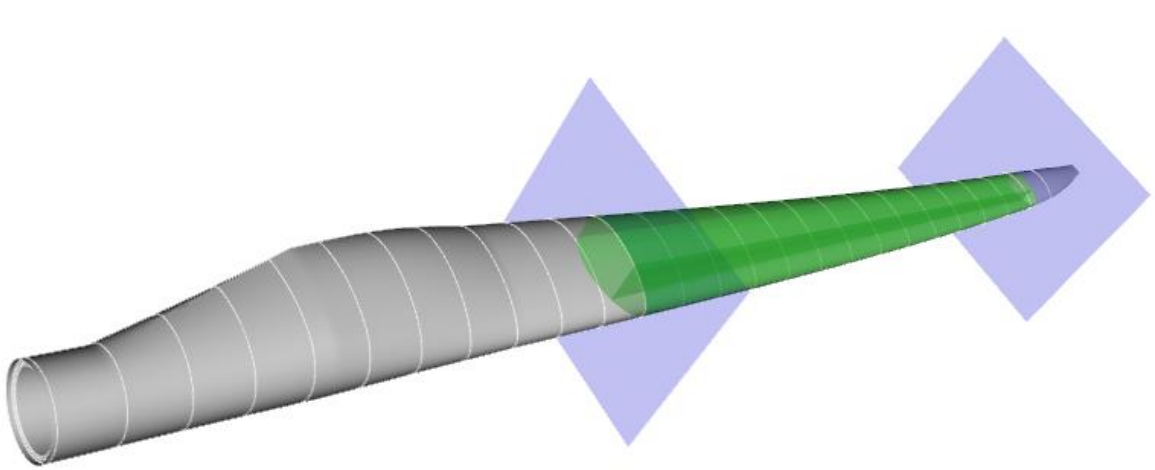
Selection Sets

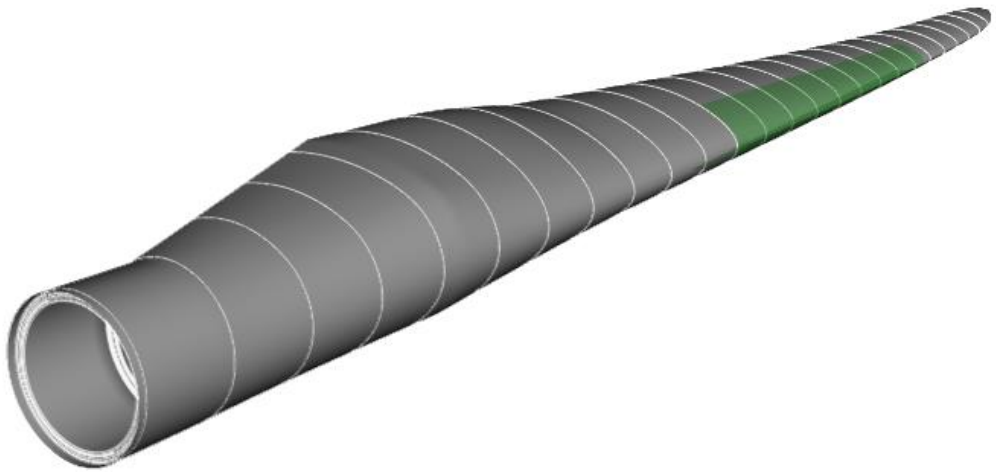


Named Selections

5 Rules

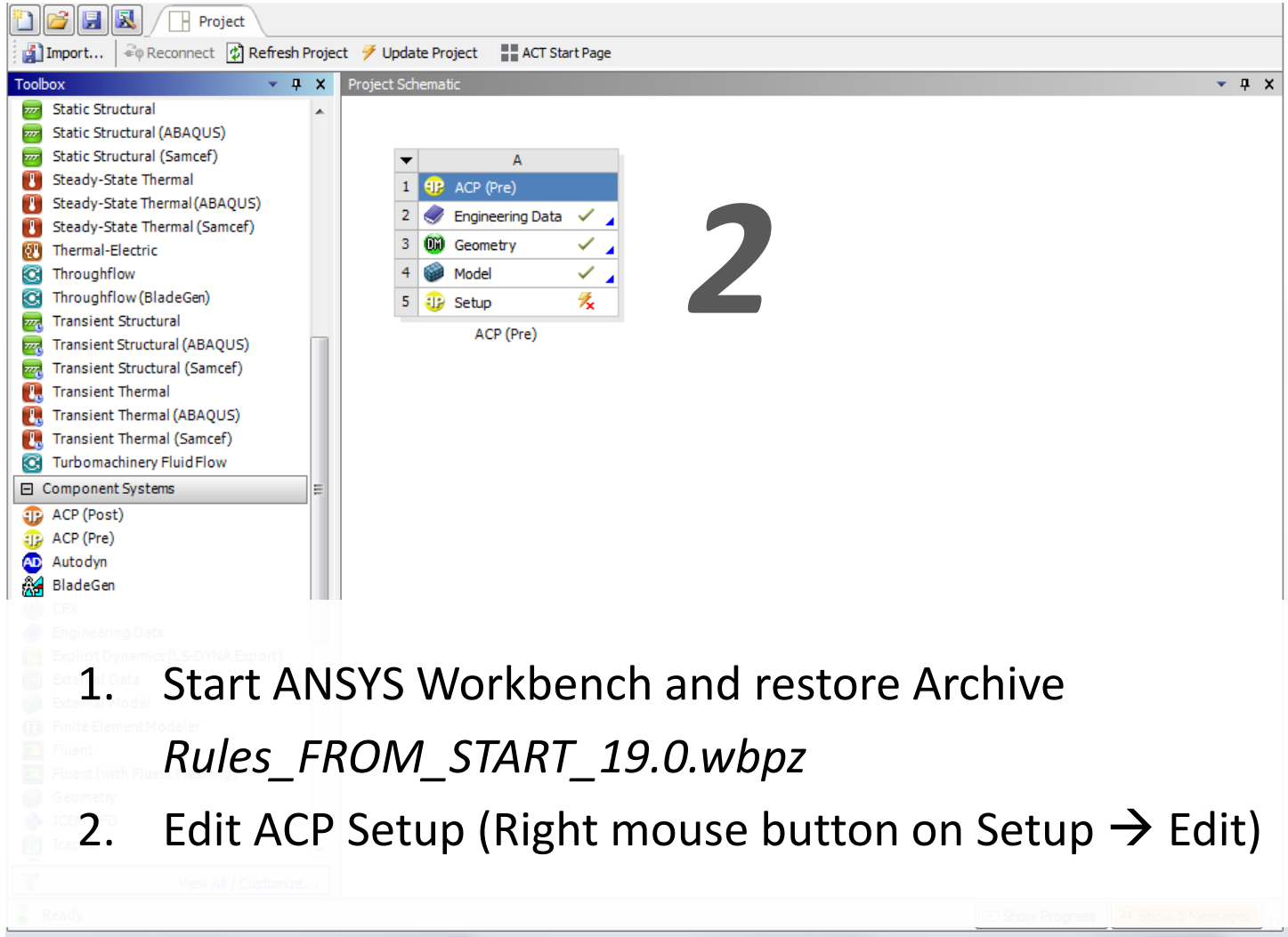
- Rules are used to reselect elements within element sets.
- Rules can be used to modify the layup area of oriented element sets or be applied to single modeling plies.





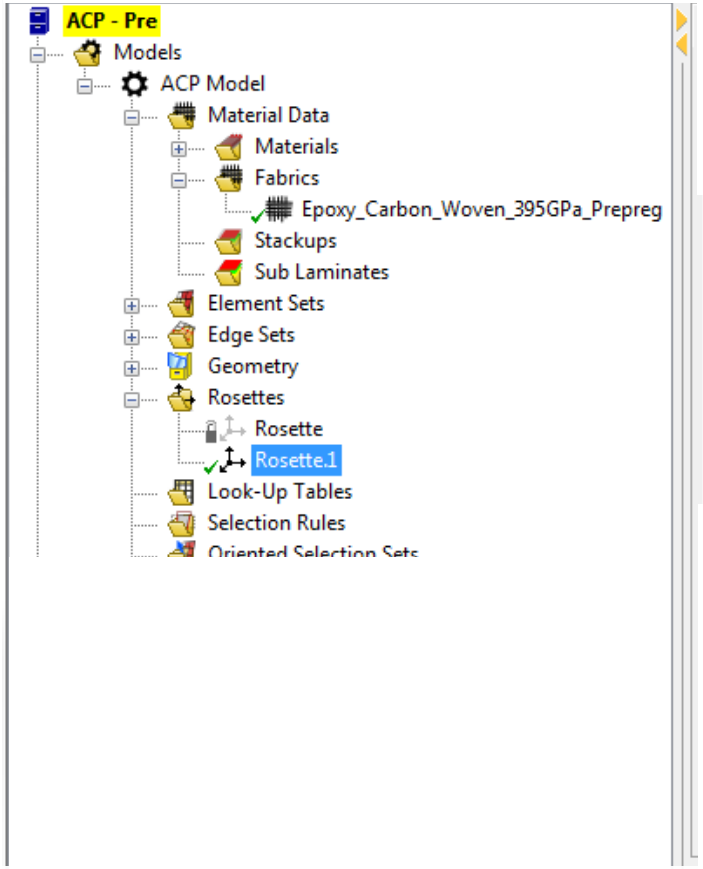
5 Workshop Rules

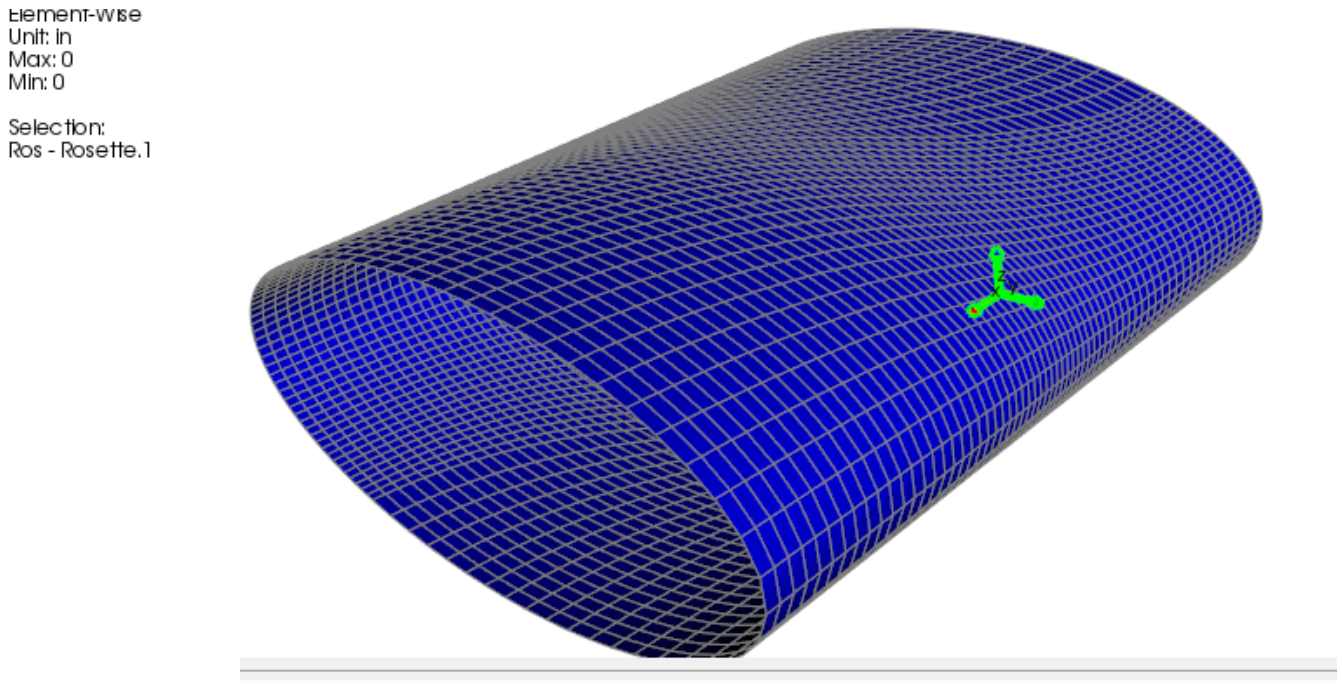
Start ANSYS Workbench and Restore Archive



1. Start ANSYS Workbench and restore Archive *Rules_FROM_START_19.0.wbpz*
2. Edit ACP Setup (Right mouse button on Setup → Edit)

5 Workshop Rules

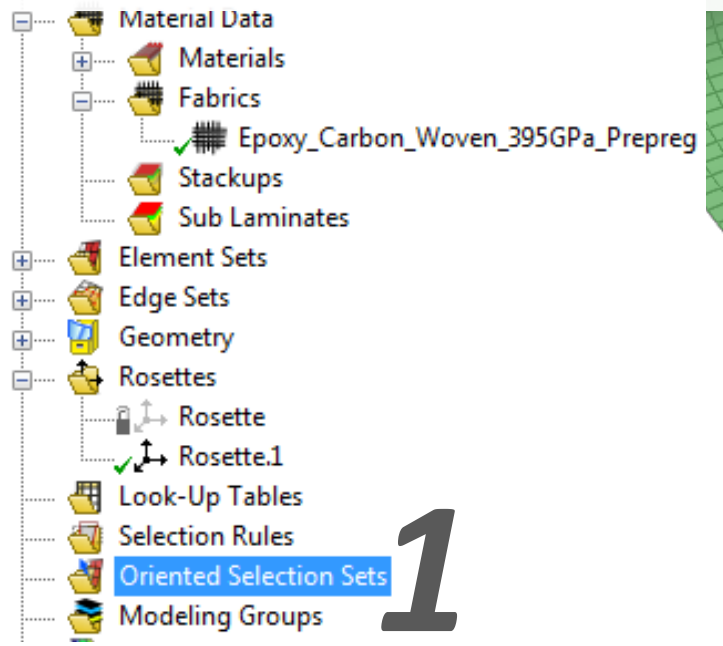


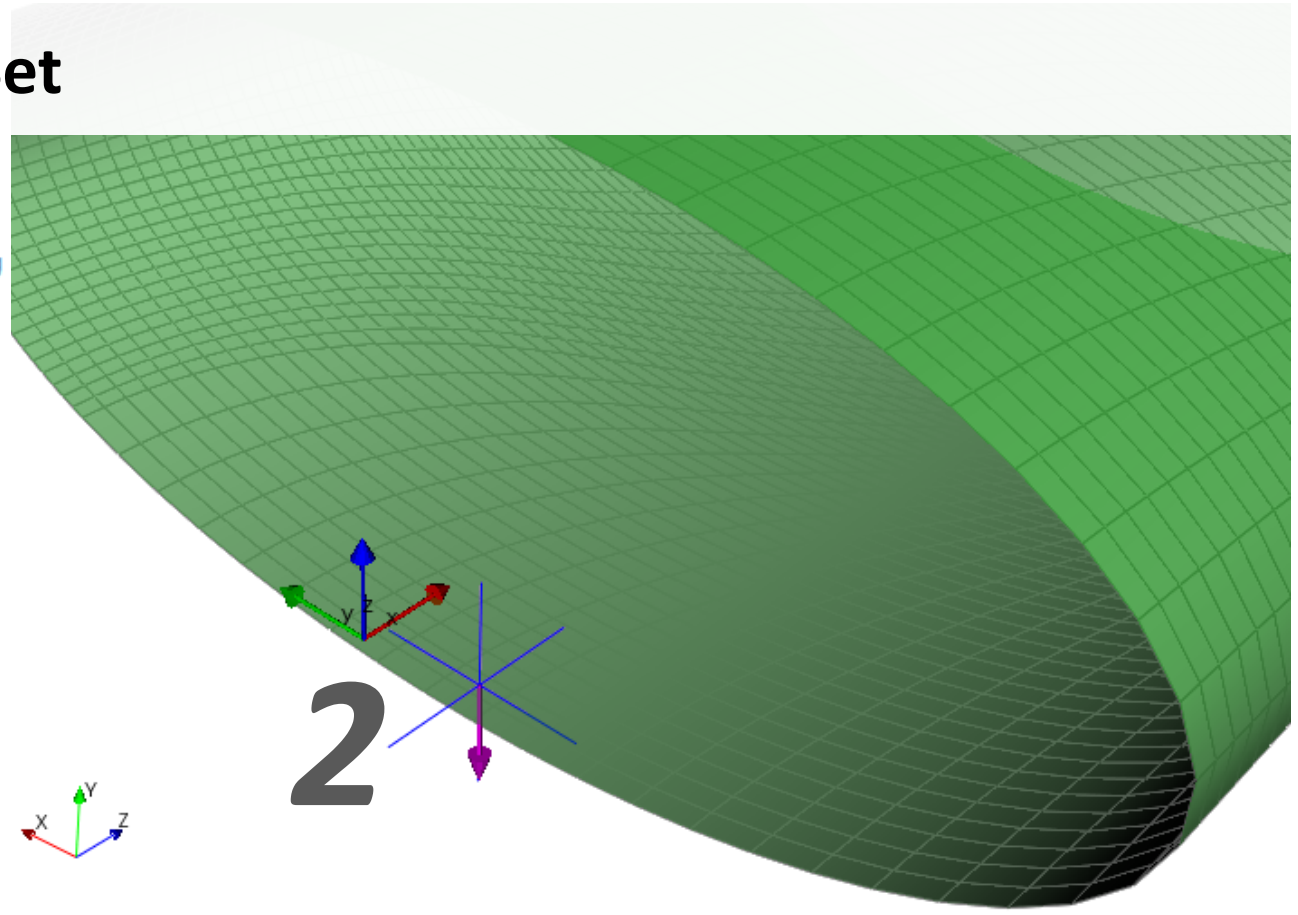


→ A fabric of woven epoxy carbon material is already defined as well as a parallel rosette to define the reference direction for the plies.

5 Workshop Rules

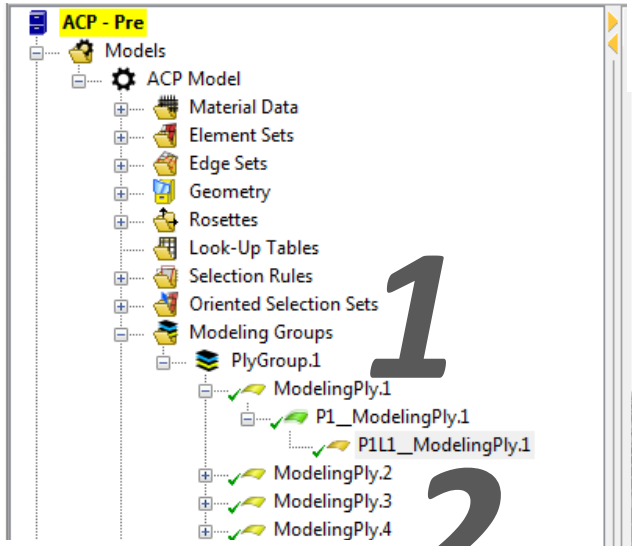
Create Oriented Selection Set

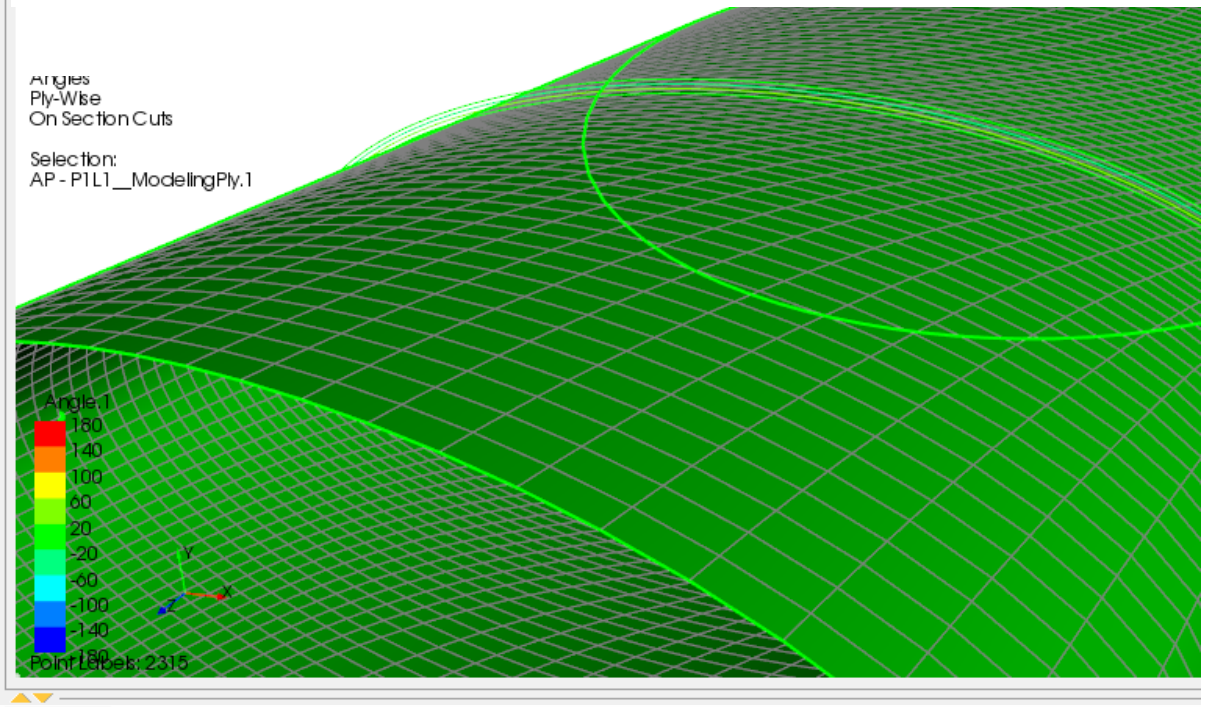




1. Create an Oriented Selection Set based on all elements and the defined rosette.
2. Define Orientation Point and Directions.

5 Workshop Rules

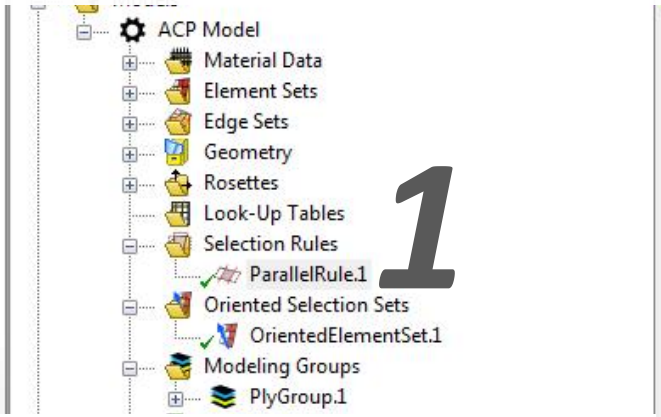


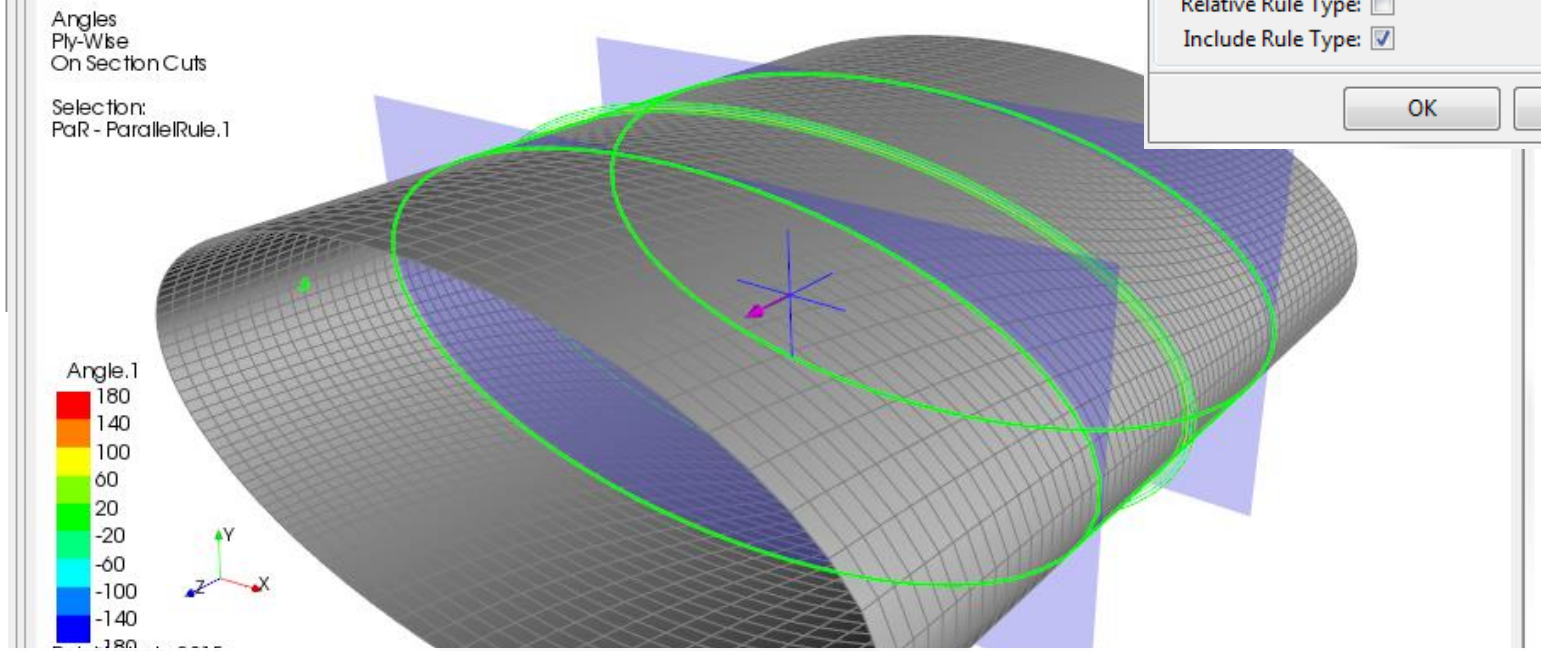


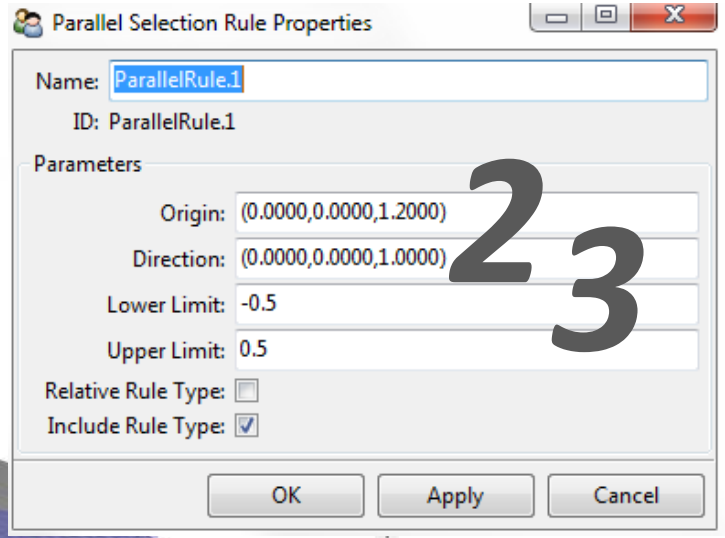
1. Create a new Ply Group.
2. Create four layers (0°, 30°, -30°, 0°) using the woven epoxy carbon fabric.

5 Workshop Rules

Create a Rule



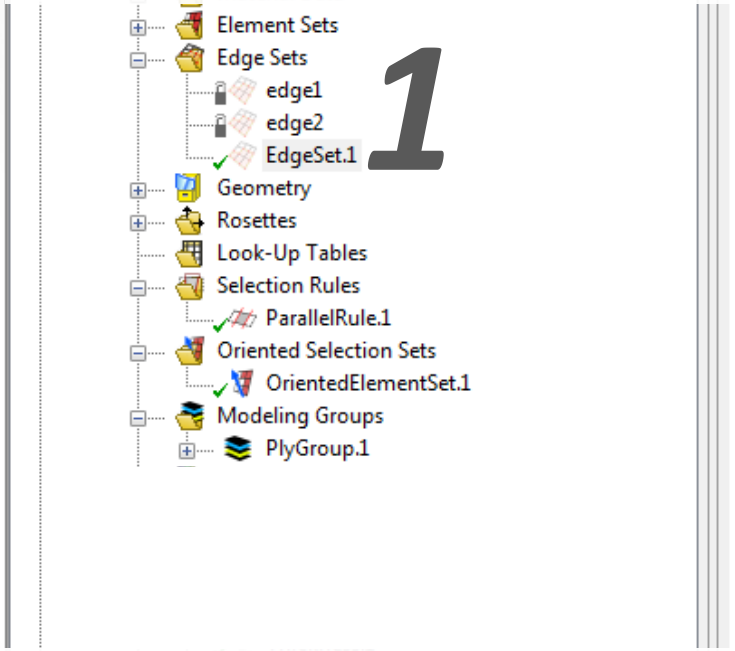


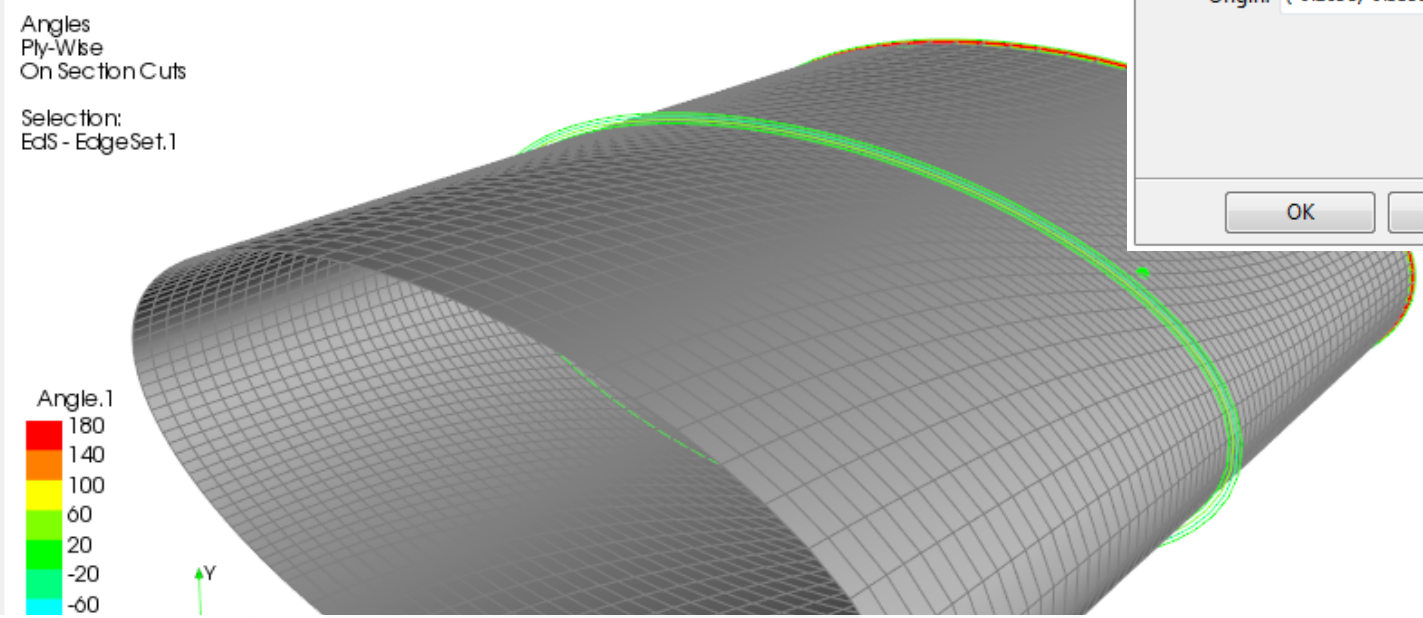


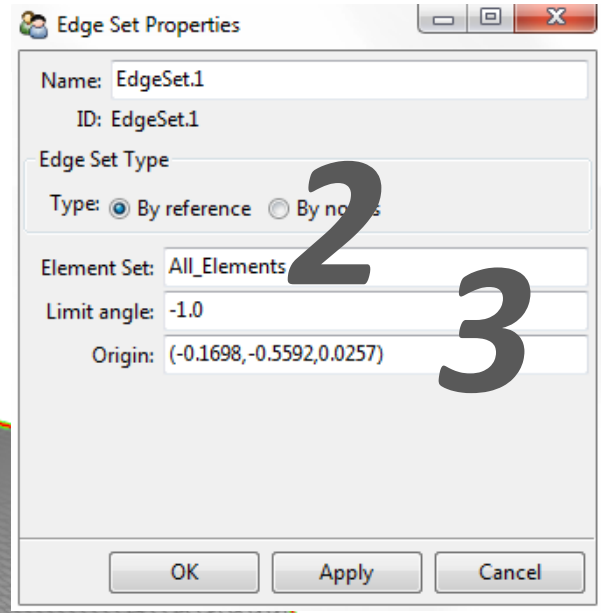
1. Create a new Rule (Right mouse button on Selection Rules → Create Parallel Rule)
2. Define origin of the rule (0,0,1.2) and the global z-direction as direction (0,0,1).
3. Define lower limit of -0.5 and upper limit of 0.5

5 Workshop Rules

- Edge Sets are usually defined as named selections in ANSYS Workbench. Sometimes its more convenient to create them in ANSYS Composite PrepPost.



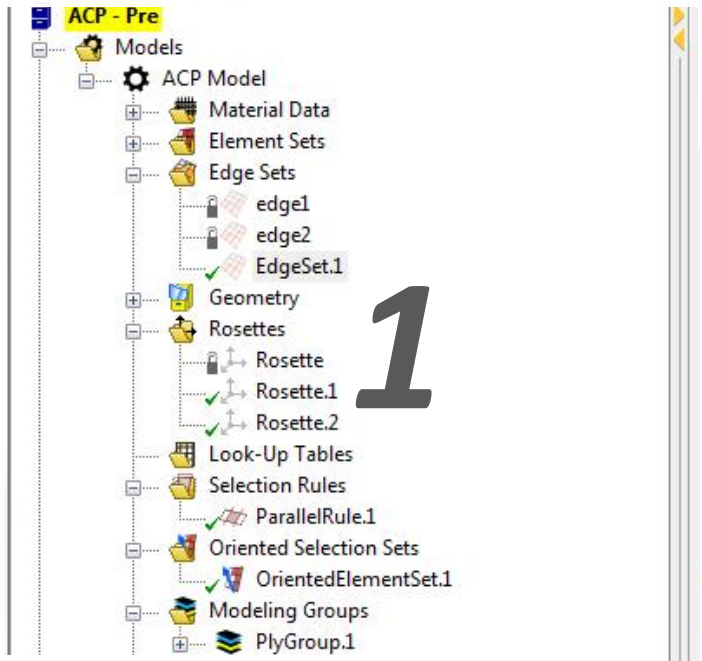


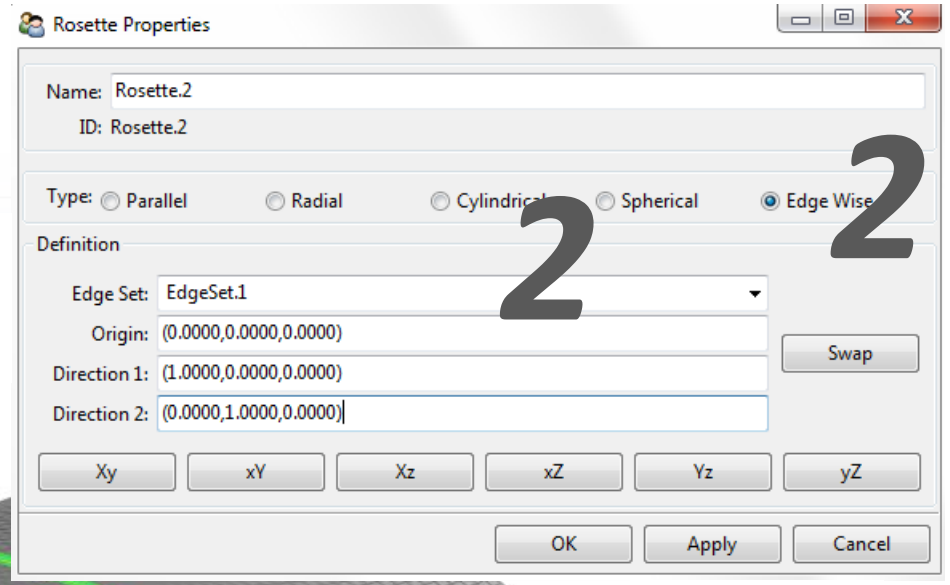


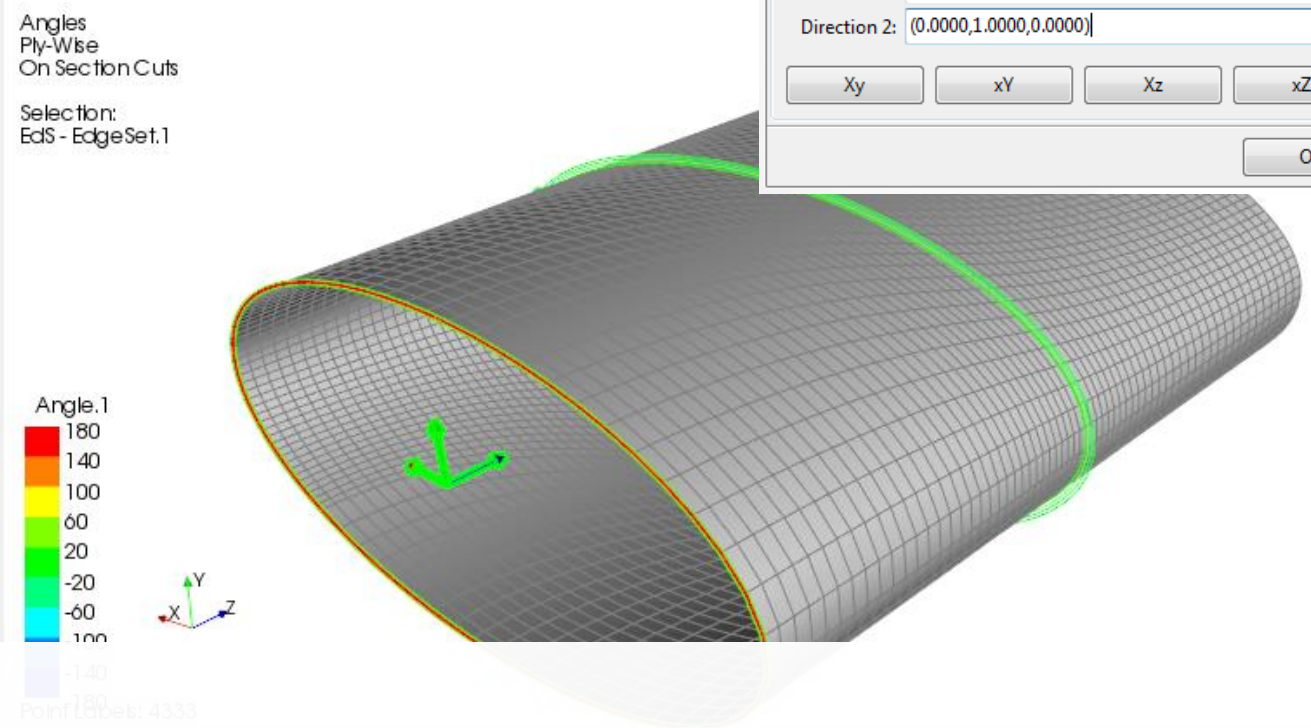
1. Create a new Edge Set (Right Mouse Button on Edge Sets → Create Edge Set)
2. Select all elements as element set
3. Select origin next to outer edge of the model (the limit angle will be explained at a later point)

5 Workshop Rules

Define an Edge Wise Rosette

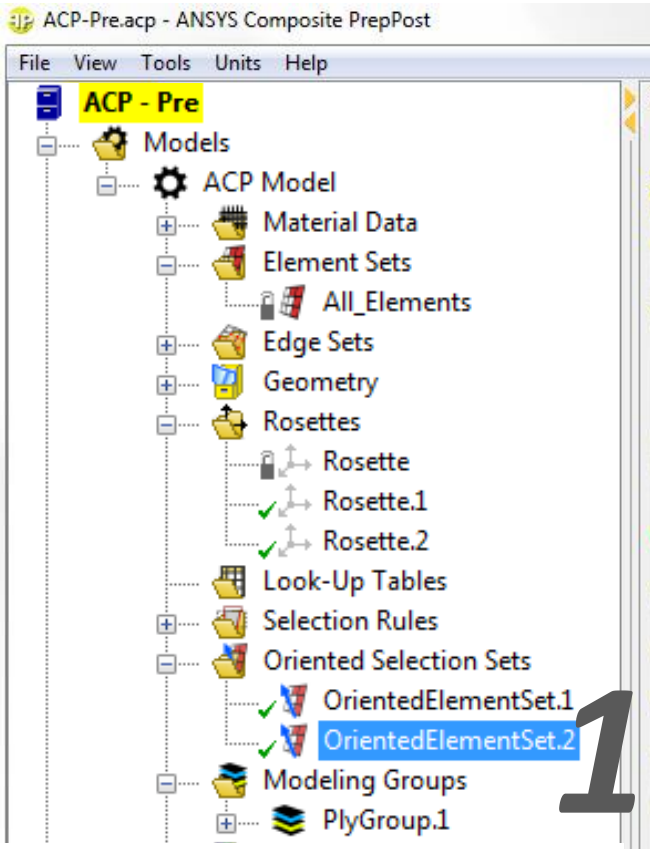


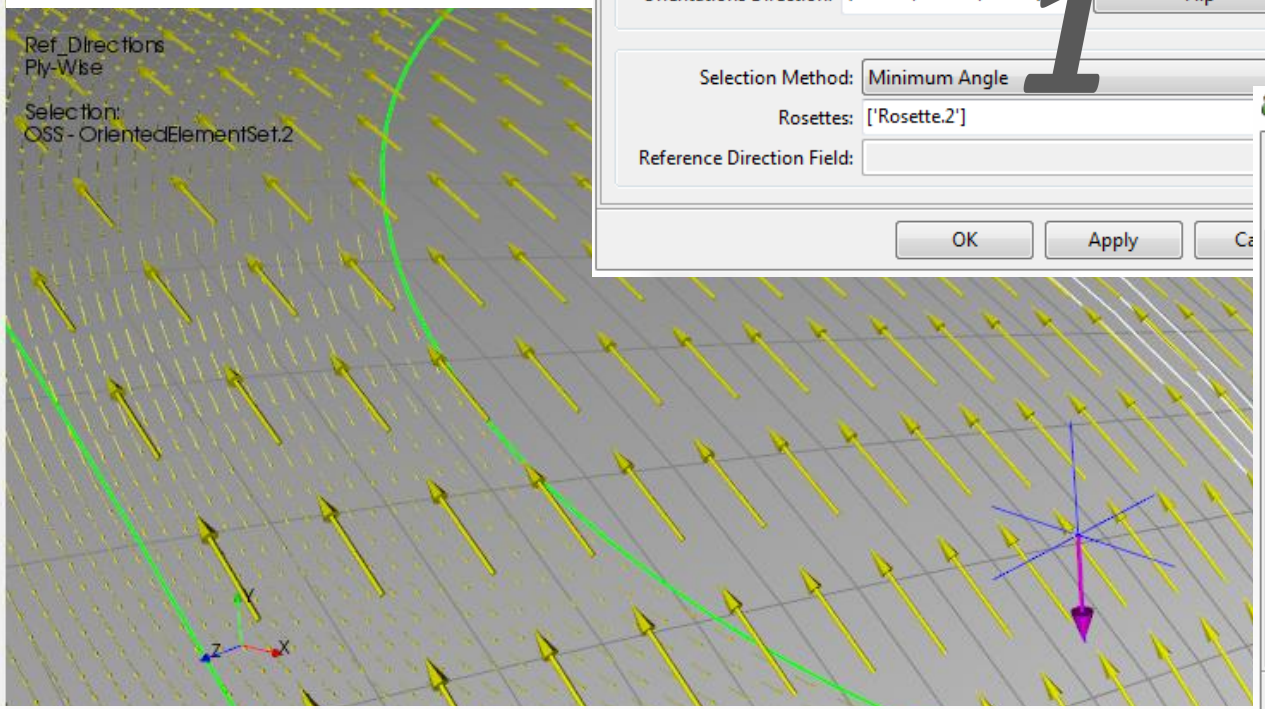


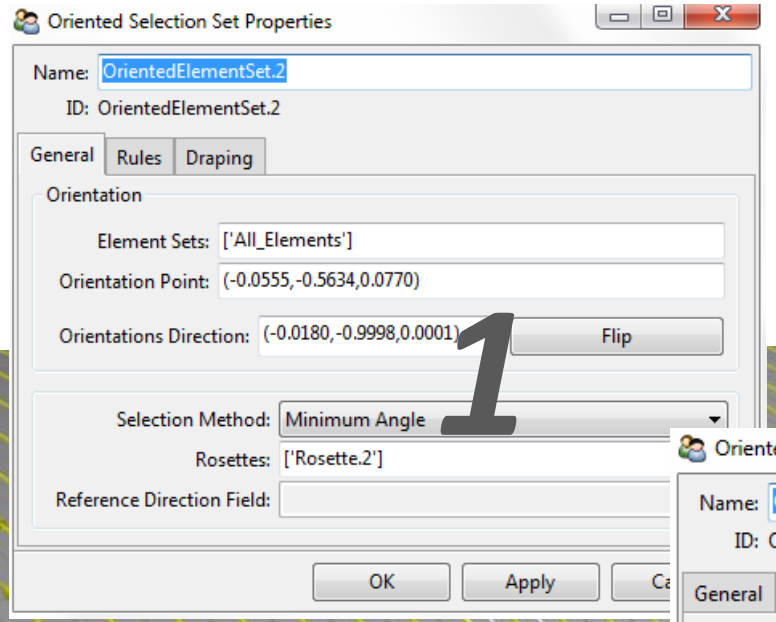


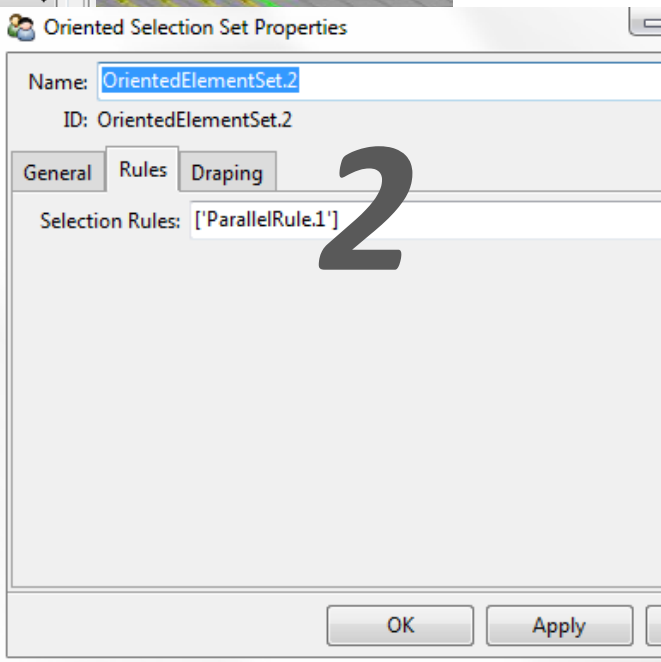
1. Create a new rosette.
2. Select edge wise rosette and the edge set created before.

5 Workshop Rules





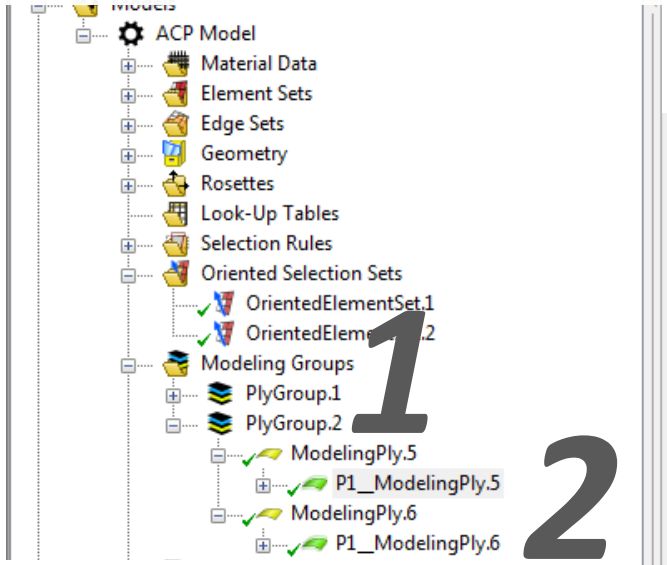


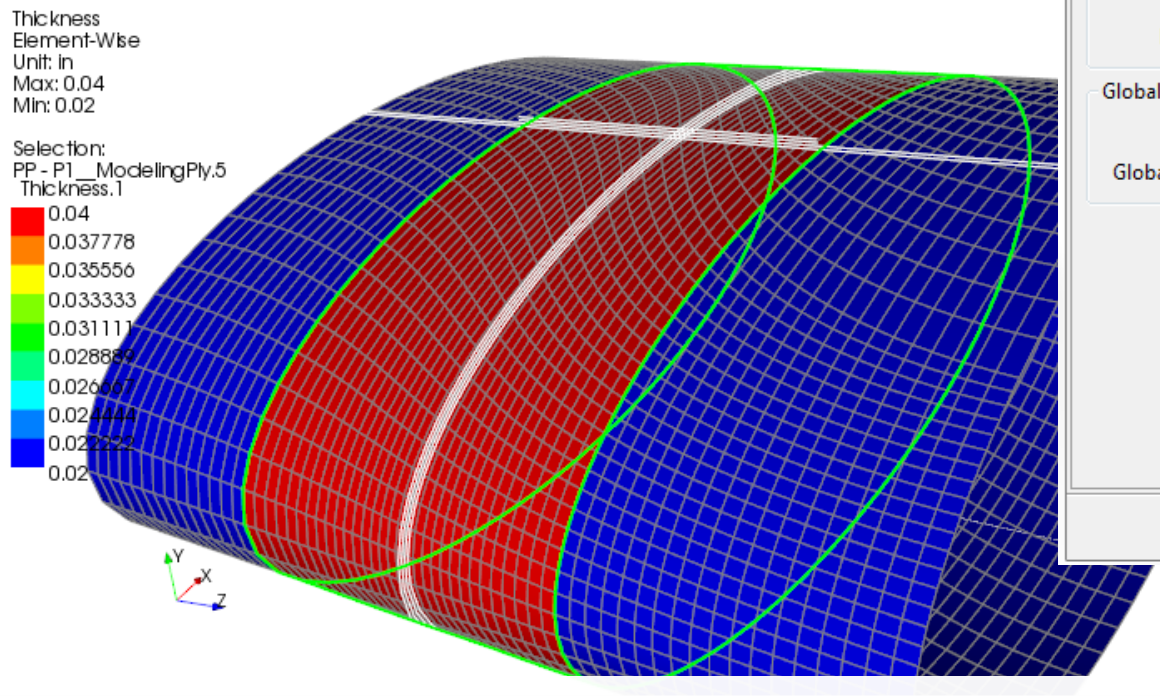


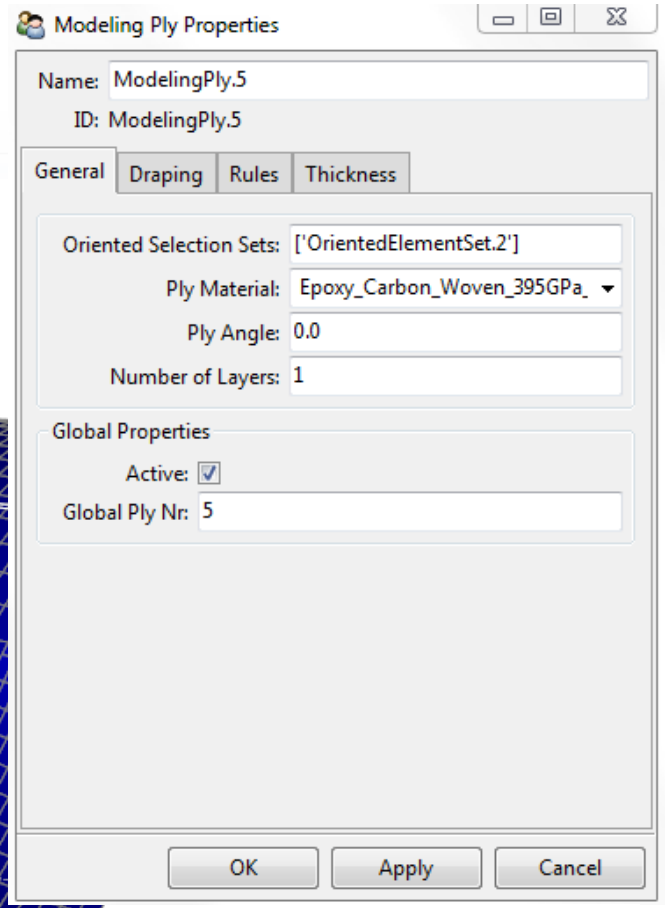
1. Create an Oriented Selection Set based on all elements and using the edge wise rosette of the previous step. Select Orientation Direction and Orientation Point.
2. Switch to tab Rules and select *ParallelRule.1* in tree.

5 Workshop Rules

Create Plies



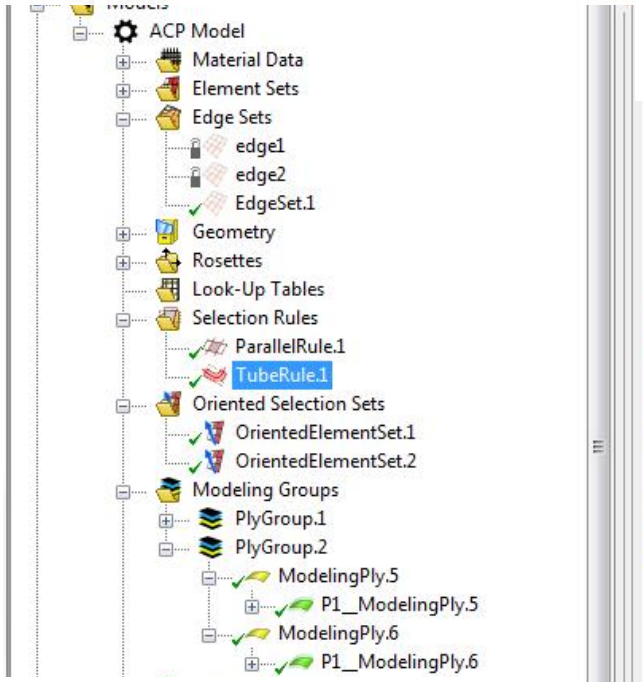


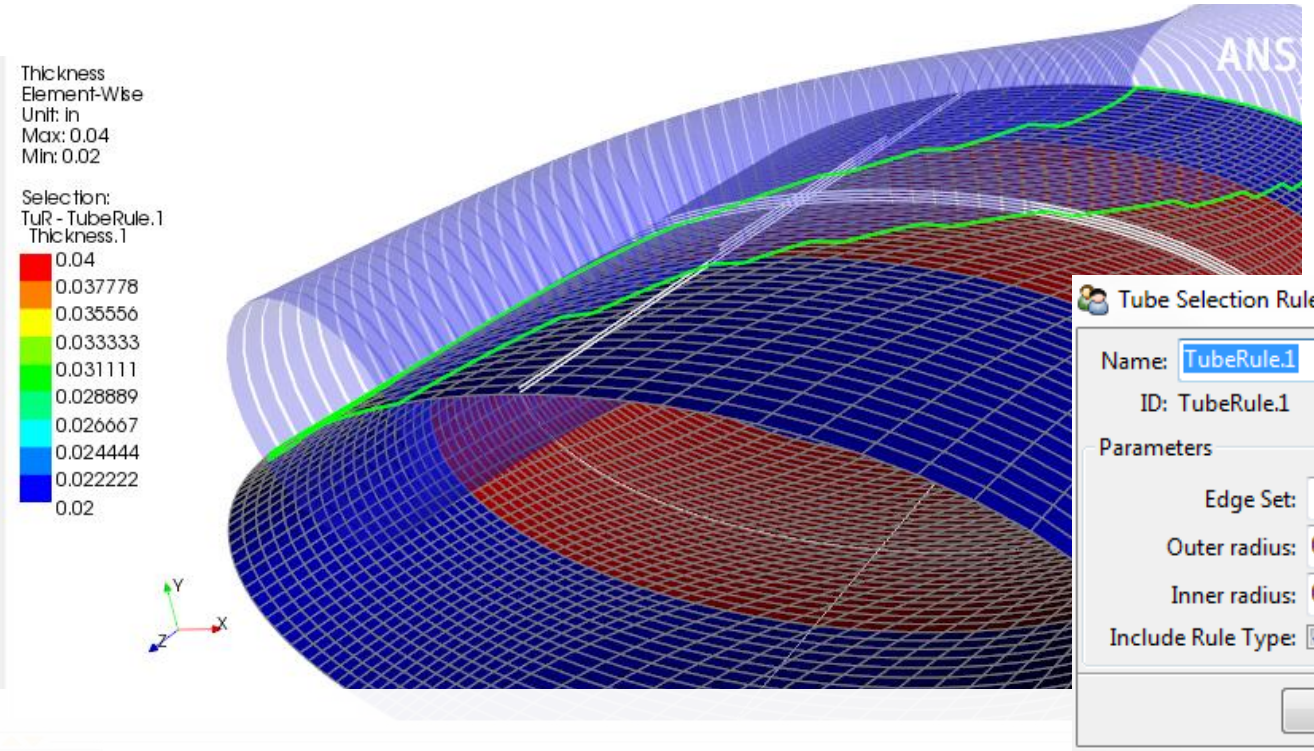


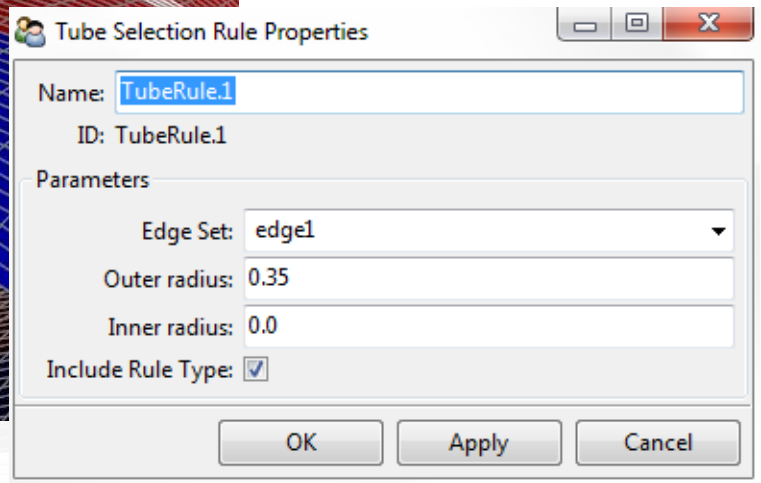
1. Create a new Ply Group.
2. Create two 0° layers using the woven epoxy carbon fabric.

5 Workshop Rules

Create a Tube Rule



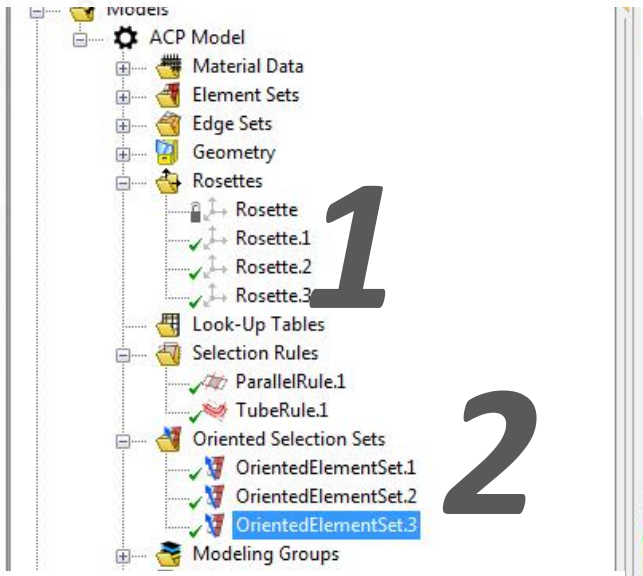


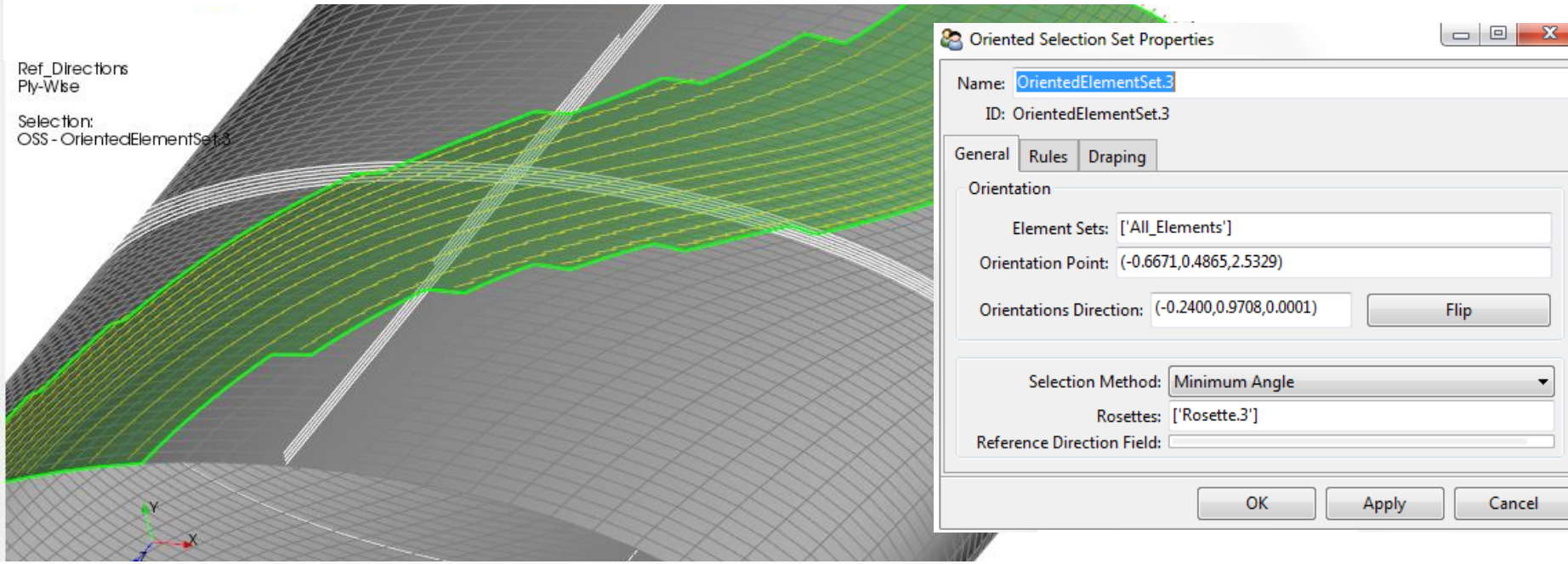


1. Create a new Tube Rule (Right mouse button on Selection Rules → Create Tube Rule)
2. Select *edge1* as edge set.
3. Define an outer radius of 0.35 in and an inner radius of 0 in.

5 Workshop Rules

Create a new Oriented Selection Set

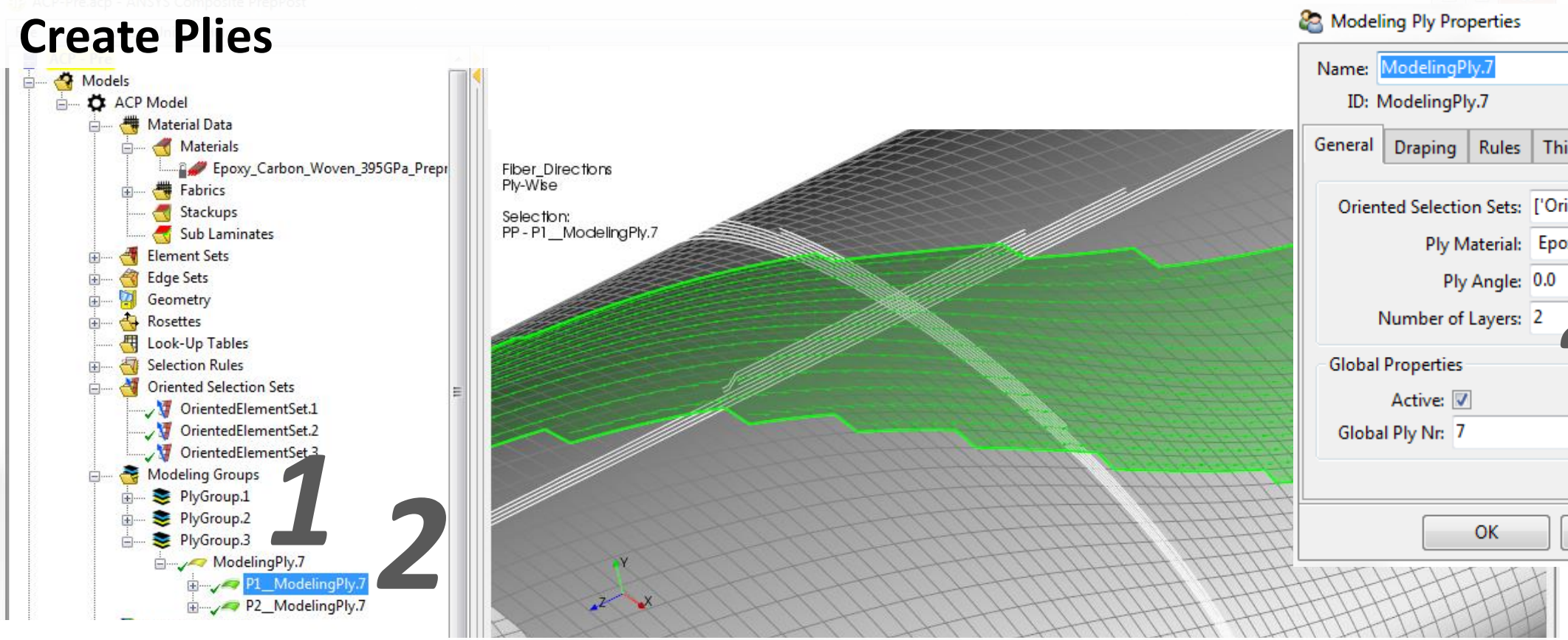




1. Create a new edge wise rosette using edge set *edge1*.
2. Create a new oriented set selecting all elements and the edge wise rosette based on *edge1*.
3. Switch to Rules and select *TubeRule.1*.

5 Workshop Rules

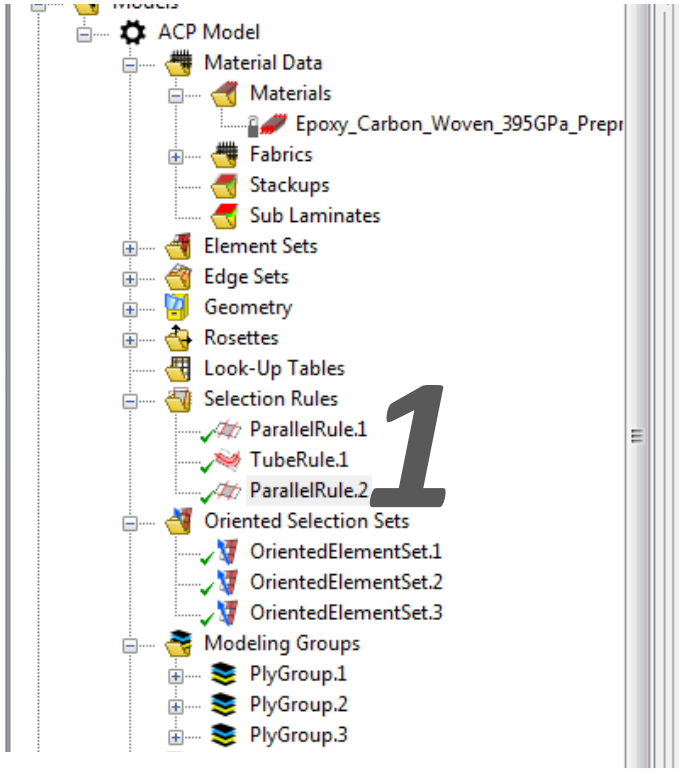
Create Plies

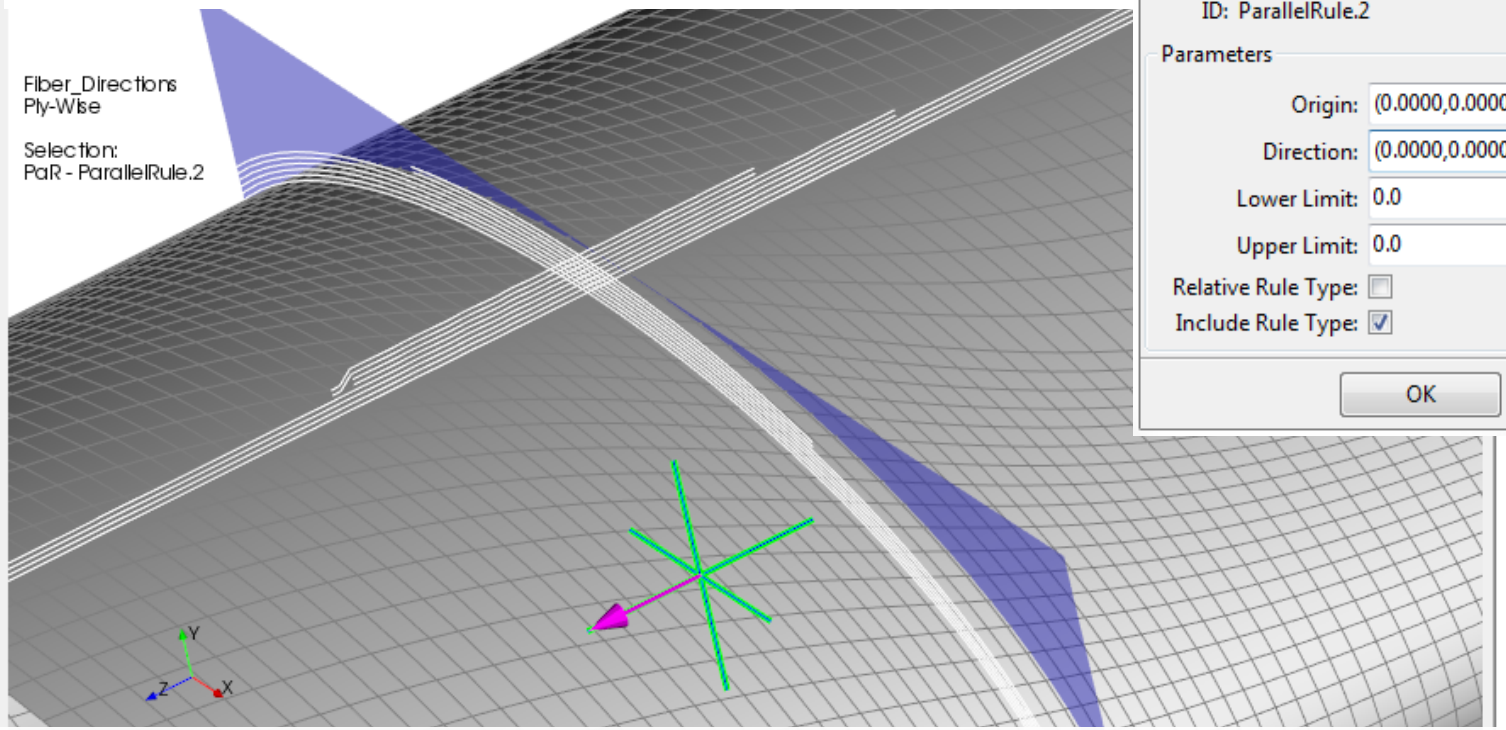


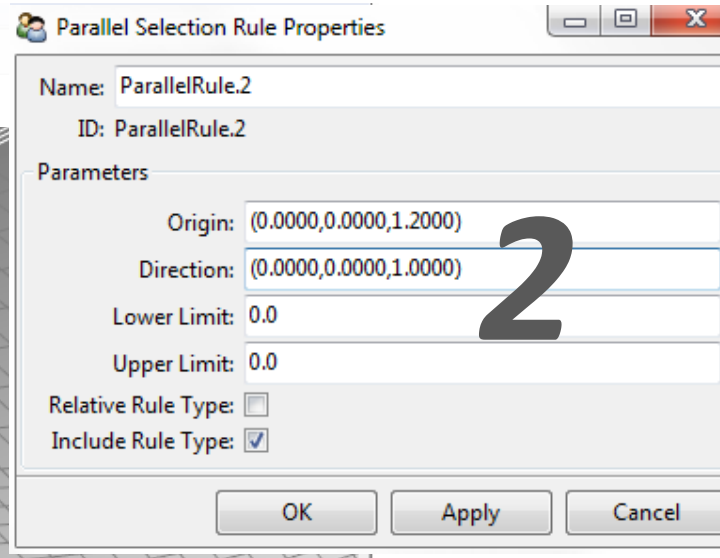
1. Create a new Ply Group.
2. Create two 0° layers based on the oriented selection set created a step before using the woven epoxy carbon fabric.

5 Workshop Rules

Create a Template Rule



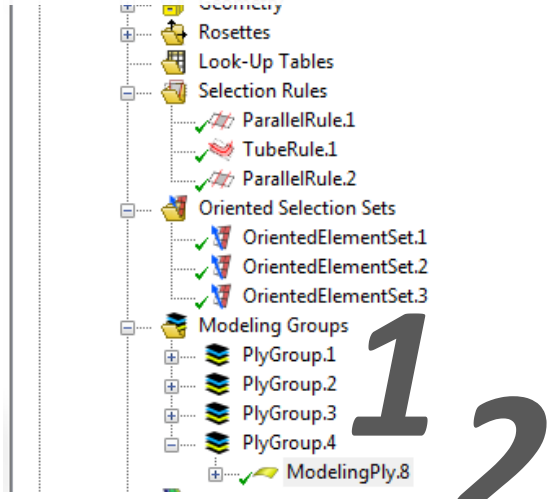


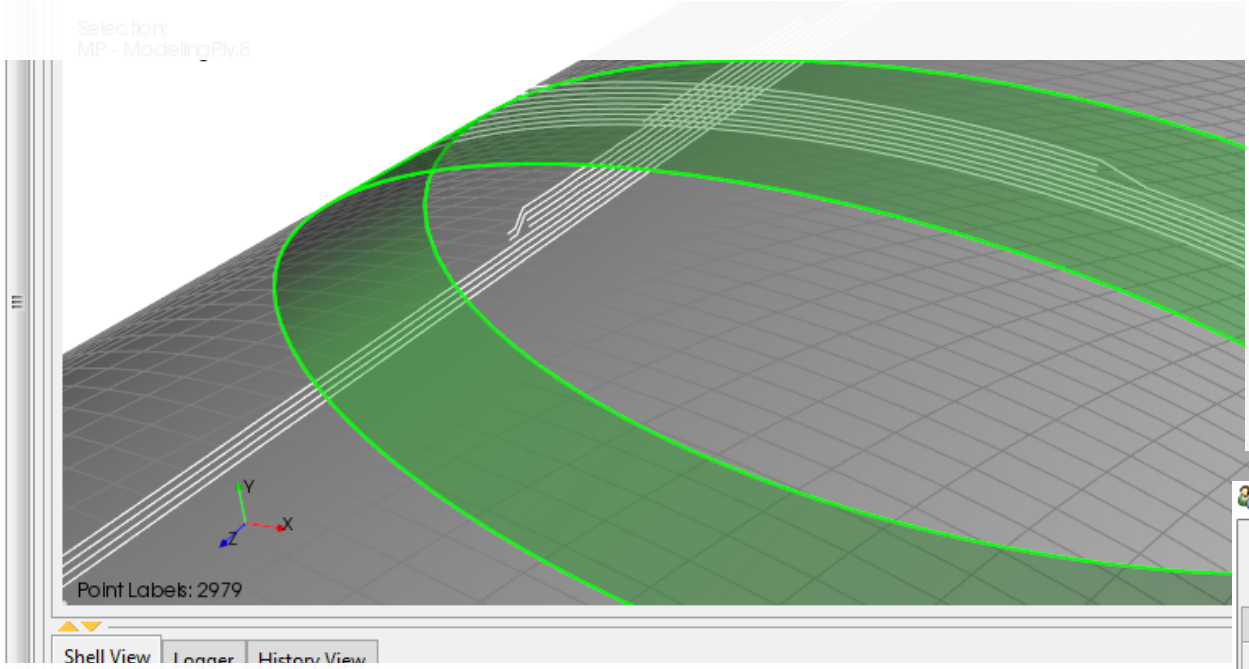


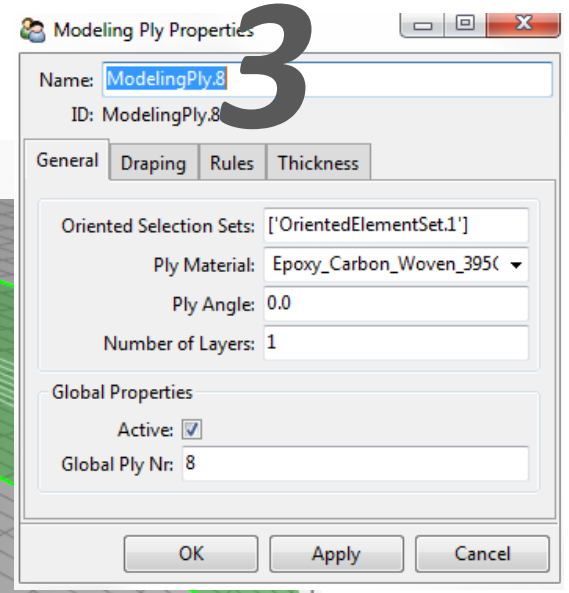
1. Create a new Rule (Right mouse button on Selection Rules → Create Parallel Rule)
2. Define origin of the rule (0,0,1.2) and the global z-direction as direction (0,0,1).
3. The lower and upper limit can be zero, they will be defined when modeling the plies.

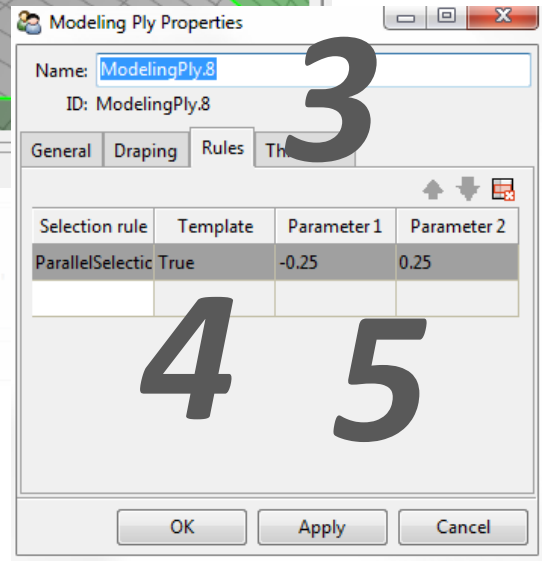
5 Workshop Rules

Create Plies





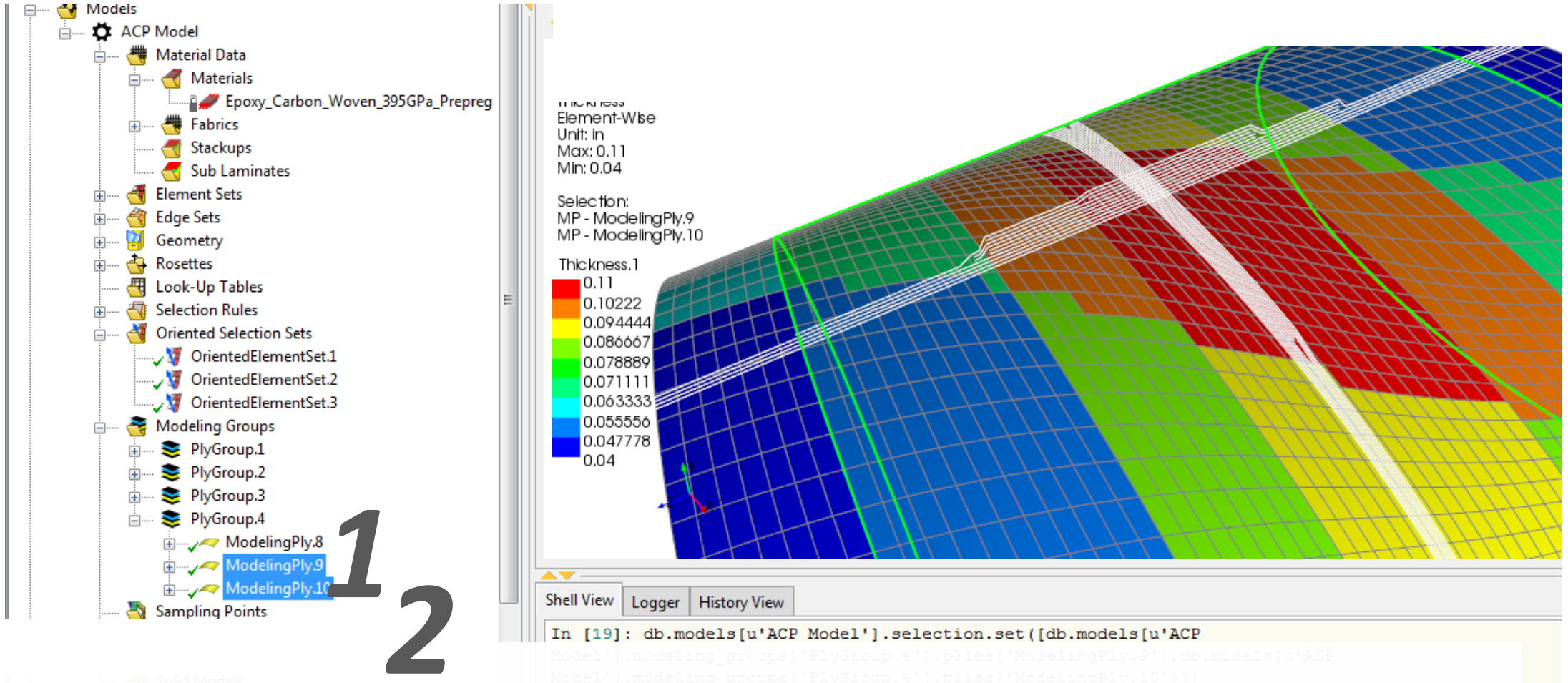




1. Create a new Ply Group.
2. Create one new layer based on the oriented set (*OrientedElementSet.1*)
3. Switch to tab Rules
4. Select rule as template in the template column
5. Define lower bound -0.25 and upper bound +0.25.

5 Workshop Rules

Create Plies



1

2

1. Create a new layer using the template rule with a lower bound of -0.5 and an upper bound of 0.5.
2. Create a third layer using a lower bound of -2 and an upper bound of 2.