Altium Designer

Advanced Training with Altium 365

Rigid-Flex 1 - Creating Multiple Layer Stacks

Software, documentation and related materials:

Table of Contents

Rigid-Flex 1 - Creating Multiple Layer Stacks

1 Purpose

When it comes to creating a Rigid-flex PCB, this requires the creation of multiple layer stacks for each of the rigid and flex regions. We will explore how to create multiple layer stacks from the Layer Stack Manager for the Advanced Mode

2 Shortcuts

Shortcuts used when working with Rigid-Flex 1 - Creating Multiple Layer Stacks

F1	Help
P » O	Place a 3D Model
2	2D Mode
3	3D Mode
CTRL+S	Save Document

3 Preparation

1. Close all existing projects and documents.
2. Next, create a copy of the Training Project: `Rigid-Flex 1 - Creating Multiple Layer Stacks`.
3. Select **File » Open Project...** to open the *Open Project* dialog.
4. Enable the folder view button .
5. Navigate to the predefined Training Project `Rigid-Flex 1 - Creating Multiple Layer Stacks (Top\Projects\Altium Designer Advanced Training Course\...)`.
6. Select **Open Project as Copy...** Open Project As Copy....
7. In the new dialog *Create Project Copy:*
   a) Add your name to the project name: `Rigid-Flex 1 - Creating Multiple Layer Stacks - [Your Name]`.
   b) Add a description: `Altium Advanced Training - [Your name]`.
   c) Open the *Advanced* section.
   d) Select the **Ellipsis Button** ... from the *Folder* configuration to open the *Choose Folder* dialog.
      i) Select the folder with your name: `Project\For Attendees\[Your name]`.
      ii) Select **OK**.
   e) Change the **Local Storage** path if needed.
   f) Select **OK** to create the copy.
8. Wait until Altium Designer creates the copy of the project and opened the Project for you in the *Projects* panel, this may take up to 1 minute.

> Hint: For details how to copy the predefined training project, see module *03 Getting started - Opening a Project*.

Next, you will use two methods to update the PCB Layer Stack. First, we will load an existing stack from the Workspace.

4 Layer Stack Manager – Load Layer Stack from the Workspace

4.1 Viewing the Current Stack

9. Right-click on the project from the *Projects* panel and **Add New to Project » PCB**.
10. **Save the new PCB** as `Rigid-Flex.PcbDoc`.
11. From the **Design** menu, select the **Layer Stack Manager**... (alternatively use shortcut **D»K** from the keyboard). The *Layer Stack Manager* will open, as shown in Figure 1.

Figure 1. Layer Stack Manager for default 2-layer board

4.2 Updating the Current Stack from the workspace

12. From the **File** menu, select **Load Stackup From Server**..., Figure 2.

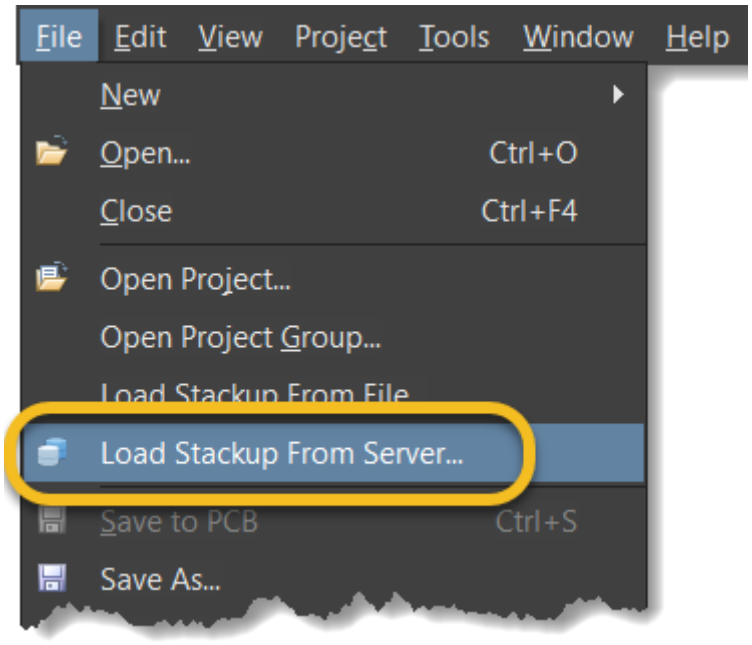


Figure 2. Load a Stackup from the Workspace

13. From the **Managed Content » Templates**, select **Layer Stacks** with a single left-click.

14. Select the stack `6Rigid – 2Flex – 6Rigid`, Figure 3.

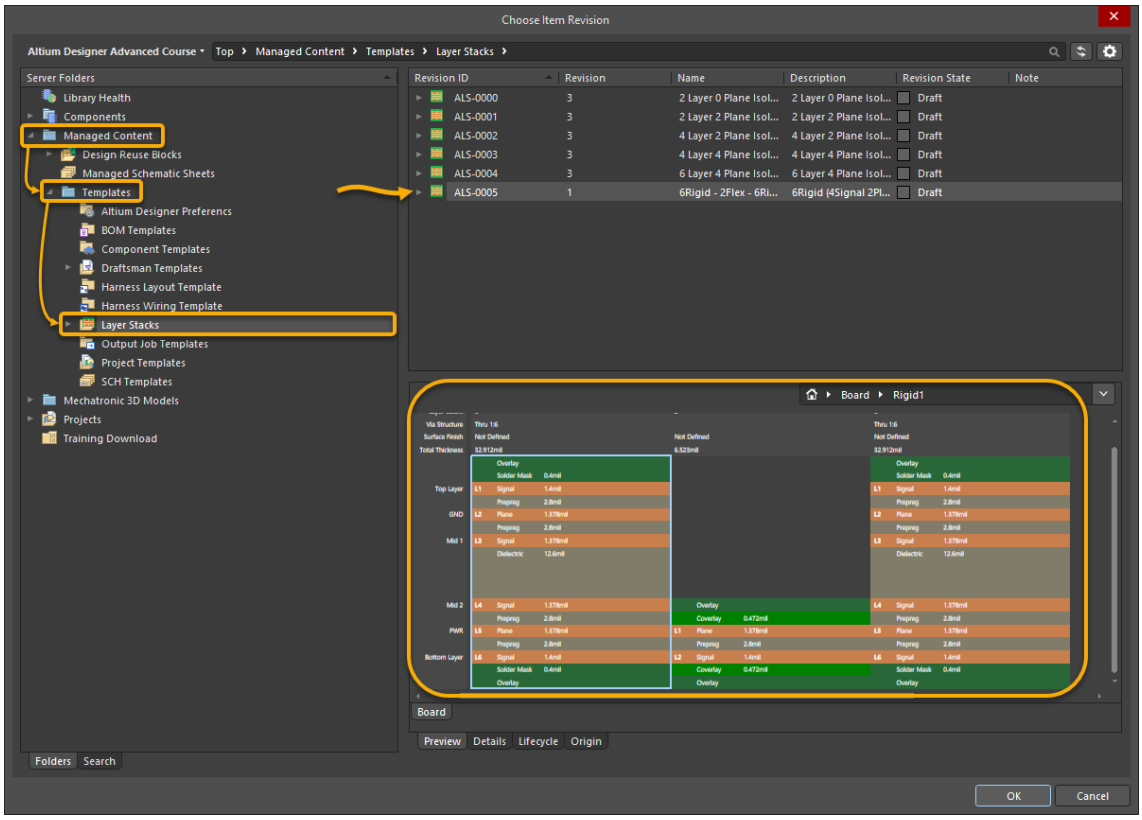


Figure 3. Select the Rigid-Flex Stack

15. Accept the selected stack with **OK.**
16. Wait until Altium Designer loads the Stack and updates the PCB for you. This may take up to 1 minute.
17. You can see a PCB Rigid Flex Stackup with two rigid definitions and one flex definition.
18. Close the stack manager without saving the stack. Next, we will show you how you can create such a Rigid-Flex Layer Stack, in case the workspace doesn't have a stack that fits to your needs.

5 Layer Stack Manager – Create New Layer Stack

5.1 Viewing the Current Stack 2

19. From the **Design** menu, select the **Layer Stack Manager**... The *Layer Stack Manager* will open again, as shown in Figure 4.

Figure 4. Layer Stack Manager for default 2-layer board

5.2 Modifying the Simple Stack

20. Right-click on the `Top Layer` cell and select **Insert layer below** from the drop-down menu.
21. Select **Signal** to add a signal copper layer, as shown in Figure 5.

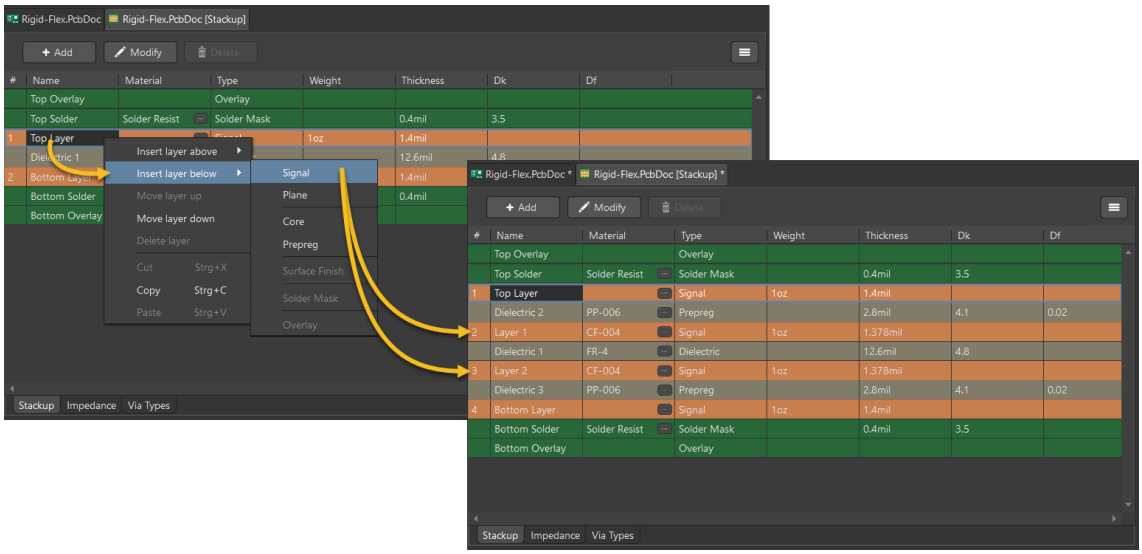


Figure 5. Adding a new layer in Layer Stack Manager

22. After inserting the signal layer, you will notice that two signal layers were added: `Layer 1` and `Layer 2`, as a result of the **Stack Symmetry** option enabled, Figure 6. You can enable or disable this option in the future.

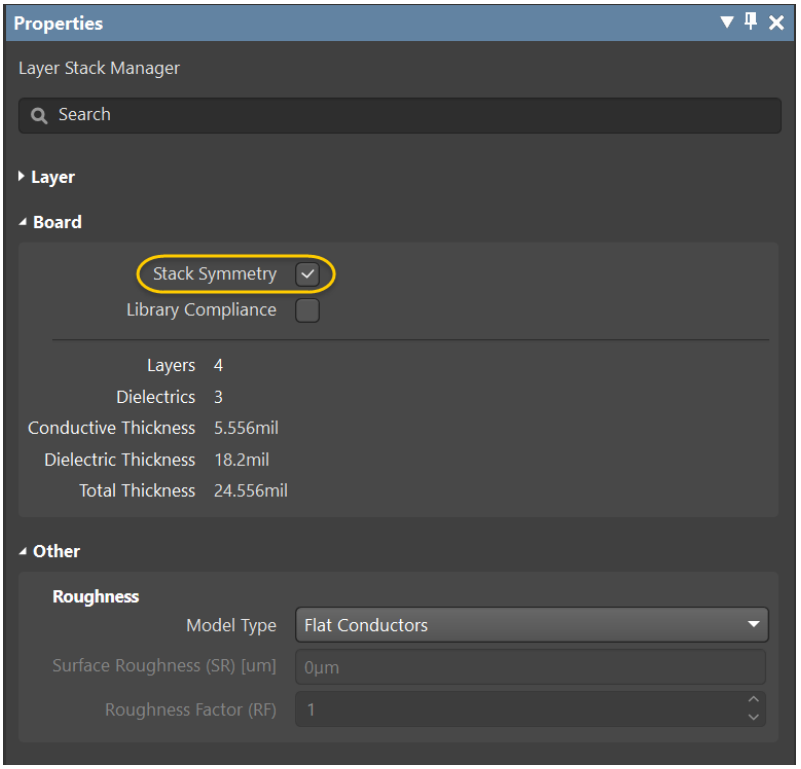


Figure 6. Stack Symmetry option

23. If this option was disabled, insert a Signal layer below `Layer 1` so that your Stackup is the same as Figure 5.
24. Double-click on the `Layer 1` cell to rename it to `Mid 1`, as shown in Figure 7.
25. Repeat the previous step and rename `Layer 2` to `Mid 2`.

Figure 7. Layer renaming

26. You will now add some internal Plane Layers for Power and GND:
    a) Right-click on the `Top Layer`, select **Insert layer below** and then select **Plane**. Like before, two layers are inserted to ensure stack symmetry.
    b) Rename `Layer 1` to `GND`.
    c) Rename `Layer 2` to `PWR`.
27. You can alter the layer ordering by right-clicking on a layer and selecting **Move Layer Up** or **Move Layer Down** where available. Your layer stack should now look like Figure 8.

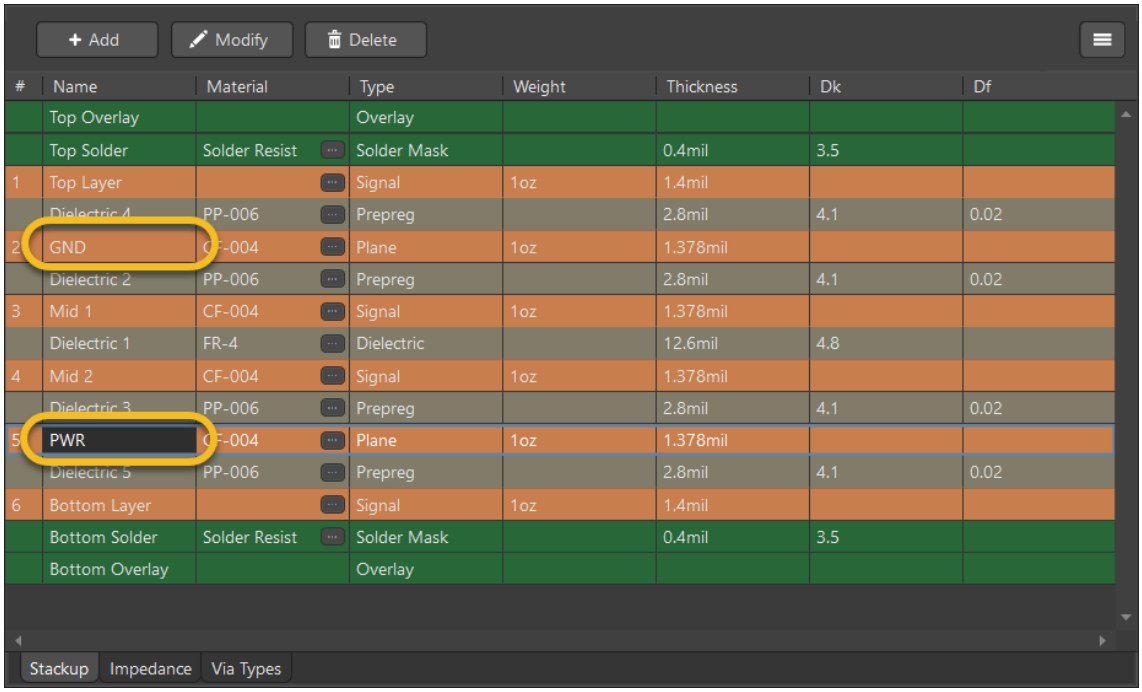


Figure 8. Complete Layer Stack

6 Modifying the Advanced Stack

28. Click the **Features** button in the top right corner and select **Rigid/Flex (Advanced)** as shown in Figure 9. This will allow us to add multiple layer stacks.

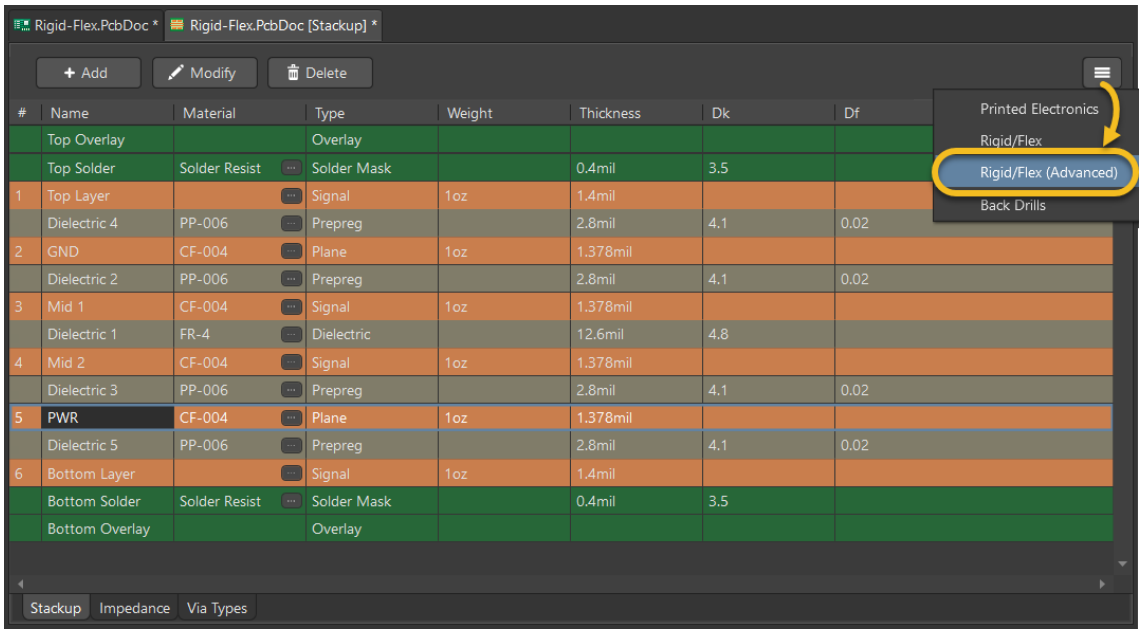


Figure 9. Advanced Layer Stack Manager View

29. With the first stack displayed as the active Stackup, click on the *Overlay* section to open the *Properties* panel and follow the steps below, Figure 10:
    a) Deactivate the option `Realistic Ratio`.
    b) Change the name for a Substack to `Rigid 1`.
    c) Change the description to `Rigid 1 - Board Layer Stack - Left Side`.

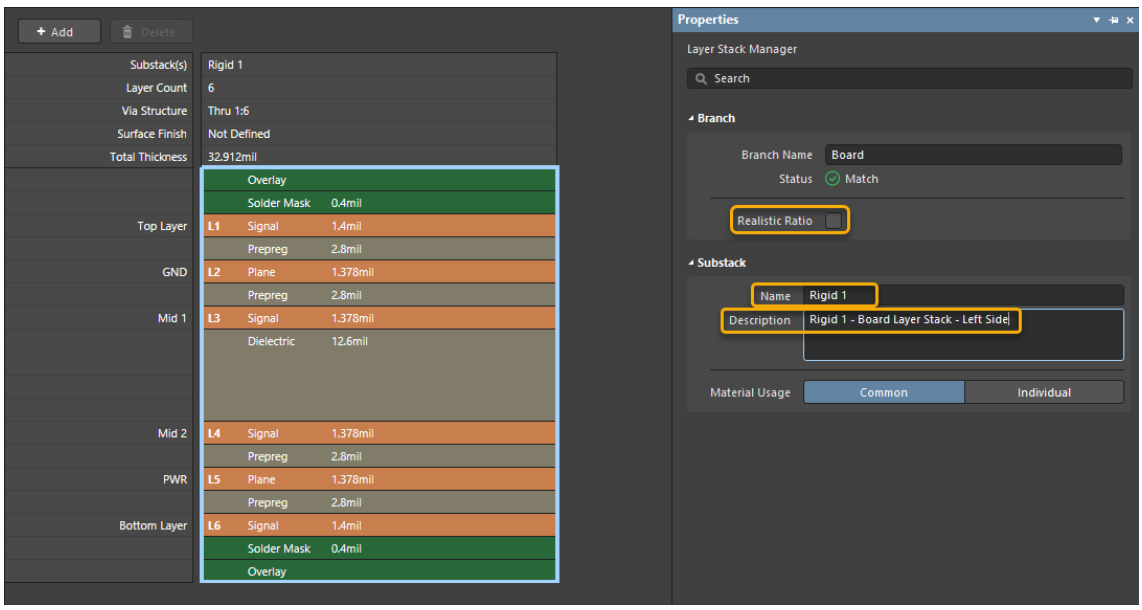


Figure 10. Change Layer Stack Properties in Properties Panel

6.1 Second Stack - Flex

30. Next, you will add a new Flex Layer Stackup, as seen in Figure 11:
    a) Press and hold the `Shift Key` to select `L5 - Prepreg - L6` in the current stack.
    b) Drag and drop the selected layers to the right side of the current stack.

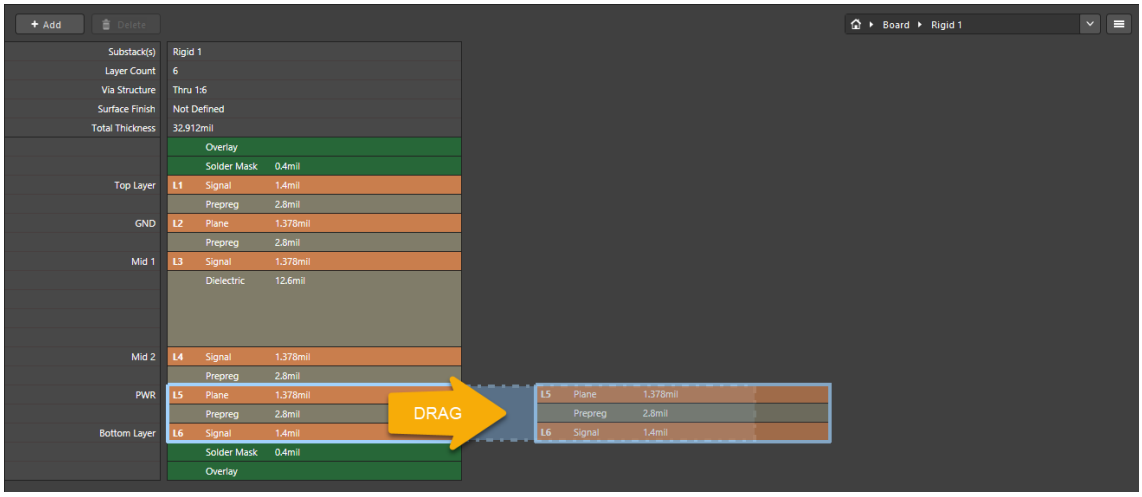
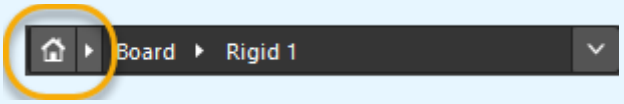


Figure 11. Adding a new Layer Stackup

Hint: If you change the view accidentally, click on the Home symbol at the Layer Stack Manager navigation bar:



31. With the second stack displayed as the active Stackup, open the *Properties* panel if needed (Figure 12 on the following page) and follow the steps below:
    a) Change the Substack name to `Flex`.
    b) Change the description to `Flex - Board Layer Stack`.
32. The new `Flex` Stackup doesn't have the same layers or materials as the `Rigid 1` Stackup of the PCB. Consequently, later you will need to make some modifications to the `Flex` Stackup.

33. Change *Material Usage* to **Individual**, as shown in Figure 12.

Hint: When creating a multi-stack PCB, please contact your board manufacturer to obtain the correct flex material type and copper thickness information for your PCB.

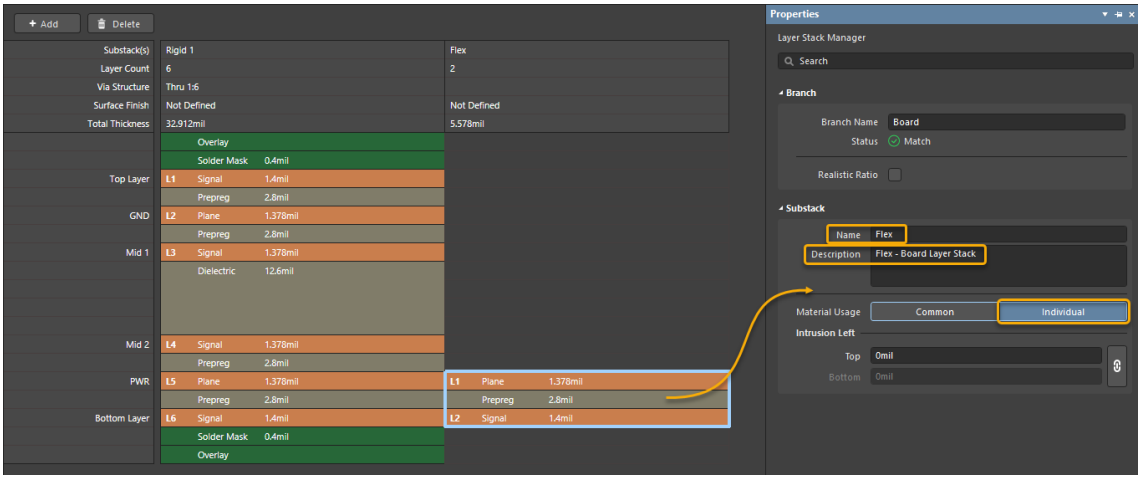


Figure 12. Name the second stack for the Flex section

34. Double-click on the Flex Substack or select the *Flex* from the Layer Stack Manager navigation bar to open it for editing in the Stackup mode of the *Layer Stack Manager*, Figure 13.

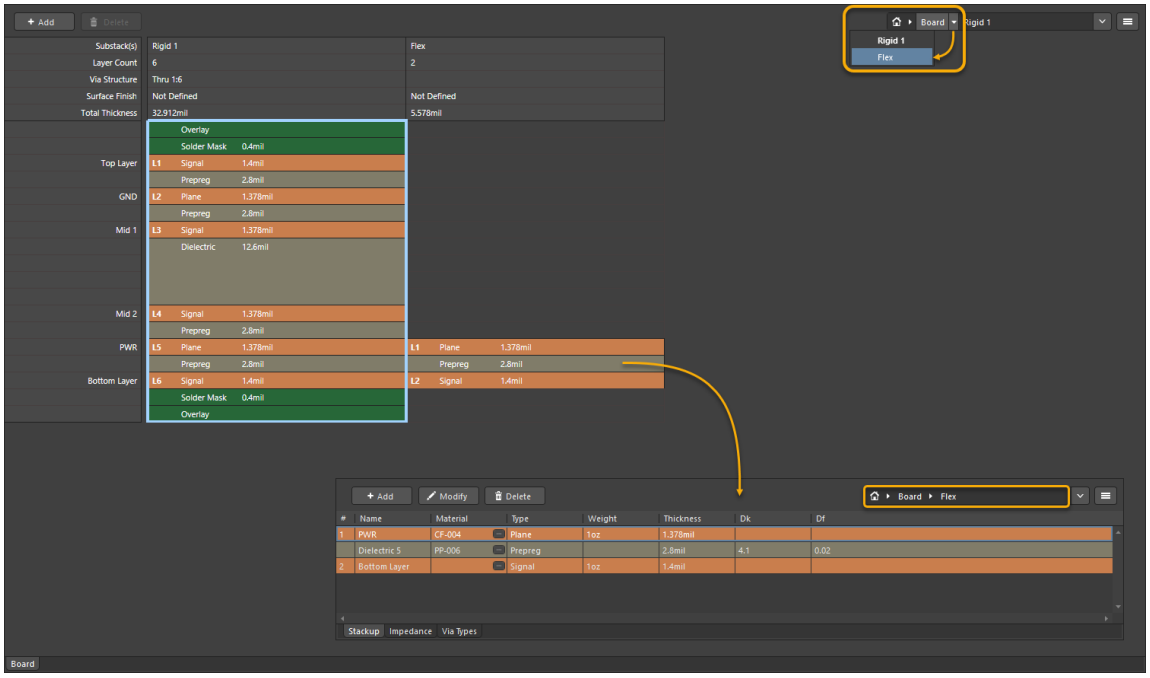


Figure 13. Open the Stackup Mode for the Flex section

35. In the *Properties* panel, activate the option **Flex** for the Sub Stack `Flex`, as seen in Figure 14.

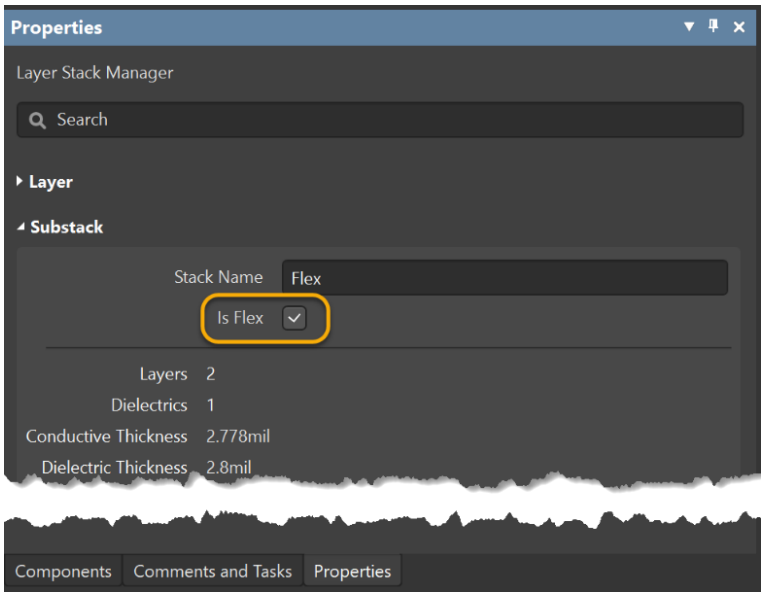


Figure 14. Properties Panel with Option Flex

36. From the layer stack, right-click on the `Bottom Layer` and select **Insert layer below**, then select **Coverlay**.
37. Right-click on the new `Flex Bottom Coverlay` layer, select **Insert layer below**, and select **Overlay**. This is equivalent to the silkscreen layer for a flex stack.
38. Right-click on the `PWR` layer, select **Insert layer above**, and select **Coverlay**.
39. Right-click on the new `Flex Top Coverlay`, select **Insert layer above**, and select **Overlay**. When you're done, your `Flex` Stackup should look similar to Figure 15.

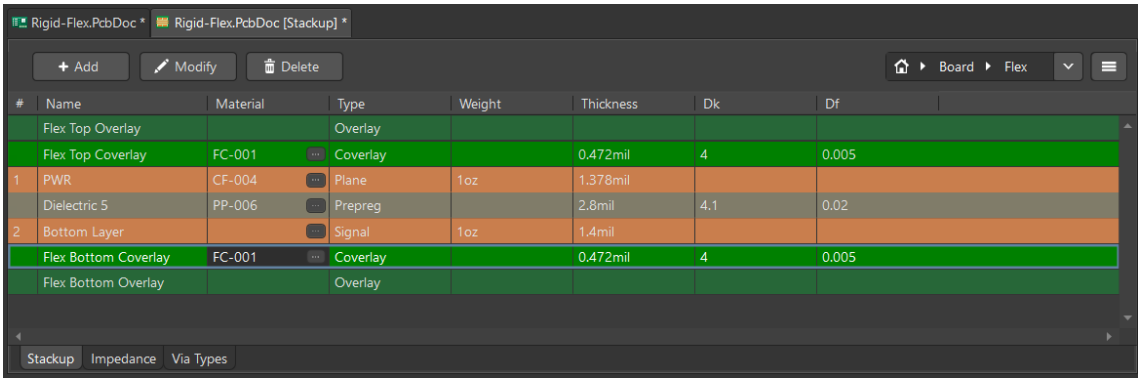


Figure 15. Stack with Flex Solder and Overlay

6.2 Third Stack - Rigid

40. Now that you're done with the flex stack, you will add a third stack:
    a) Select the **Home** button to change back to the Board Mode  .
    b) Select the `Rigid 1` Substack.
    c) Right-click and select **Insert Selected After » Flex**, as shown in Figure 16.

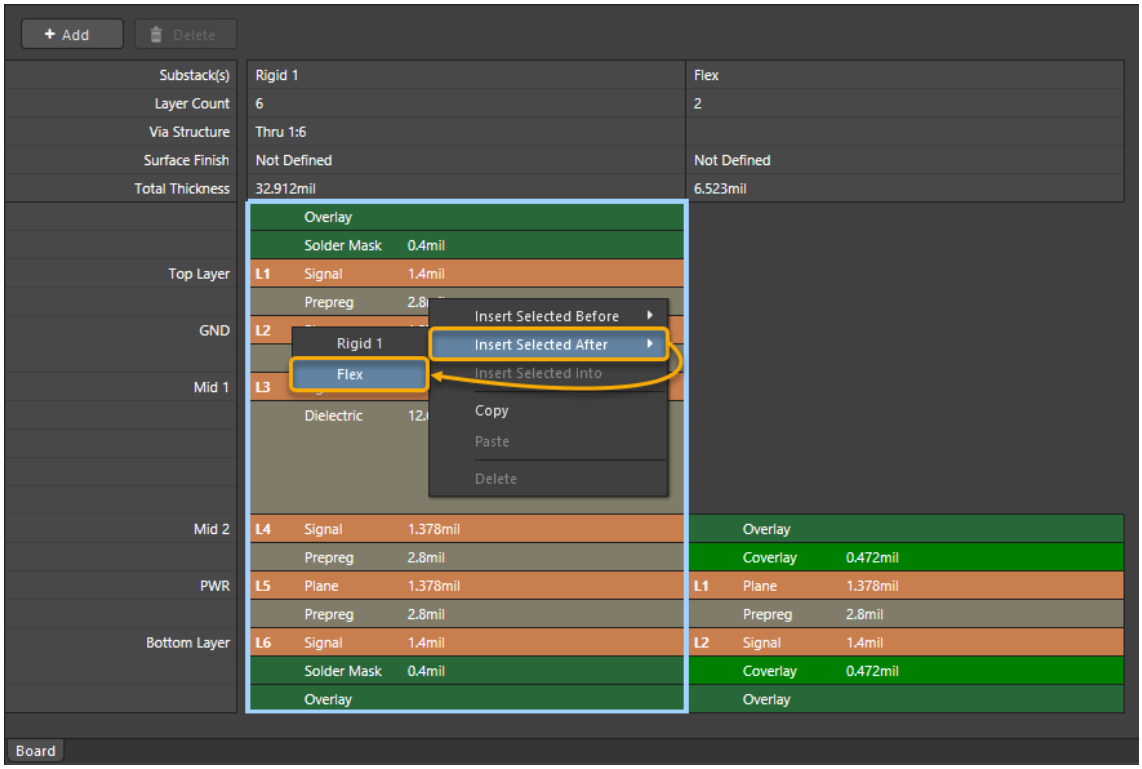


Figure 16. Adding a new third Stackup

41. From the *Properties* panel, change the description to `Rigid 2 - Board Layer Stack - Right Side`. This is the same stack as the left side, therefore the name won't change.

7 Layer Stack Visualizer

It can be difficult to envision what your PCB looks like, but you can use the Layer Stack Visualizer to give you an idea.

42. From the **Tools** menu, select the **Layer Stack Visualizer**. This will give you a 3D view of the PCB.
43. To see all 3 stacks in our design, enable the **Show Full Stack** checkbox near the bottom of the *Layerstack Visualizer* window, as shown in Figure 17.
44. Click on the **3D** button to see all of the Stackups in an isometric view.
45. Feel free to rotate the view by holding the **Right-Mouse-Button** and **moving the mouse**. Using the mouse scroll wheel allows you to zoom in and out.

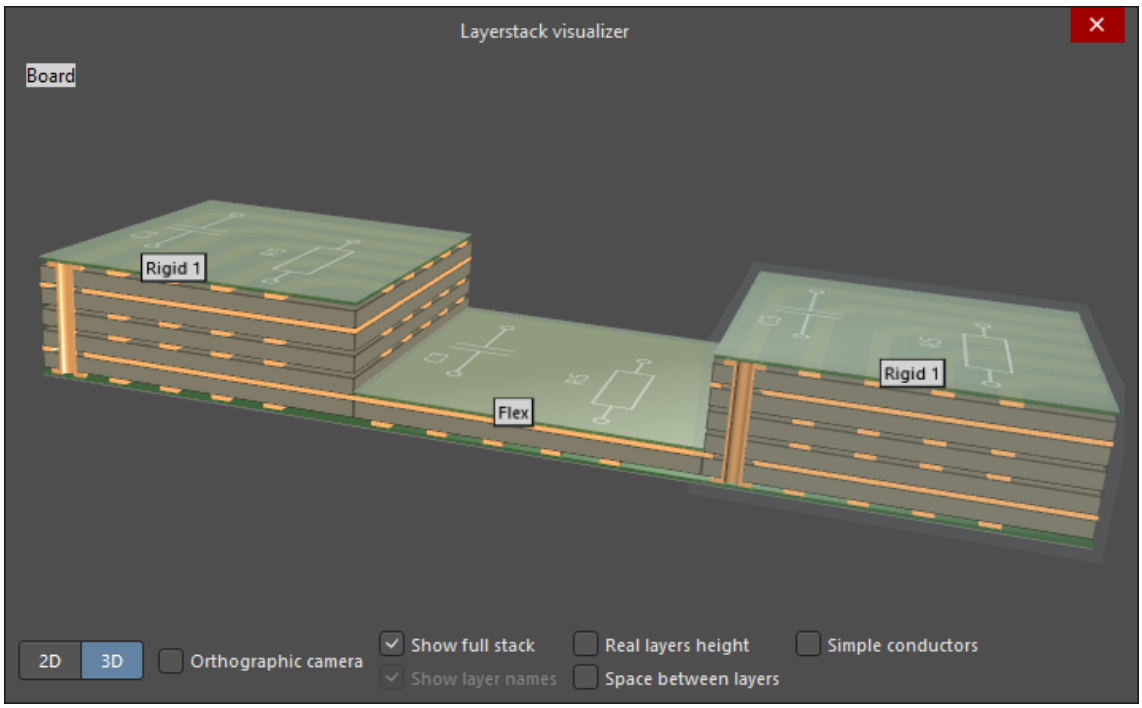
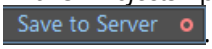


Figure 17. Rigid-Flex-Rigid Stack in 3D

Note: For future designs, the **[Stackup]** document needs to be saved to reflect the changes in the PCB. If you exit the Layer Stack Manager without saving any changes, they won't be applied.

46. Use the *Save All Documents* icon at the top left of the screen  .
47. Save the modifications to the server:
    a) In the *Projects* panel, next to the Project name you find the command **Save to Server**  .
    b) Select **Save to Server**.
    c) In the dialog *Save [Project Name]:*
        i) Add the comment `Rigid-Flex 1 - Creating Multiple Layer Stacks - [Add Your Name] - Finished`.
        ii) Select **OK**.
48. When ready, close the project and any open documents, **Window » Close All**.

Congratulations on completing the Module!

Rigid-Flex 1 - Creating Multiple Layer Stacks

from

Altium Designer Advanced Training with Altium 365

Thank you for choosing **Altium Designer**