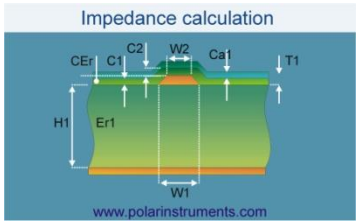
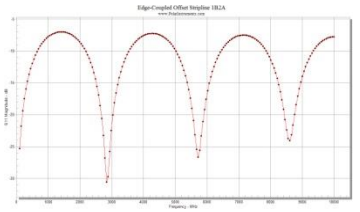
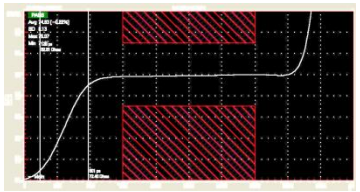
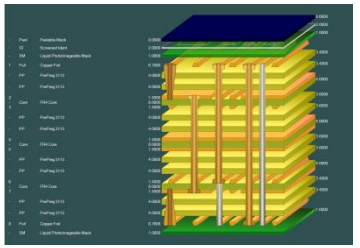
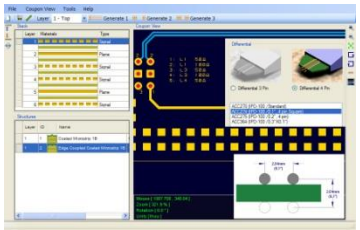










Building a rigid-flex construction

Richard Attrill – August 2013

Welcome to Speedstack

This tutorial is one of a series of documents that will help guide you through the process of building stackups using Speedstack. The other modules in the series are as follows:

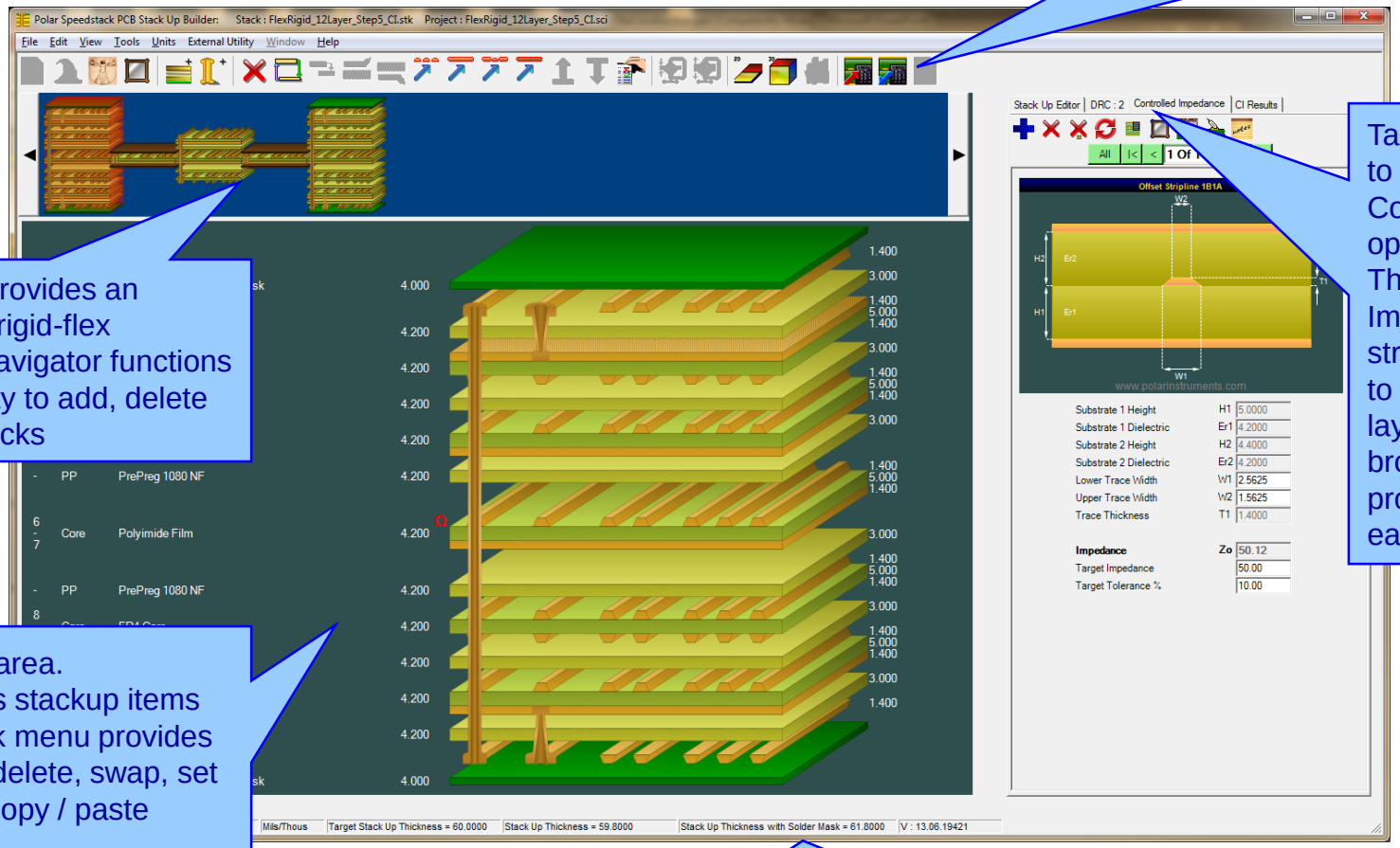
Module 1: Getting Started Guide

Module 2: Building stackups using the Materials Library

Module 3: Building a rigid-flex construction

Speedstack – Introducing the interface

Toolbar provides access to commonly used functions included add, delete and swap materials.



The Navigator provides an overview of the rigid-flex construction. Navigator functions include the ability to add, delete and edit sub-stacks

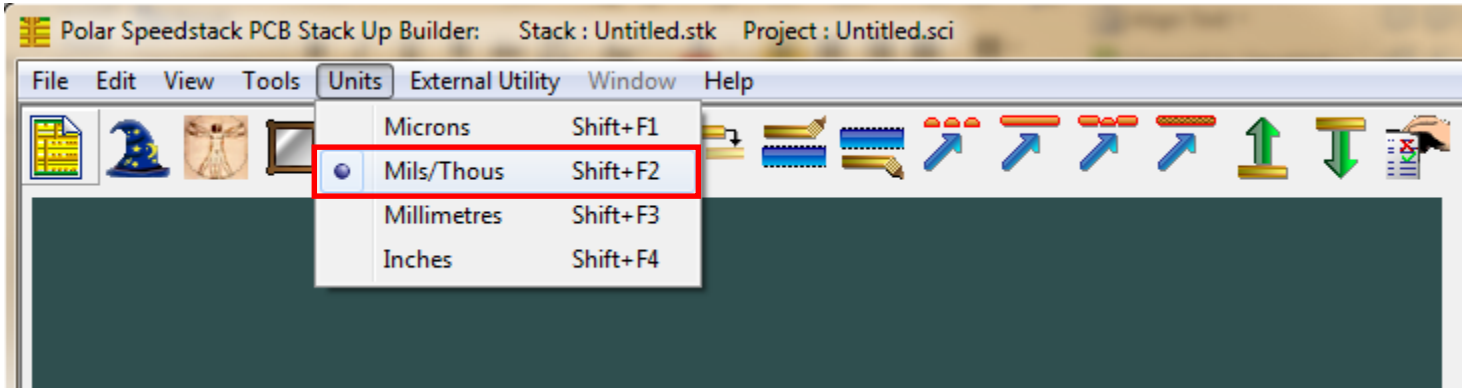
Tabs provide access to Stack Up, DRC and Controlled Impedance options.
The Controlled Impedance tab allows structures to be added to the stack on a per layer basis. The browser buttons provide access to each structure

Stack up editor area.
Left-click selects stackup items (blue), right-click menu provides options to add, delete, swap, set properties and copy / paste materials.
Mouse wheel offers ability to zoom in / out

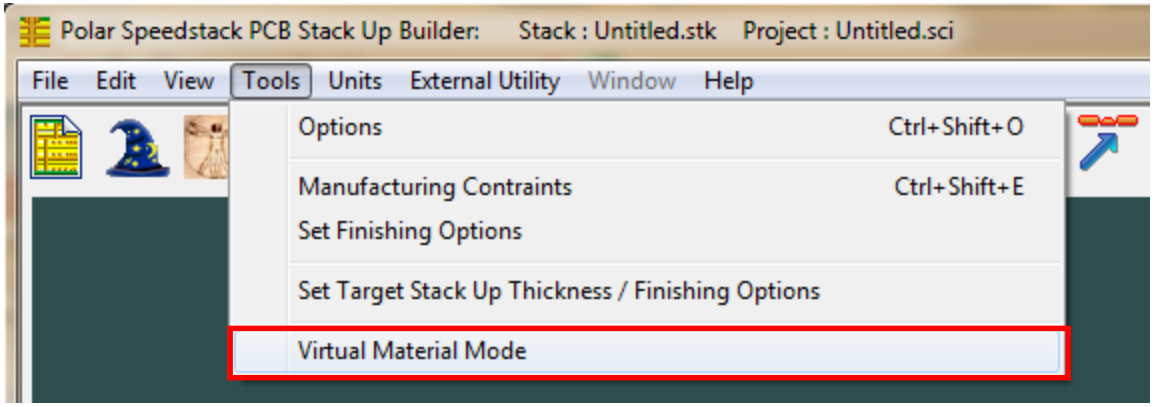
Stack up thickness can be monitored via the status bar

Step 1: Setting the Units and Materials Library Mode

From the Units menu select the ‘Mils/Thou’ option

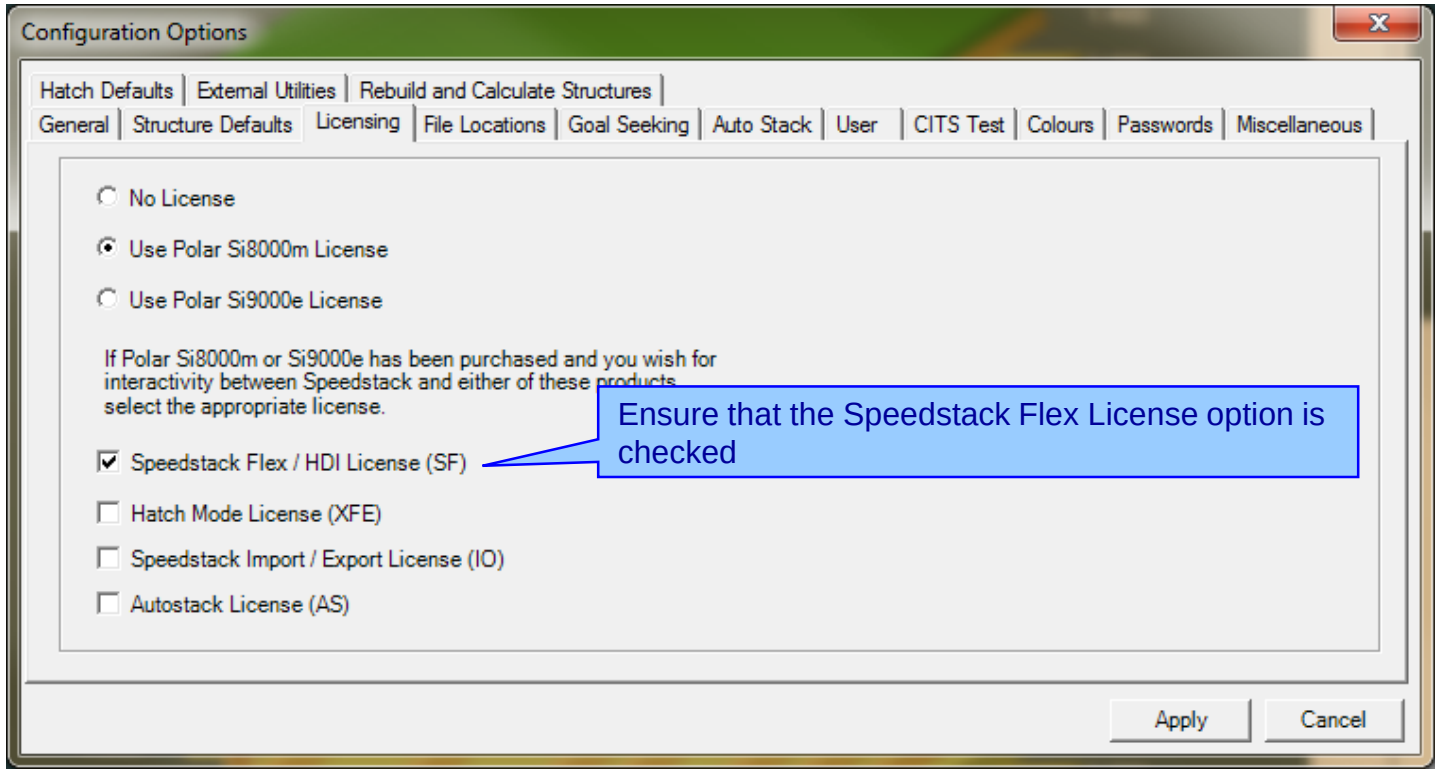


From the Tools menu de-select the ‘Virtual Material Mode’ option, this will enable Materials Library Mode. Note the enabled icon 



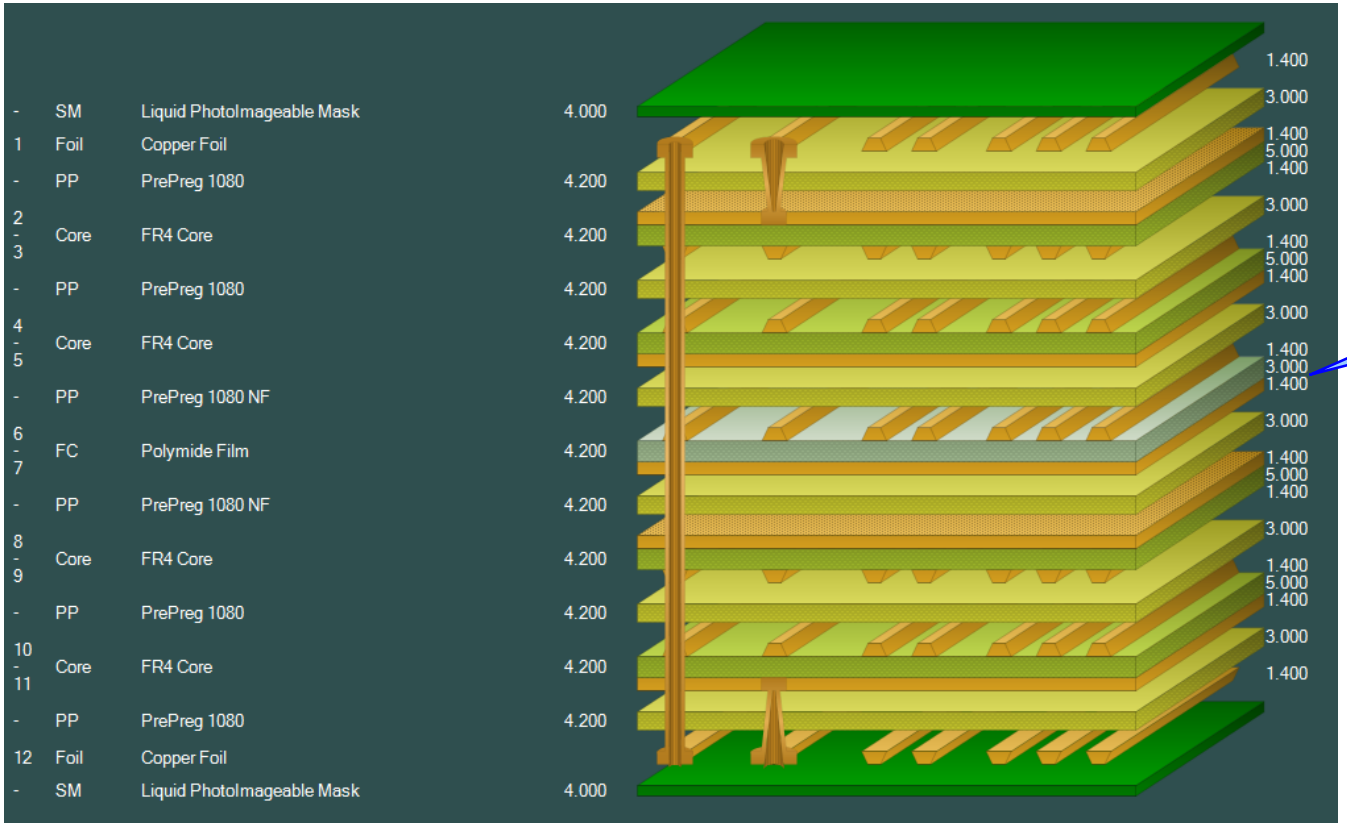
Step 2: Enabling the Speedstack Flex option

The Speedstack Flex Navigator option is a licensed add-on to Speedstack that can be enabled using the Tools menu Options, Licensing tab selection



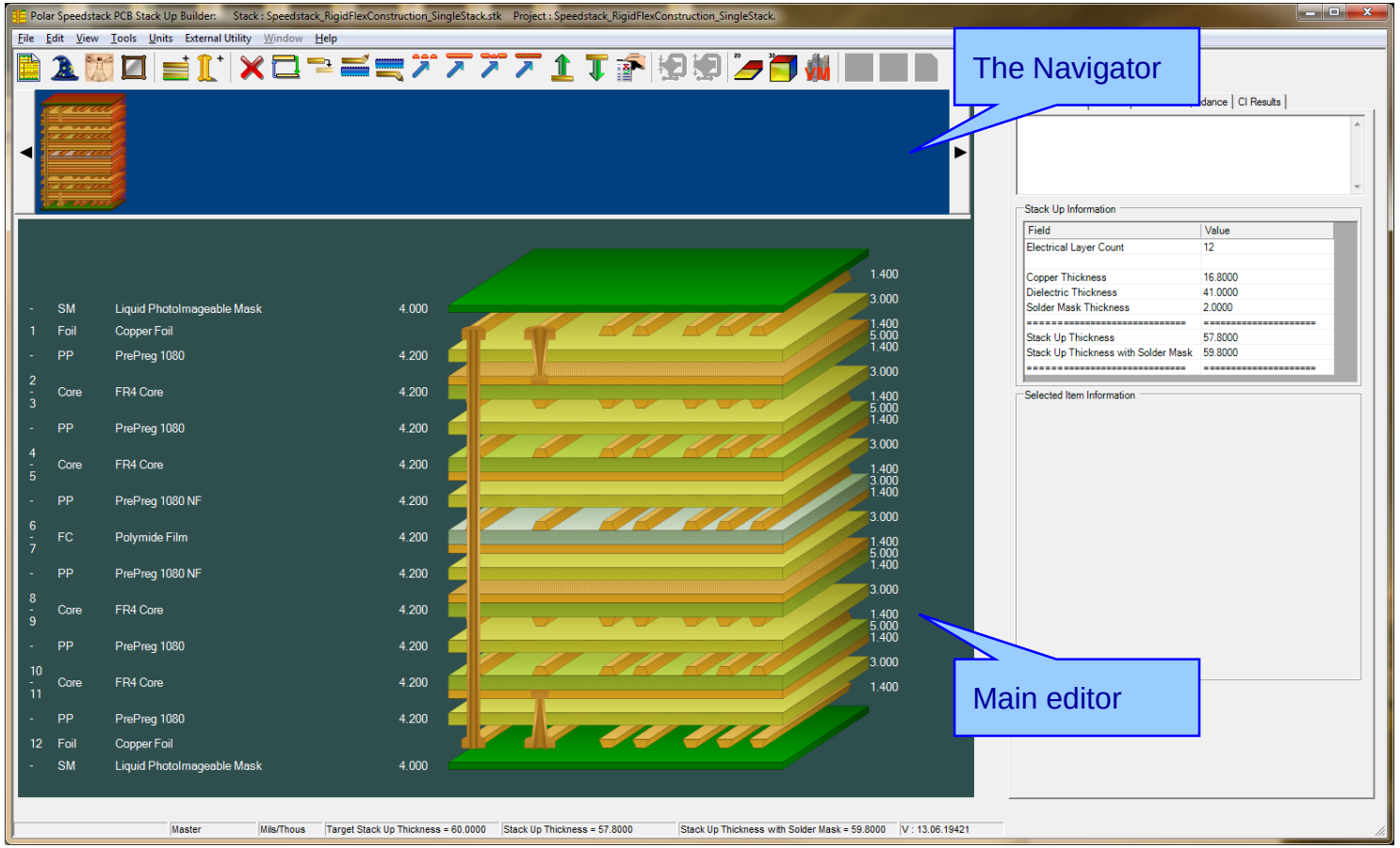
Step 3: Opening an existing single stackup project

Open the ‘Speedstack_RigidFlexConstruction_SingleStack.sci’ project file that has been supplied with this tutorial. Notice the flexible core material within the stack, shown in grey



Step 4: Opening the Navigator

From the View menu select the Open Navigator option. Notice that a small version of the current stack is displayed

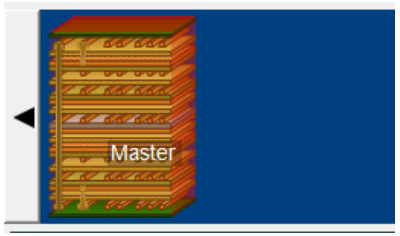


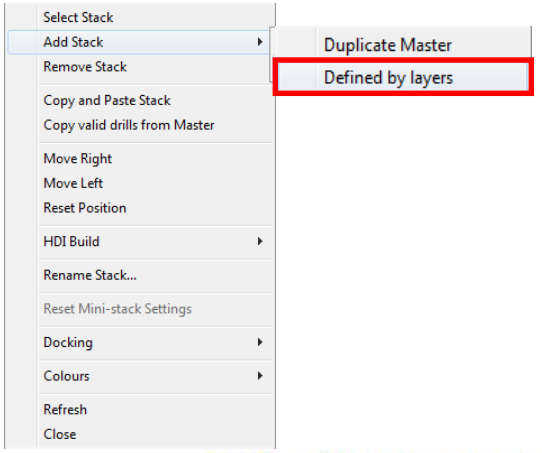
Step 5: Adding a sub-stack

The first stack of the construction is known as the ‘Master’ stack, in this case the 12 layer stack that is currently loaded. The electrical layer numbers of sub-stacks are determined from the Master stack, so this stackup should be created first.

To add a sub-stack:

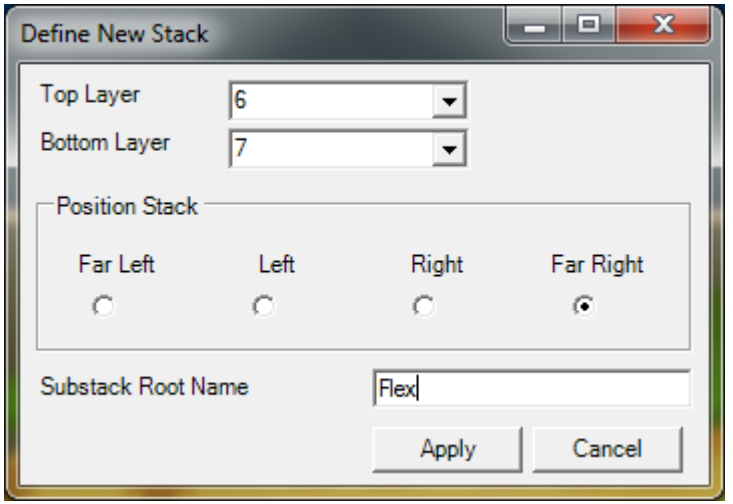
- Click on the ‘Master’ stack in the Navigator
- Use the right-click menu and select Add Stack | Define by layers

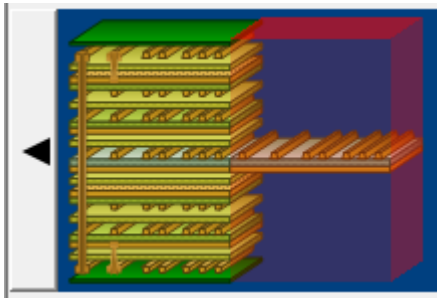




Step 5: Adding a sub-stack (continued)

- The Define New Stack dialog controls which materials in the Master are added to the new sub-stack. In this case just the flex core, layers 6 / 7
- The new sub-stack position is to be placed to the far-right of the existing stack
- The sub-stack name is called ‘Flex’
- Selecting ‘Apply’ will add the ‘Flex’ sub-stack, highlighted with a red background

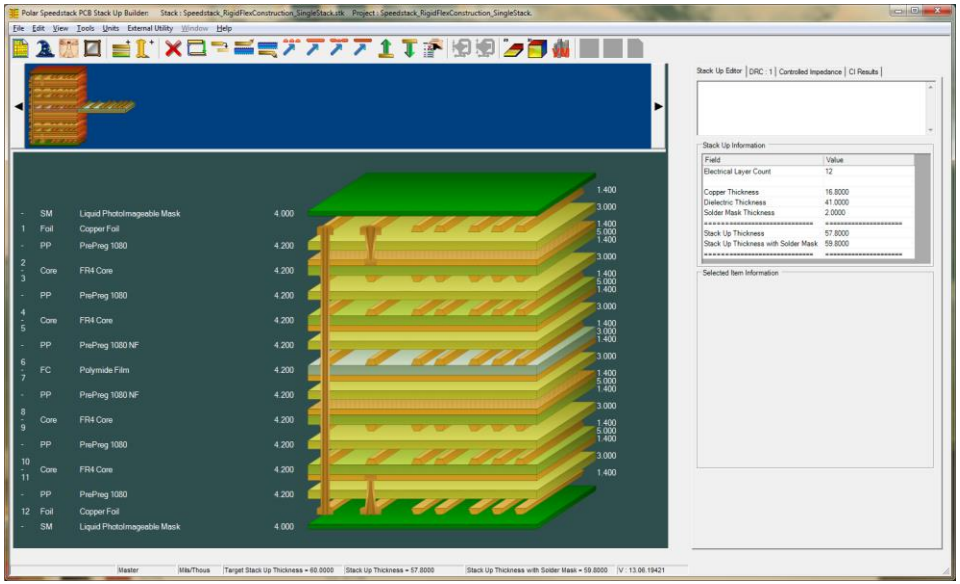




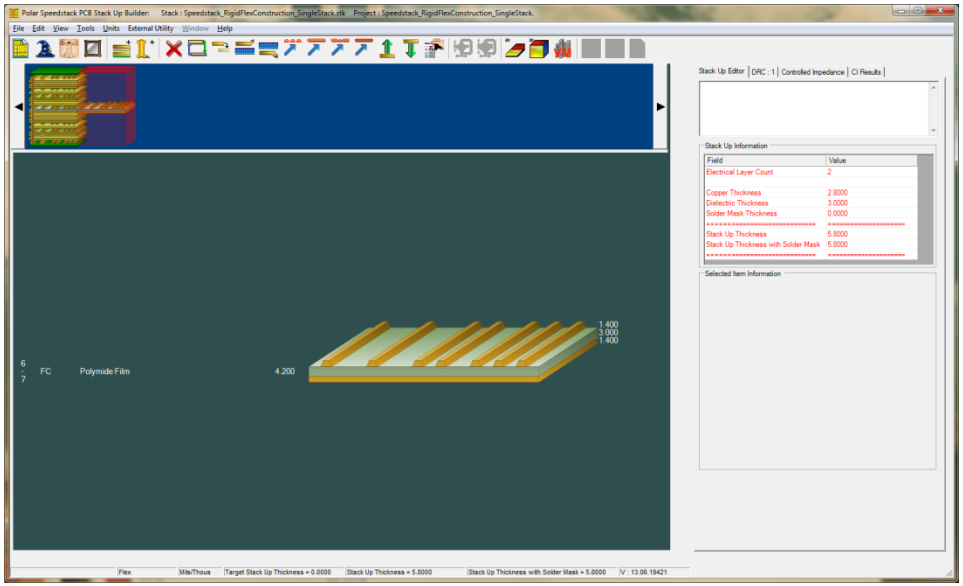
Step 5: Adding a sub-stack (continued)

At this point two stacks exist, the 12-layer Master stack and the 2-layer flex sub-stack. Clicking the stack in the Navigator will update the stack displayed in the main editor window.

12-layer Master stack



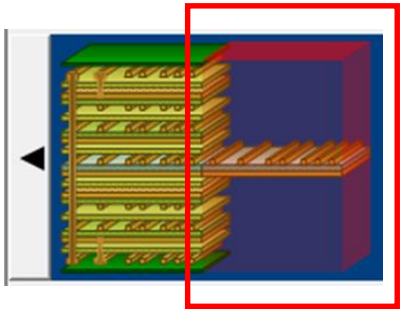
2-layer flex stack



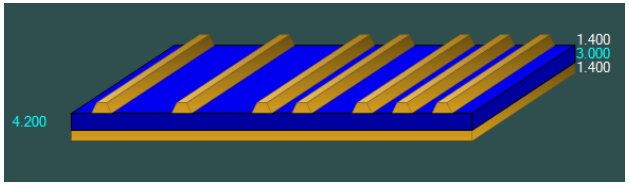
Step 6: Adding additional materials to the Flex sub-stack

Often it is necessary to add flex-specific materials to flexible sub-stacks. The following steps will add coverlays to the flex core

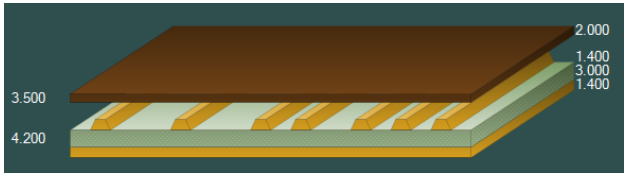
- Click on the Flex stack in the Navigator
- The Flex sub-stack will be displayed in the main editor window



- Select the flex core material, layers 6 / 7

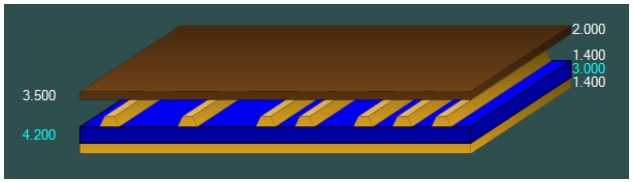


- From the right-click menu select Add | Coverlay and choose the top item from the list. Select Add Material Above 

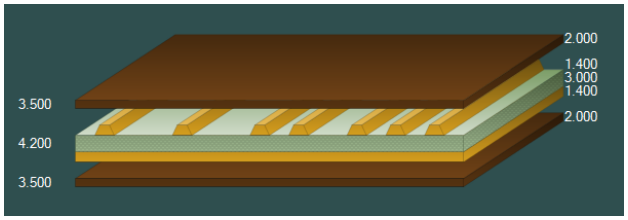


Step 6: Adding additional materials to the Flex sub-stack (cont'd)

- Select the flex core material, layers 6 / 7

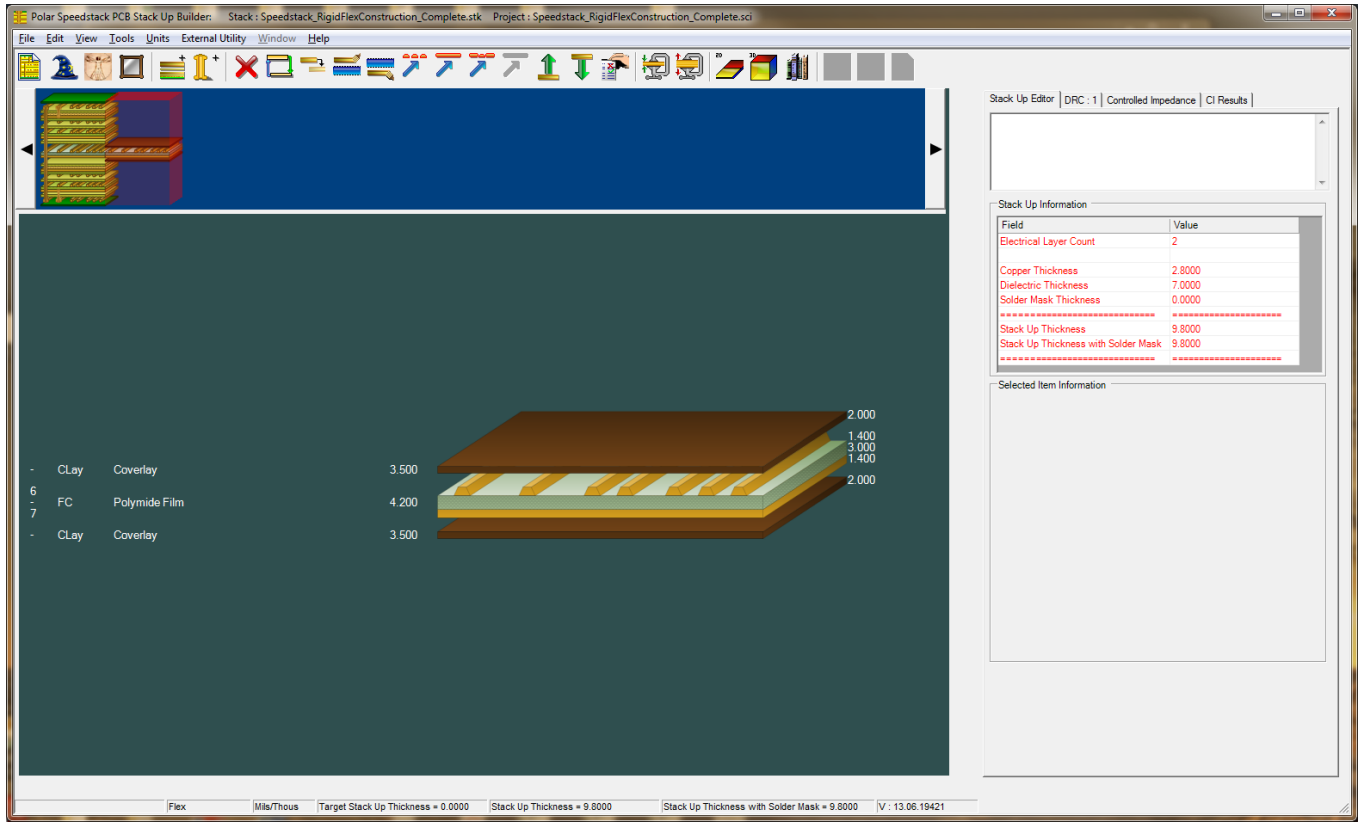


- From the right-click menu select Add | Coverlay and choose the top item from the list. Select Add Material Below 



Step 6: Adding additional materials to the Flex sub-stack (cont'd)

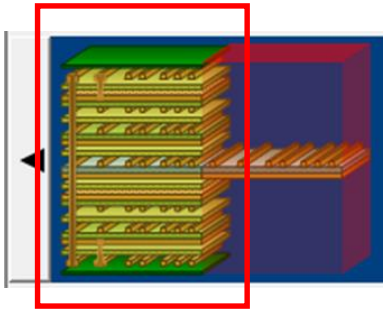
At this point the 2-layer flex sub-stack is complete as it contains a flex core with coverlay material above and below the exposed copper surfaces.



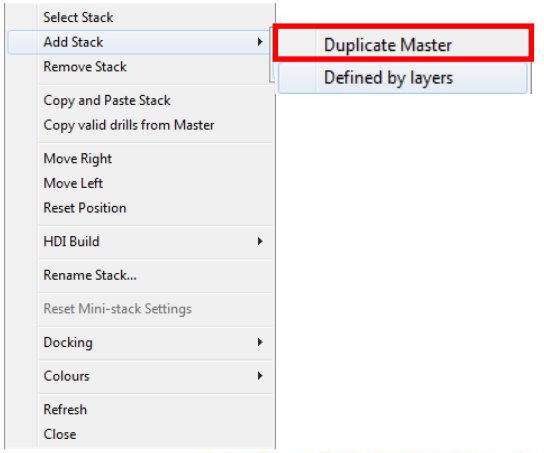
Step 7: Completing the rigid-flex construction

Many rigid-flex designs have a flexible circuit between two rigid stackups, a rigid – flex – rigid construction.

- Click on the Master stack in the Navigator

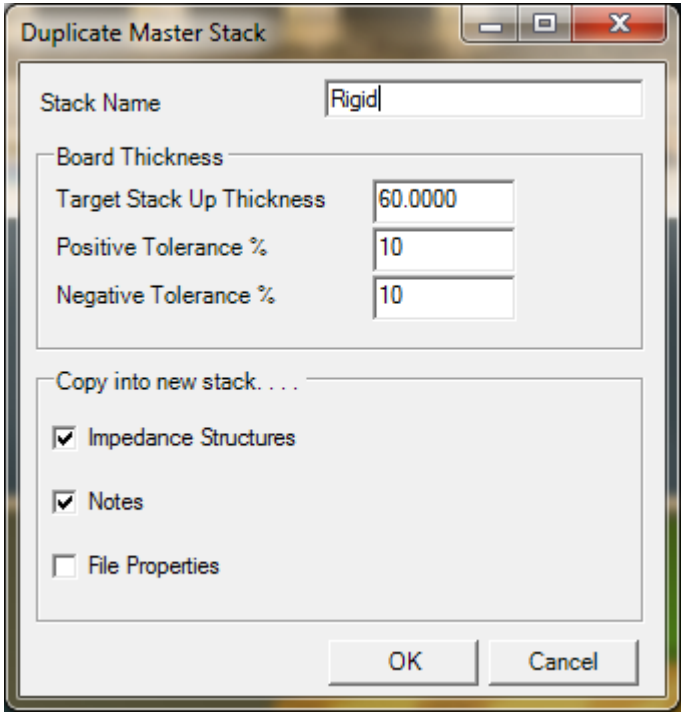


- Use the right-click menu and select Add Stack | Duplicate Master

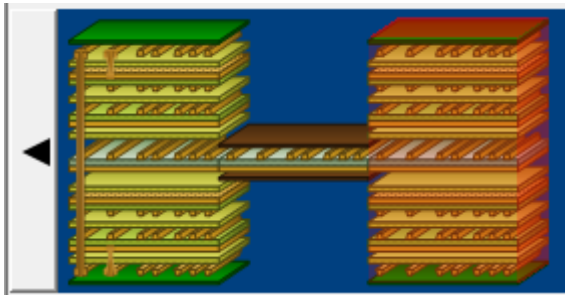


Step 7: Completing the rigid-flex construction (continued)

- The Duplicate Master Stack dialog allows the user to alter the properties of the new sub-stack. In this case the Stack Name is called ‘Rigid’. Selecting OK will add the duplicate stack

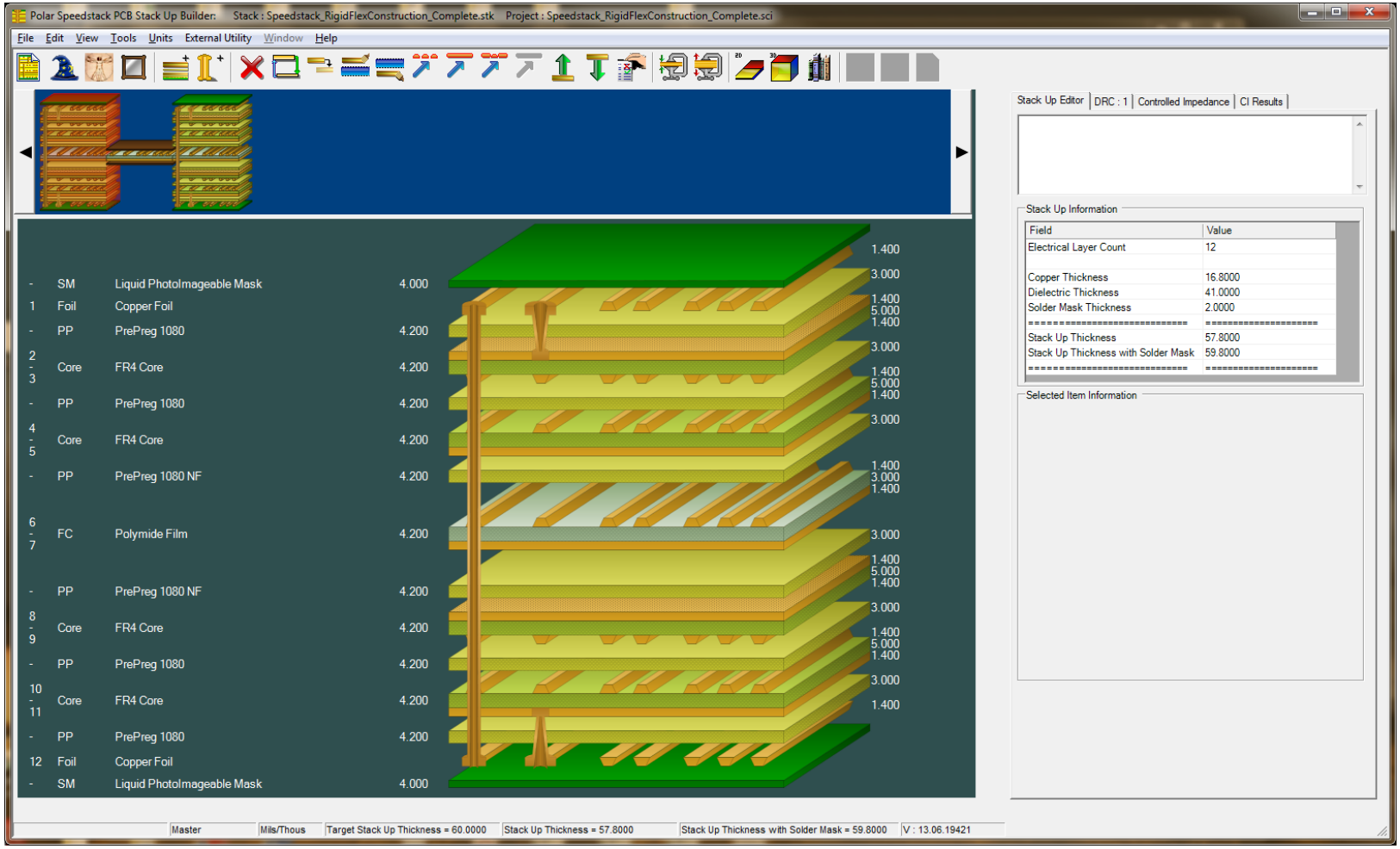


- The construction now contains an additional rigid sub-stack



Step 7: Completing the rigid-flex construction (continued)

The rigid – flex – rigid construction should now appear as follows



Step 8: Saving the Speedstack project

Now that a rigid-flex construction has been created we can save it

Use the File | Save Project As menu option and specify a filename

The filename will have a .SCI extension, recognisable by this icon 

Summary

At this point the rigid – flex – rigid construction is complete. Impedance structures may be added to each sub-stack, with the structure types being determined by the materials in each sub-stack.

The other tutorials in the series will guide you through the process of adding structures and generating technical reports.

If you have any questions please feel free to contact your local Polar office at: www.polarinstruments.com/distrib/international_offices.html

or contact us at polarcare@polarinstruments.com

Thanks again for using Speedstack.