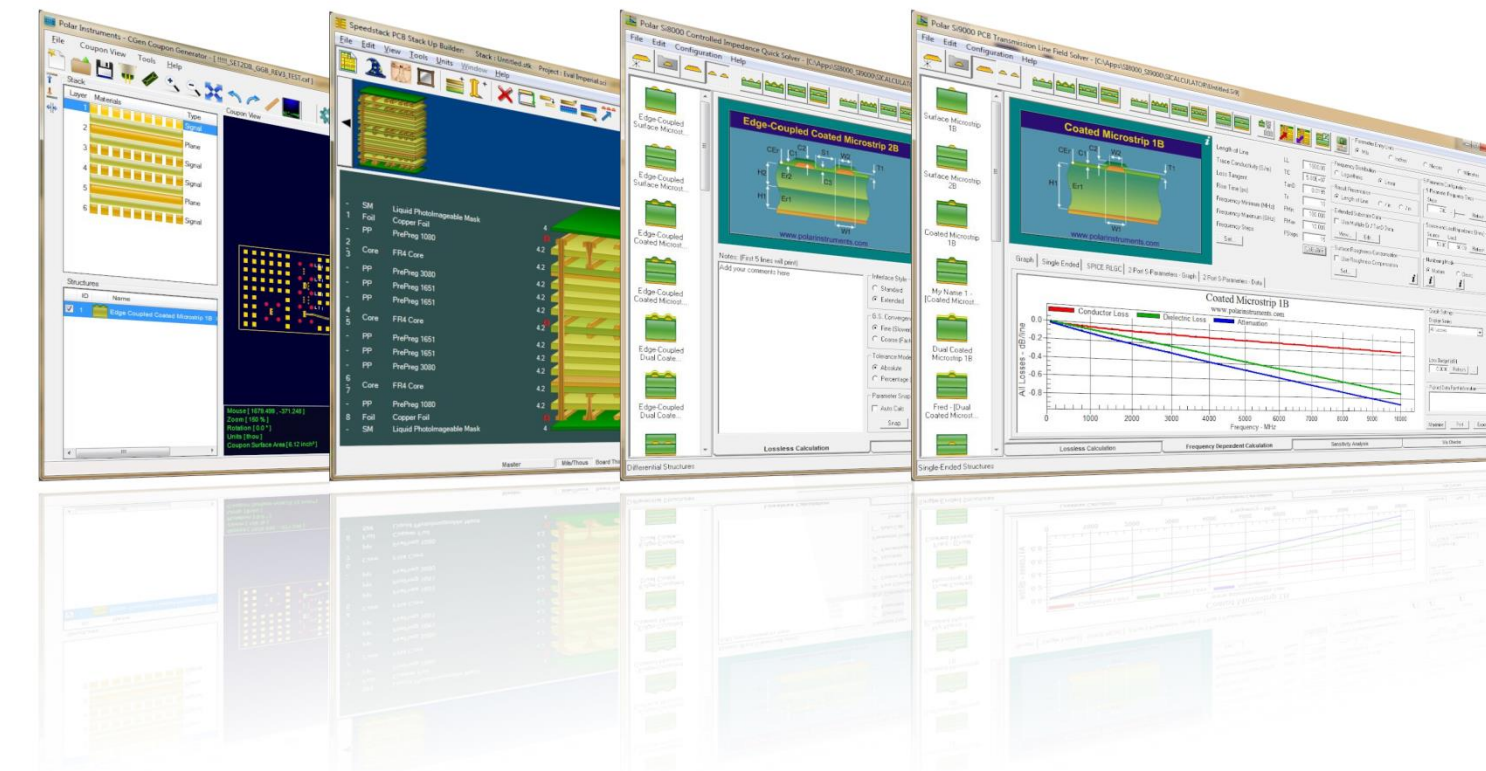
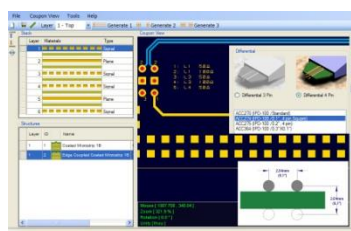
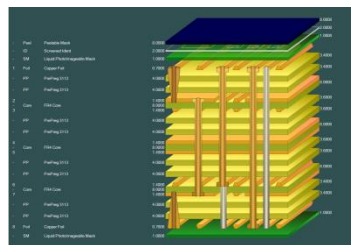
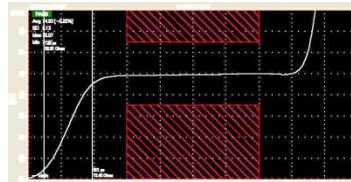
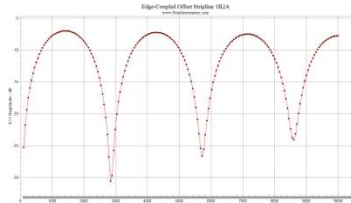
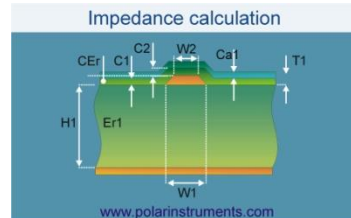




Richard Attrill – September 2022 (Rev 9)



Introducing the latest features of Speedstack

Welcome to a preview of Speedstack.

Since January 2021 we have released 10 versions of Speedstack, each introducing a number of new features that have been requested through our Polarcare software maintenance service.

These slides are arranged in a “newest first” format. A slide containing the version number and release date precedes information detailing the new features contained in each release.

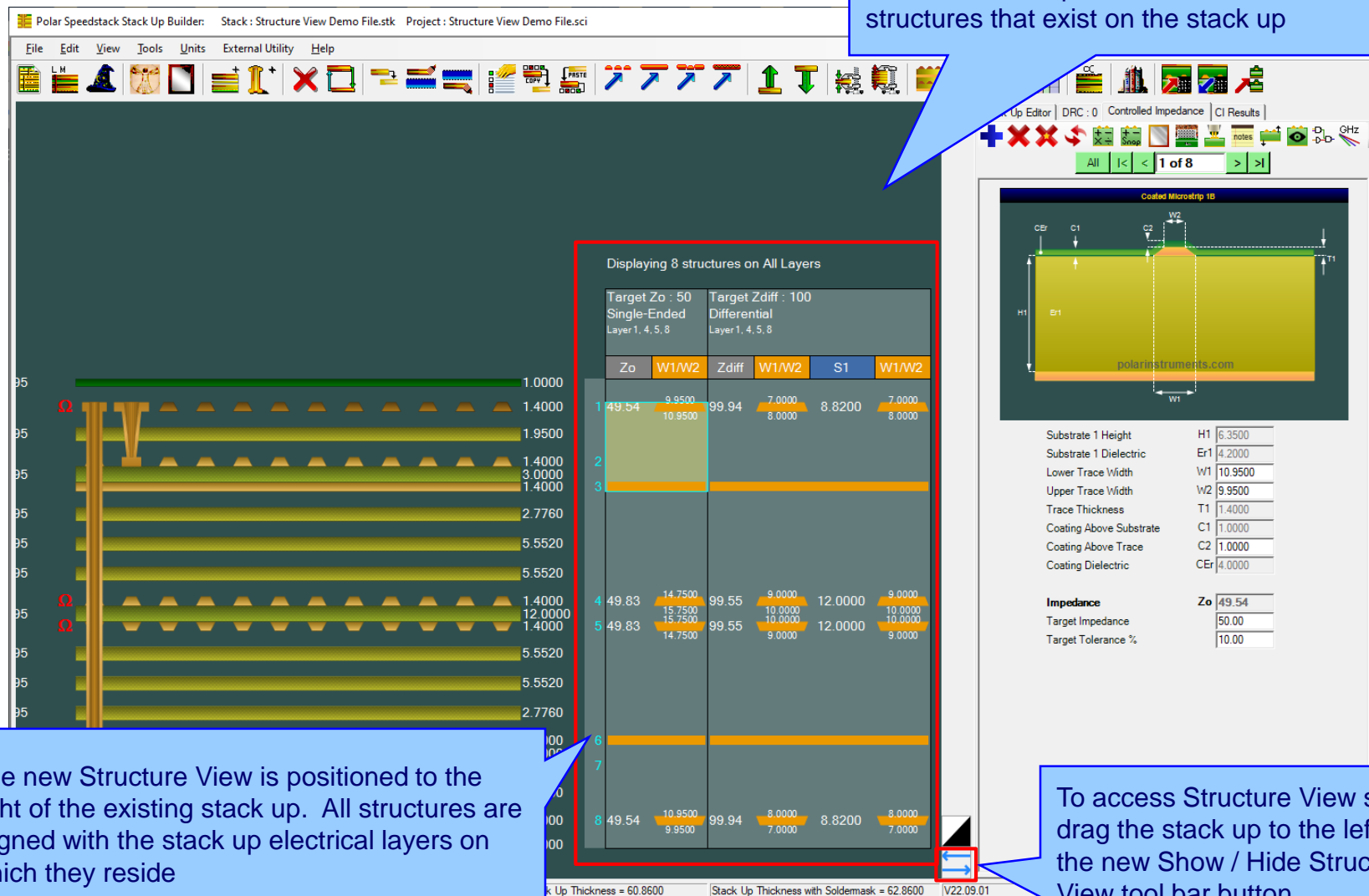
If you would like to have a web-based demonstration please contact your local Polar office, details are shown on the last slide of this presentation.

Please note: the Speedstack units have been set to Mils in the following screen grabs

Speedstack v22.09.01 (September 2022)

Introducing Structure View

Structure View presents a useful overview of the controlled impedance / insertion loss structures that exist on the stack up



The new Structure View is positioned to the right of the existing stack up. All structures are aligned with the stack up electrical layers on which they reside

To access Structure View simply drag the stack up to the left or use the new Show / Hide Structure View tool bar button

Introducing Structure View

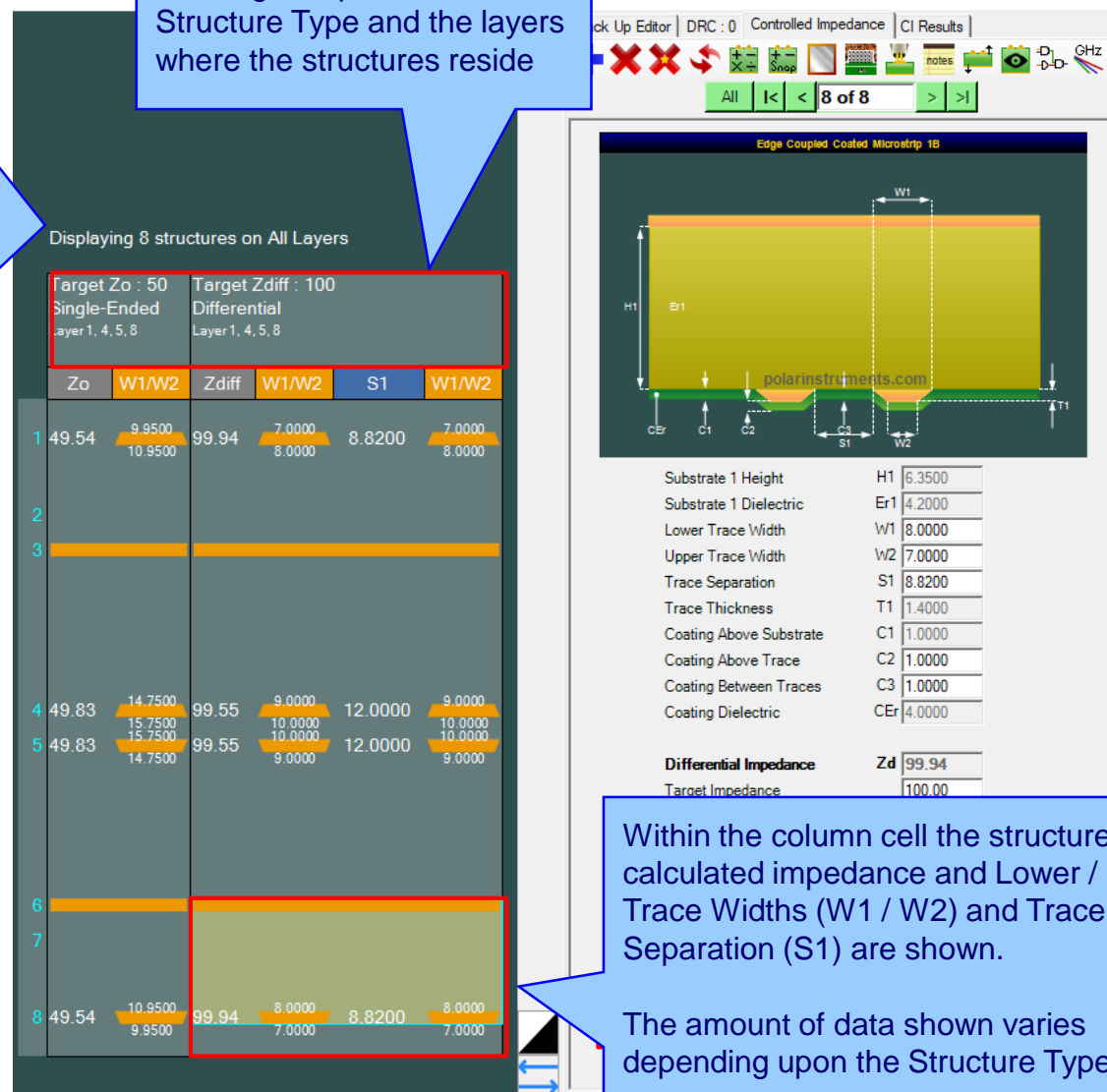
Structures are arranged by Target Impedance, low to high, then by Structure Type.

All structures of the same Target Impedance and Structure Type will be positioned in the same column

In this example there are 8 structures in total:

4 x 50 ohm singled-ended (column 1)
4 x 100 ohm differential (column 2)

The column header contains the Target Impedance, Structure Type and the layers where the structures reside



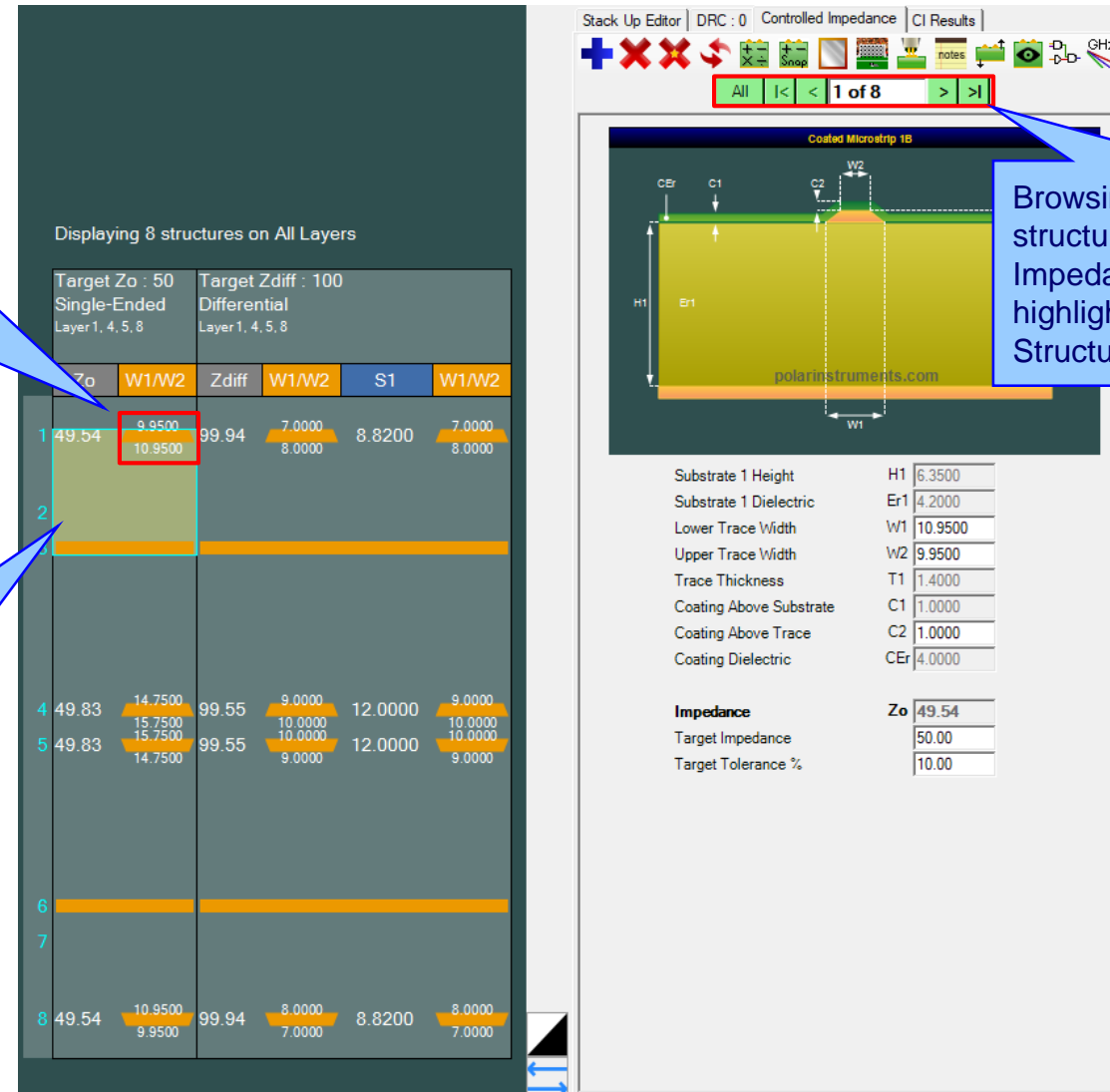
Within the column cell the structure calculated impedance and Lower / Upper Trace Widths (W1 / W2) and Trace Separation (S1) are shown.

The amount of data shown varies depending upon the Structure Type

Introducing Structure View

Structure View is interactive. Clicking on the golden trace will auto-switch to that structure on the Controlled Impedance tab

The transparent blue highlight reflects the current structure selected on the Controlled Impedance tab



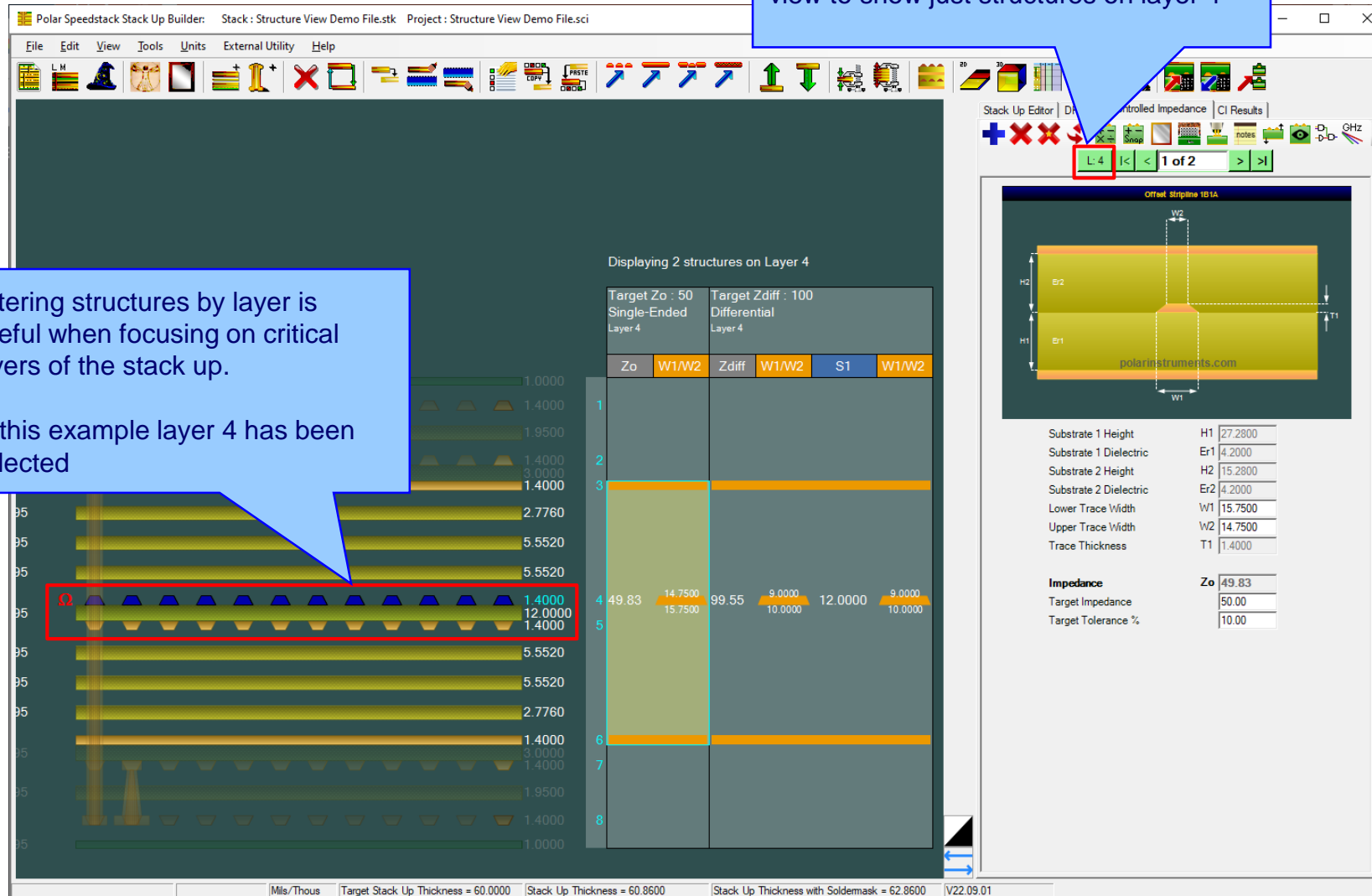
Browsing through the structures on the Controlled Impedance tab will auto highlight the structure on Structure View

Introducing Structure View

Clicking the 'Filter by Layer' updates the view to show just structures on layer 4

Filtering structures by layer is useful when focusing on critical layers of the stack up.

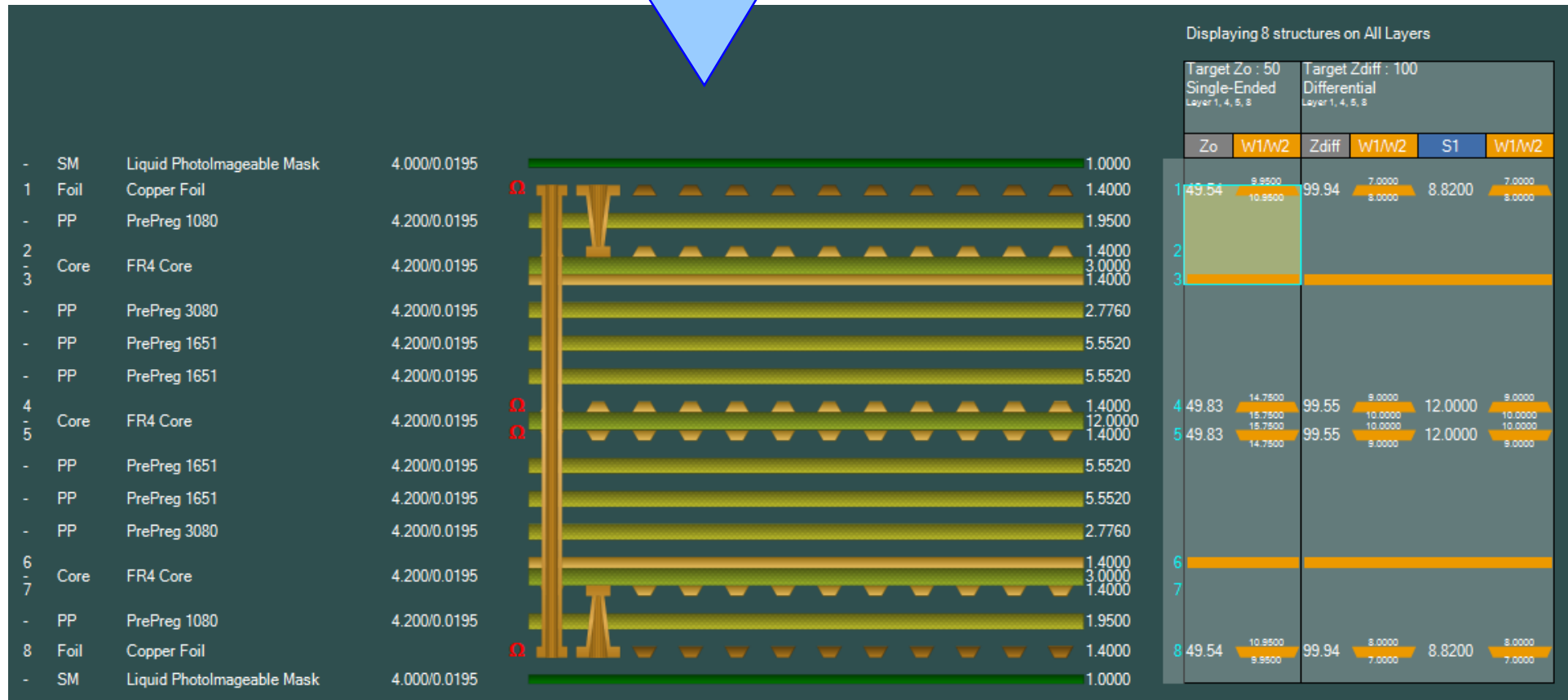
In this example layer 4 has been selected



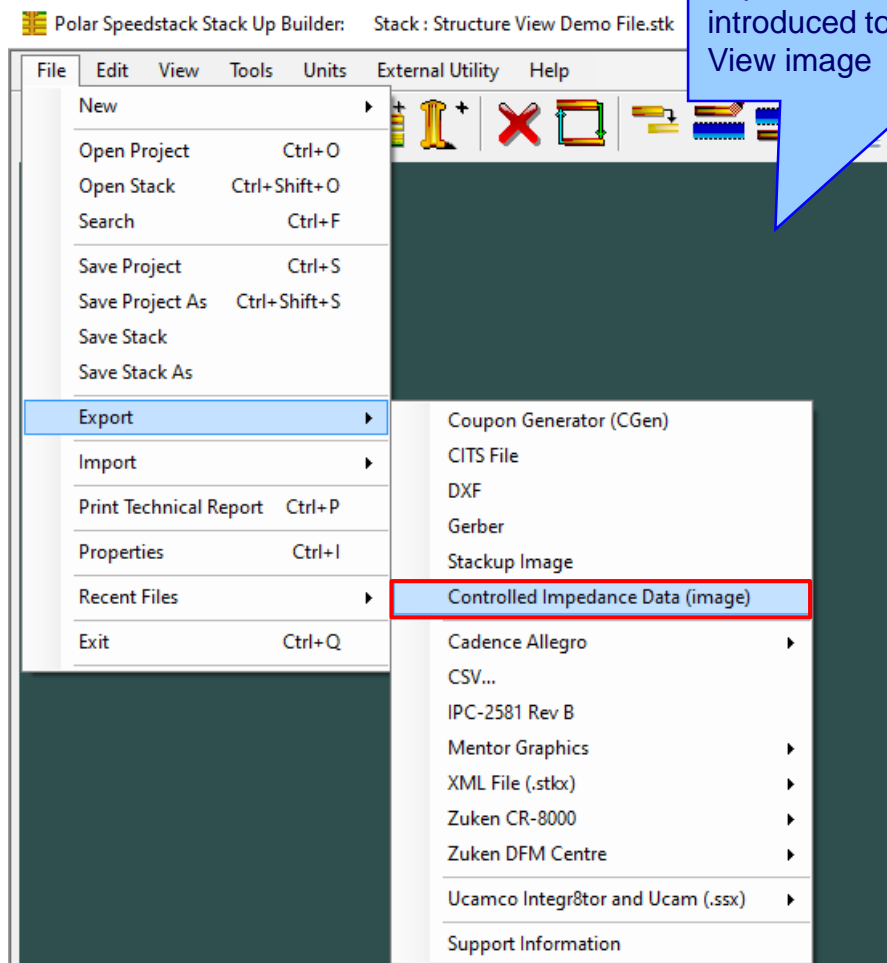
Introducing Structure View

Use the mouse wheel to zoom out and show the complete stack up together with the structures.

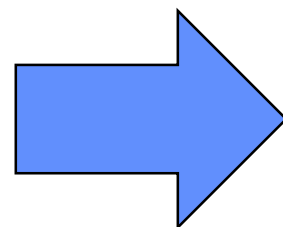
All data is now visible in one view



Introducing Structure View



A new File | Export | Controlled Impedance Data option has been introduced to export the Structure View image



Displaying 8 structures on All Layers

Target Zo : 50 Single-Ended Layer 1, 4, 5, 8		Target Zdiff : 100 Differential Layer 1, 4, 5, 8			
Zo	W1/W2	Zdiff	W1/W2	S1	W1/W2
1 49.54	9.9500 10.9500	99.94	7.0000 8.0000	8.8200	7.0000 8.0000
2					
3					
4 49.83	14.7500 15.7500 15.7500	99.55	9.0000 10.0000 10.0000	12.0000	9.0000 10.0000 10.0000
5 49.83	14.7500	99.55	9.0000	12.0000	9.0000
6					
7					
8 49.54	10.9500 9.9500	99.94	8.0000 7.0000	8.8200	8.0000 7.0000

Online Library enhancements

Online Library

Filter by Supplier

南亞塑膠
NAN YA PLASTICS

nelco
Subsidiary of Park Electrochemical Corp.

OAK-MITSUI TECHNOLOGIES
MITSUBISHI KAWASU GROUP

Panasonic

File Type

Foils
RCCs
PrePregs
Cores
SolderMasks
Idents
Peelables
Coverlays
BondPly
Adhesives
FlexCores
Shields

Filter by Frequency

☒ All
☐ 1 GHz ☐ 20 GHz ☐ 50 GHz

Library Files Available : OakMitsui

Oak Mitsui_FaradFlex_MC12M_1GHz_2201.mlbx
Oak Mitsui_FaradFlex_MC12M_1MHz_2201.mlbx
Oak Mitsui_FaradFlex_MC12TM_1GHz_2201.mlbx
Oak Mitsui_FaradFlex_MC12TM_1MHz_2201.mlbx
Oak Mitsui_FaradFlex_MC24M_1GHz_2201.mlbx
Oak Mitsui_FaradFlex_MC24M_1MHz_2201.mlbx
Oak Mitsui_FaradFlex_MC24P_1MHz_2201.mlbx
Oak Mitsui_FaradFlex_MC8M_1GHz_2201.mlbx
Oak Mitsui_FaradFlex_MC8M_1MHz_2201.mlbx
Oak Mitsui_FaradFlex_MC8TM_1GHz_2201.mlbx
Oak Mitsui_FaradFlex_MC8TM_1MHz_2201.mlbx

Library Files Downloaded during this session

Existing Data Table

☐ Clear
☒ Append

Download
Close

Clear - use this option to clear data from the existing library data table and download a single library

Append - use this option to add data to the existing library data table and when downloading multiple libraries during a single session

File Access Mode

☒ Online Polar Library (<ftp://polarinstruments.com>)
☐ On-Premise Mode [Application Note](#)

C:\Users\vicha\Desktop\Material_Library_2021 [Browse...](#)

Please Note: This data is accurate to the best of our knowledge, however it is provided, as is from our Material supplier partners. Please feedback any errors or inaccuracies to Polarcare and we will contact the material partner for clarification or rectification.

Oak-Mitsui have recently joined the Polar Material Partner program

Speedstack v22.07.20 (July 2022)

Introducing Grid View

Grid View presents the current stack up in an editable data grid form to allow for easy editing of multiple materials from a single dialog

Grid View

Stack Up Collection Index	Material Class	Material Element	Electrical Layer	Material Layer Type ID	Layer Name	Description	Processed Thickness	Dielectric Constant	Loss Tangent
0	CSTSolderMask	Mask		SM		Liquid PhotoImageable Mask	1.0000	4.0000	0.0195
1	CSTFoil	Copper	1	Foil	Top	Copper Foil	1.4000		
2	CSTPrePreg	Dielectric		PP		PrePreg 1080	1.9500	4.2000	0.0195
3	CSTCore	UpperCopper	2		Inner 2		1.4000		
3	CSTCore	Dielectric		Core		FR4 Core	3.0000	4.2000	0.0195
3	CSTCore	LowerCopper	3		Inner 3		1.4000		
4	CSTPrePreg	Dielectric		PP		PrePreg 3080	2.7760	4.2000	0.0195
5	CSTPrePreg	Dielectric		PP		PrePreg 1651	5.5520	4.2000	0.0195
6	CSTPrePreg	Dielectric		PP		PrePreg 1651	5.5520	4.2000	0.0195
7	CSTCore	UpperCopper	4		Inner 4		1.4000		
7	CSTCore	Dielectric		Core		FR4 Core	12.0000	4.2000	0.0195
7	CSTCore	LowerCopper	5		Inner 5		1.4000		
8	CSTPrePreg	Dielectric		PP		PrePreg 1651	5.5520	4.2000	0.0195
9	CSTPrePreg	Dielectric		PP		PrePreg 1651	5.5520	4.2000	0.0195
10	CSTPrePreg	Dielectric				PrePreg 3080	2.7760	4.2000	0.0195
11	CSTCore	UpperCopper			Inner 6		1.4000		
						FR4 Core	3.0000	4.2000	0.0195
					Inner 7		1.4000		
						PrePreg 1080	1.9500	4.2000	0.0195
					Bottom	Copper Foil	1.4000		
						Liquid PhotoImageable Mask	1.0000	4.0000	0.0195

Grid View allows for quick editing of key stack up information such as Material Description, Processed Thickness, Dielectric Constant and Loss Tangent.

The stack up data from Grid View can also be edited in Microsoft Excel using the Grid View copy and paste functions

Changes in Grid View can be saved back to the original stack up design

Apply Cancel

Introducing Grid View

Grid View

NOTE: In order to preserve stack integrity – some fields are locked.

Stack Up Collection Index	Material Class	Material Element	Electrical Layer	Material Type	Layer Name, Description	Processed Thickness	Dielectric Constant	Loss Tangent
0	CSTSolderMask	Mask		SM		1.0000	4.0000	0.0195
1	CSTFoil	Copper	1	Foil		1.4000		
2	CSTPrePreg	Dielectric		PP		1.9500	4.2000	0.0195
3	CSTCore	UpperCopper	2		Inner 2	1.4000		
3	CSTCore	Dielectric		Core	FR4 Core	3.0000	4.2000	0.0195
3	CSTCore	LowerCopper	3		Inner 3	1.4000		
4	CSTPrePreg	Dielectric		PP	PrePreg 3080	2.7760	4.2000	0.0195
5	CSTPrePreg	Dielectric		PP	PrePreg 1651	5.5520	4.2000	0.0195
6	CSTPrePreg	Dielectric		PP	PrePreg 1651	5.5520	4.2000	0.0195
7	CSTCore	UpperCopper	4		Inner 4	1.4000		
7	CSTCore	Dielectric		Core	FR4 Core	12.0000	4.2000	0.0195
7	CSTCore	LowerCopper	5		Inner 5	1.4000		
8	CSTPrePreg	Dielectric		PP	PrePreg 1651	5.5520	4.2000	0.0195
9	CSTPrePreg	Dielectric		PP	PrePreg 1651	5.5520	4.2000	0.0195
10	CSTPrePreg	Dielectric		PP	PrePreg 3080	2.7760	4.2000	0.0195
11	CSTCore	UpperCopper	6		Inner 6	1.4000		
11	CSTCore	Dielectric		Core	FR4 Core	3.0000	4.2000	0.0195
11	CSTCore	LowerCopper	7		Inner 7	1.4000		
12	CSTPrePreg	Dielectric		PP	PrePreg 1080	1.9500	4.2000	0.0195
13	CSTFoil	Copper	8	Foil	Bottom	1.4000		
14	CSTSolderMask	Mask		SM	Liquid PhotoImageable Mask	1.0000	4.0000	0.0195

Use the right-click menu to copy / paste the Grid View to the clipboard - the data may then be edited with Excel
 Layer Name, Description, Processed Thickness, Dielectric Constant and Loss Tangent columns are editable, other columns are read-only
 Processed Thickness = Copper.FinishedThickness, Dielectric.IsolationDistance, SolderMask.MaskThickness, Coverlay.FinishedThickness

Apply Cancel

Introducing Grid View

Grid View has many uses, some are highlighted here:

1. Key information for the whole stack up can be edited from a single dialog / screen
2. If changes to the original stack up design are made by the fabricator during the manufacturing stage, these can be quickly evaluated by updating the Processed Thickness, Dielectric Constant and Loss Tangent cells. The impact of these changes on stack up thickness, controlled impedance and insertion loss calculations can then be quickly evaluated
3. Plated layer thicknesses can be adjusted quickly and easily
4. Layer Names can be quickly assigned to electrical layers

Stack Up Collection Index	Material Class	Material Element	Electrical Layer	Material Layer Type ID	Layer Name	Processed Thickness	Dielectric Constant	Loss Tangent
0	CSTSolderMask	Mask		SM				
1	CSTFoil	Copper	1	Foil	Top		4.0000	0.0195
2	CSTPrePreg	Dielectric		PP			4.2000	0.0195
3	CSTCore	UpperCopper	2		Inner			
3	CSTCore	Dielectric		Core			4.2000	0.0195
3	CSTCore	LowerCopper	3		Inner			
4	CSTPrePreg	Dielectric		PP			4.2000	0.0195
5	CSTPrePreg	Dielectric		PP			4.2000	0.0195
6	CSTPrePreg	Dielectric		PP		5.5520	4.2000	0.0195
7	CSTCore	UpperCopper	4		Inner 4	1.4000		
7	CSTCore	Dielectric		Core		FR4 Core	12.0000	4.2000
7	CSTCore	LowerCopper	5		Inner 5	1.4000		
8	CSTPrePreg	Dielectric		PP		PrePreg 1651	5.5520	4.2000
9	CSTPrePreg	Dielectric		PP		PrePreg 1651	5.5520	4.2000
10	CSTPrePreg	Dielectric		PP		PrePreg 3080	2.7760	4.2000
11	CSTCore	UpperCopper	6		Inner 6	1.4000		
11	CSTCore	Dielectric		Core		FR4 Core	3.0000	4.2000
11	CSTCore	LowerCopper	7		Inner 7	1.4000		
12	CSTPrePreg	Dielectric		PP		PrePreg 1080	1.9500	4.2000
13	CSTFoil	Copper	8	Foil	Bottom	Copper Foil	1.4000	
14	CSTSolderMask	Mask		SM		Liquid Photoimageable Mask	1.0000	4.0000

Use the right-click menu to copy / paste the Grid View to the clipboard - the data may then be edited with Excel
 Layer Name, Description, Processed Thickness, Dielectric Constant and Loss Tangent columns are editable, other columns are read-only
 Processed Thickness = Copper.FinishedThickness, Dielectric.IsolationDistance, SolderMask.MaskThickness, Coverlay.FinishedThickness

Apply Cancel

Grid View – Walkthrough Step #1

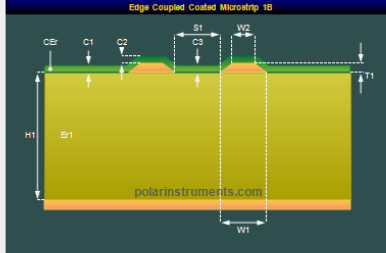
Polar Speedstack Stack Up Builder: Stack: Eval Imperial.stk Project: Eval Imperial.sci

File Edit View Tools Units External Utility Help

Stack Up Editor | DRC: 0 | Controlled Impedance | CI Results

All | 1 of 4 | >1

Edge Coupled Coated Microstrip 1B



SM	Liquid PhotoImageable Mask	4.000/0.0195	1.0000
1	Foil	Copper Foil	1.4000
PP	PrePreg 1080	4.200/0.0195	1.9500
2	Core	FR4 Core	1.4000
3	Core	FR4 Core	3.0000
PP	PrePreg 3080	4.200/0.0195	2.7760
PP	PrePreg 1651	4.200/0.0195	5.5520
PP	PrePreg 1651	4.200/0.0195	5.5520
4	Core	FR4 Core	1.4000
5	Core	FR4 Core	12.0000
PP	PrePreg 1651	4.200/0.0195	5.5520
PP	PrePreg 1651	4.200/0.0195	5.5520
PP	PrePreg 3080	4.200/0.0195	2.7760
6	Core	FR4 Core	1.4000
7	Core	FR4 Core	3.0000
PP	PrePreg 1080	4.200/0.0195	1.9500
8	Foil	Copper Foil	1.4000
SM	Liquid PhotoImageable Mask	4.000/0.0195	1.0000

Substrate 1 Height H1 6.3500
 Substrate 1 Dielectric Er1 4.2000
 Lower Trace Width W1 7.6500
 Upper Trace Width W2 6.6500
 Trace Separation S1 8.1150
 Trace Thickness T1 1.4000
 Coating Above Substrate C1 1.0000
 Coating Above Trace C2 1.0000
 Coating Between Traces C3 1.0000
 Coating Dielectric CEr 4.0000

Differential Impedance Zd 100.29
 Target Impedance 100.00
 Target Tolerance % 10.00

Mils/Thous | Target Stack Up Thickness = 60.0000 | Stack Up Thickness = 60.8600 | Stack Up Thickness with Soldermask = 62.8600 | V22.07.20

Step #1
 An 8 layer stack up is loaded into the Speedstack editor. To examine and edit this stack up in Grid View select the new toolbar button

Grid View – Walkthrough Step #2

Grid View

Stack Up Collection Index	Material Class	Material Element	Electrical Layer	Material Layer Type ID	Layer Name	Description	Processed Thickness	Dielectric Constant	Loss Tangent
0	CSTSolderMask	Mask		SM		Liquid PhotoImageable Mask	1.0000	4.0000	0.0195
1	CSTFoil	Copper	1	Foil	Top	Copper Foil	1.4000		
2	CSTPrePreg	Dielectric		PP		PrePreg 1080	1.9500	4.2000	0.0195
3	CSTCore	UpperCopper	2		Inner 2		1.4000		
3	CSTCore	Dielectric		Core		FR4 Core	3.0000	4.2000	0.0195
3	CSTCore	LowerCopper	3		Power		1.4000		
4	CSTPrePreg	Dielectric		PP		PrePreg 3080	2.5000	4.2000	0.0195
5	CSTPrePreg	Dielectric		PP		PrePreg 1651	2.5000	4.2000	0.0195
6	CSTPrePreg	Dielectric		PP		PrePreg 1651	6.0000	4.2000	0.0195
7	CSTCore	UpperCopper	4		Inner 4		1.4000		
7	CSTCore	Dielectric		Core		FR4 Core	12.0000	4.2000	0.0195
7	CSTCore	LowerCopper	5		Inner 5		1.4000		
8	CSTPrePreg	Dielectric		PP		PrePreg 1651	6.0000	4.2000	0.0195
9	CSTPrePreg	Dielectric		PP		PrePreg 1651	6.0000	4.2000	0.0195
10	CSTPrePreg	Dielectric		PP		PrePreg 3080	2.5000	4.2000	0.0195
11	CSTCore	UpperCopper	6		Ground		1.4000		
11	CSTCore	Dielectric		Core		FR4 Core	3.0000	4.2000	0.0195
11	CSTCore	LowerCopper	7		Inner 7		1.4000		
12	CSTPrePreg	Dielectric		PP		PrePreg 1080	1.9500	4.2000	0.0195
13	CSTFoil	Copper	8	Foil	Bottom	Copper Foil	1.4000		
14	CSTSolderMask	Mask		SM		Liquid PhotoImageable Mask	1.0000	4.0000	0.0195

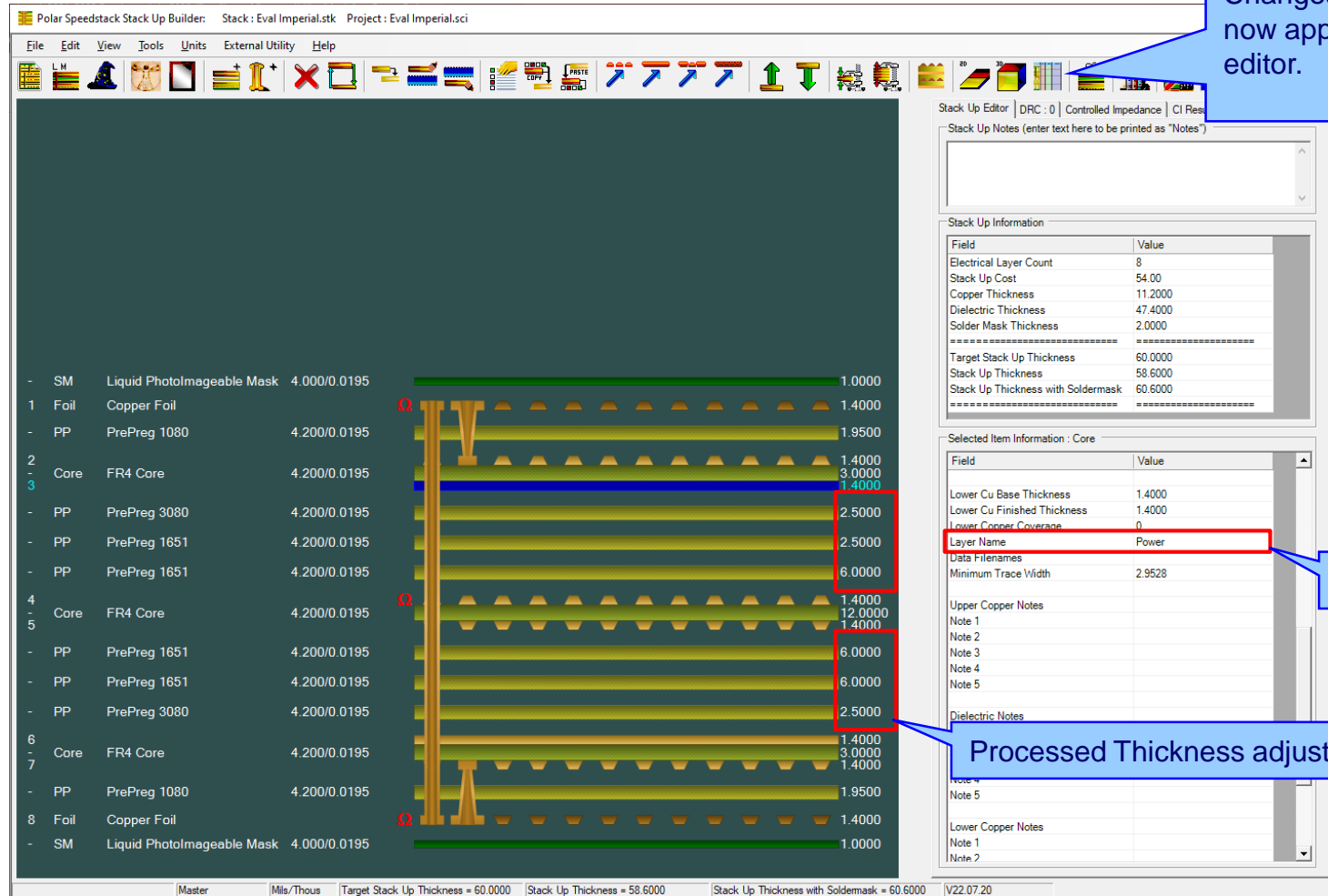
Use the right-click menu to copy / paste the Grid View to the clipboard - the data may then be edited with Excel
 Layer Name, Description, Processed Thickness, Dielectric Constant and Loss Tangent columns are editable, other columns are read only
 Processed Thickness = Copper.FinishedThickness, Dielectric.IsolationDistance, SolderMask.MaskThickness, Coverlay.FinishedThickness

Apply Cancel

Step #2
Using the Grid View editor the following cells are amended. Layer Names have been changed and Processed Thickness adjusted

Selecting Apply will save the changes back to the stack up editor

Grid View – Walkthrough Step #3



The screenshot shows the Polar Speedstack Stack Up Builder interface. The main window displays a grid view of the stack up layers. The layers are listed on the left, and the grid shows the physical layout of the stack up. The right panel shows the Stack Up Information and Selected Item Information.

Stack Up Information:

Field	Value
Electrical Layer Count	8
Stack Up Cost	54.00
Copper Thickness	11.2000
Dielectric Thickness	47.4000
Solder Mask Thickness	2.0000
Target Stack Up Thickness	60.0000
Stack Up Thickness	58.6000
Stack Up Thickness with Soldermask	60.6000

Selected Item Information : Core:

Field	Value
Lower Cu Base Thickness	1.4000
Lower Cu Finished Thickness	1.4000
Lower Copper Coverage	0
Layer Name	Power
Data Filenames	
Minimum Trace Width	2.9528
Upper Copper Notes	
Note 1	
Note 2	
Note 3	
Note 4	
Note 5	
Dielectric Notes	
Note 1	
Note 2	
Lower Copper Notes	
Note 1	
Note 2	

The grid view shows the following layers (from top to bottom):

- SM Liquid Photoimageable Mask 4.000/0.0195 1.0000
- 1 Foil Copper Foil 1.4000
- PP PreReg 1080 4.200/0.0195 1.9500
- 2 Core FR4 Core 4.200/0.0195 3.0000
- 3 Core FR4 Core 4.200/0.0195 1.4000
- PP PreReg 3080 4.200/0.0195 2.5000
- PP PreReg 1651 4.200/0.0195 2.5000
- PP PreReg 1651 4.200/0.0195 6.0000
- 4 Core FR4 Core 4.200/0.0195 12.0000
- 5 Core FR4 Core 4.200/0.0195 1.4000
- PP PreReg 1651 4.200/0.0195 6.0000
- PP PreReg 1651 4.200/0.0195 6.0000
- PP PreReg 3080 4.200/0.0195 2.5000
- 6 Core FR4 Core 4.200/0.0195 1.4000
- 7 Core FR4 Core 4.200/0.0195 3.0000
- 8 Foil Copper Foil 1.4000
- SM Liquid Photoimageable Mask 4.000/0.0195 1.0000

The status bar at the bottom shows: Master | Mis/Thous | Target Stack Up Thickness = 60.0000 | Stack Up Thickness = 58.6000 | Stack Up Thickness with Soldermask = 60.6000 | V22.07.20

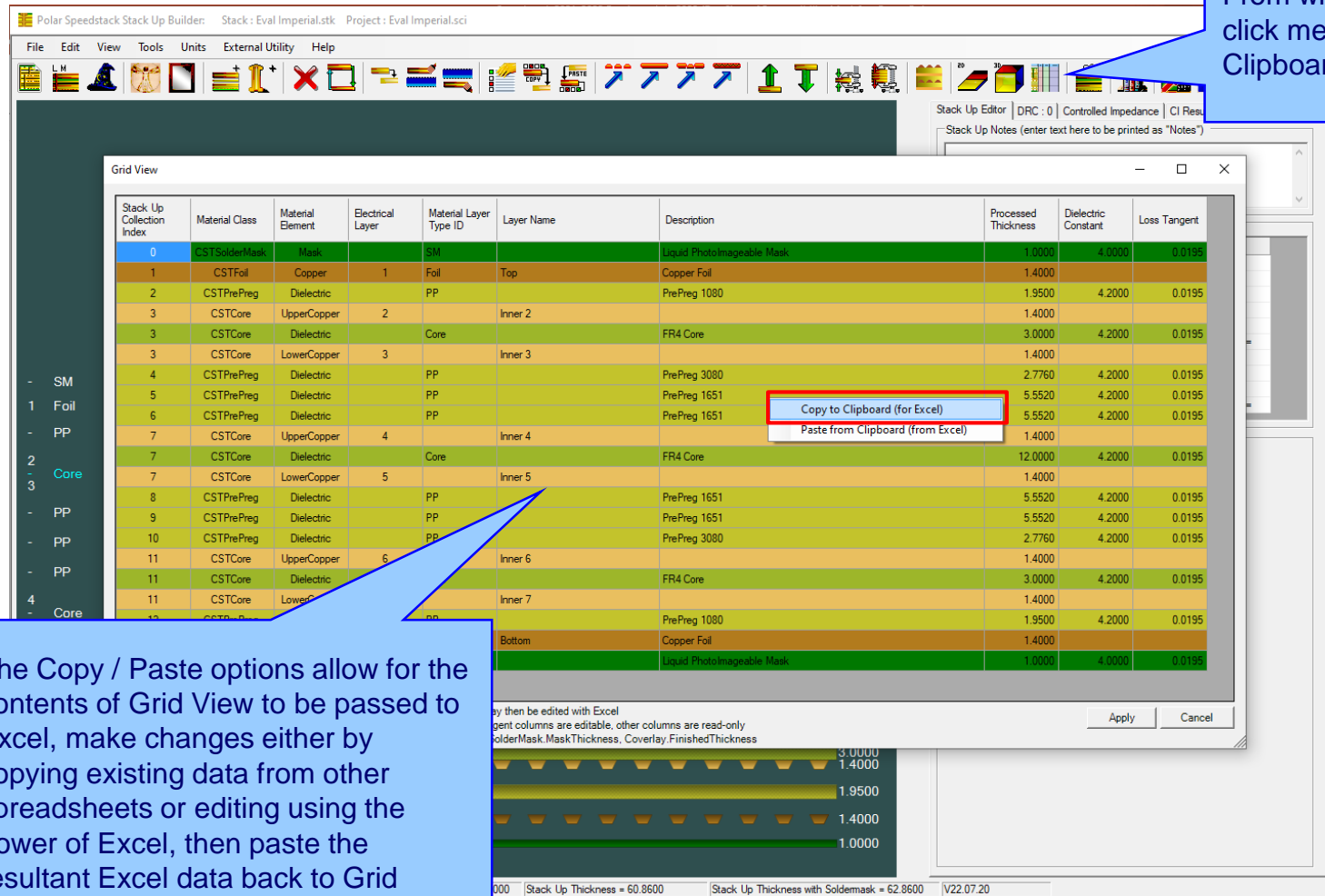
Step #3
Changes made under Grid View are now applied back to the stack up editor.

Layer Name change

Processed Thickness adjustments

Using Grid View with Microsoft Excel – Step #1

Step #1
From within Grid View use the right-click menu and select the Copy to Clipboard option.



The screenshot shows the Polar Speedstack Stack Up Builder interface. The 'Grid View' window is open, displaying a table of stack-up layers. A right-click context menu is open over the table, showing options: 'Copy to Clipboard (for Excel)' and 'Paste from Clipboard (from Excel)'. The 'Copy to Clipboard (for Excel)' option is highlighted with a red box. Below the table, there is a section for 'Stack Up Thickness' with a bar chart and numerical values.

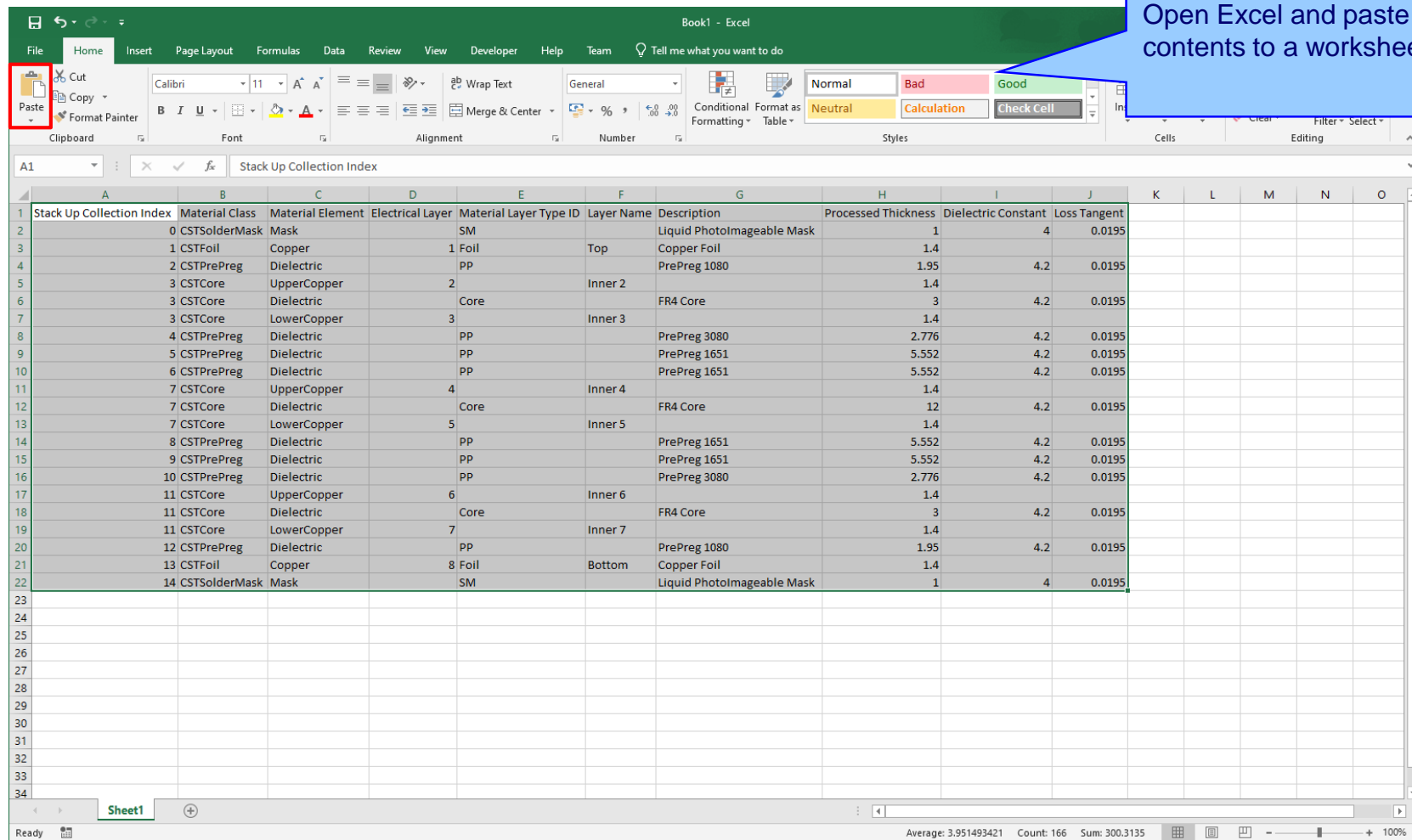
Stack Up Collection Index	Material Class	Material Element	Electrical Layer	Material Layer Type ID	Layer Name	Description	Processed Thickness	Dielectric Constant	Loss Tangent
0	CSTSolderMask	Mask		SM		Liquid PhotoImageable Mask	1.0000	4.0000	0.0195
1	CSTFoil	Copper	1	Foil	Top	Copper Foil	1.4000		
2	CSTPrePreg	Dielectric		PP		PrePreg 1080	1.9500	4.2000	0.0195
3	CSTCore	UpperCopper	2		Inner 2		1.4000		
3	CSTCore	Dielectric		Core		FR4 Core	3.0000	4.2000	0.0195
3	CSTCore	LowerCopper	3		Inner 3		1.4000		
4	CSTPrePreg	Dielectric		PP		PrePreg 3080	2.7760	4.2000	0.0195
5	CSTPrePreg	Dielectric		PP		PrePreg 1651	5.5520	4.2000	0.0195
6	CSTPrePreg	Dielectric		PP		PrePreg 1651	5.5520	4.2000	0.0195
7	CSTCore	UpperCopper	4		Inner 4		1.4000		
7	CSTCore	Dielectric		Core		FR4 Core	12.0000	4.2000	0.0195
7	CSTCore	LowerCopper	5		Inner 5		1.4000		
8	CSTPrePreg	Dielectric		PP		PrePreg 1651	5.5520	4.2000	0.0195
9	CSTPrePreg	Dielectric		PP		PrePreg 1651	5.5520	4.2000	0.0195
10	CSTPrePreg	Dielectric		PP		PrePreg 3080	2.7760	4.2000	0.0195
11	CSTCore	UpperCopper	6		Inner 6		1.4000		
11	CSTCore	Dielectric		Core		FR4 Core	3.0000	4.2000	0.0195
11	CSTCore	LowerCopper			Inner 7		1.4000		
						PrePreg 1080	1.9500	4.2000	0.0195
					Bottom	Copper Foil	1.4000		
						Liquid PhotoImageable Mask	1.0000	4.0000	0.0195

Stack Up Thickness = 60.8600 | Stack Up Thickness with Soldermask = 62.8600 | V22.07.20

The Copy / Paste options allow for the contents of Grid View to be passed to Excel, make changes either by copying existing data from other spreadsheets or editing using the power of Excel, then paste the resultant Excel data back to Grid View.

Using Grid View with Microsoft Excel – Step #2

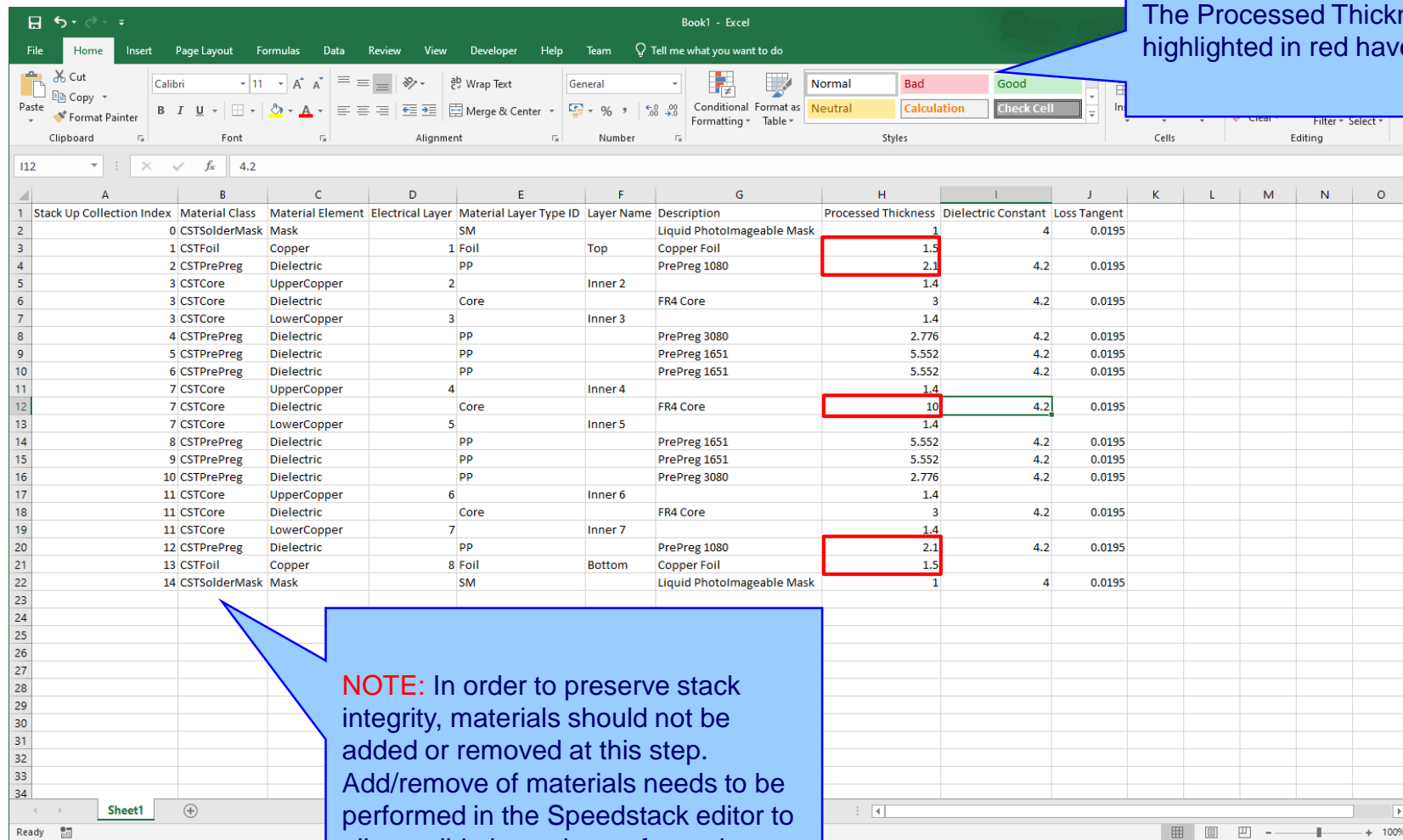
Step #2
Open Excel and paste the clipboard contents to a worksheet



Stack Up Collection Index	Material Class	Material Element	Electrical Layer	Material Layer Type ID	Layer Name	Description	Processed Thickness	Dielectric Constant	Loss Tangent
0	CSTSolderMask	Mask		SM		Liquid PhotoImageable Mask	1	4	0.0195
1	CSTFoil	Copper	1	Foil	Top	Copper Foil	1.4		
2	CSTPrePreg	Dielectric		PP		PrePreg 1080	1.95	4.2	0.0195
3	CSTCore	UpperCopper	2		Inner 2		1.4		
3	CSTCore	Dielectric		Core		FR4 Core	3	4.2	0.0195
3	CSTCore	LowerCopper	3		Inner 3		1.4		
4	CSTPrePreg	Dielectric		PP		PrePreg 3080	2.776	4.2	0.0195
5	CSTPrePreg	Dielectric		PP		PrePreg 1651	5.552	4.2	0.0195
6	CSTPrePreg	Dielectric		PP		PrePreg 1651	5.552	4.2	0.0195
7	CSTCore	UpperCopper	4		Inner 4		1.4		
7	CSTCore	Dielectric		Core		FR4 Core	12	4.2	0.0195
7	CSTCore	LowerCopper	5		Inner 5		1.4		
8	CSTPrePreg	Dielectric		PP		PrePreg 1651	5.552	4.2	0.0195
9	CSTPrePreg	Dielectric		PP		PrePreg 1651	5.552	4.2	0.0195
10	CSTPrePreg	Dielectric		PP		PrePreg 3080	2.776	4.2	0.0195
11	CSTCore	UpperCopper	6		Inner 6		1.4		
11	CSTCore	Dielectric		Core		FR4 Core	3	4.2	0.0195
11	CSTCore	LowerCopper	7		Inner 7		1.4		
12	CSTPrePreg	Dielectric		PP		PrePreg 1080	1.95	4.2	0.0195
13	CSTFoil	Copper	8	Foil	Bottom	Copper Foil	1.4		
14	CSTSolderMask	Mask		SM		Liquid PhotoImageable Mask	1	4	0.0195

Using Grid View with Microsoft Excel – Step #3

Step #3
The Processed Thickness cells highlighted in red have been changed

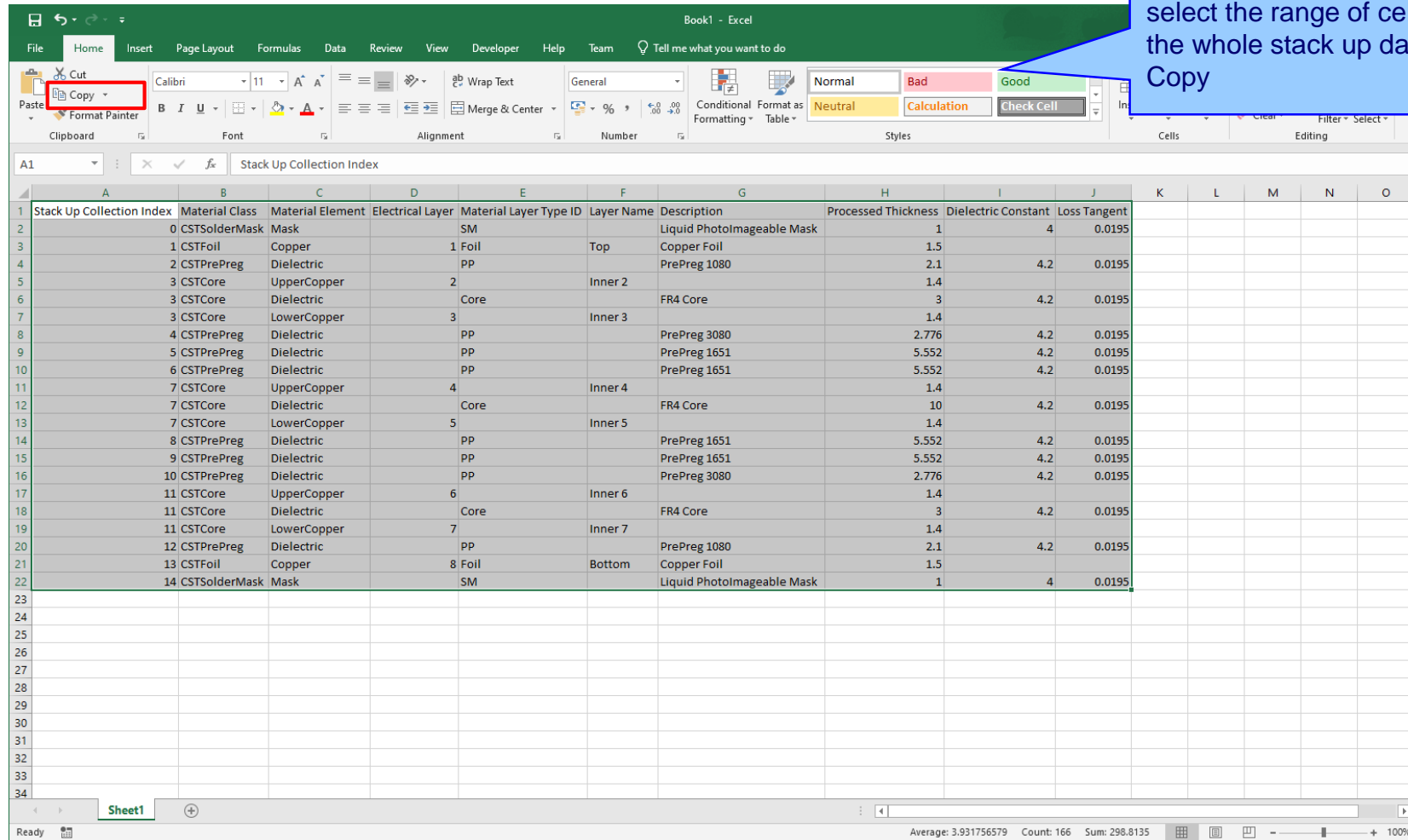


Stack Up Collection Index	Material Class	Material Element	Electrical Layer	Material Layer Type ID	Layer Name	Description	Processed Thickness	Dielectric Constant	Loss Tangent
0	CSTSolderMask	Mask		SM		Liquid PhotoImageable Mask	1	4	0.0195
1	CSTFoil	Copper	1	Foil	Top	Copper Foil	1.5		
2	CSTPrePreg	Dielectric		PP		PrePreg 1080	2.1	4.2	0.0195
3	CSTCore	UpperCopper	2		Inner 2		1.4		
3	CSTCore	Dielectric		Core		FR4 Core	3	4.2	0.0195
3	CSTCore	LowerCopper	3		Inner 3		1.4		
4	CSTPrePreg	Dielectric		PP		PrePreg 3080	2.776	4.2	0.0195
5	CSTPrePreg	Dielectric		PP		PrePreg 1651	5.552	4.2	0.0195
6	CSTPrePreg	Dielectric		PP		PrePreg 1651	5.552	4.2	0.0195
7	CSTCore	UpperCopper	4		Inner 4		1.4		
7	CSTCore	Dielectric		Core		FR4 Core	10	4.2	0.0195
7	CSTCore	LowerCopper	5		Inner 5		1.4		
8	CSTPrePreg	Dielectric		PP		PrePreg 1651	5.552	4.2	0.0195
9	CSTPrePreg	Dielectric		PP		PrePreg 1651	5.552	4.2	0.0195
10	CSTPrePreg	Dielectric		PP		PrePreg 3080	2.776	4.2	0.0195
11	CSTCore	UpperCopper	6		Inner 6		1.4		
11	CSTCore	Dielectric		Core		FR4 Core	3	4.2	0.0195
11	CSTCore	LowerCopper	7		Inner 7		1.4		
12	CSTPrePreg	Dielectric		PP		PrePreg 1080	2.1	4.2	0.0195
13	CSTFoil	Copper	8	Foil	Bottom	Copper Foil	1.5		
14	CSTSolderMask	Mask		SM		Liquid PhotoImageable Mask	1	4	0.0195

NOTE: In order to preserve stack integrity, materials should not be added or removed at this step. Add/remove of materials needs to be performed in the Speedstack editor to allow validation to be performed.

Using Grid View with Microsoft Excel – Step #4

Step #4
Once the Excel changes are complete select the range of cells representing the whole stack up data and select Copy



	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
1	Stack Up Collection Index	Material Class	Material Element	Electrical Layer	Material Layer Type ID	Layer Name	Description	Processed Thickness	Dielectric Constant	Loss Tangent					
2		0 CSTSolderMask	Mask		SM		Liquid PhotoImageable Mask	1	4	0.0195					
3		1 CSTFoil	Copper	1 Foil		Top	Copper Foil	1.5							
4		2 CSTPrePreg	Dielectric		PP		PrePreg 1080	2.1	4.2	0.0195					
5		3 CSTCore	UpperCopper		2		Inner 2	1.4							
6		3 CSTCore	Dielectric				FR4 Core	3	4.2	0.0195					
7		3 CSTCore	LowerCopper		3		Inner 3	1.4							
8		4 CSTPrePreg	Dielectric		PP		PrePreg 3080	2.776	4.2	0.0195					
9		5 CSTPrePreg	Dielectric		PP		PrePreg 1651	5.552	4.2	0.0195					
10		6 CSTPrePreg	Dielectric		PP		PrePreg 1651	5.552	4.2	0.0195					
11		7 CSTCore	UpperCopper		4		Inner 4	1.4							
12		7 CSTCore	Dielectric				FR4 Core	10	4.2	0.0195					
13		7 CSTCore	LowerCopper		5		Inner 5	1.4							
14		8 CSTPrePreg	Dielectric		PP		PrePreg 1651	5.552	4.2	0.0195					
15		9 CSTPrePreg	Dielectric		PP		PrePreg 1651	5.552	4.2	0.0195					
16		10 CSTPrePreg	Dielectric		PP		PrePreg 3080	2.776	4.2	0.0195					
17		11 CSTCore	UpperCopper		6		Inner 6	1.4							
18		11 CSTCore	Dielectric				FR4 Core	3	4.2	0.0195					
19		11 CSTCore	LowerCopper		7		Inner 7	1.4							
20		12 CSTPrePreg	Dielectric		PP		PrePreg 1080	2.1	4.2	0.0195					
21		13 CSTFoil	Copper	8 Foil		Bottom	Copper Foil	1.5							
22		14 CSTSolderMask	Mask		SM		Liquid PhotoImageable Mask	1	4	0.0195					
23															
24															
25															
26															
27															
28															
29															
30															
31															
32															
33															
34															

Using Grid View with Microsoft Excel – Step #5

Step #5
Back in Grid View select the right-click menu Paste from Clipboard option and Grid View will update with the data from Excel. Notice how the data now matches Excel

Grid View

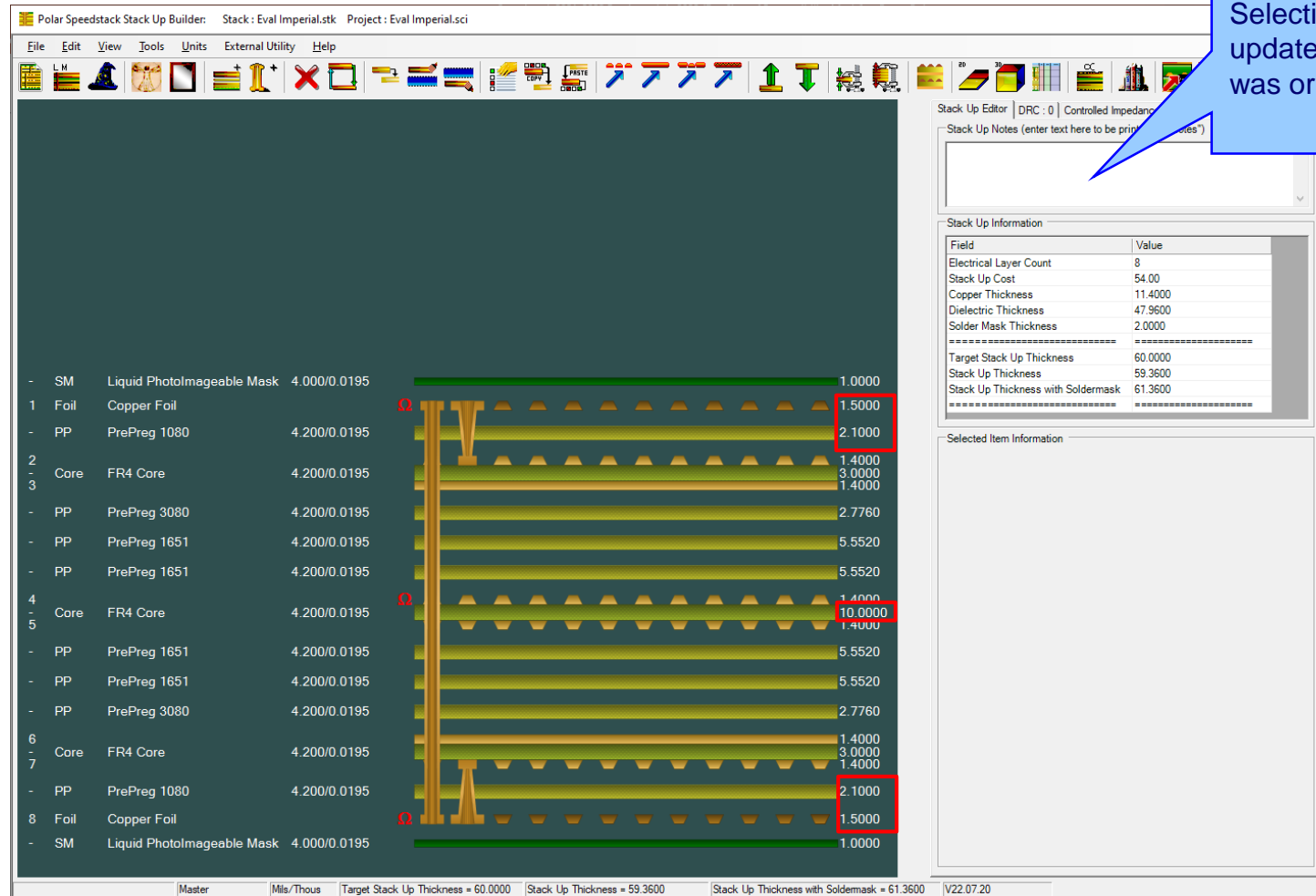
Stack Up Collection Index	Material Class	Material Element	Electrical Layer	Material Layer Type ID	Layer Name	Description	Processed Thickness	Dielectric Constant	Loss Tangent
0	CSTSolderMask	Mask		SM		Liquid PhotoImageable Mask	1.0000	4.0000	0.0195
1	CSTFoil	Copper	1	Foil	Top	Copper Foil	1.5000		
2	CSTPrePreg	Dielectric		PP		PrePreg 1080	2.1000	4.2000	0.0195
3	CSTCore	UpperCopper	2		Inner 2		1.4000		
3	CSTCore	Dielectric		Core		FR4 Core	3.0000	4.2000	0.0195
3	CSTCore	LowerCopper	3		Inner 3		1.4000		
4	CSTPrePreg	Dielectric		PP		PrePreg 3080	2.7760	4.2000	0.0195
5	CSTPrePreg	Dielectric		PP		PrePreg 1651	5.5520	4.2000	0.0195
6	CSTPrePreg	Dielectric		PP		PrePreg 1651	5.5520	4.2000	0.0195
7	CSTCore	UpperCopper	4		Inner 4		1.4000		
7	CSTCore	Dielectric		Core		FR4 Core	10.0000	4.2000	0.0195
7	CSTCore	LowerCopper	5		Inner 5		1.4000		
8	CSTPrePreg	Dielectric		PP		PrePreg 1651	5.5520	4.2000	0.0195
9	CSTPrePreg	Dielectric		PP		PrePreg 1651	5.5520	4.2000	0.0195
10	CSTPrePreg	Dielectric		PP		PrePreg 3080	2.7760	4.2000	0.0195
11	CSTCore	UpperCopper	6		Inner 6		1.4000		
11	CSTCore	Dielectric		Core		FR4 Core	3.0000	4.2000	0.0195
11	CSTCore	LowerCopper	7		Inner 7		1.4000		
12	CSTPrePreg	Dielectric		PP		PrePreg 1080	2.1000	4.2000	0.0195
13	CSTFoil	Copper	8	Foil	Bottom	Copper Foil	1.5000		
14	CSTSolderMask	Mask		SM		Liquid PhotoImageable Mask	1.0000	4.0000	0.0195

Copy to Clipboard (for Excel)
Paste from Clipboard (from Excel)

Use the right-click menu to copy / paste the Grid View to the clipboard - the data may then be edited with Excel
Layer Name, Description, Processed Thickness, Dielectric Constant and Loss Tangent columns are editable, other columns are read-only
Processed Thickness = Copper.FinishedThickness, Dielectric.IsolationDistance, SolderMask.MaskThickness, Coverlay.FinishedThickness

Apply Cancel

Using Grid View with Microsoft Excel – Step #6



Step #6
Selecting Apply in Grid View will update the stack up with the data that was originally changed in Excel

Other enhancements

- Stack Up Notes user interface improvements
- The Tools | Options | Structure Defaults | Separation Region Dielectric (REr) now supports double data types. Previously, it only supported integers


Speedstack v22.05.06 (May 2022)

Online Library enhancements


Online Library

Filter by Supplier

All Suppliers



AGC



Filter by Frequency

All

File Type

Foils
RCCs
PrePregs
Cores
SolderMasks
Idents
Peelables
Coverlays
BondPly
Adhesives
FlexCores
Shields

Library Files Available : AGC

AGC_Mercurywave_9350_10GHz_2201.mlbx
AGC_Mercurywave_9350B_10GHz_2201.mlbx
AGC_MW1000_10GHz_2201.mlbx
AGC_MW2000_10GHz_2201.mlbx
AGC_MW3000_10GHz_2201.mlbx
AGC_MW3350_10GHz_2201.mlbx
AGC_MW4000_10GHz_2201.mlbx
AGC_MW8000_10GHz_2201.mlbx
AGC_MW8300_10GHz_2201.mlbx
AGC_MW8350_10GHz_2201.mlbx
AGC_N4000_13_10GHz_2201.mlbx
AGC_N4000_13_EP_10GHz_2201.mlbx
AGC_N4000_13_EP_SI_10GHz_2201.mlbx
AGC_N4000_13_SI_10GHz_2201.mlbx
AGC_N4000_29_10GHz_2201.mlbx

Existing Data Table

☐ Clear
☒ Append

Download
Close

Clear - use this option to clear data from the existing library data table and download a single library

Append - use this option to add data to the existing library data table and when downloading multiple libraries during a single session

Library Files Downloaded during this session

File Access Mode

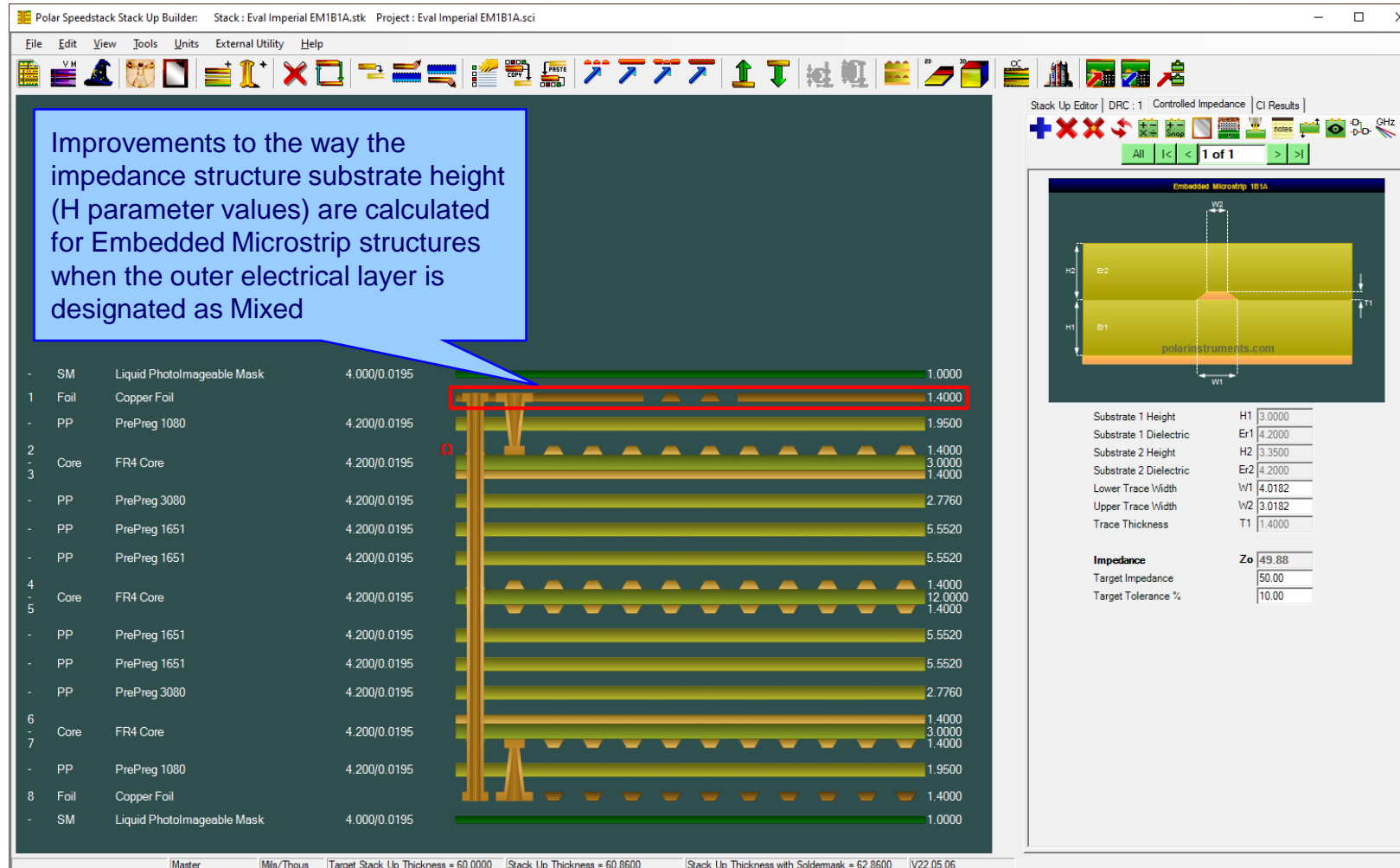
☒ Online Polar Library ([ftp://polarinstruments.com](http://polarinstruments.com))
☐ On-Premise Mode [Application Note](#)

Please Note: This data is accurate to the best of our knowledge, however it is provided, as is from our Material supplier partners. Please feedback any errors or inaccuracies to Polarcare and we will contact the material partner for clarification or rectification.

AGC have recently joined the Polar Material Partner program

Embedded Microstrip structure enhancements

Improvements to the way the impedance structure substrate height (H parameter values) are calculated for Embedded Microstrip structures when the outer electrical layer is designated as Mixed



Layer	Material	Thickness (Mils/Thous)	Height (Mils)
SM	Liquid PhotoImageable Mask	4.000/0.0195	1.0000
1	Foil Copper Foil	4.200/0.0195	1.4000
PP	PrePreg 1080	4.200/0.0195	1.9500
2	Core FR4 Core	4.200/0.0195	1.4000
3	PP PrePreg 3080	4.200/0.0195	2.7760
PP	PrePreg 1651	4.200/0.0195	5.5520
PP	PrePreg 1651	4.200/0.0195	5.5520
4	Core FR4 Core	4.200/0.0195	1.4000
5	PP PrePreg 1651	4.200/0.0195	5.5520
PP	PrePreg 1651	4.200/0.0195	5.5520
PP	PrePreg 3080	4.200/0.0195	2.7760
6	Core FR4 Core	4.200/0.0195	1.4000
7	PP PrePreg 1080	4.200/0.0195	1.9500
8	Foil Copper Foil	4.200/0.0195	1.4000
SM	Liquid PhotoImageable Mask	4.000/0.0195	1.0000

Stack Up Editor | DRC : 1 | Controlled Impedance | CI Results

All | < | 1 of 1 | > | > |

Embedded Microstrip 101A

Substrate 1 Height H1 3.0000
 Substrate 1 Dielectric Er1 4.2000
 Substrate 2 Height H2 3.3500
 Substrate 2 Dielectric Er2 4.2000
 Lower Trace Width W1 4.0182
 Upper Trace Width W2 3.0182
 Trace Thickness T1 1.4000

Impedance Zo 49.88
 Target Impedance 50.00
 Target Tolerance % 10.00

Master | Mils/Thous | Target Stack Up Thickness = 60.0000 | Stack Up Thickness = 60.8600 | Stack Up Thickness with Soldermask = 62.8600 | V22.05.06

New Confidential Stamp options added to the technical report

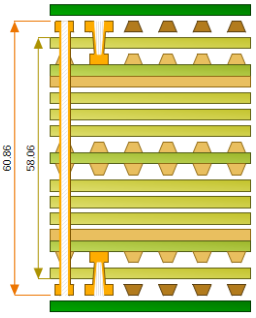
Speedstack Report Printer

File Options





Display Page 1

CONFIDENTIAL

C:\Apps\Samples\Eval Imperial.sci Units: MILs

Layer	Stack up	Supplier	Description	Type	Processed Thickness	er	Loss Tangent	Impedance ID	
1		Polar Samples	Liquid PhotoImageable Mask	SolderMask	1.000	4.000	0.0195		
		Polar Samples	Copper Foil	Copper	1.400			1, 2	
		Polar Samples	PrePreg 1080	Dielectric	1.950	4.200	0.0195		
2			Polar Samples	FR4 Core	FR4	1.400	4.200	0.0195	
			Polar Samples	PrePreg 3080	Dielectric	2.776	4.200	0.0195	
			Polar Samples	PrePreg 1651	Dielectric	5.552	4.200	0.0195	
			Polar Samples	PrePreg 1651	Dielectric	5.552	4.200	0.0195	
3			Polar Samples	FR4 Core	FR4	1.400	4.200	0.0195	3
4		Polar Samples	PrePreg 1651	Dielectric	5.552	4.200	0.0195		
		Polar Samples	PrePreg 1651	Dielectric	5.552	4.200	0.0195		
		Polar Samples	PrePreg 3080	Dielectric	2.776	4.200	0.0195		
5		Polar Samples	FR4 Core	FR4	1.400	4.200	0.0195		
		Polar Samples	PrePreg 1080	Dielectric	1.950	4.200	0.0195		
6		Polar Samples	Copper Foil	Copper	1.400			4	
7		Polar Samples	Liquid PhotoImageable Mask	SolderMask	1.000	4.000	0.0195		
8									

Copper Thickness = 11.200 | Dielectric Thickness = 49.660 | Solder Mask Thickness = 2.000 | Stack Up Thickness = 60.860 | Stack Up Thickness with Stack Up Cost = 54.00

Impedance ID	Structure Image	Structure Name	Impedance Signal Layer	Ref. Plane 1 in Layer	Ref. Plane 2 in Layer	Lower Trace Width (W1)	Upper Trace Width (W2)	Trace Separation (S1)	Trace Pitch (S1+ W1)	Target Impedance	Calculated Impedance
1		Edge Coupled Coated Microstrip 1B	1	3	0	7.650	6.650	8.115	15.765	100.000	100.290
2		Coated Microstrip 1B	1	3	0	4.000	3.000	0.000	0.000	75.000	75.740
3		Edge Coupled Offset Stripline 1B1A									
4		Coated Microstrip 1B									

StackName: Master
Date:
Author:
Department:
Site:

Copyright ©

Page 1/X

CONFIDENTIAL

CONFIDENTIAL Stamp Options

Select which location where you wish 'Confidential' to appear.
Note that some locations may interfere with existing text or logos. It is your responsibility to resolve this by editing the existing text or logos.
If you require, you can substitute Confidential with a word of your choosing. Otherwise leave the field blank.

CONFIDENTIAL—1

2

3

Alternative word

☒ Location 1 ☐ Location 3

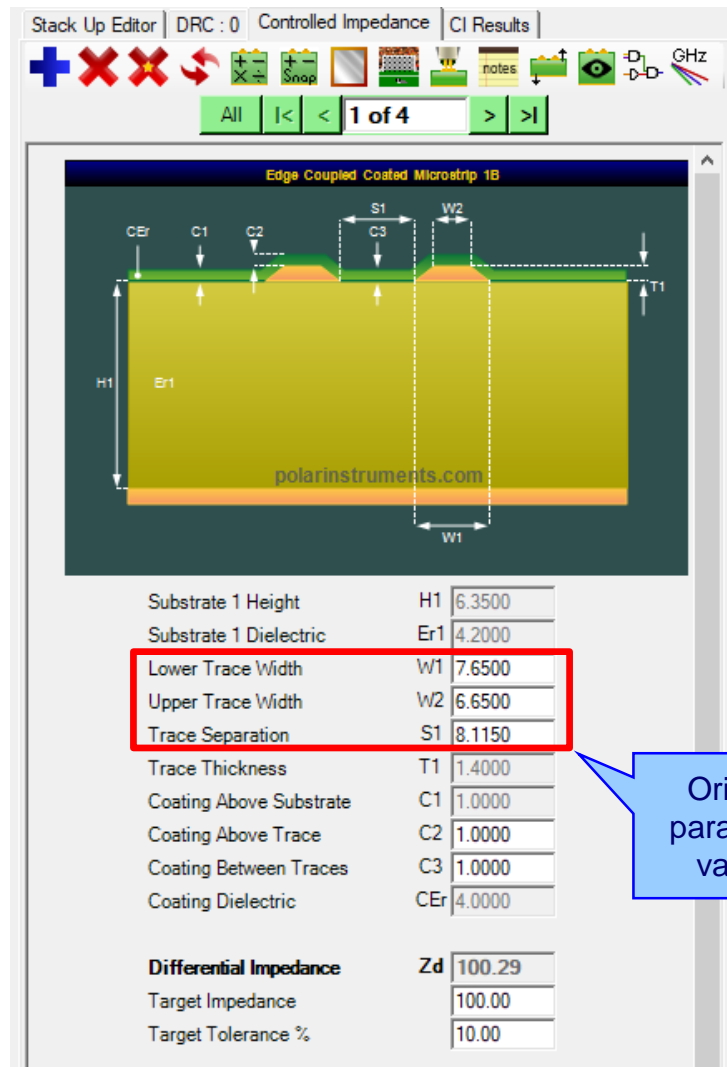
☒ Location 2 ☐ Location 4

Close

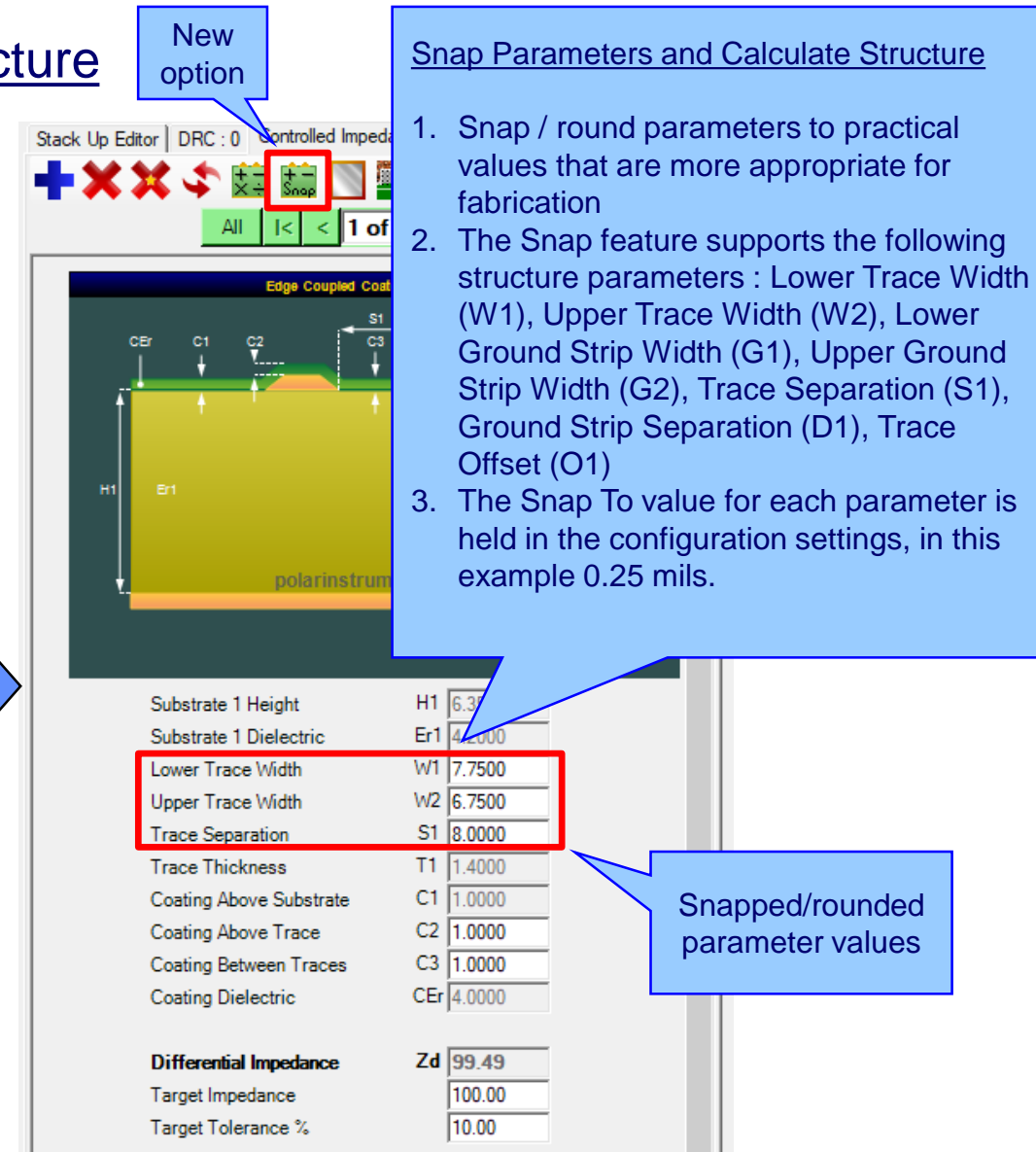
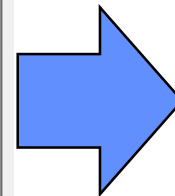
The confidential stamps are customisable in terms of the text used and location. This new functionality is available from the technical report Options menu

Speedstack v22.01.01 (January 2022)

Snap Parameters and Calculate Structure



Original
parameter
values



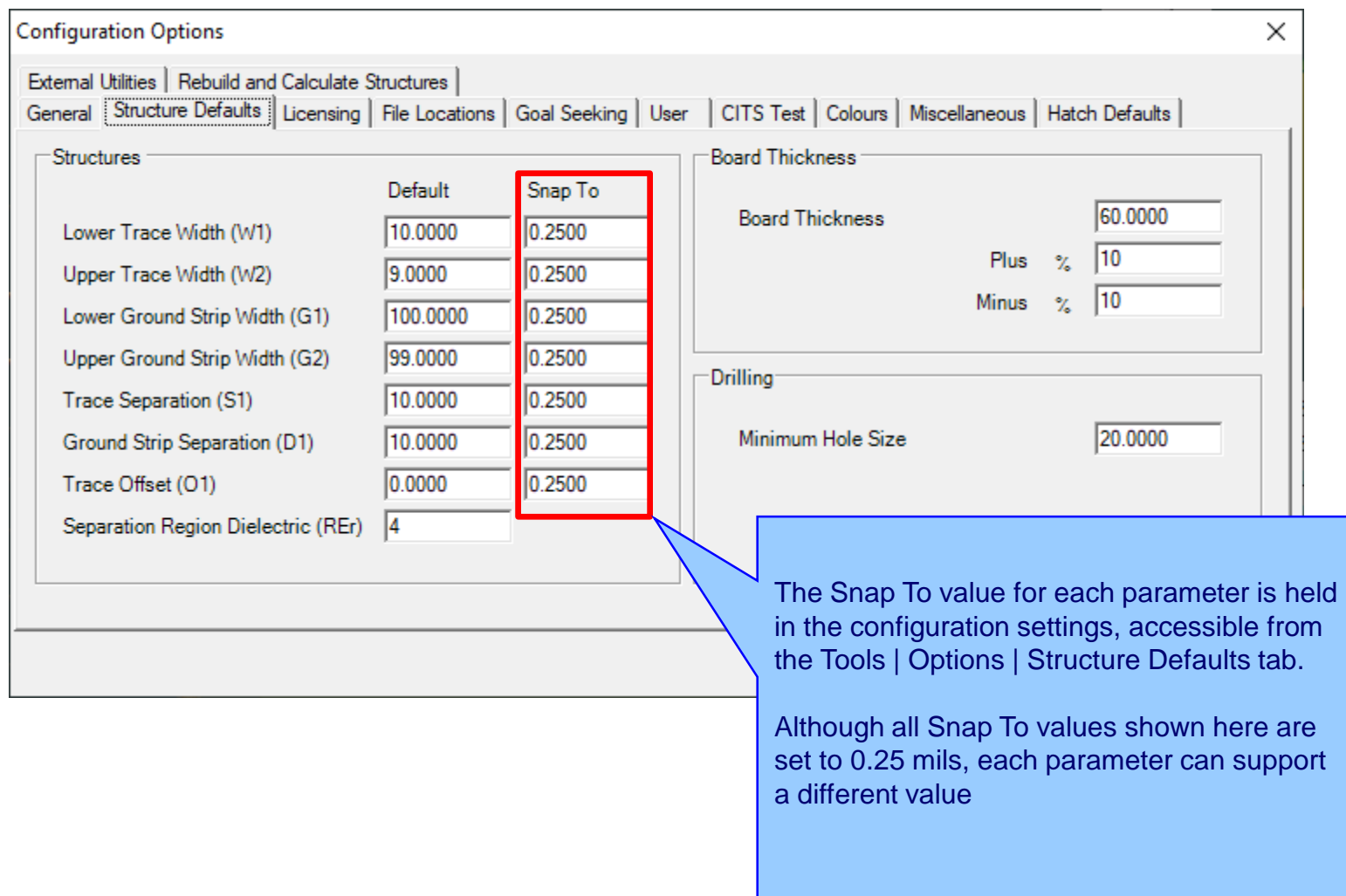
Snapped/rounded
parameter values

New
option

Snap Parameters and Calculate Structure

1. Snap / round parameters to practical values that are more appropriate for fabrication
2. The Snap feature supports the following structure parameters : Lower Trace Width (W1), Upper Trace Width (W2), Lower Ground Strip Width (G1), Upper Ground Strip Width (G2), Trace Separation (S1), Ground Strip Separation (D1), Trace Offset (O1)
3. The Snap To value for each parameter is held in the configuration settings, in this example 0.25 mils.

Snap Parameters and Calculate Structure



Configuration Options

External Utilities | Rebuild and Calculate Structures |

General | **Structure Defaults** | Licensing | File Locations | Goal Seeking | User | CITS Test | Colours | Miscellaneous | Hatch Defaults

Structures	Default	Snap To
Lower Trace Width (W1)	10.0000	0.2500
Upper Trace Width (W2)	9.0000	0.2500
Lower Ground Strip Width (G1)	100.0000	0.2500
Upper Ground Strip Width (G2)	99.0000	0.2500
Trace Separation (S1)	10.0000	0.2500
Ground Strip Separation (D1)	10.0000	0.2500
Trace Offset (O1)	0.0000	0.2500
Separation Region Dielectric (REr)	4	

Board Thickness

Board Thickness 60.0000

Plus % 10

Minus % 10

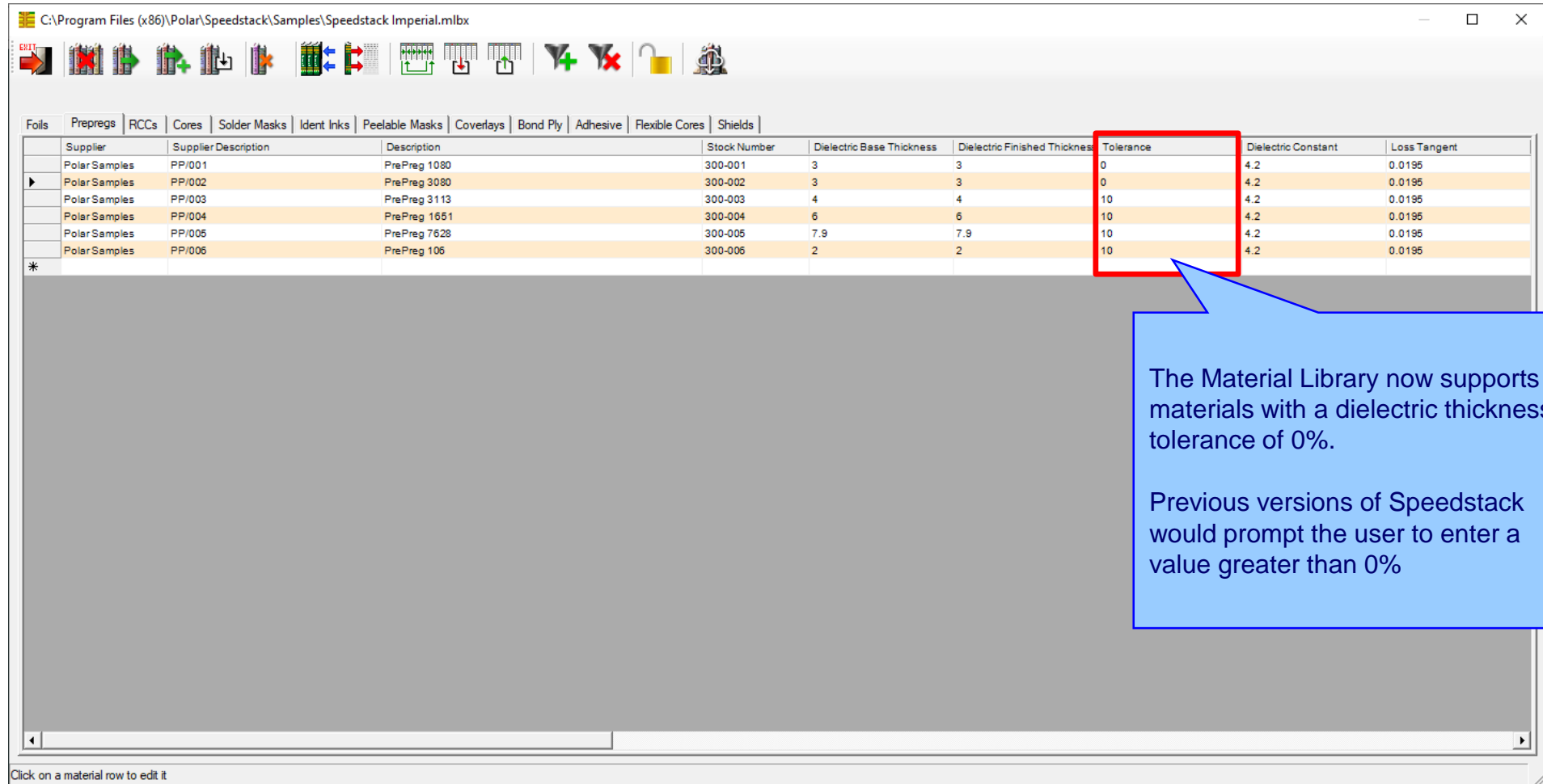
Drilling

Minimum Hole Size 20.0000

The Snap To value for each parameter is held in the configuration settings, accessible from the Tools | Options | Structure Defaults tab.

Although all Snap To values shown here are set to 0.25 mils, each parameter can support a different value

Material Library Enhancements



The screenshot shows the Speedstack Material Library window with the following table of materials:

Supplier	Supplier Description	Description	Stock Number	Dielectric Base Thickness	Dielectric Finished Thickness	Tolerance	Dielectric Constant	Loss Tangent
PolarSamples	PP/001	PrePreg 1080	300-001	3	3	0	4.2	0.0195
PolarSamples	PP/002	PrePreg 3080	300-002	3	3	0	4.2	0.0195
PolarSamples	PP/003	PrePreg 3113	300-003	4	4	10	4.2	0.0195
PolarSamples	PP/004	PrePreg 1651	300-004	6	6	10	4.2	0.0195
PolarSamples	PP/005	PrePreg 7628	300-005	7.9	7.9	10	4.2	0.0195
PolarSamples	PP/006	PrePreg 106	300-006	2	2	10	4.2	0.0195

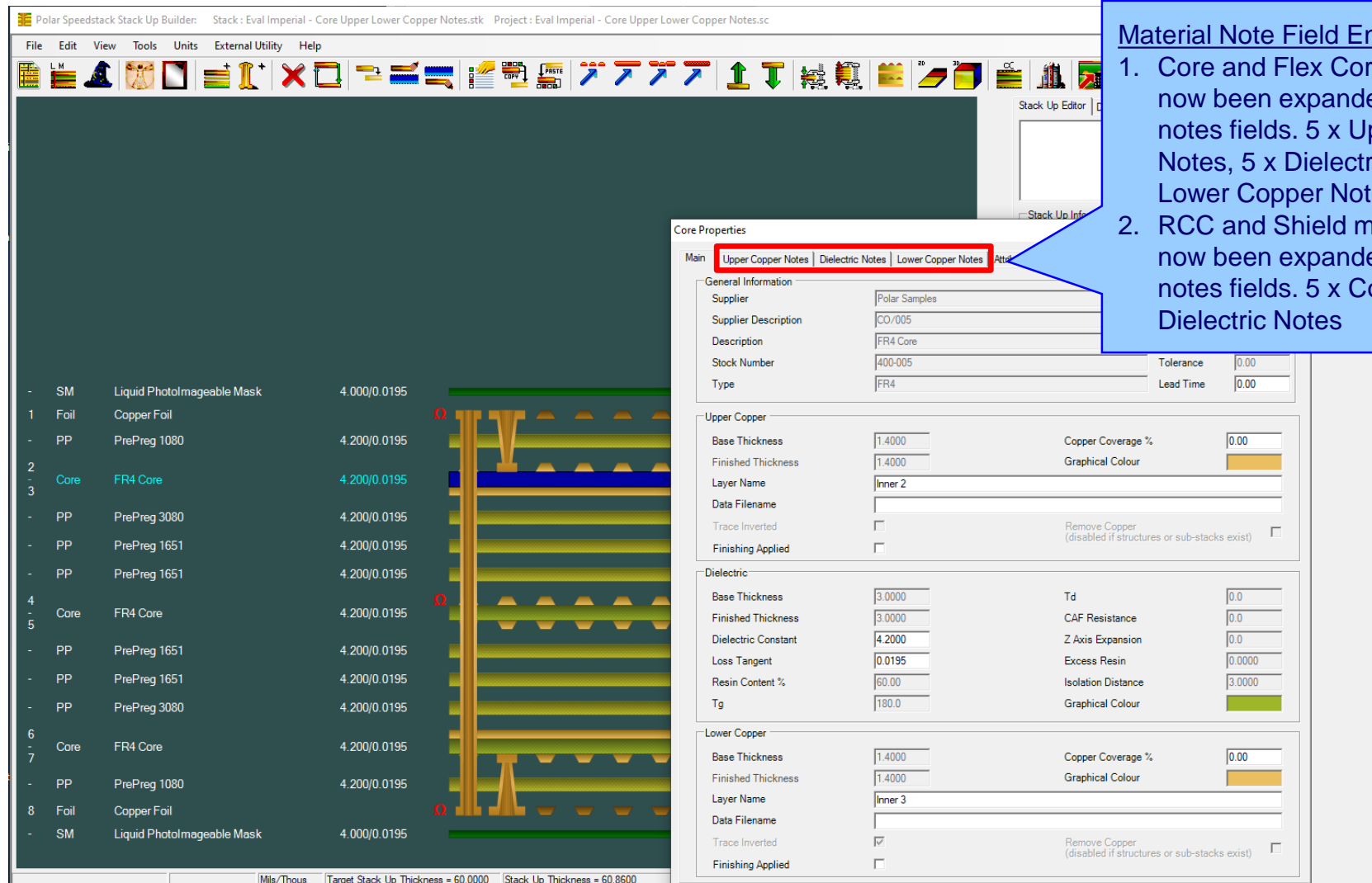
A red box highlights the 'Tolerance' column, showing values of 0, 0, 10, 10, 10, and 10. A blue callout box points to the '0' values in the Tolerance column.

The Material Library now supports materials with a dielectric thickness tolerance of 0%.

Previous versions of Speedstack would prompt the user to enter a value greater than 0%

Speedstack v21.11.01 (November 2021)

Material Note Field Enhancements – improvements to stack up documentation



The screenshot shows the Polar Speedstack Stack Up Builder interface. On the left, a list of materials is displayed with their descriptions, thicknesses, and tolerances. The materials include Liquid Photolamable Mask, Copper Foil, PrePreg 1080, FR4 Core, PrePreg 3080, PrePreg 1651, and Liquid Photolamable Mask. The stack up thickness is shown as 60.8600.

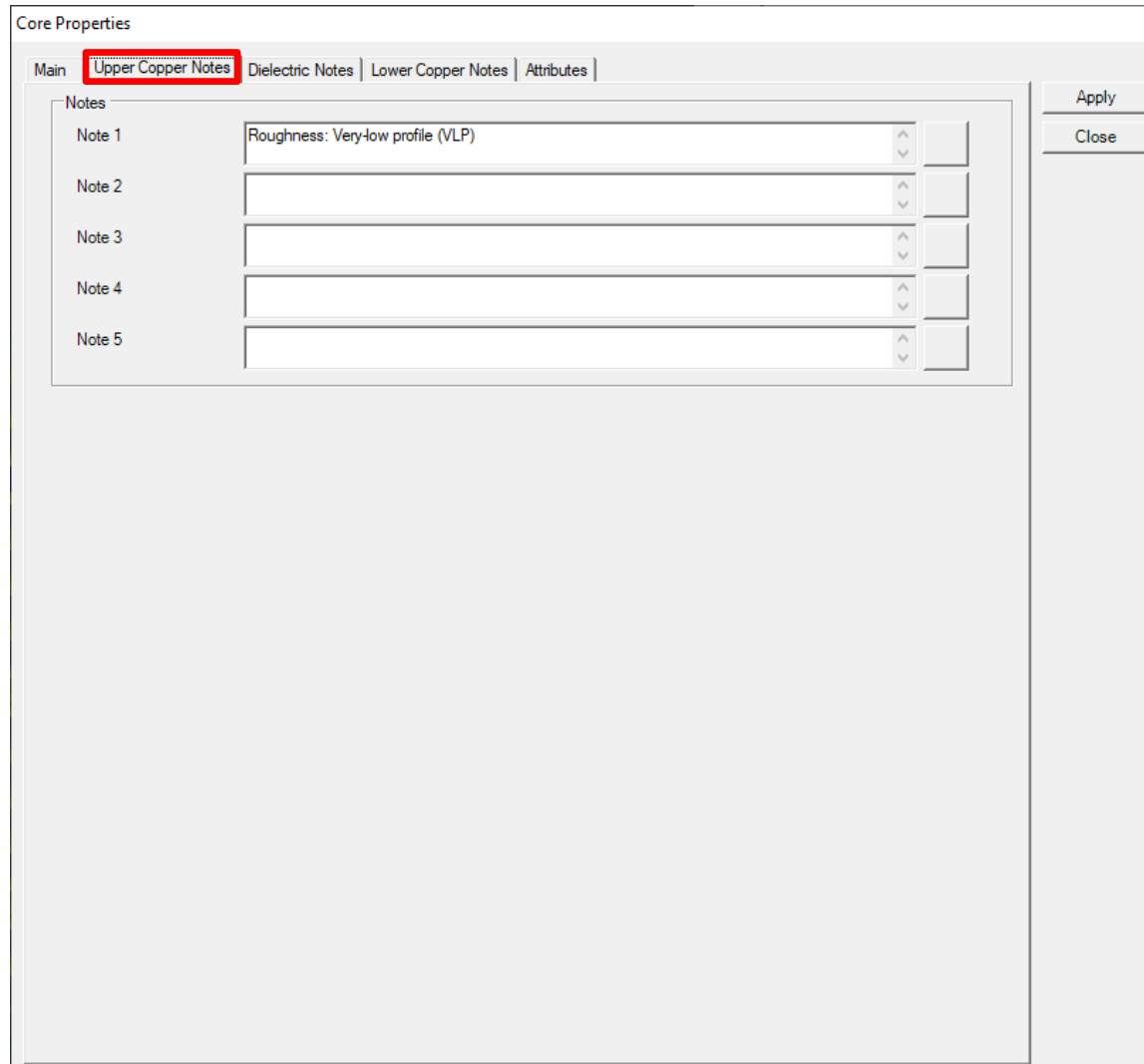
The Core Properties dialog box is open, showing the 'Upper Copper Notes' tab. The dialog box contains the following information:

- General Information:**
 - Supplier: Polar Samples
 - Supplier Description: CO/005
 - Description: FR4 Core
 - Stock Number: 400-005
 - Type: FR4
 - Tolerance: 0.00
 - Lead Time: 0.00
- Upper Copper:**
 - Base Thickness: 1.4000
 - Finished Thickness: 1.4000
 - Copper Coverage %: 0.00
 - Graphical Colour: [Yellow]
 - Layer Name: Inner 2
 - Data Filename: [Empty]
 - Trace Inverted: ☐
 - Remove Copper (disabled if structures or sub-stacks exist): ☐
 - Finishing Applied: ☐
- Dielectric:**
 - Base Thickness: 3.0000
 - Finished Thickness: 3.0000
 - Dielectric Constant: 4.2000
 - Loss Tangent: 0.0195
 - Resin Content %: 60.00
 - Tg: 180.0
 - Td: 0.0
 - CAF Resistance: 0.0
 - Z Axis Expansion: 0.0
 - Excess Resin: 0.0000
 - Isolation Distance: 3.0000
 - Graphical Colour: [Green]
- Lower Copper:**
 - Base Thickness: 1.4000
 - Finished Thickness: 1.4000
 - Copper Coverage %: 0.00
 - Graphical Colour: [Yellow]
 - Layer Name: Inner 3
 - Data Filename: [Empty]
 - Trace Inverted: ☒
 - Remove Copper (disabled if structures or sub-stacks exist): ☐
 - Finishing Applied: ☐

Material Note Field Enhancements

1. Core and Flex Core materials have now been expanded to support 15 notes fields. 5 x Upper Copper Notes, 5 x Dielectric Notes, 5 x Lower Copper Notes
2. RCC and Shield materials have now been expanded to support 10 notes fields. 5 x Copper Notes, 5 x Dielectric Notes

Material Note Field Enhancements – improvements to stack up documentation



Core Properties

Main | **Upper Copper Notes** | Dielectric Notes | Lower Copper Notes | Attributes

Notes

Note 1	Roughness: Very-low profile (VLP)	^	v
Note 2		^	v
Note 3		^	v
Note 4		^	v
Note 5		^	v

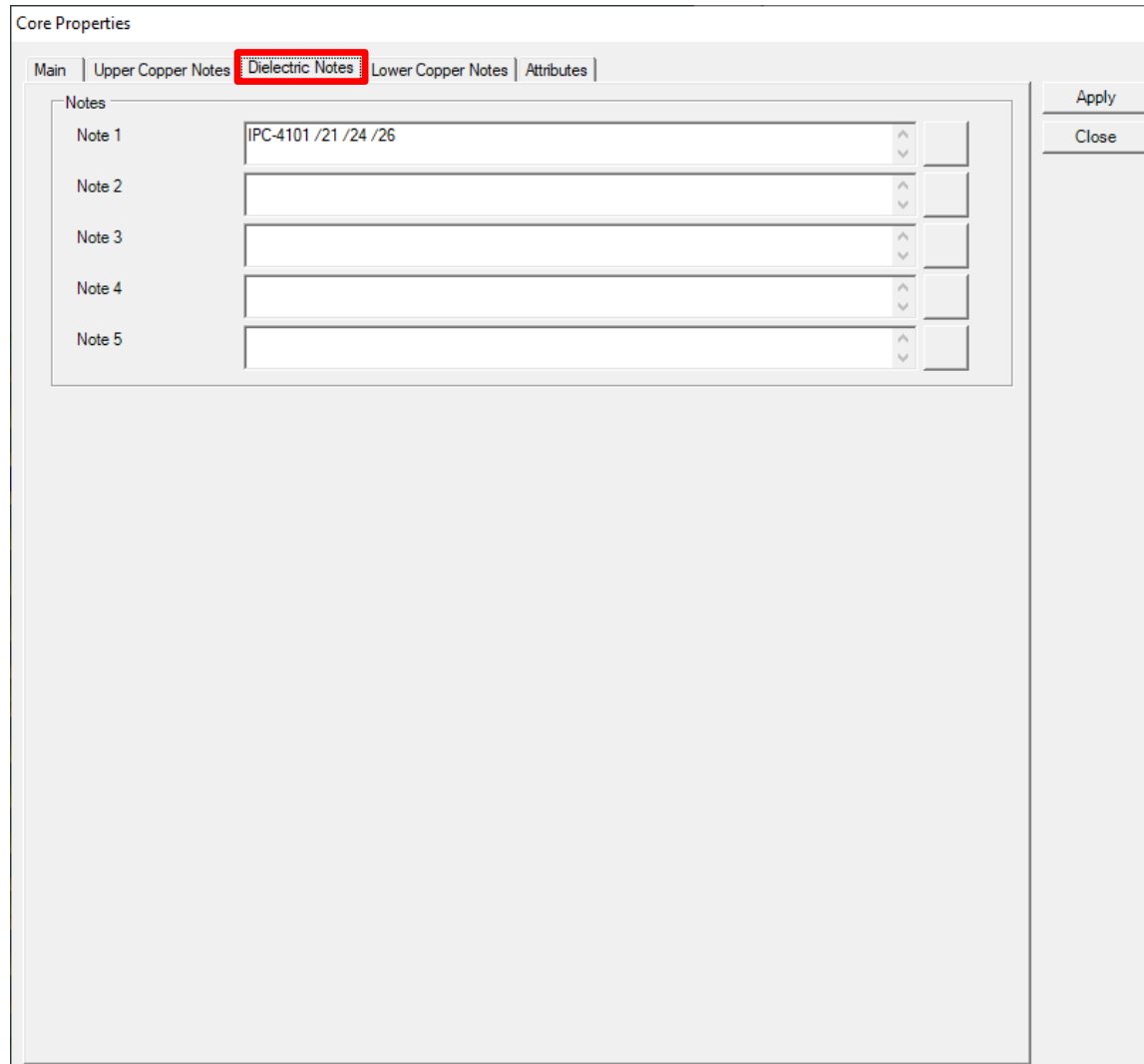
Apply

Close

The new Upper and Lower Copper Notes allow the user to specify important information about the copper surfaces for a Core and Flex Core material.

For instance, copper roughness and plating fabrication information can be specified

Material Note Field Enhancements – improvements to stack up documentation



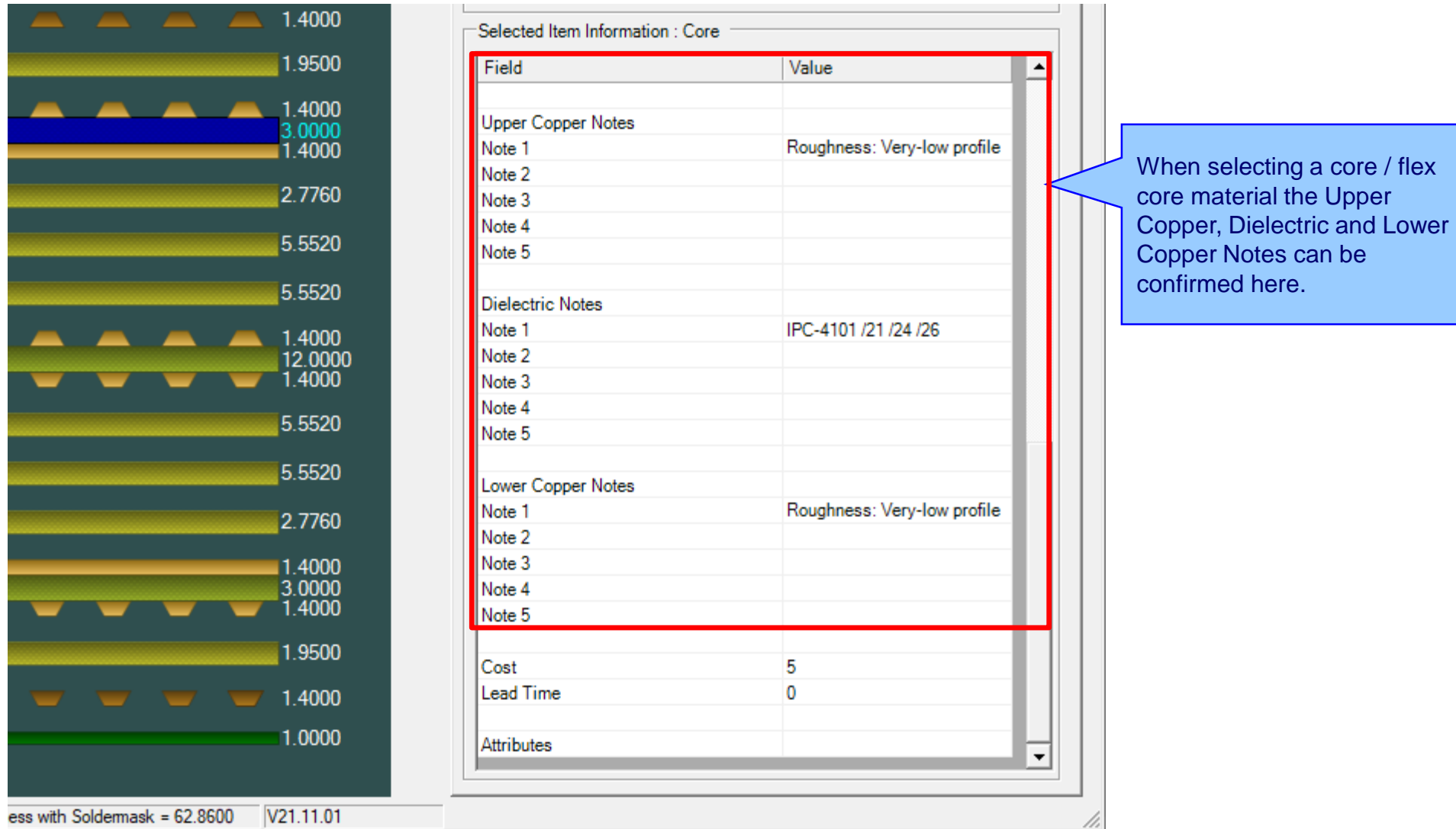
The screenshot shows the 'Core Properties' dialog box with the 'Dielectric Notes' tab selected. The 'Notes' section contains five text input fields labeled 'Note 1' through 'Note 5'. 'Note 1' contains the text 'IPC-4101 /21 /24 /26'. To the right of the input fields are up and down arrow buttons. On the far right of the dialog are 'Apply' and 'Close' buttons.

Tab	Note 1	Note 2	Note 3	Note 4	Note 5
Dielectric Notes	IPC-4101 /21 /24 /26				

Dielectric Notes are useful for specifying IPC-4101 slash sheet categories, glass weave information (spread glass) and other important information regarding the dielectric region of the core.

The existing five Notes fields from previous versions of Speedstack will be allocated as Dielectric Notes.

Material Note Field Enhancements – improvements to stack up documentation



Selected Item Information : Core

Field	Value
Upper Copper Notes	
Note 1	Roughness: Very-low profile
Note 2	
Note 3	
Note 4	
Note 5	
Dielectric Notes	
Note 1	IPC-4101 /21 /24 /26
Note 2	
Note 3	
Note 4	
Note 5	
Lower Copper Notes	
Note 1	Roughness: Very-low profile
Note 2	
Note 3	
Note 4	
Note 5	
Cost	5
Lead Time	0
Attributes	

When selecting a core / flex core material the Upper Copper, Dielectric and Lower Copper Notes can be confirmed here.

ess with Soldermask = 62.8600 V21.11.01

Material Note Field Enhancements – library enhancements

Review/Edit Cores

Supplier	Polar Samples
Supplier Description	CO/005
Description	FR4 Core
Stock Number	400-005
Type	FR4
Base Thickness	3.0000
Finished Thickness	3.0000
Dielectric Constant	4.2
Loss Tangent	0.0195
Resin Content	60
Tg	180
Td	0
CAF Resistance	0
Z Axis Expansion	0
Tolerance +/-%	10
Upper Cu Thickness	1.4000
Lower Cu Thickness	1.4000
Cost	5
Lead Time	0
Size	*
Use in Auto Stack	<input checked="" type="checkbox"/>
Planes Both Sides	<input type="checkbox"/>
Laser Drillable	<input checked="" type="checkbox"/>

Upper Copper Notes

Note 1	Roughness: Very-low profile (VLP)
Note 2	
Note 3	
Note 4	
Note 5	

Dielectric Notes

Note 1	IPC-4101 /21 /24 /26
Note 2	
Note 3	
Note 4	
Note 5	

Lower Copper Notes

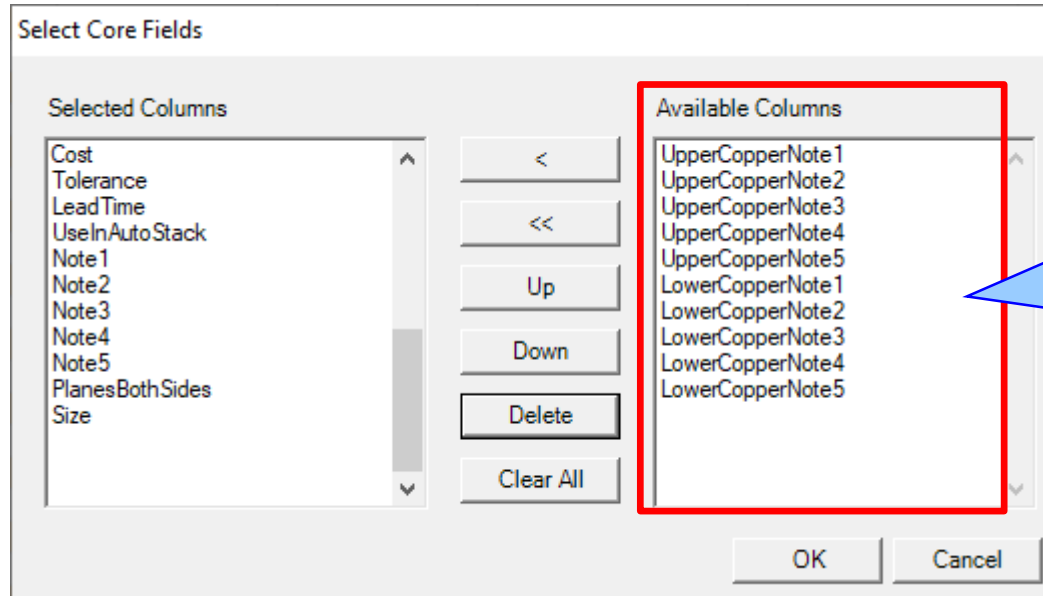
Note 1	Roughness: Very-low profile (VLP)
Note 2	
Note 3	
Note 4	
Note 5	

<< < 5 of 27 > >>

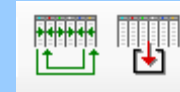
The Speedstack material library has been enhanced to support the extra notes fields.

Notes added to the materials in the library will automatically be transferred to the stack up.

Material Note Field Enhancements – library enhancements



For existing Speedstack users upgrading to v21.11, use the Select and Arrange Columns and Save Column Order toolbar options to add these new material library columns to the Data Grid view

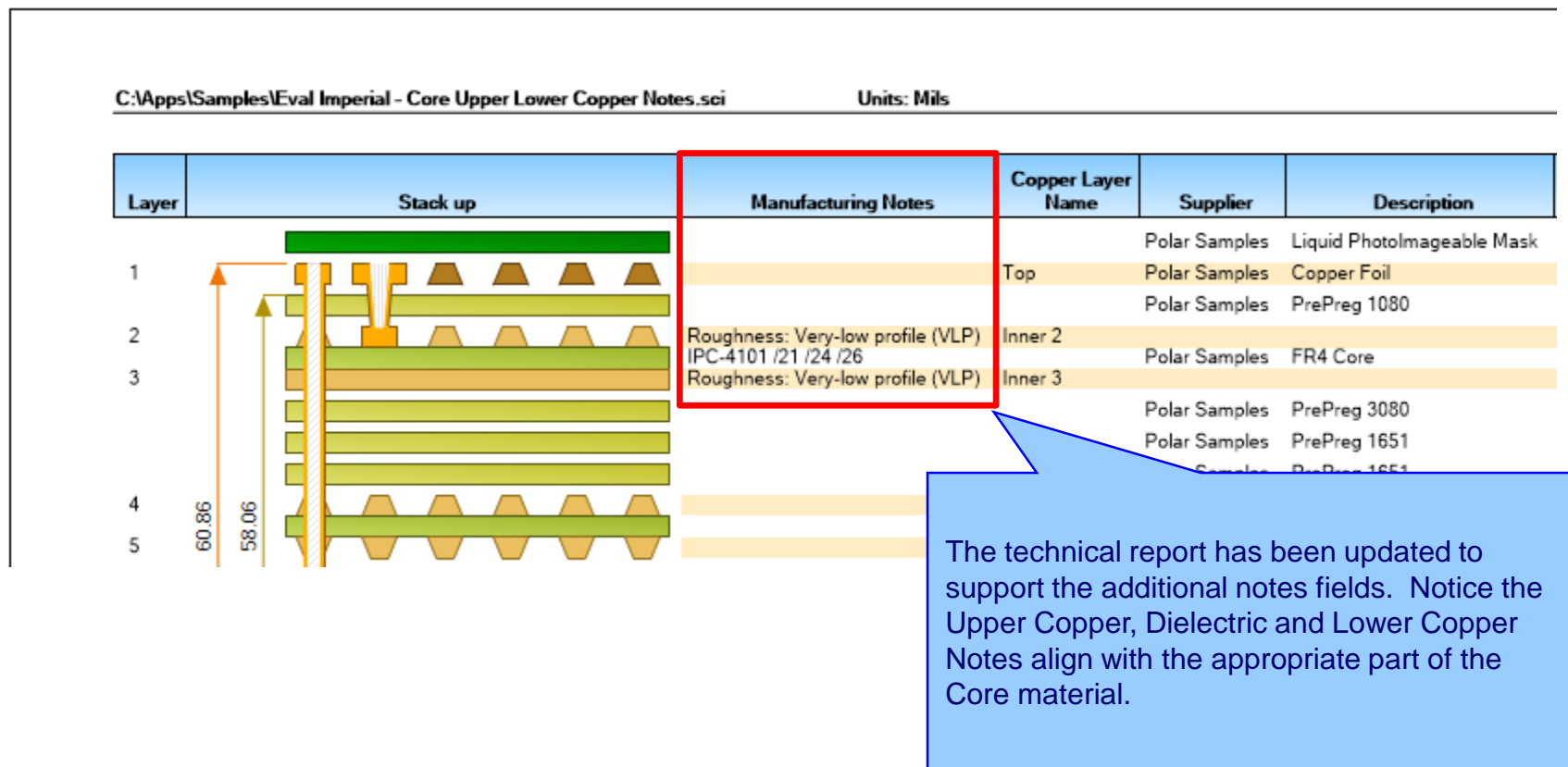


Material Library Import / Export

The import / export options have been enhanced to support the additional material library notes columns.



Material Note Field Enhancements – technical report enhancements



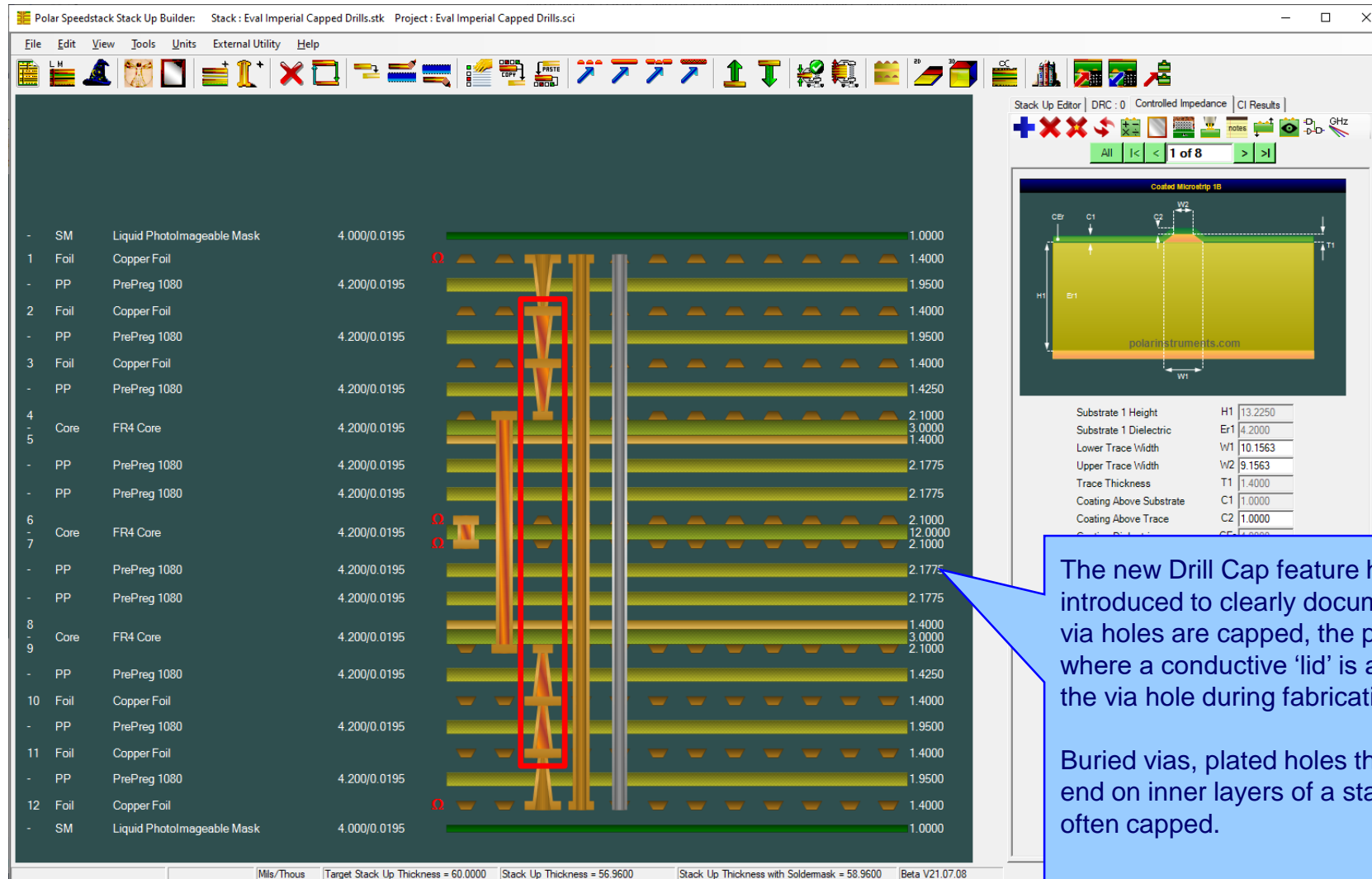
Import / Export enhancements

The following Import / Export options have been updated to support the additional material notes properties introduced with Speedstack v21.11.01:

- XML STKX v23.00 and SSX v13.00 import / export options
- CSV export option

Speedstack v21.07.08 (July 2021)

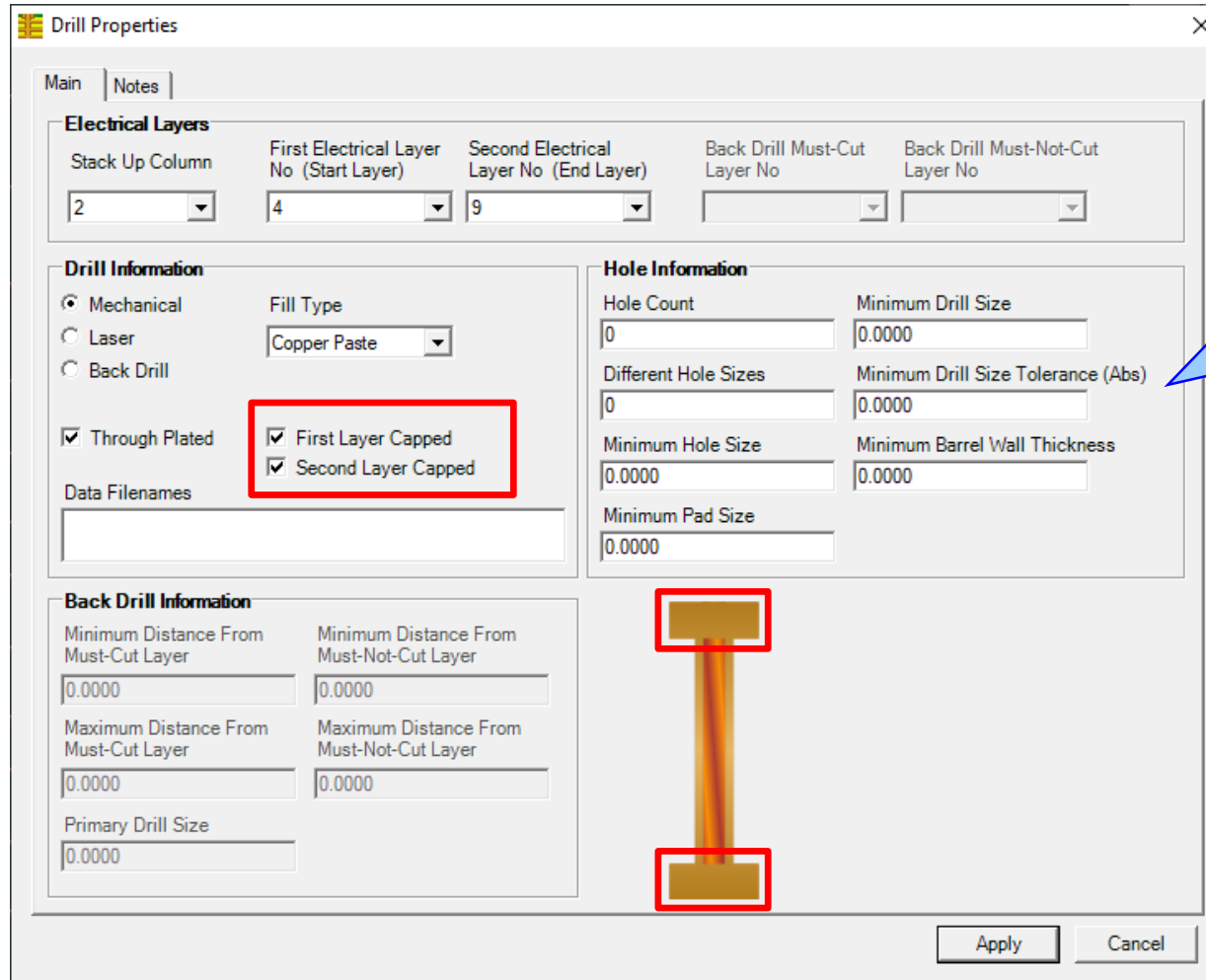
New Drill Cap feature



The new Drill Cap feature has been introduced to clearly document when via holes are capped, the process where a conductive 'lid' is added to the via hole during fabrication.

Buried vias, plated holes that start and end on inner layers of a stack up, are often capped.

Drill Cap option – mechanical through plated drills



Drill Properties

Main | Notes

Electrical Layers

Stack Up Column: 2

First Electrical Layer No (Start Layer): 4

Second Electrical Layer No (End Layer): 9

Back Drill Must-Cut Layer No:

Back Drill Must-Not-Cut Layer No:

Drill Information

☒ Mechanical ☐ Laser ☐ Back Drill

Fill Type: Copper Paste

☒ Through Plated

☒ First Layer Capped

☒ Second Layer Capped

Data Filenames:

Hole Information

Hole Count: 0

Minimum Drill Size: 0.0000

Different Hole Sizes: 0

Minimum Drill Size Tolerance (Abs): 0.0000

Minimum Hole Size: 0.0000

Minimum Barrel Wall Thickness: 0.0000

Minimum Pad Size: 0.0000

Back Drill Information

Minimum Distance From Must-Cut Layer: 0.0000

Minimum Distance From Must-Not-Cut Layer: 0.0000

Maximum Distance From Must-Cut Layer: 0.0000

Maximum Distance From Must-Not-Cut Layer: 0.0000

Primary Drill Size: 0.0000

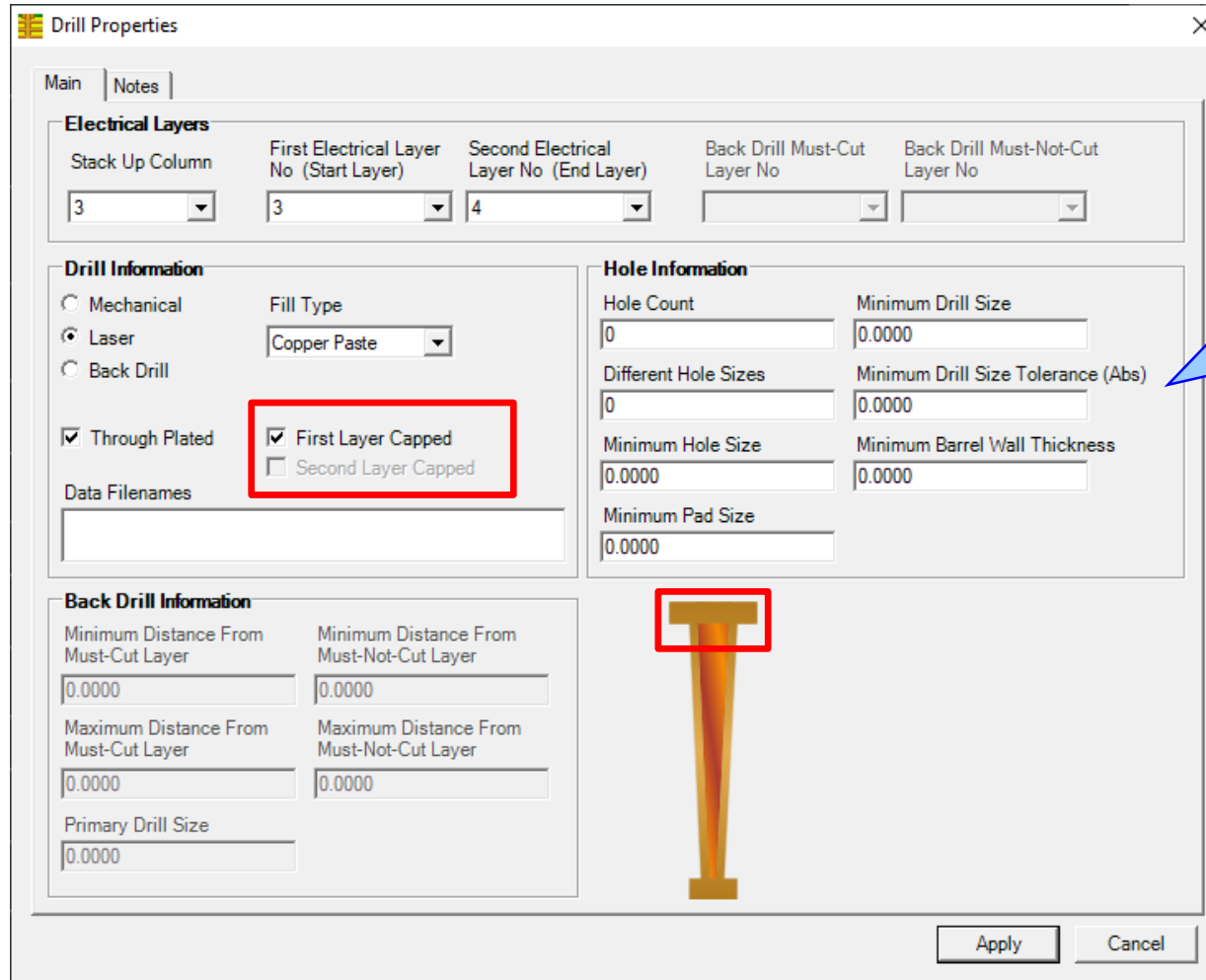
Apply Cancel

Mechanical

For mechanical drills it is possible to have four states:

1. Neither first or second layer capped (default when adding a drill)
2. First layer capped
3. Second layer capped
4. Both layers capped

Drill Cap option – laser drills

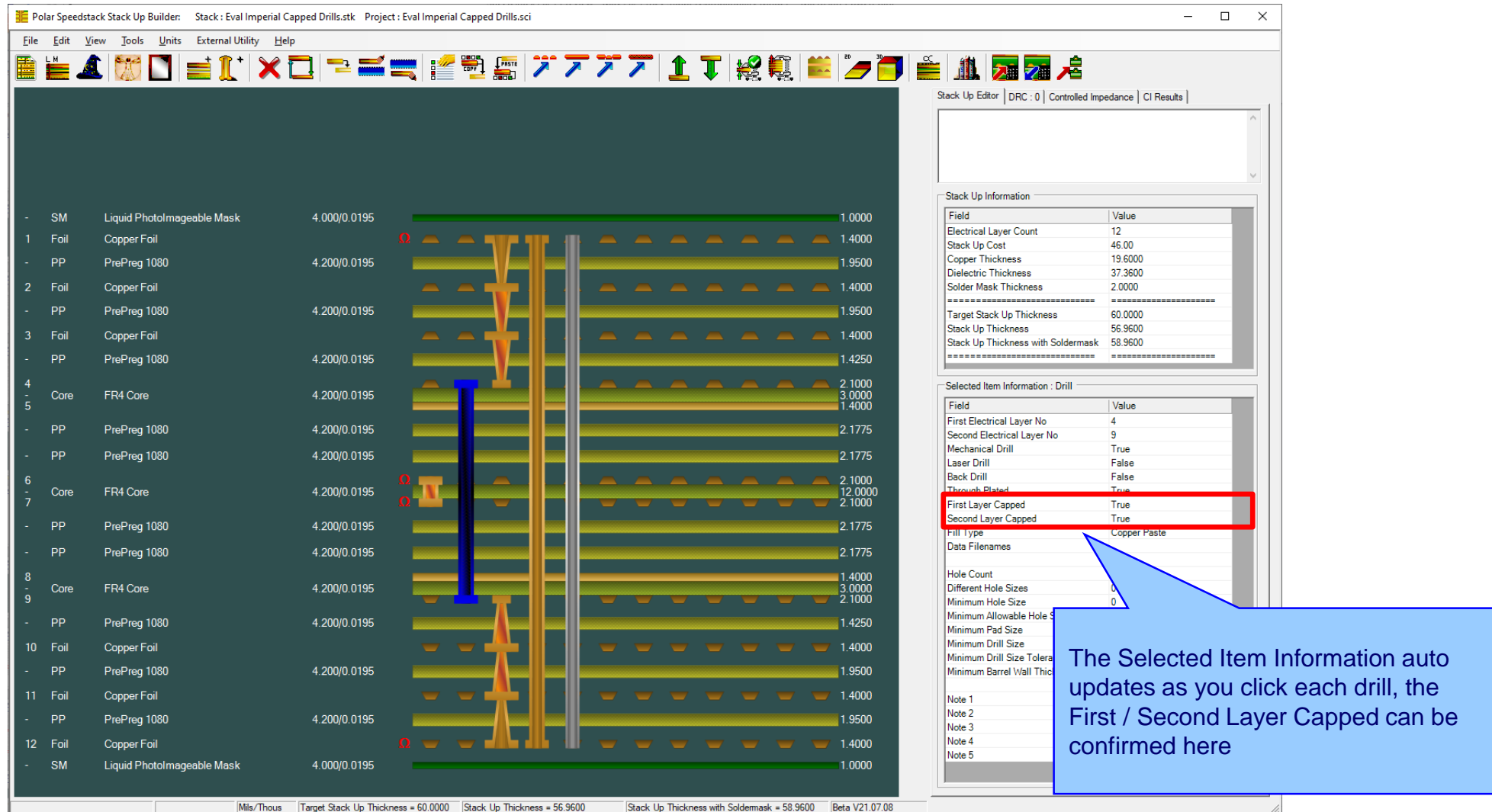


Laser

For laser drills it is possible to have two states as the Second Layer Capped checkbox is disabled:

1. Not capped (default when adding a drill)
2. First layer capped

New Drill Cap feature

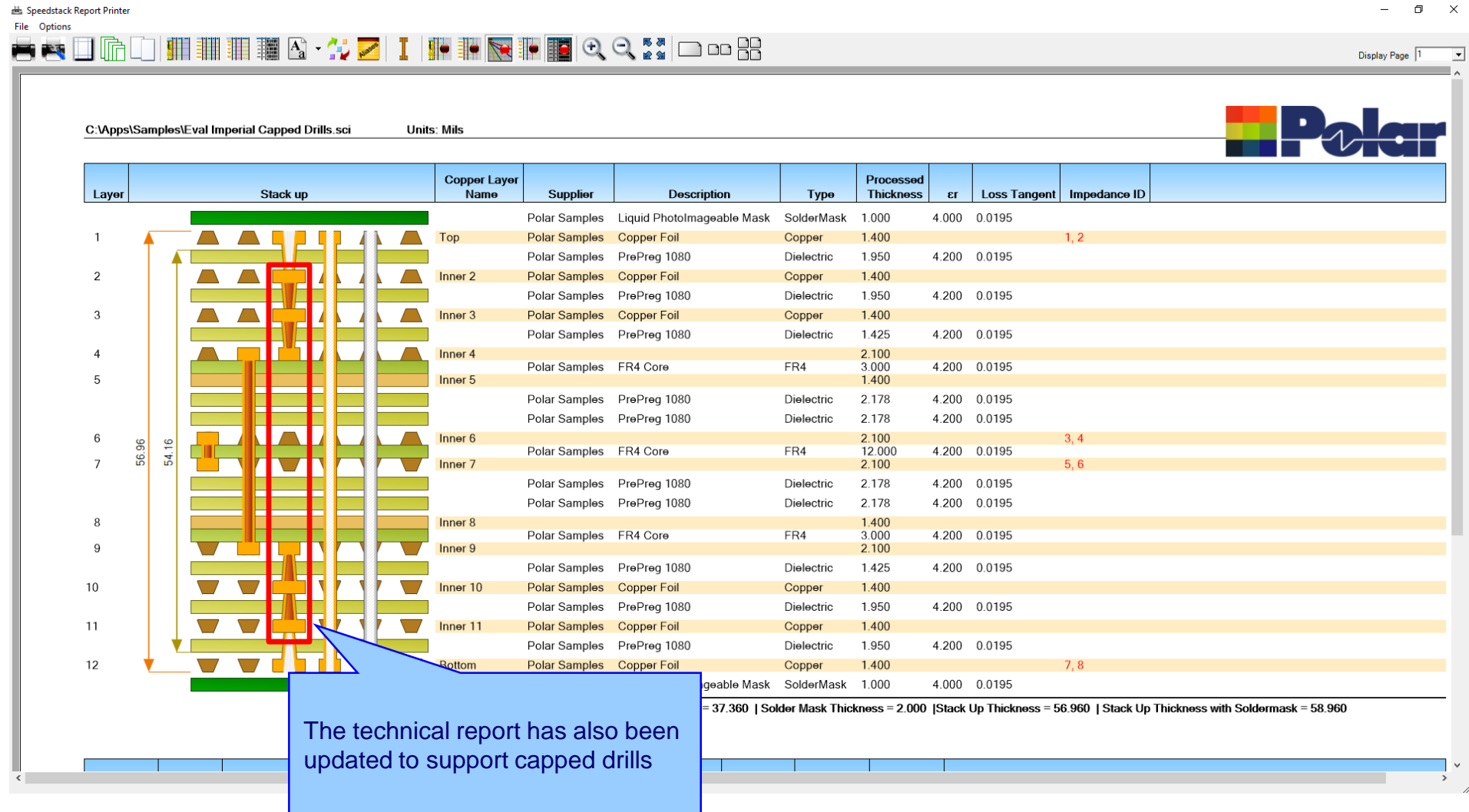


The screenshot displays the Polar Speedstack Stack Up Builder interface. The main window shows a stack up list with layers including SM (Liquid Photolamable Mask), PP (PreReg 1080), and Core (FR4 Core). A 3D model of a drill is shown in the center. The right-hand panel contains two sections: 'Stack Up Information' and 'Selected Item Information : Drill'. The 'Selected Item Information : Drill' section is highlighted with a red box, showing the following fields:

Field	Value
First Electrical Layer No	4
Second Electrical Layer No	9
Mechanical Drill	True
Laser Drill	False
Back Drill	False
Through Plated	True
First Layer Capped	True
Second Layer Capped	True
Fill Type	Copper Paste
Data Filenames	
Hole Count	
Different Hole Sizes	0
Minimum Hole Size	0
Minimum Allowable Hole Size	
Minimum Pad Size	
Minimum Drill Size	
Minimum Drill Size Tolerance	
Minimum Barrel Wall Thickness	
Note 1	
Note 2	
Note 3	
Note 4	
Note 5	

A blue callout box points to the 'First Layer Capped' and 'Second Layer Capped' fields, stating: "The Selected Item Information auto updates as you click each drill, the First / Second Layer Capped can be confirmed here".

New Drill Cap feature – technical report enhancements



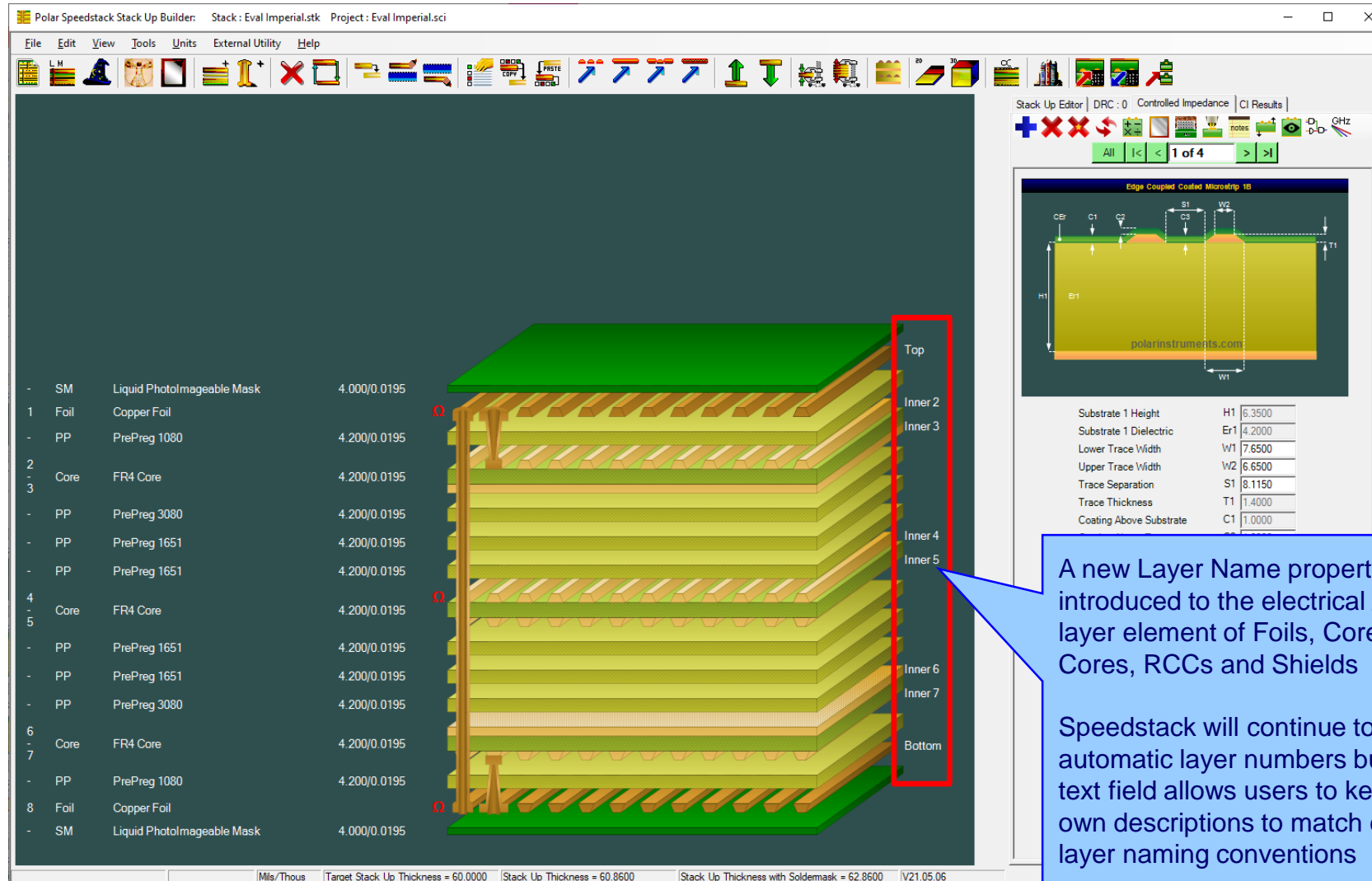
Import / Export enhancements

The following Import / Export options have been updated to support the drill cap properties introduced with Speedstack v21.07.08:

- XML STKX v22.00 and SSX v12.00 import / export options
- CSV export option

Speedstack v21.05.06 (May 2021)

New Layer Name property for electrical / copper layers



Polar Speedstack Stack Up Builder: Stack: Eval Imperial.stk Project: Eval Imperial.sci

File Edit View Tools Units External Utility Help

Stack Up Editor | DRC: 0 Controlled Impedance | CI Results | 1 of 4

Edge Coupled Coated Microstrip 10

Substrate 1 Height H1 6.3500
 Substrate 1 Dielectric Er1 4.2000
 Lower Trace Width W1 7.6500
 Upper Trace Width W2 6.6500
 Trace Separation S1 8.1150
 Trace Thickness T1 1.4000
 Coating Above Substrate C1 1.0000

Layer List:

Layer	Material	Thickness
SM	Liquid Photolimageable Mask	4.000/0.0195
1	Foil Copper Foil	4.200/0.0195
PP	PrePreg 1080	4.200/0.0195
2	Core FR4 Core	4.200/0.0195
3	PP PrePreg 3080	4.200/0.0195
PP	PrePreg 1651	4.200/0.0195
PP	PrePreg 1651	4.200/0.0195
4	Core FR4 Core	4.200/0.0195
5	PP PrePreg 1651	4.200/0.0195
PP	PrePreg 1651	4.200/0.0195
PP	PrePreg 3080	4.200/0.0195
6	Core FR4 Core	4.200/0.0195
7	PP PrePreg 1080	4.200/0.0195
8	Foil Copper Foil	4.200/0.0195
SM	Liquid Photolimageable Mask	4.000/0.0195

3D Stack Up Visualization: Top, Inner 2, Inner 3, Inner 4, Inner 5, Inner 6, Inner 7, Bottom

Callout Box:

A new Layer Name property has been introduced to the electrical / copper layer element of Foils, Cores, Flex Cores, RCCs and Shields

Speedstack will continue to use the automatic layer numbers but this new text field allows users to key in their own descriptions to match existing layer naming conventions

Target Stack Up Thickness = 60.0000 | Stack Up Thickness = 60.8600 | Stack Up Thickness with Soldermask = 62.8600 | V21.05.06

New Layer Name property for electrical / copper layers


Foil Properties

Main Notes Attributes

General Information

Supplier	Polar Samples	Cost	1.00
Supplier Description	FO/001	Lead Time	0.00
Description	Copper Foil		
Stock Number	100-001		
Type	Copper		

Copper

Base Thickness	0.7000	Copper Coverage %	0.00
Finished Thickness	1.4000	Graphical Colour	
Layer Name	Top		
Data Filename			
Trace Inverted	<input type="checkbox"/>	Remove Copper (disabled if structures or sub-stacks exist)	<input type="checkbox"/>
Finishing Applied	<input type="checkbox"/>		

Apply

Foil Properties

The new Layer Name property exists on all materials with an electrical / copper layer. The user can key in any alphanumeric name

New Layer Name property for electrical / copper layers


Core Properties

Main | Notes | Attributes


General Information

Supplier	Polar Samples	Exchange Copper	<input type="checkbox"/>
Supplier Description	CO/005		
Description	FR4 Core	Cost	5.00
Stock Number	400-005	Tolerance	0.00
Type	FR4	Lead Time	0.00


Upper Copper

Base Thickness	1.4000	Copper Coverage %	0.00
Finished Thickness	1.4000	Graphical Colour	
Layer Name	Inner 2		
Data Filename			
Trace Inverted	<input type="checkbox"/>	Remove Copper (disabled if structures or sub-stacks exist)	<input type="checkbox"/>
Finishing Applied	<input type="checkbox"/>		

Dielectric

Base Thickness	3.0000	Td	0.0
Finished Thickness	3.0000	CAF Resistance	0.0
Dielectric Constant	4.2000	Z Axis Expansion	0.0
Loss Tangent	0.0195	Excess Resin	0.0000
Resin Content %	60.00	Isolation Distance	3.0000
Tg	180.0	Graphical Colour	

Lower Copper

Base Thickness	1.4000	Copper Coverage %	0.00
Finished Thickness	1.4000	Graphical Colour	
Layer Name	Inner 3		
Data Filename			
Trace Inverted	<input checked="" type="checkbox"/>	Remove Copper (disabled if structures or sub-stacks exist)	<input type="checkbox"/>
Finishing Applied	<input type="checkbox"/>		

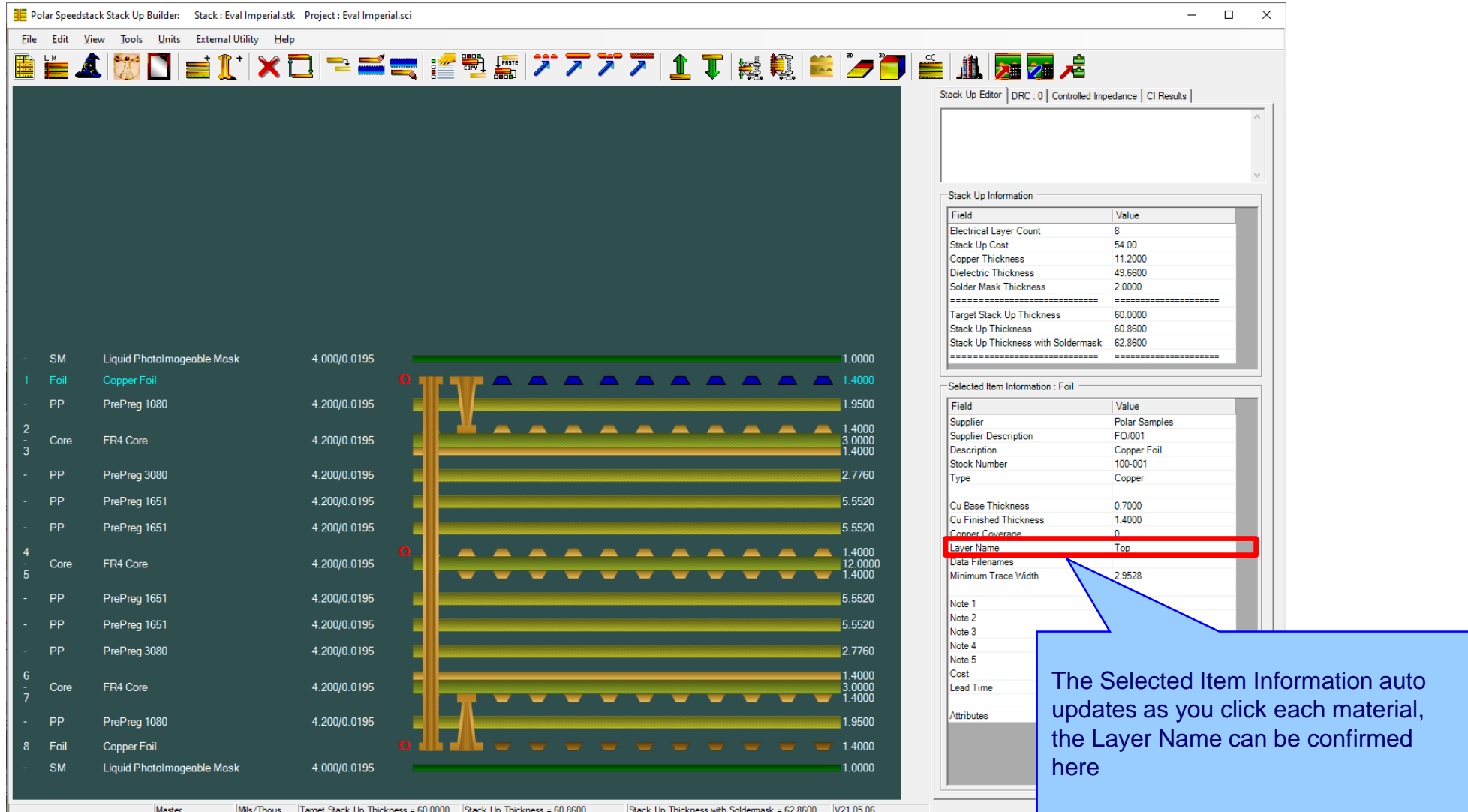
Apply

Close

Core Properties

For core materials, a new Layer Name property has been added for both upper and lower electrical / copper layers

New Layer Name property for electrical / copper layers

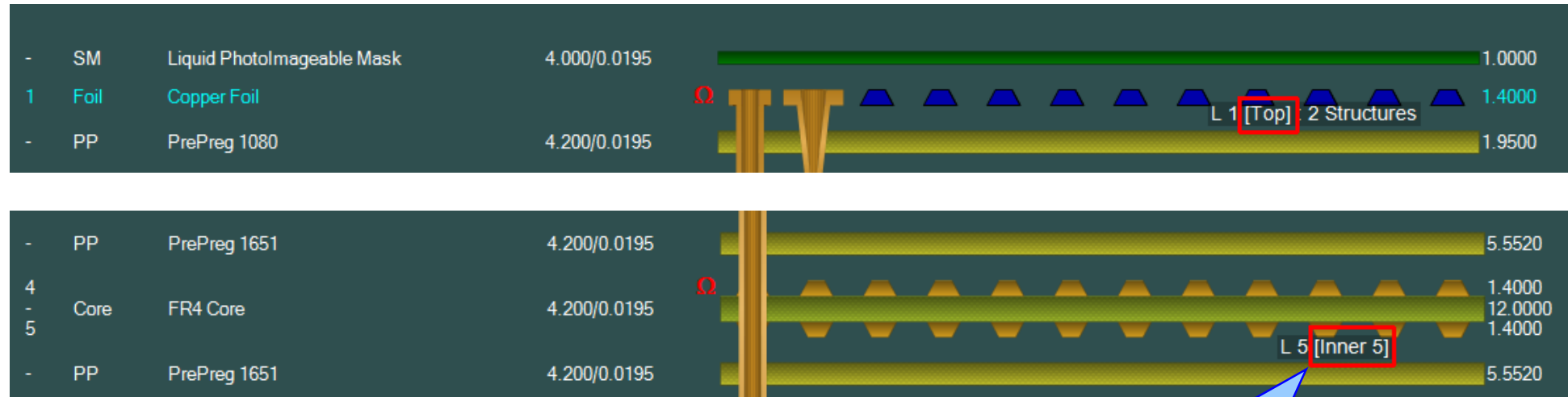


The screenshot displays the Polar Speedstack Stack Up Builder interface. The main window shows a stack up configuration with layers listed on the left and a cross-sectional diagram on the right. The layers include SM (Liquid Photolmageable Mask), Foil (Copper Foil), PP (PrePreg 1080), Core (FR4 Core), and PP (PrePreg 3080, 1651). The right panel shows the Stack Up Information and Selected Item Information. A red box highlights the 'Layer Name' property in the Selected Item Information table, which is set to 'Top'. A blue callout box points to this property with the text: 'The Selected Item Information auto updates as you click each material, the Layer Name can be confirmed here'.

Field	Value
Electrical Layer Count	8
Stack Up Cost	54.00
Copper Thickness	11.2000
Dielectric Thickness	49.6600
Solder Mask Thickness	2.0000
=====	
Target Stack Up Thickness	60.0000
Stack Up Thickness	60.8600
Stack Up Thickness with Soldermask	62.8600
=====	

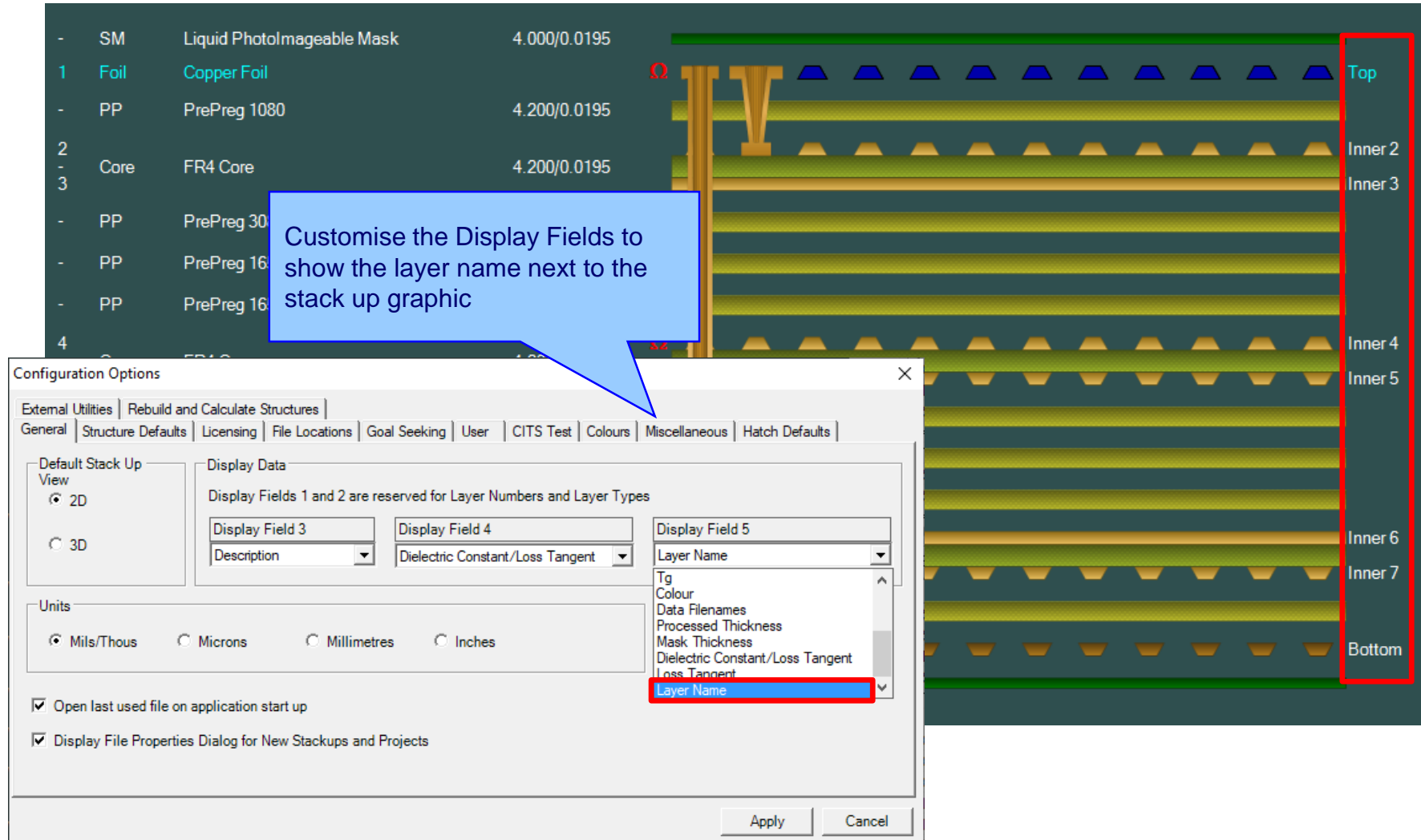
Field	Value
Supplier	Polar Samples
Supplier Description	FO/001
Description	Copper Foil
Stock Number	100-001
Type	Copper
Cu Base Thickness	0.7000
Cu Finished Thickness	1.4000
Copper Coverage	0
Layer Name	Top
Data Filenames	
Minimum Trace Width	2.9528
Note 1	
Note 2	
Note 3	
Note 4	
Note 5	
Cost	
Lead Time	
Attributes	

New Layer Name property for electrical / copper layers



Mouse over the electrical layer and the Layer Name will display alongside the layer number and the amount of structures. Very quickly confirm the Layer Name without needing to open the Properties dialog

New Layer Name property for electrical / copper layers



The screenshot displays the Speedstack software interface. On the left, a table lists the stackup layers:

Layer	Type	Material	Thickness
-	SM	Liquid PhotoImageable Mask	4.000/0.0195
1	Foil	Copper Foil	
-	PP	PrePreg 1080	4.200/0.0195
2	Core	FR4 Core	4.200/0.0195
3	PP	PrePreg 30	
-	PP	PrePreg 16	
-	PP	PrePreg 16	
4	Core	FR4 Core	

A blue callout box points to the 'Copper Foil' layer, stating: "Customise the Display Fields to show the layer name next to the stack up graphic".

The 'Configuration Options' dialog box is open, showing the 'Miscellaneous' tab. The 'Display Data' section is active, with the following settings:

- Default Stack Up View: 2D
- Units: Mils/Thous
- Open last used file on application start up: ☒
- Display File Properties Dialog for New Stackups and Projects: ☒

The 'Display Fields' section shows the following configurations:

- Display Field 3: Description
- Display Field 4: Dielectric Constant/Loss Tangent
- Display Field 5: Layer Name

The 'Layer Name' dropdown menu is open, showing the following options:

- Tg
- Colour
- Data Filenames
- Processed Thickness
- Mask Thickness
- Dielectric Constant/Loss Tangent
- Loss Tangent
- Layer Name

The 'Layer Name' option is highlighted with a red box.

The background shows a 3D stackup graphic with layers labeled: Top, Inner 2, Inner 3, Inner 4, Inner 5, Inner 6, Inner 7, and Bottom. A red box highlights the 'Top' and 'Bottom' labels.

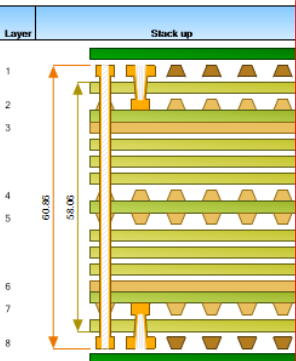
New Layer Name property for electrical / copper layers

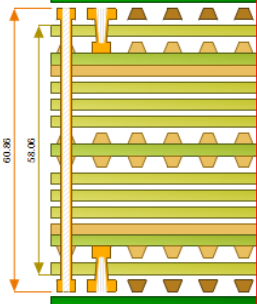
Speedstack Report Printer

File Options





Display Page 1

C:\Appet\Samples\Eval Imperial.sci Units: Mils



Layer	Stack up	Copper Layer Name	Supplier	Description	Type	Processed Thickness	εr	Loss Tangent	Impedance ID
1		Top	Polar Samples	Liquid PhotoImageable Mask	SolderMask	1.000	4.000	0.0195	
			Polar Samples	Copper Foil	Copper	1.400			1, 2
2			Polar Samples	PrePreg 1080	Dielectric	1.950	4.200	0.0195	
3		Inner 2	Polar Samples	FR4 Core	FR4	3.000	4.200	0.0195	
		Inner 3	Polar Samples	PrePreg 3080	Dielectric	2.776	4.200	0.0195	
			Polar Samples	PrePreg 1651	Dielectric	5.552	4.200	0.0195	
			Polar Samples	PrePreg 1651	Dielectric	5.552	4.200	0.0195	
4		Inner 4	Polar Samples	FR4 Core	FR4	12.000	4.200	0.0195	3
5	Inner 5	Polar Samples	PrePreg 1651	Dielectric	5.552	4.200	0.0195		
		Polar Samples	PrePreg 1651	Dielectric	5.552	4.200	0.0195		
		Polar Samples	PrePreg 3080	Dielectric	2.776	4.200	0.0195		
6	Inner 6	Polar Samples	FR4 Core	FR4	1.400	4.200	0.0195		
7	Inner 7	Polar Samples	PrePreg 1080	Dielectric	1.950	4.200	0.0195		
8	Bottom	Polar Samples	Copper Foil	Copper	1.400			4	
		Polar Samples	Liquid PhotoImageable Mask	SolderMask	1.000	4.000	0.0195		

Copper Thickness = 11.200 | Dielectric Thickness = 49.660 | Solder Mask Thickness = 2.000 | Stack Up Thickness = 60.860 | Stack Up Thickness with Soldermask = 62.860
Stack Up Cost = 54.00

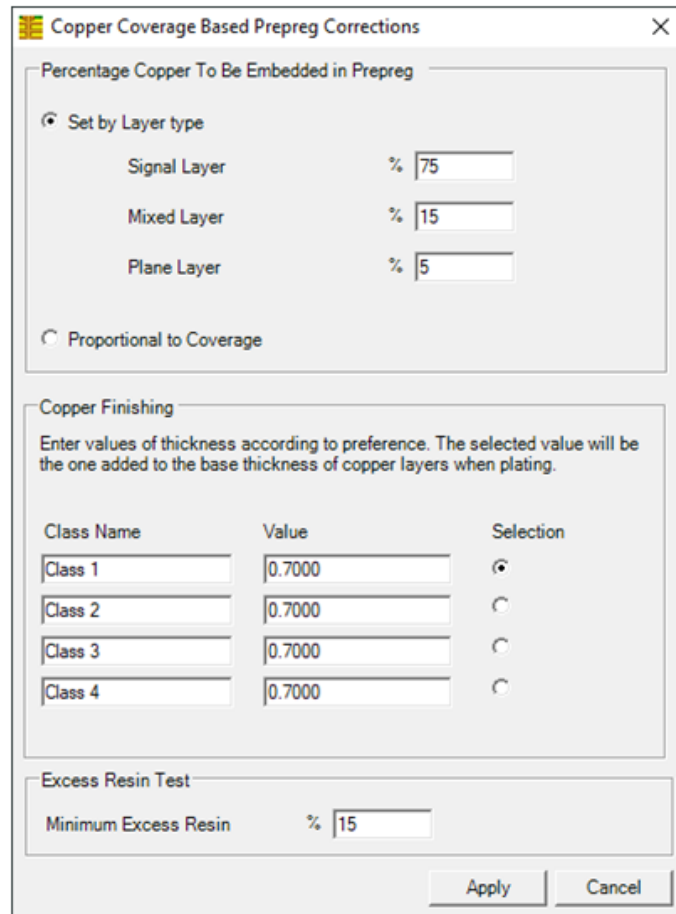
Impedance ID	Structure Image	Structure Name	Impedance Signal Layer	Ref. Plane 1 in Layer	Ref. Plane 2 in Layer	Lower Trace Width (W1)	Upper Trace Width (W2)	Trace Separation (S1)	Target Impedance	Calculated Impedance
1		Edge Coupled Coated Microstrip 1B	1	3	0	7.650	6.650	8.115	100.000	100.290
2		Coated Microstrip 1B	1	3	0	4.000	3.000	0.000	75.000	75.740
3		Edge Coupled Offset Stripline 1B1A	4	3	6	7.250	6.250	8.500	100.000	101.280
4		Coated Microstrip 1B	8	6	0	4.000	3.000	0.000	75.000	75.740

StackName: Master	Version:	Revision:	Modification:	Date of Revision:	Editor	Page 1/X
Date:	Associated Documents:					
Author:						
Department:						
Site:						

Copyright © Polar Instruments Ltd

The technical report has also been updated to support layer names

Copper Finishing classes increased



Copper Coverage Based Prepreg Corrections

Percentage Copper To Be Embedded in Prepreg

☒ Set by Layer type

Signal Layer % 75

Mixed Layer % 15

Plane Layer % 5

☐ Proportional to Coverage

Copper Finishing

Enter values of thickness according to preference. The selected value will be the one added to the base thickness of copper layers when plating.

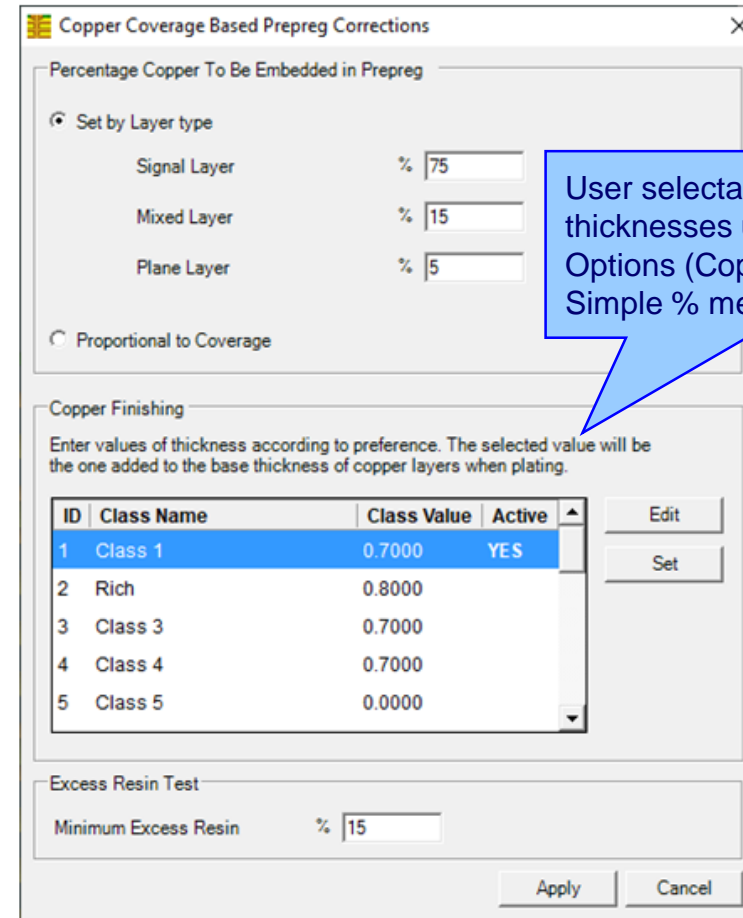
Class Name	Value	Selection
Class 1	0.7000	<input checked="" type="radio"/>
Class 2	0.7000	<input type="radio"/>
Class 3	0.7000	<input type="radio"/>
Class 4	0.7000	<input type="radio"/>

Excess Resin Test

Minimum Excess Resin % 15

Apply Cancel

Speedstack v21.04 and earlier supported 4 classes

Copper Coverage Based Prepreg Corrections

Percentage Copper To Be Embedded in Prepreg

☒ Set by Layer type

Signal Layer % 75

Mixed Layer % 15

Plane Layer % 5

☐ Proportional to Coverage

Copper Finishing

Enter values of thickness according to preference. The selected value will be the one added to the base thickness of copper layers when plating.

ID	Class Name	Class Value	Active
1	Class 1	0.7000	YES
2	Rich	0.8000	
3	Class 3	0.7000	
4	Class 4	0.7000	
5	Class 5	0.0000	

Excess Resin Test

Minimum Excess Resin % 15

Apply Cancel

User selectable plating thicknesses under Finishing Options (Copper Coverage & Simple % methods)

Speedstack v21.05 now supports 20 classes

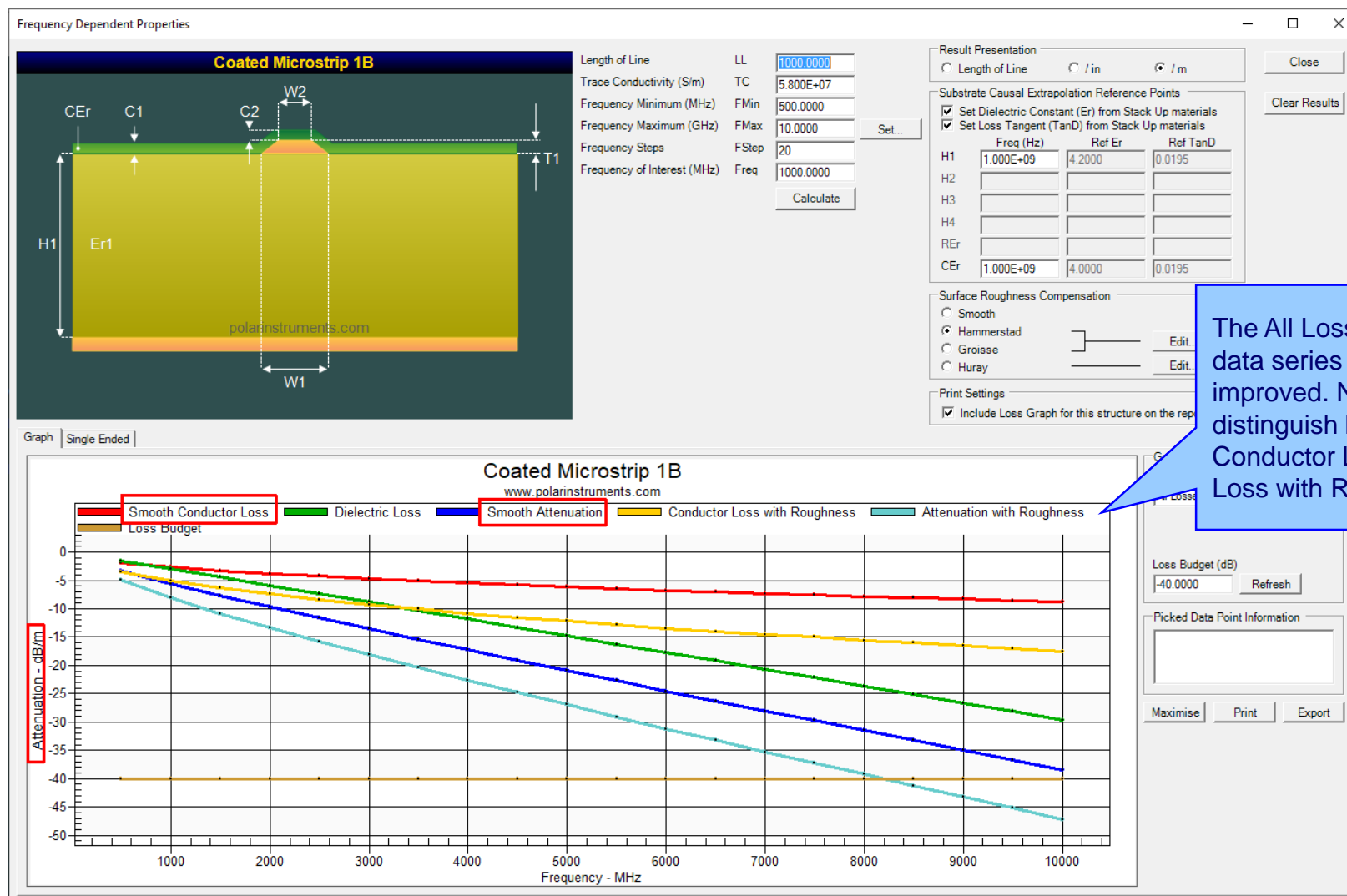
Import / Export enhancements

The following Import / Export options have been updated to support the layer name property introduced with Speedstack v21.05.06:

- XML STKX v21.00 and SSX v11.00 import / export options
- CSV export option
- Gerber / DXF export option

Speedstack v21.04.00 (April 2021)

All Losses plot - clearer labelling



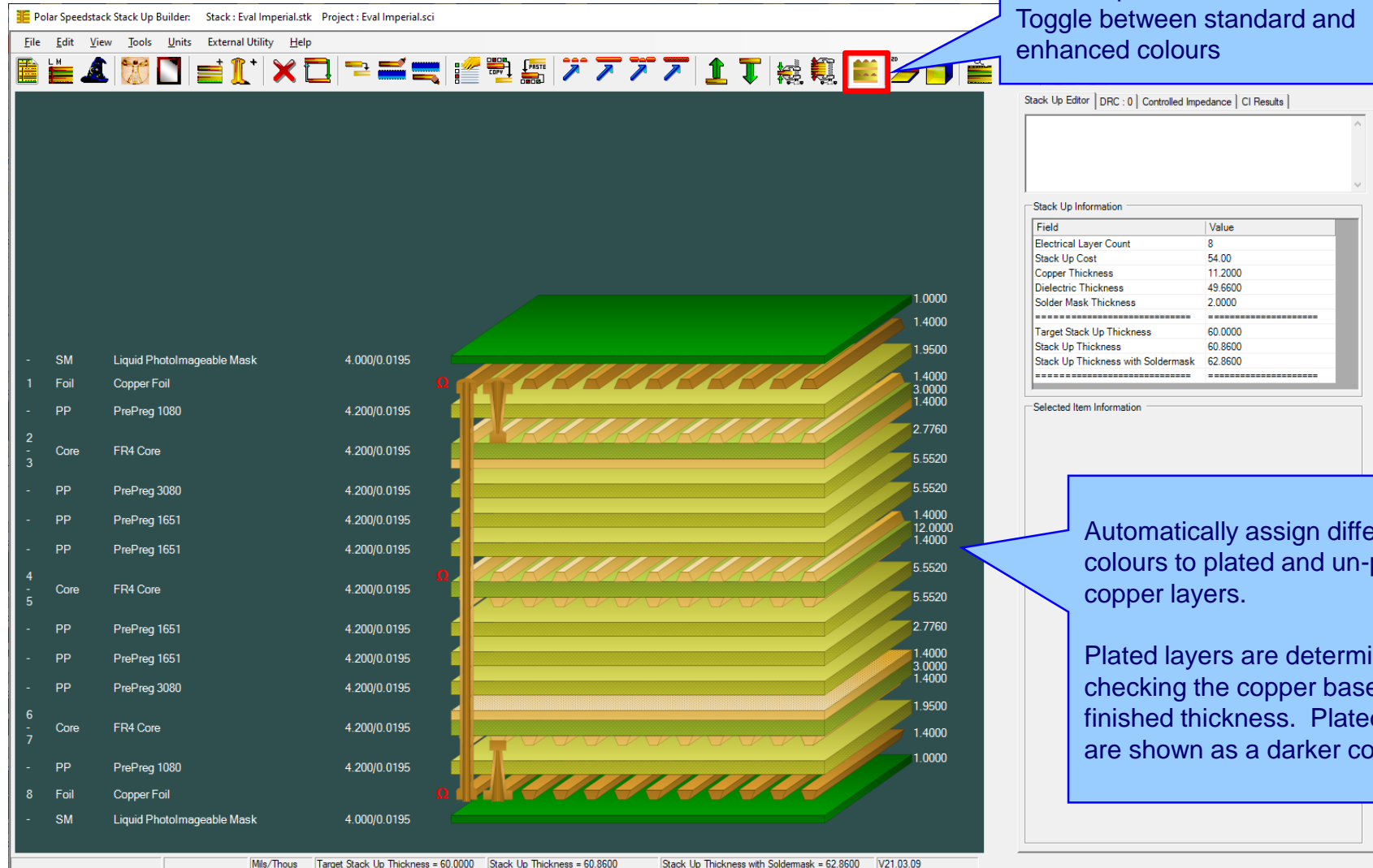
The All Losses plot y-axis and data series labelling has been improved. Now easier to distinguish between Smooth Conductor Loss and Conductor Loss with Roughness

Other enhancements

- The controlled impedance and insertion loss Calculation Engine updated to the latest edition
- Frequency Dependent Calculations graphing library enhancements

Speedstack v21.03.09 (March 2021)

New Apply Plating Colours toolbar option



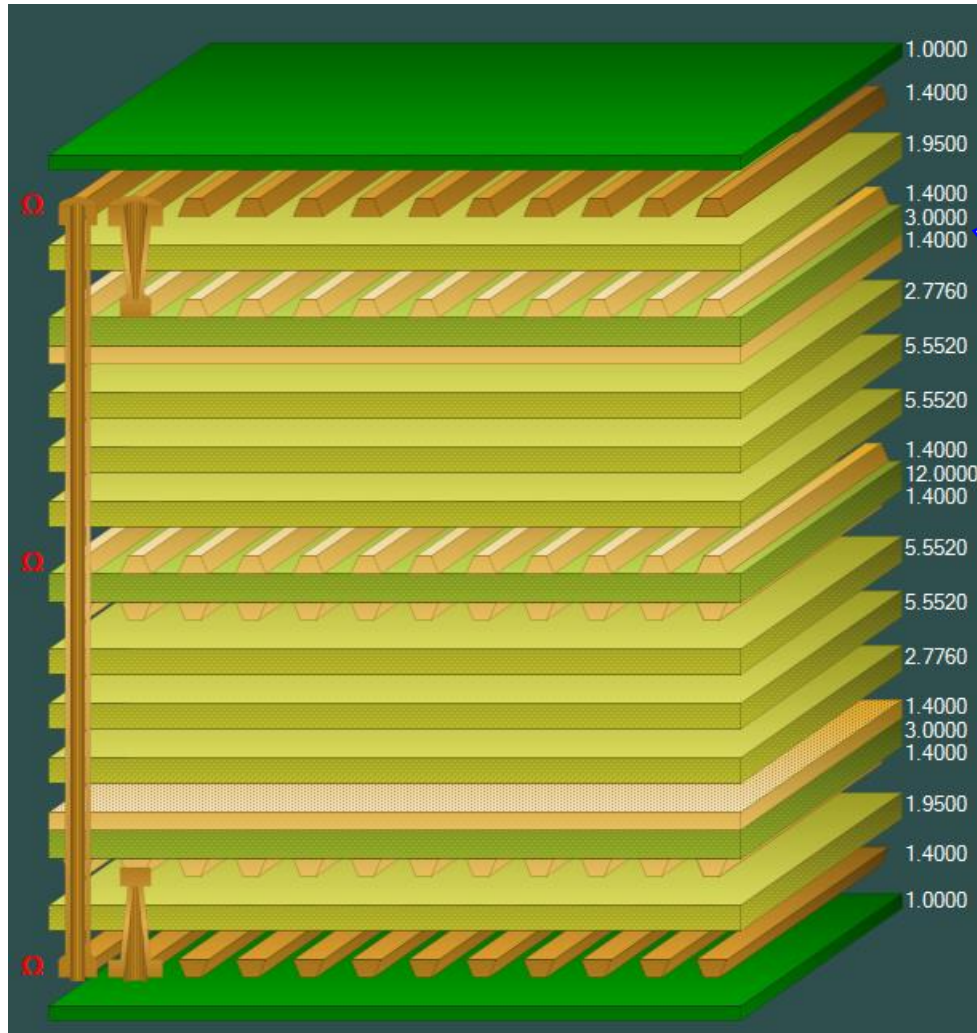
Stack Up Editor | DRC : 0 | Controlled Impedance | CI Results

Field	Value
Electrical Layer Count	8
Stack Up Cost	54.00
Copper Thickness	11.2000
Dielectric Thickness	49.6600
Solder Mask Thickness	2.0000
Target Stack Up Thickness	60.0000
Stack Up Thickness	60.8600
Stack Up Thickness with Soldermask	62.8600

Selected Item Information

Mils/Thous | Target Stack Up Thickness = 60.0000 | Stack Up Thickness = 60.8600 | Stack Up Thickness with Soldermask = 62.8600 | V21.03.09

New Apply Plating Colours toolbar option



Plated Copper Layers

During PCB fabrication drill holes commonly have copper applied to the barrel wall by an electroplating process. This provides an interconnect between copper layers in the stack up.

This electroplating process often results in additional copper also being applied to the exposed copper layers where the mechanical drill starts / ends.

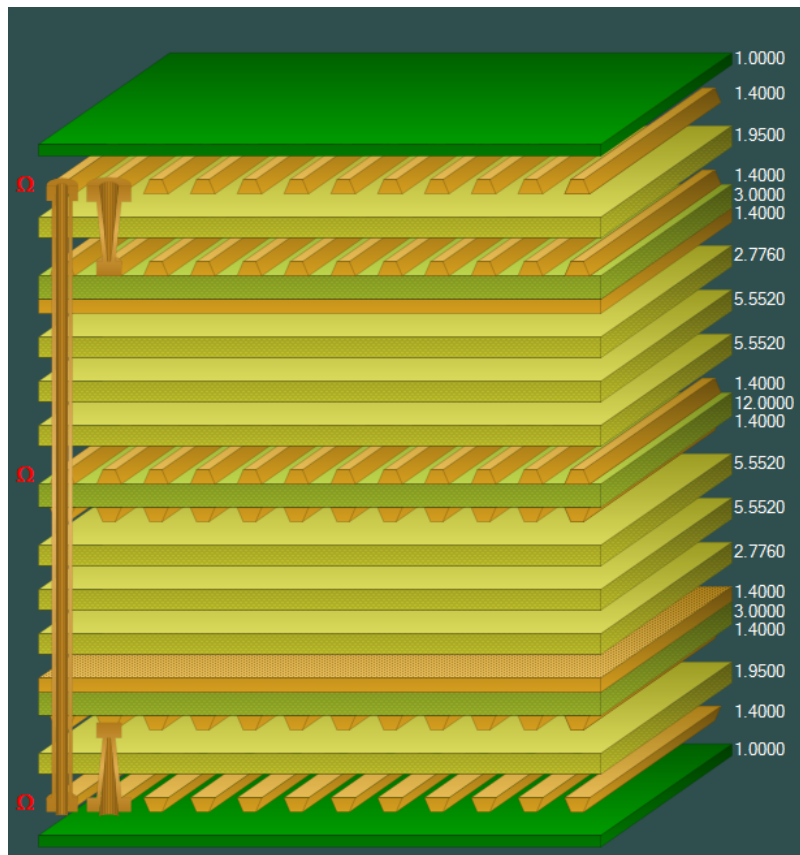
It is important to account for this additional plated copper thickness when calculating the overall stack up thickness and controlled impedance / insertion loss structures.

Speedstack has always allowed this additional plating thickness to be applied to the relevant copper layers. With v21.03 this has been enhanced further with automatic colour assignments to the plated and unplated layers

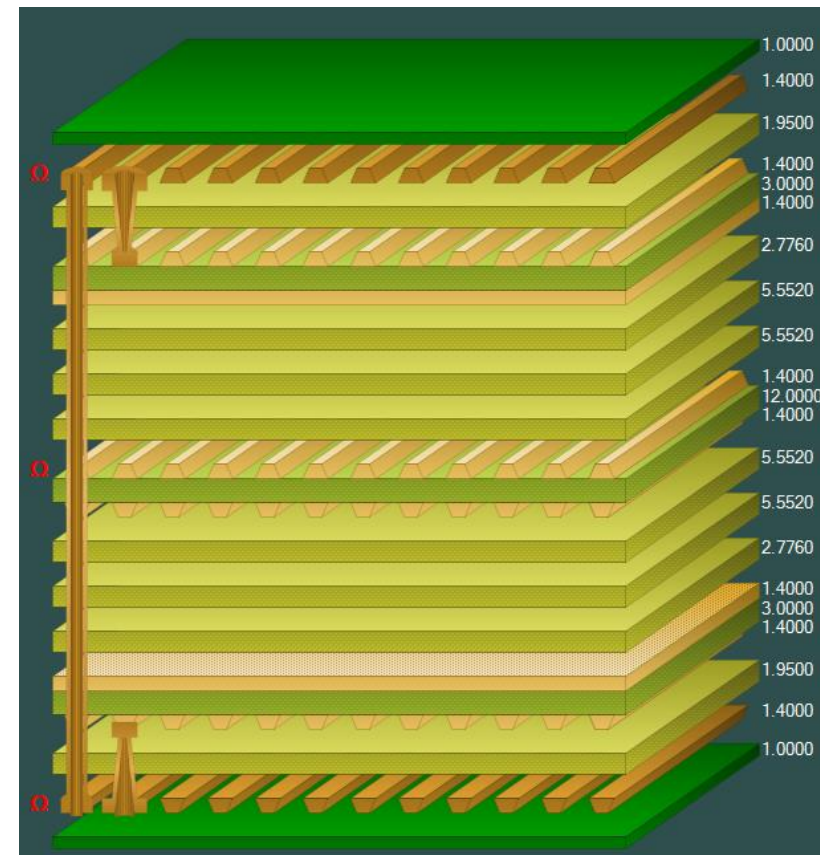
New Apply Plating Colours toolbar option



Standard Colours



Apply Plating Colours



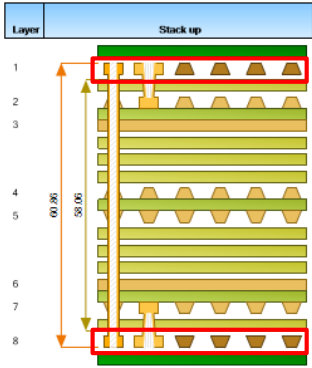
New Apply Plating Colours toolbar option

Speedstack Report Printer

File Options

Display Page 1




C:\Appel\Samples\Eval Imperial.sci Units: Mils



Layer	Stack up	Supplier	Description	Type	Processed Thickness	cr	Loss Tangent	Impedance ID
1		Polar Samples	Liquid Photoimageable Mask	SolderMask	1.000	4.000	0.0195	
		Polar Samples	Copper Foil	Copper	1.400			1, 2
2		Polar Samples	PrePreg 1080	Dielectric	1.950	4.200	0.0195	
3		Polar Samples	FR4 Core	FR4	1.400	3.000	4.200	0.0195
		Polar Samples	PrePreg 3080	Dielectric	2.776	4.200	0.0195	
		Polar Samples	PrePreg 1651	Dielectric	5.552	4.200	0.0195	
		Polar Samples	PrePreg 1651	Dielectric	5.552	4.200	0.0195	
4		Polar Samples	FR4 Core	FR4	1.400	12.000	4.200	0.0195
		Polar Samples	PrePreg 1651	Dielectric	5.552	4.200	0.0195	
		Polar Samples	PrePreg 1651	Dielectric	5.552	4.200	0.0195	
		Polar Samples	PrePreg 3080	Dielectric	2.776	4.200	0.0195	
6		Polar Samples	FR4 Core	FR4	1.400	3.000	4.200	0.0195
		Polar Samples	PrePreg 1080	Dielectric	1.950	4.200	0.0195	
8		Polar Samples	Copper Foil	Copper	1.400			4
		Polar Samples	Liquid Photoimageable Mask	SolderMask	1.000	4.000	0.0195	

Copper Thickness = 11.200 | Dielectric Thickness = 49.660 | Solder Mask Thickness = 2.000 | Stack Up Thickness = 60.860 | Stack Up Thickness with Soldermask = 62.860
Stack Up Cost = 54.00

Notes

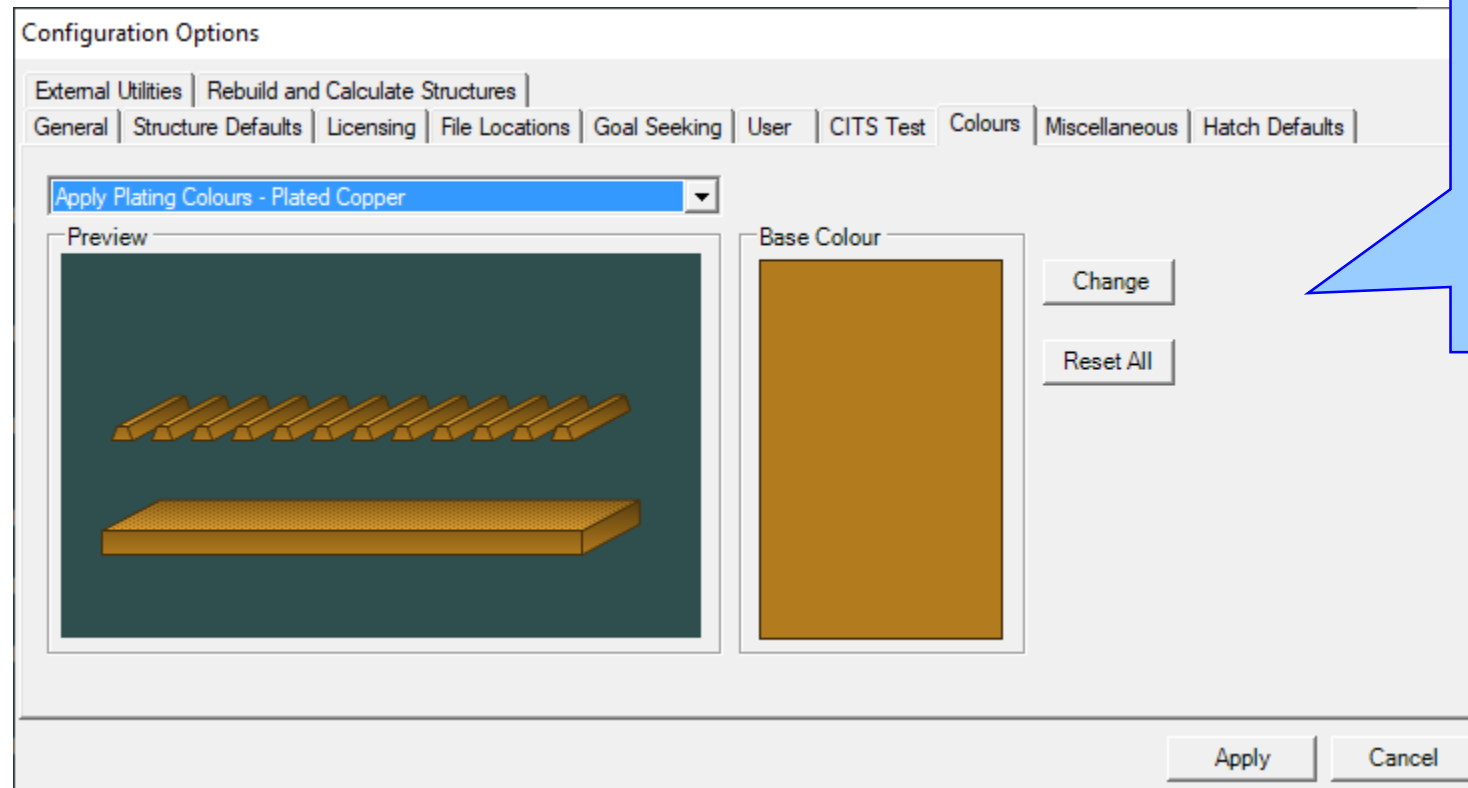
Impedance ID	Structure Image	Structure Name	Impedance Signal Layer	Ref. Plane 1 in Layer	Ref. Plane 2 in Layer	Lower Trace Width (W1)	Upper Trace Width (W2)	Trace Separation (S1)	Target Impedance	Tol (+/- %)	Calculated Impedance
1		Edge Coupled Coated Microstrip 1B	1	3	0	7.650	6.650	8.115	100.000	10.000	100.290
2		Coated Microstrip 1B	1	3	0	4.000	3.000	0.000	75.000	10.000	75.740
3		Edge Coupled Offset Stripline 1B1A	4	3	6	7.250	6.250	8.500	100.000	10.000	101.280

StackName: Master	Version:	Revision:	Modification:	Date of Revision:	Editor:	Page 1/1
Date:	Associated Documents:					
Author:						
Department:						
Site:						

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The technical report will also show the plated and un-plated copper layers.

New Apply Plating Colours toolbar option



Two new user-definable colours have been introduced to the Speedstack Configuration Options.

Customise the Plated and Un-plated colours to suit existing colour schemes adopted by your organisation

Online Library enhancements

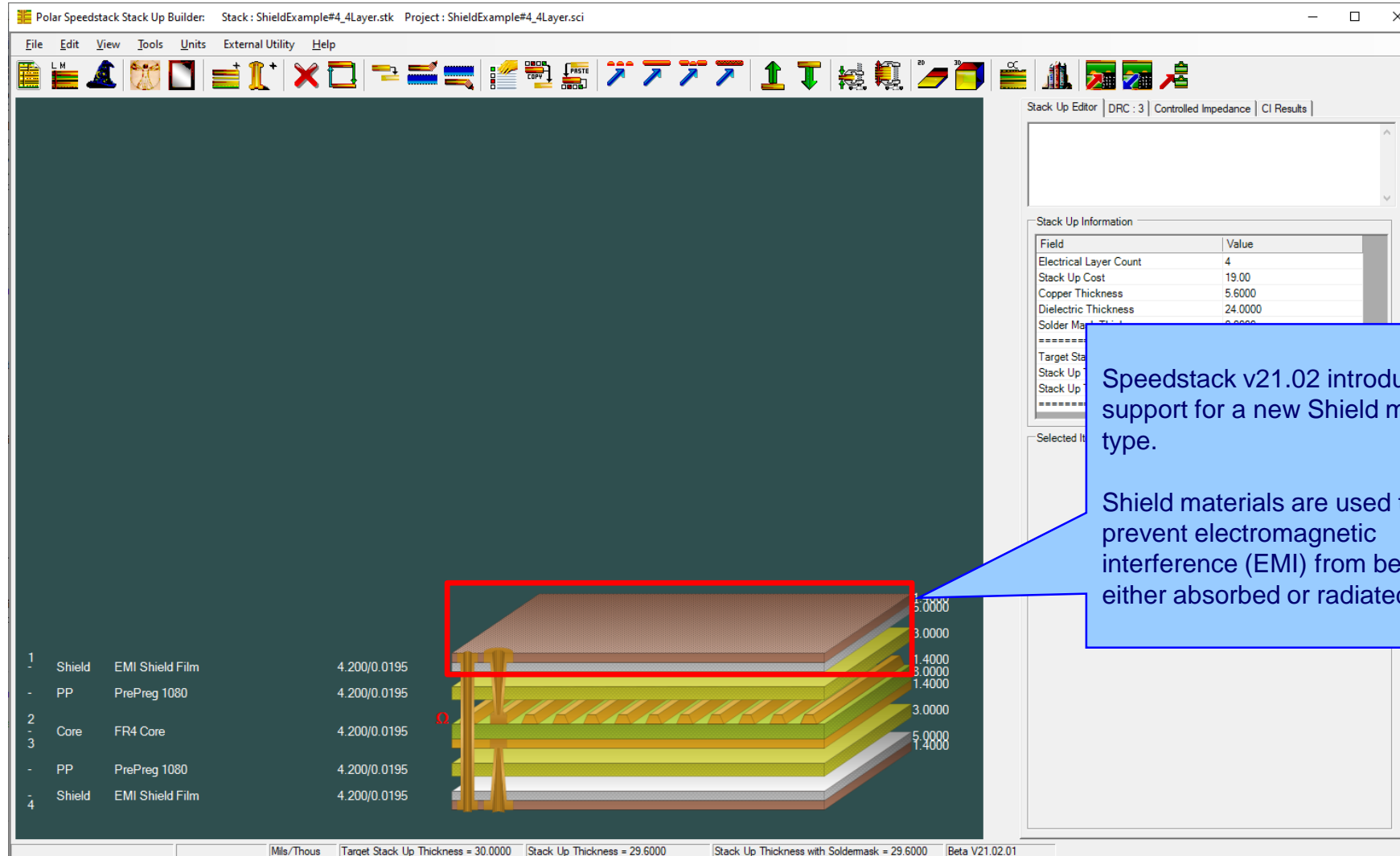
The screenshot displays the 'Online Library' window of the Polar Instruments software. The interface is divided into several sections:

- Filter by Supplier:** A list of suppliers including Showa Denko, Taconic, and Tatsuta. Callouts highlight that Showa Denko and Tatsuta have recently joined the Polar Material Partner program.
- File Type:** A list of material types such as Foils, RCCs, PrePregs, Cores, SolderMasks, Idents, Peelables, Coverlays, BondPly, Adhesives, FlexCores, and Shields. A callout indicates that downloadable libraries can be filtered by frequency (dielectric constant ϵ_r / loss tangent $\tan \delta$ material properties).
- Library Files Available:** A list of available files, including ShowaDenko_GEA_679_1GHz_1901.mlbx, Taconic_FR_25_10GHz_1901.mlbx, and others.
- Filter by Frequency:** Radio buttons for selecting frequency ranges: All, 1 GHz, 20 GHz, 5 GHz, 50 GHz, 10 GHz, and 75 GHz.
- Existing Data Table:** Options to 'Clear' or 'Append' data. Callouts explain that 'Clear' is used to clear data from the existing library data table and download a single library, while 'Append' is used to add data to the existing library data table and download multiple libraries during a single session.
- File Access Mode:** Radio buttons for 'Online Polar Library (ftp://polarinstruments.com)' and 'On-Premise Mode'. A callout notes that 'On-Premise Mode' is used for security reasons where no Internet connection is available. Below this, a text box shows the path 'C:\Users\richa\Desktop\Material_Library_2021' with a 'Browse...' button.

At the bottom, a disclaimer states: 'Please Note: This data is accurate to the best of our knowledge, however it is provided, as is from our Material supplier partners. Please feedback any errors or inaccuracies to Polarcare and we will contact the material partner for clarification or rectification.'

Speedstack v21.02.01 (February 2021)

New Shield material



The screenshot shows the Polar Speedstack Stack Up Builder interface. The main window displays a 3D visualization of a stack up with four layers. A red box highlights the top layer, which is identified as 'EMI Shield Film' in the layer list. The layer list on the left shows the following configuration:

Layer	Material	Thickness (Mils/Thous)
1	Shield EMI Shield Film	4.200/0.0195
-	PP PrePreg 1080	4.200/0.0195
2	Core FR4 Core	4.200/0.0195
-	PP PrePreg 1080	4.200/0.0195
4	Shield EMI Shield Film	4.200/0.0195

The right-hand pane shows 'Stack Up Information' with the following data:

Field	Value
Electrical Layer Count	4
Stack Up Cost	19.00
Copper Thickness	5.6000
Dielectric Thickness	24.0000
Solder Mask Thickness	0.0000


The bottom status bar indicates: Target Stack Up Thickness = 30.0000, Stack Up Thickness = 29.6000, Stack Up Thickness with Soldermask = 29.6000, Beta V21.02.01.

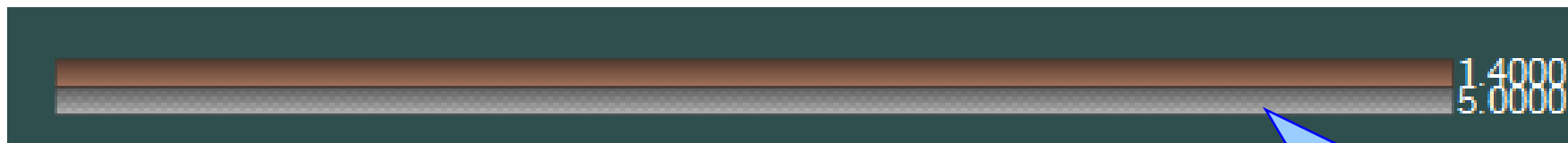
Speedstack v21.02 introduces support for a new Shield material type.

Shield materials are used to prevent electromagnetic interference (EMI) from being either absorbed or radiated.

New Shield material

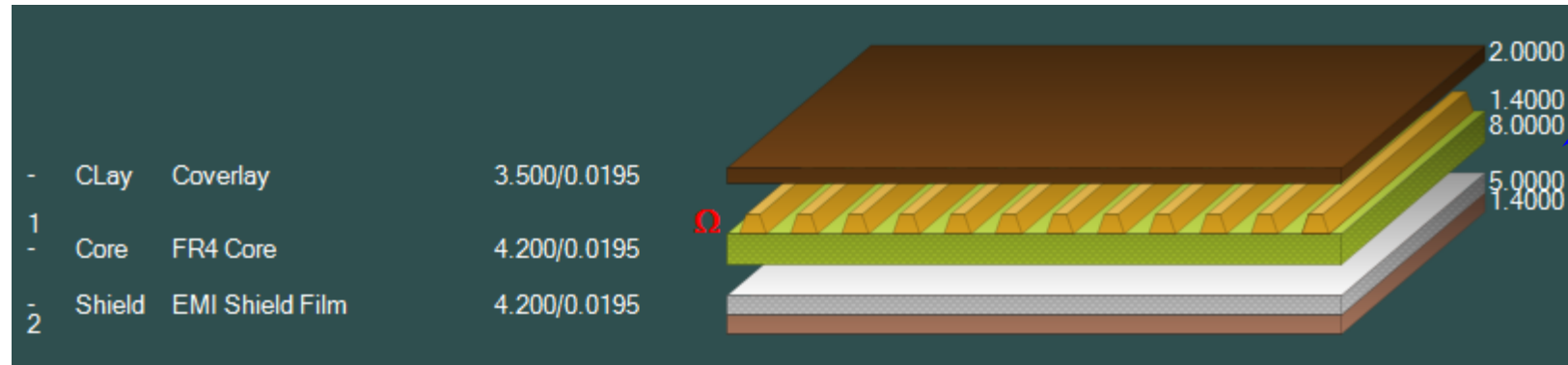
Shields are typically applied to the outer layer(s) of the stack up

1	Shield	EMI Shield Film	4.200/0.0195		1.4000 5.0000
-	PP	PrePreg 1080	4.200/0.0195		3.0000
2	Core	FR4 Core	4.200/0.0195		1.4000
3					8.0000
-	PP	PrePreg 1080	4.200/0.0195		1.4000
-	PP	PrePreg 1080	4.200/0.0195		3.0000
-	Shield	EMI Shield Film	4.200/0.0195		5.0000
4					1.4000

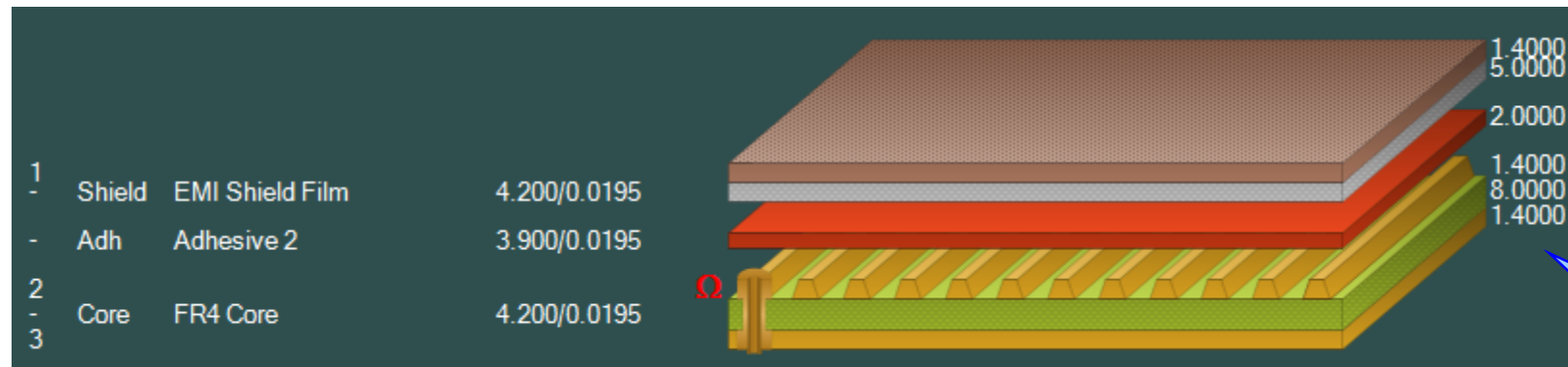


They consist of a shield layer (brown) and dielectric adhesive (silver)

Shield material examples

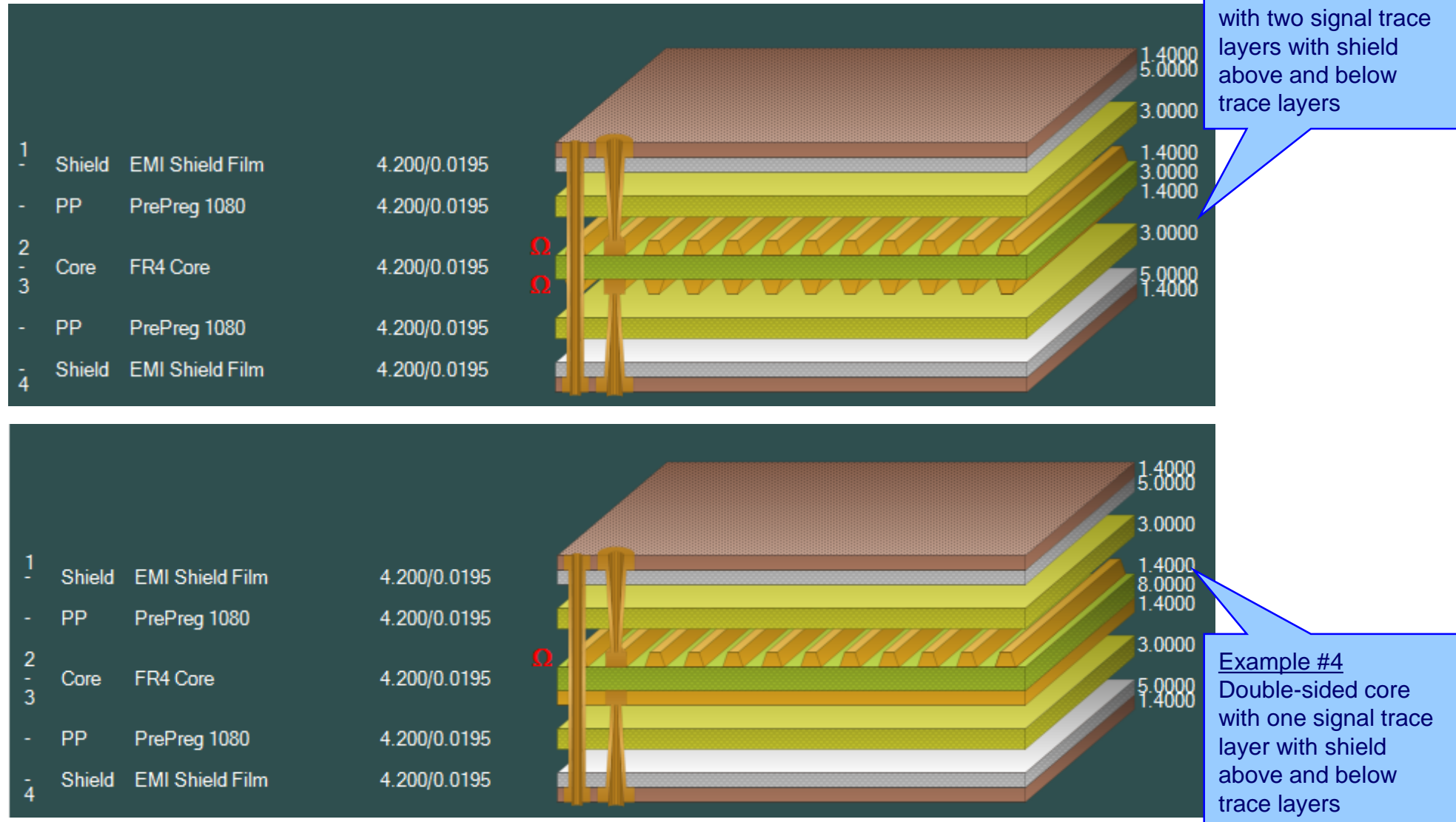


Example #1
Single-sided core,
coverlay above trace,
shield below

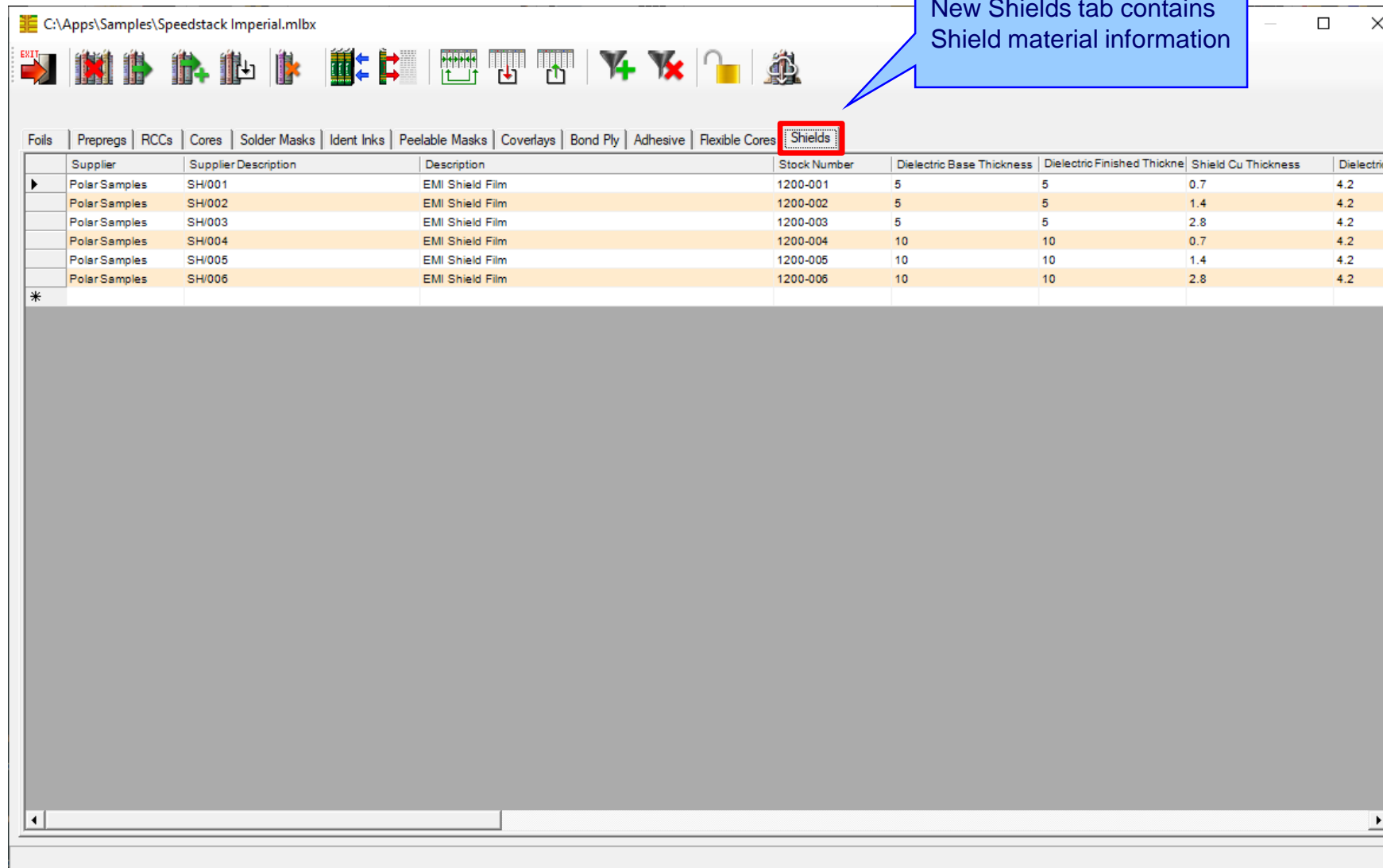


Example #2
Double-sided core,
adhesive and shield
above

Shield material examples



Material library enhancements



The screenshot shows the Speedstack Imperial.mlbx software interface. The 'Shields' tab is highlighted in the top navigation bar. A blue callout box points to the 'Shields' tab with the text: 'New Shields tab contains Shield material information'.

Supplier	Supplier Description	Description	Stock Number	Dielectric Base Thickness	Dielectric Finished Thickne	Shield Cu Thickness	Dielectric
PolarSamples	SH/001	EMI Shield Film	1200-001	5	5	0.7	4.2
PolarSamples	SH/002	EMI Shield Film	1200-002	5	5	1.4	4.2
PolarSamples	SH/003	EMI Shield Film	1200-003	5	5	2.8	4.2
PolarSamples	SH/004	EMI Shield Film	1200-004	10	10	0.7	4.2
PolarSamples	SH/005	EMI Shield Film	1200-005	10	10	1.4	4.2
PolarSamples	SH/006	EMI Shield Film	1200-006	10	10	2.8	4.2

Material library enhancements

Review/Edit Shield

Supplier	<input type="text" value="Polar Samples"/>	Size	<input type="text" value=""/>
Supplier Description	<input type="text" value="SH/001"/>	Note 1	<input type="text" value=""/>
Description	<input type="text" value="EMI Shield Film"/>		
StockNumber	<input type="text" value="1200-001"/>		
Type	<input type="text" value="Shield"/>	Note 2	<input type="text" value=""/>
Base Thickness	<input type="text" value="5.0000"/>		
Finished Thickness	<input type="text" value="5.0000"/>		
Dielectric Constant	<input type="text" value="4.2"/>	Note 3	<input type="text" value=""/>
Loss Tangent	<input type="text" value="0.0195"/>		
Resin Content	<input type="text" value="0"/>		
Tg	<input type="text" value="0"/>	Note 4	<input type="text" value=""/>
Td	<input type="text" value="0"/>		
CAF Resistance	<input type="text" value="0"/>		
Z Axis Expansion	<input type="text" value="0"/>		
Excess Resin	<input type="text" value="0.0000"/>	Note 5	<input type="text" value=""/>
Tolerance +/- %	<input type="text" value="10"/>		
Shield Copper Thickness	<input type="text" value="0.7000"/>		
Cost	<input type="text" value="0"/>		
Lead Time	<input type="text" value="0"/>		
Laser Drillable	<input type="checkbox"/>		

Material library Edit Shield dialog

Online Library enhanced to support Shield materials

Online Library

Filter by Supplier

Polar

ARLON
MATERIALS FOR ELECTRONICS

CIRCUIT FOIL

DOOSAN
Electro-Materials

File Type

Foils
RCCs
PrePregs
Cores
SolderMasks
Idents
Peelables
Coverlays
BondPly
Adhesives
FlexCores
Shields

Library Files Available : All

Polar_Shield_21_02.mlbx
Tatsuta_SF_PC3000_Series_1GHz_21_02_BETA.mlbx

Download the latest material library data from the Polar Online Material Library

New Shields file type has been introduced.

Existing Data Table

☐ Clear
☒ Append

Clear - use this option to clear data from the existing library data table and download a single library

Append - use this option to add data to the existing library data table and when downloading multiple libraries during a single session

Download

Close

Filter by Frequency

☒ All
☐ 1 GHz
☐ 10 GHz

Library Files Downloaded during this session

Polar_Shield_21_02.mlbx

File Access Mode

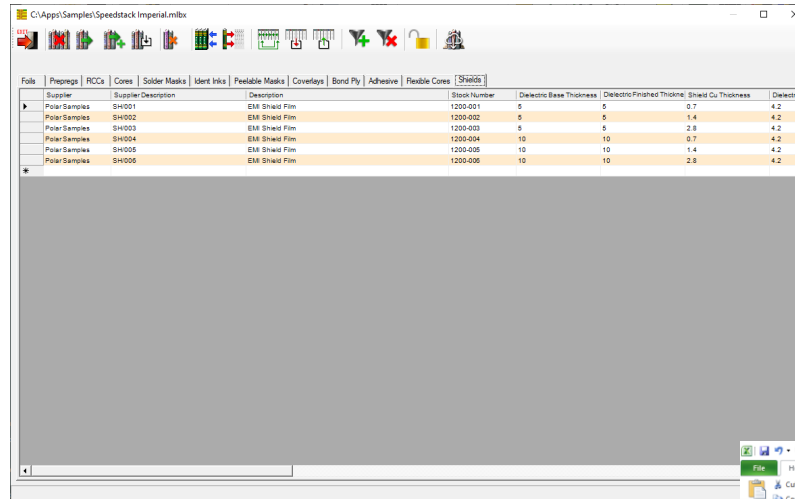
☒ Online Polar Library (ftp://polarinstruments.com)
☐ On-Premise Mode

S:\Software\Speedstack\MaterialLibrary_v20_11

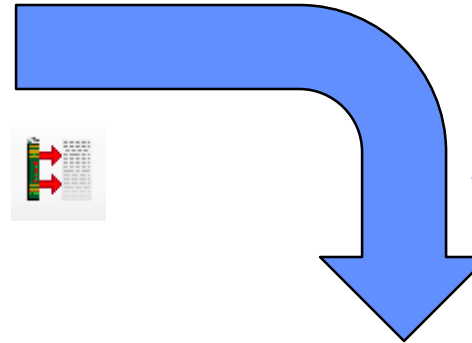
Browse...

Please Note: This data is accurate to the best of our knowledge, however it is provided, as is from our Material supplier partners. Please feedback any errors or inaccuracies to Polarcare and we will contact the material partner for clarification or rectification.

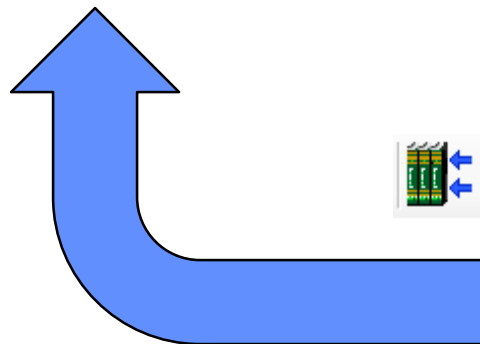
Export / Import Shield library to Excel



Supplier	Supplier Description	Description	Stock Number	Dielectric Base Thickness	Dielectric Finished Thickness	Shield Cu Thickness	Dielectric
Polar Samples	SH001	EMI Shield Film	1200-001	5	5	0.7	4.2
Polar Samples	SH002	EMI Shield Film	1200-002	5	5	1.4	4.2
Polar Samples	SH003	EMI Shield Film	1200-003	5	5	2.8	4.2
Polar Samples	SH004	EMI Shield Film	1200-004	10	10	0.7	4.2
Polar Samples	SH005	EMI Shield Film	1200-005	10	10	1.4	4.2
Polar Samples	SH006	EMI Shield Film	1200-006	10	10	2.8	4.2



It is possible to export / import Shield library data with 3rd part tools like Excel



FileHomeInsertPage LayoutFormulasDataReviewViewDeveloperTools

Clipboard

Font

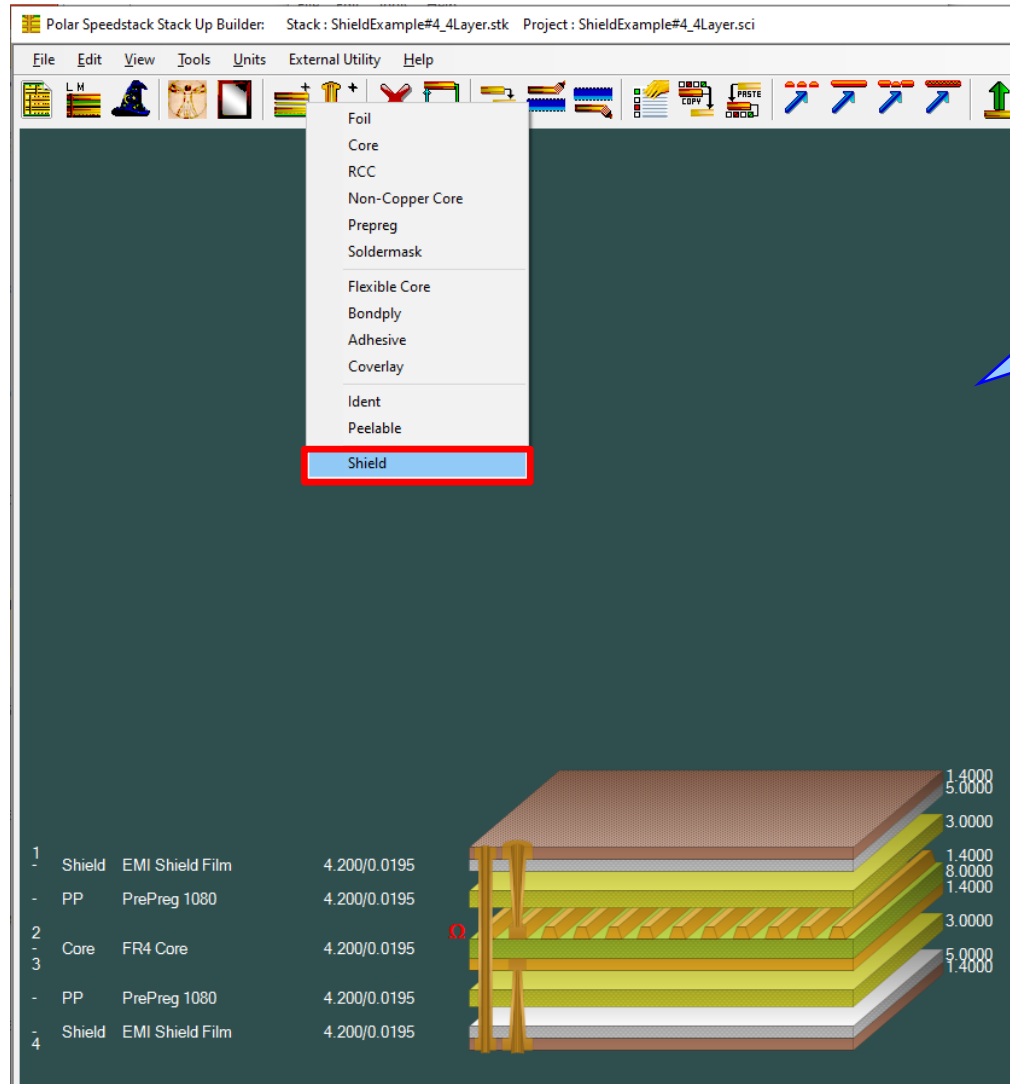
Alignment

Number

Calibri11

</

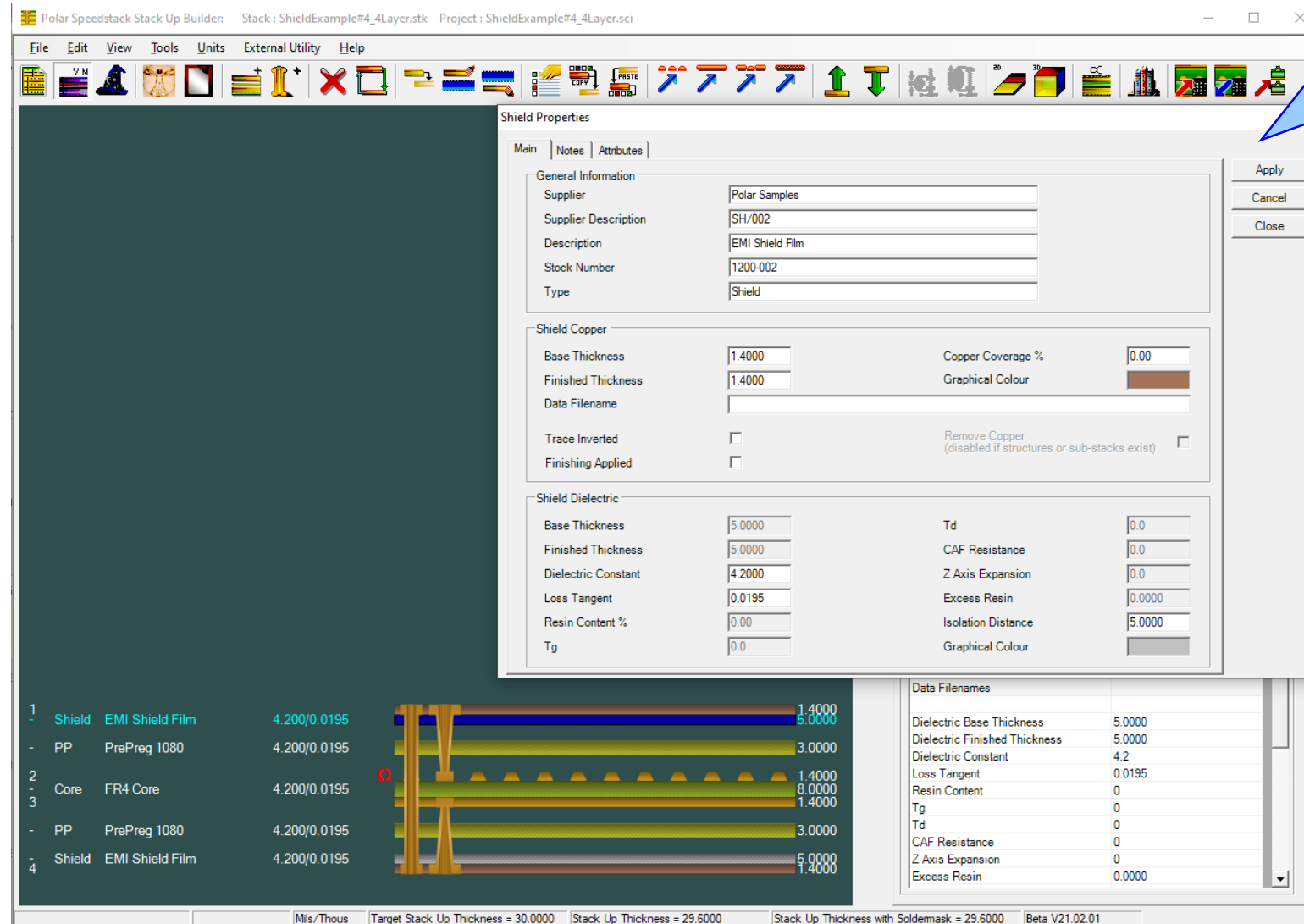
Stack up editor enhancements



Stack Up editor enhancements:

Shield material options to add, delete, swap, move up, move down, symmetry and set properties

Shield properties



Shield Properties

Main | Notes | Attributes

General Information

Supplier: Polar Samples

Supplier Description: SH/002

Description: EMI Shield Film

Stock Number: 1200-002

Type: Shield

Shield Copper

Base Thickness: 1.4000

Finished Thickness: 1.4000

Data Filename:

Trace Inverted: ☐

Finishing Applied: ☐

Copper Coverage %: 0.00

Graphical Colour:

Remove Copper (disabled if structures or sub-stacks exist): ☐

Shield Dielectric

Base Thickness: 5.0000

Finished Thickness: 5.0000

Dielectric Constant: 4.2000

Loss Tangent: 0.0195

Resin Content %: 0.00

Tg: 0.0

Td: 0.0

CAF Resistance: 0.0

Z Axis Expansion: 0.0

Excess Resin: 0.0000

Isolation Distance: 5.0000

Graphical Colour:

Data Filenames

Dielectric Base Thickness	5.0000
Dielectric Finished Thickness	5.0000
Dielectric Constant	4.2
Loss Tangent	0.0195
Resin Content	0
Tg	0
Td	0
CAF Resistance	0
Z Axis Expansion	0
Excess Resin	0.0000

Target Stack Up Thickness = 30.0000

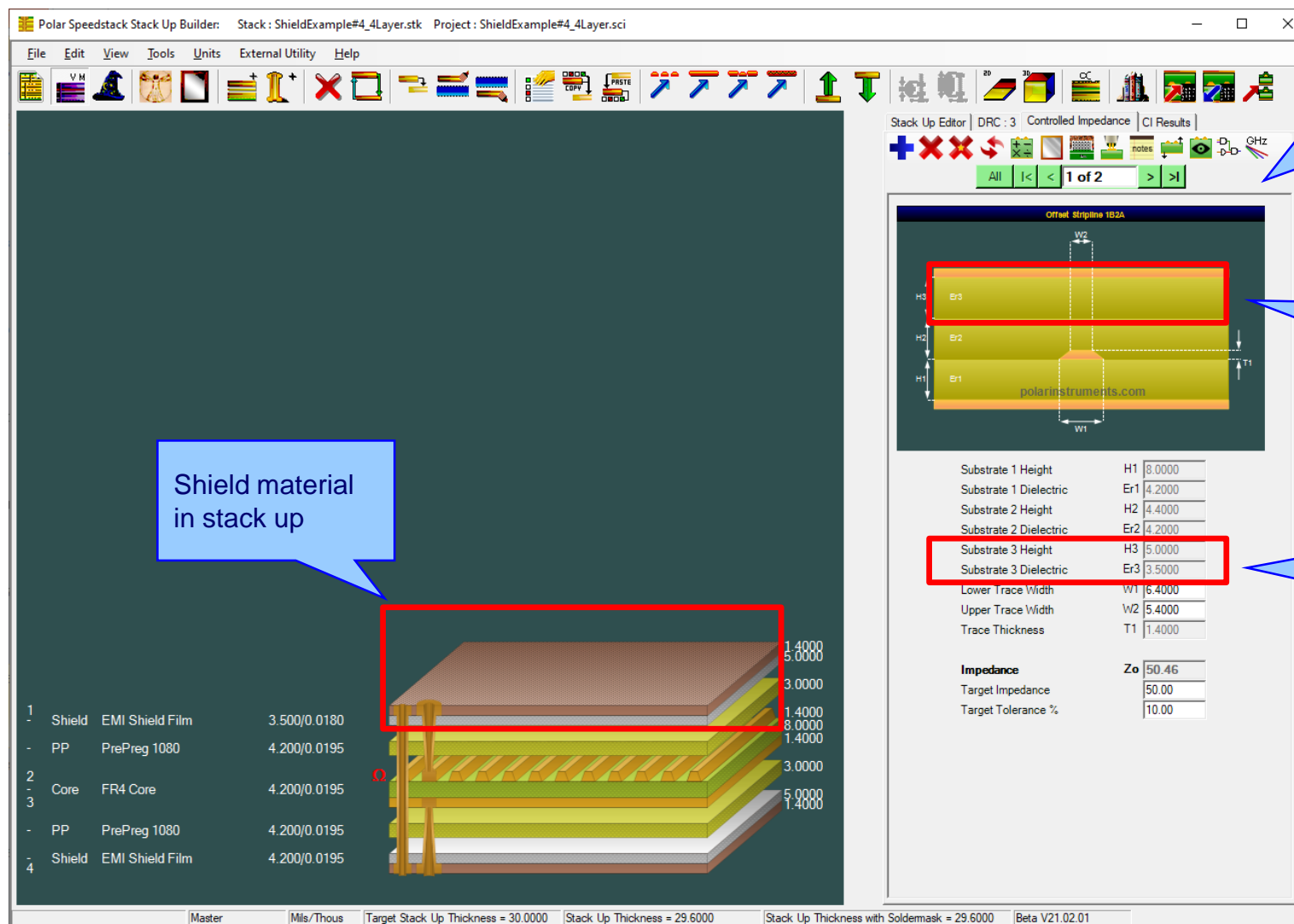
Stack Up Thickness = 29.6000

Stack Up Thickness with Soldermask = 29.6000

Beta V21.02.01

View and customise the Shield properties. Useful in 'what-if' scenarios

Controlled impedance and insertion loss calculations



The screenshot shows the Polar Speedstack Stack Up Builder interface. The main window displays a 3D model of a 4-layer stack up. The layers are listed in a table on the left:

Layer	Material	Thickness (in)	Thickness (mm)
1	Shield EMI Shield Film	3.500	0.0180
2	PP PrePreg 1080	4.200	0.0195
3	Core FR4 Core	4.200	0.0195
4	PP PrePreg 1080	4.200	0.0195

The 3D model shows the stack up with dimensions. A red box highlights the shield material layer (Layer 1). A callout points to this layer with the text: "Shield material in stack up".

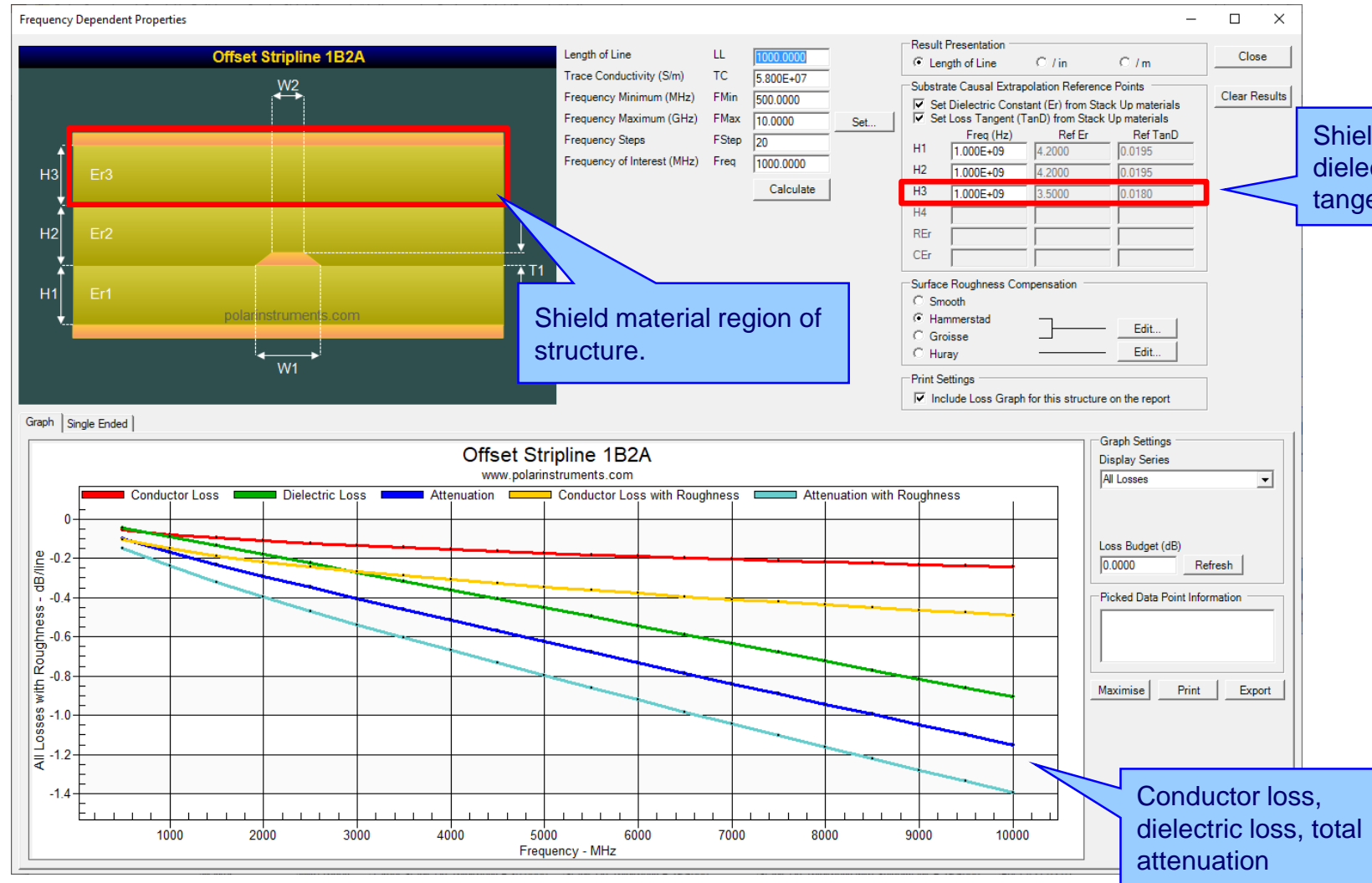
The right panel shows the "Stack Up Editor" with a "Controlled Impedance" tab. It displays a cross-section diagram of the stack up with dimensions H1, H2, H3, W1, W2, and T1. A red box highlights the shield material region of the structure. A callout points to this region with the text: "Shield material region of structure".

Below the diagram, a table lists the material properties and dimensions:

Property	Value
Substrate 1 Height	H1 8.0000
Substrate 1 Dielectric	Er1 4.2000
Substrate 2 Height	H2 4.4000
Substrate 2 Dielectric	Er2 4.2000
Substrate 3 Height	H3 5.0000
Substrate 3 Dielectric	Er3 3.5000
Lower Trace Width	W1 6.4000
Upper Trace Width	W2 5.4000
Trace Thickness	T1 1.4000
Impedance	Zo 50.46
Target Impedance	50.00
Target Tolerance %	10.00

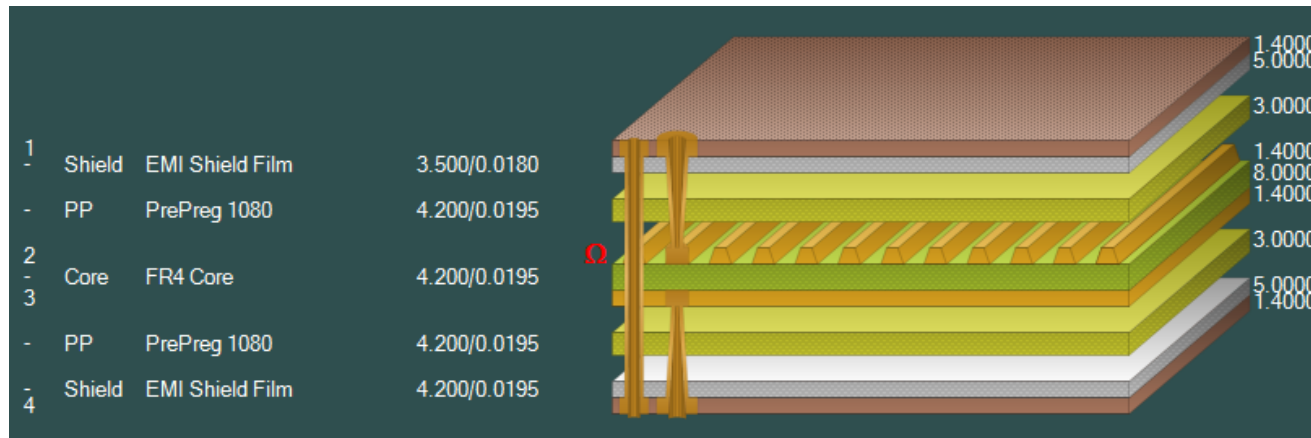
A red box highlights the "Substrate 3 Height" and "Substrate 3 Dielectric" values. A callout points to this box with the text: "Shield adhesive height / thickness dimension and dielectric constant."

Controlled impedance and insertion loss calculations



Controlled impedance and insertion loss calculations

Please note: Speedstack is capable of supporting many shield types for stack up design and documentation. However, it is important to use the correct type of shield material for controlled impedance and insertion loss applications. They are often designated by the shield vendor as 'for high speed signal transmission applications'.

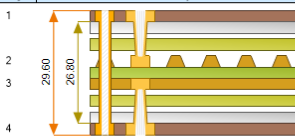


Technical report enhancements

Technical report showing shield materials

Speedstack Report Printer
File Options



C:\Apps\Samples\ShieldExample\F5_4Layer.sci Units: Mils






Layer	Stack up	Supplier	Description	Type	Processed Thickness	εr	Loss Tangent	Impedance ID
1		Polar Samples	EMI Shield Film	Shield	1.400	3.500	0.0180	
		Polar Samples	PrePreg 1080	Dielectric	3.000	4.200	0.0195	
2		Polar Samples	FR4 Core	FR4	1.400	4.200	0.0195	1, 2
3		Polar Samples	PrePreg 1080	Dielectric	3.000	4.200	0.0195	
4		Polar Samples	EMI Shield Film	Shield	1.400	4.200	0.0195	

Copper Thickness = 5.600 | Dielectric Thickness = 24.000 | Solder Mask Thickness = 0.000 | Stack Up Thickness = 29.600 | Stack Up Thickness with Soldermask = 29.600
Stack Up Cost = 19.00

Notes

Impedance ID	Structure Image	Structure Name	Impedance Signal Layer	Ref. Plane 1 in Layer	Ref. Plane 2 in Layer	Lower Trace Width (W1)	Upper Trace Width (W2)	Trace Separation (S1)	Target Impedance	Tol (+/- %)	Calculated Impedance
1		Offset Stripline 1B2A	2	1	3	6.400	5.400	0.000	50.000	10.000	50.460
2		Edge Coupled Offset Stripline 1B2A	2	1	3	5.000	4.000	8.800	100.000	10.000	100.010

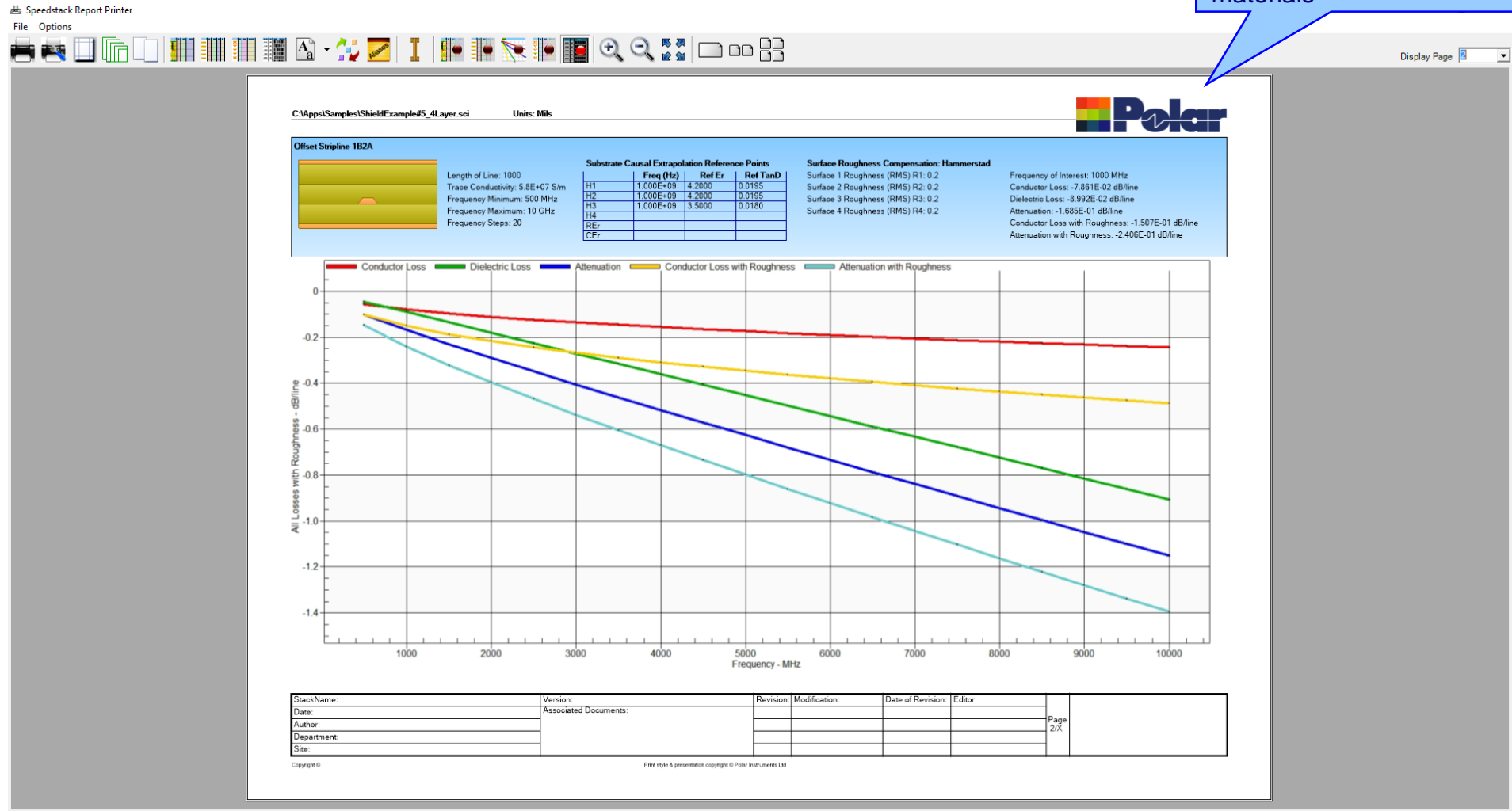
Drill Image	1st Layer	2nd Layer	Column Position	Drill Type
	1	2	2	Laser PTH
	1	4	1	Mechanical PTH
	4	3	2	Laser PTH

StackName: Master	Version:	Revision:	Modification:	Date of Revision:	Editor:	Page 1/X
Date:	Associated Documents:					
Author:						
Department:						
Site:						

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Technical report enhancements

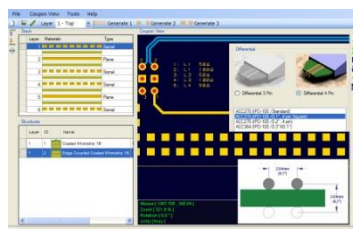
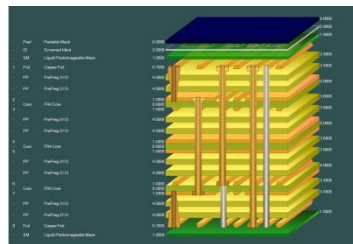
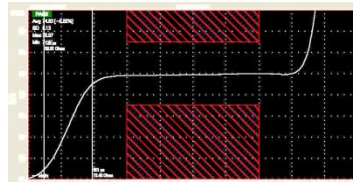
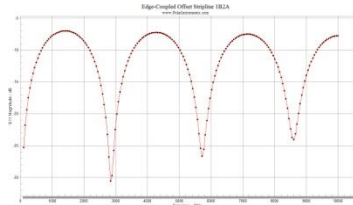
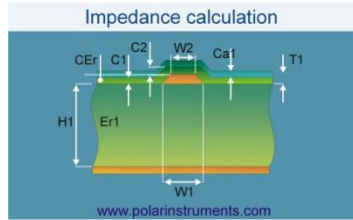
Insertion loss report
supporting shield
materials



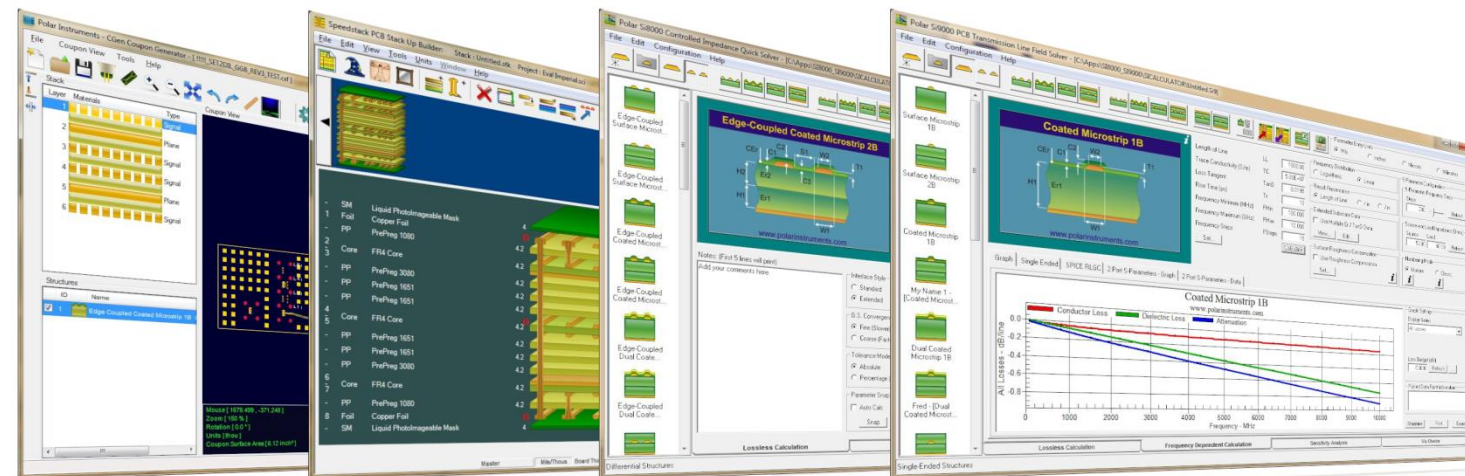
Import / Export enhancements

The following Import / Export options have been updated to support the new shield material introduced with Speedstack 2021:

- XML STKX v20.00 and SSX v10.00 import / export options
- CSV export option
- Gerber / DXF export option

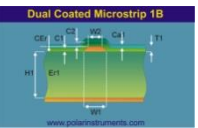
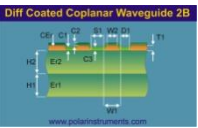
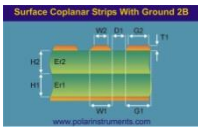
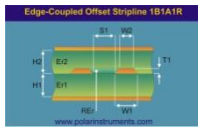
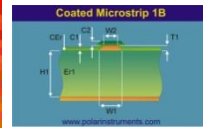
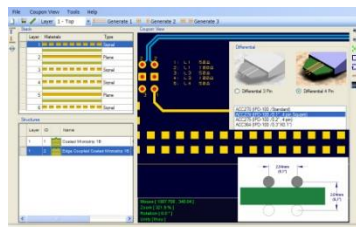
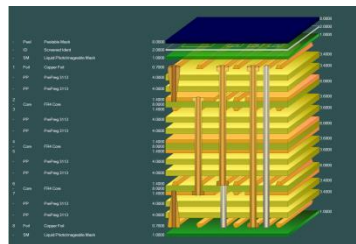
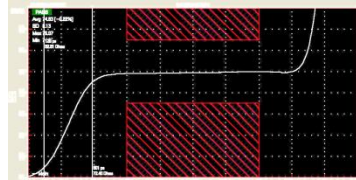
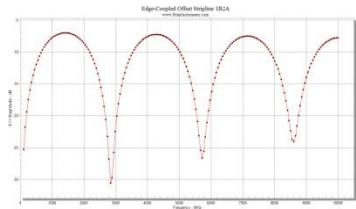
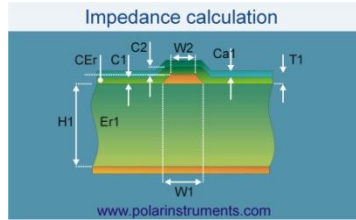


Thank you for viewing this Speedstack 2021 - 2022 preview.
If you have questions we would be delighted to help you.
Your local contact information is contained on the following slide



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