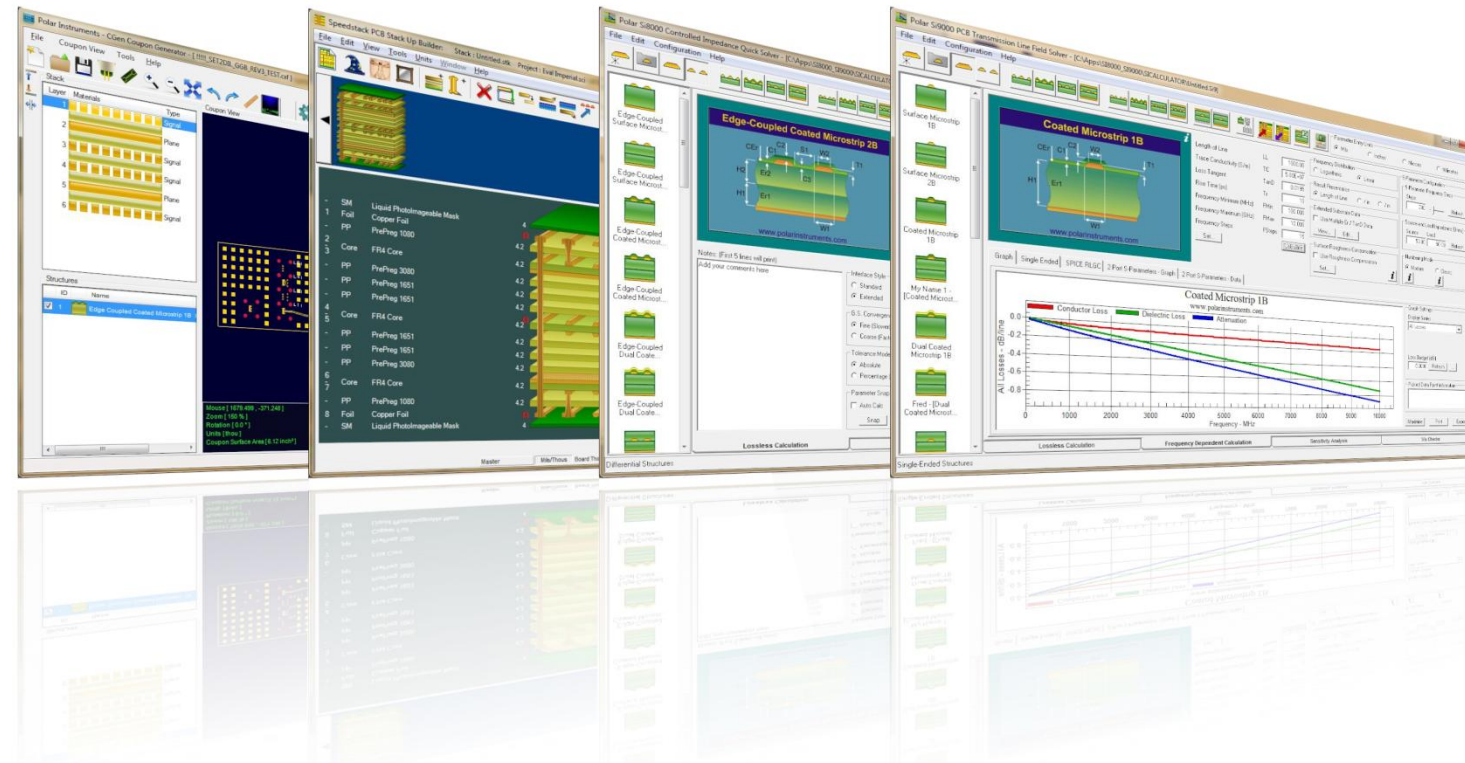


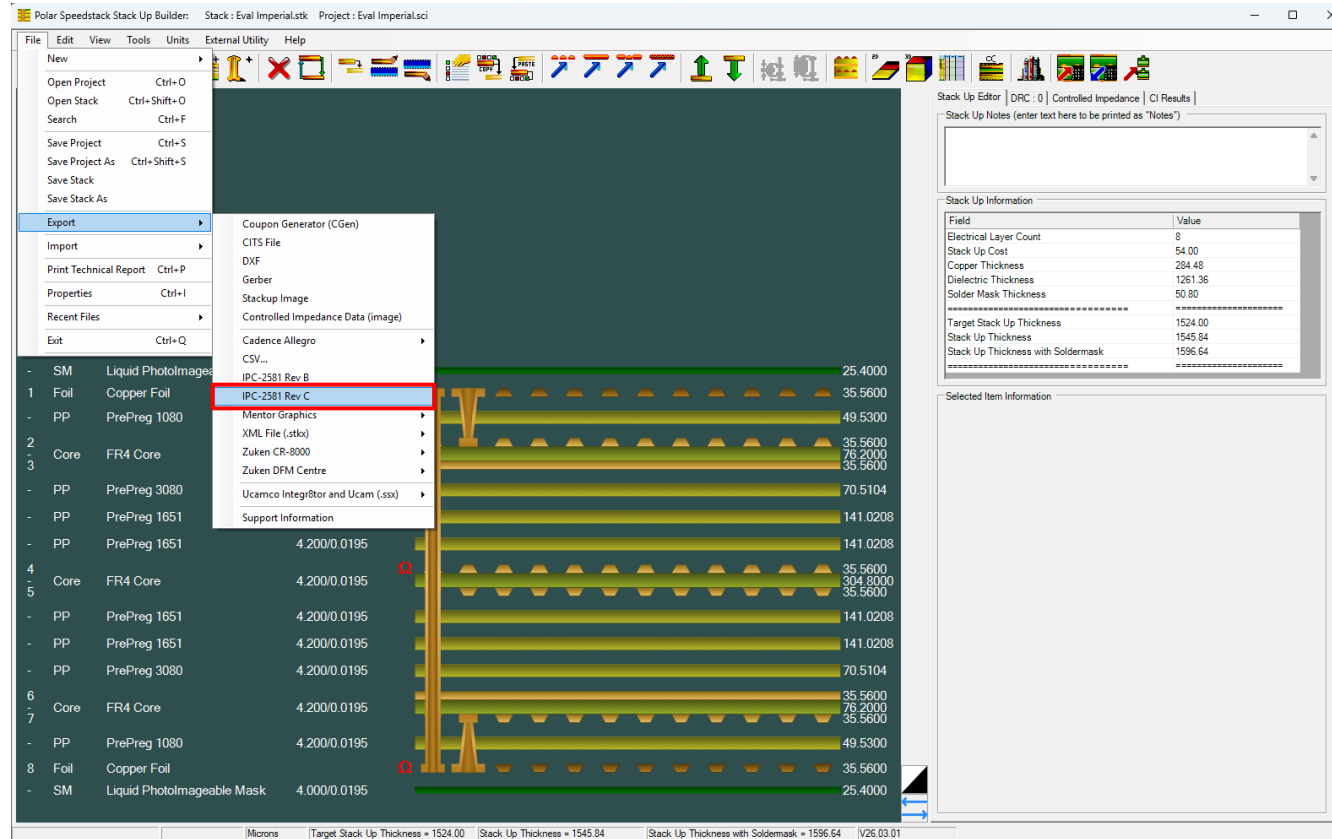
Speedstack 2026 Cumulative Updates

Richard Attrill – March 2026 (Rev 21)



Speedstack v26.03.10 (March 2026)

New File | Import / Export | IPC-2581 Rev C options

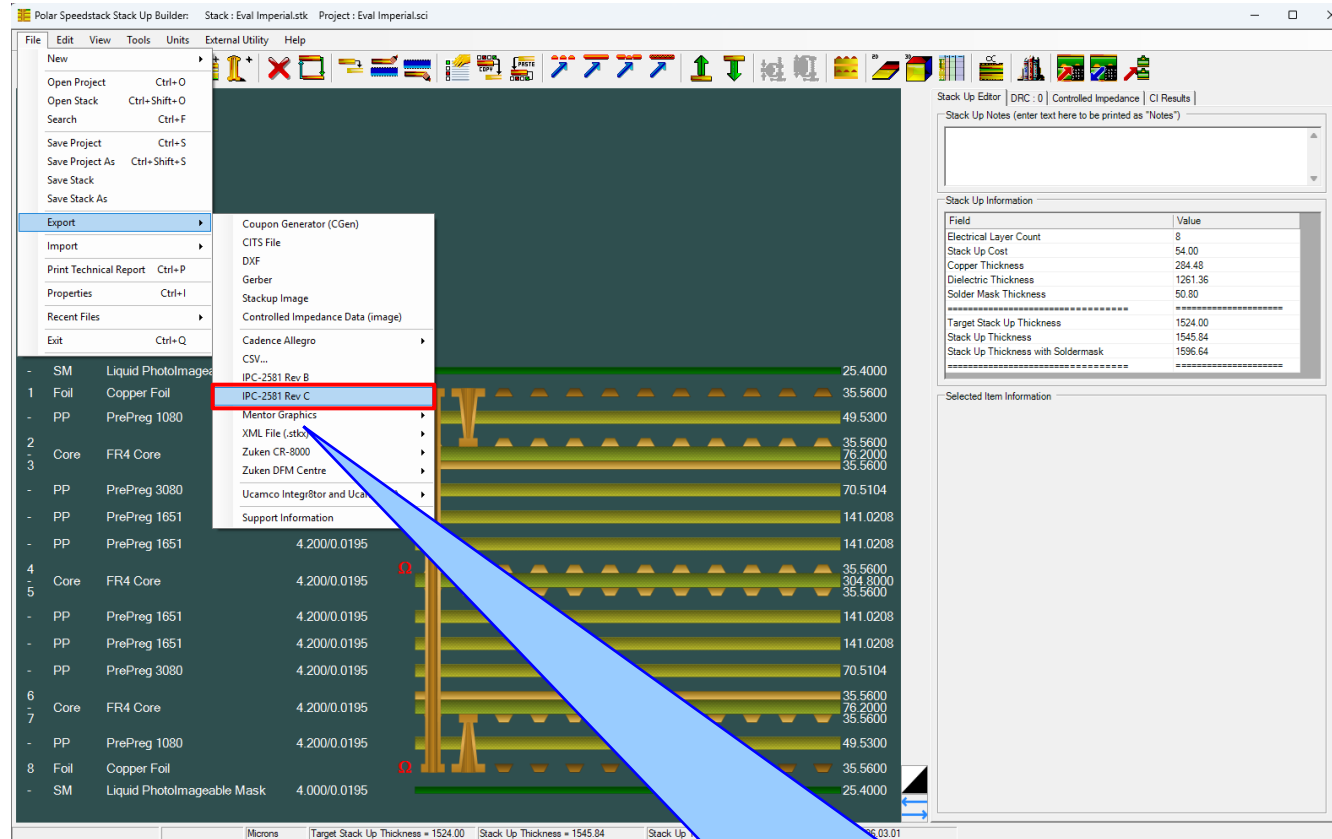


The new import / export IPC-2581 Rev C options allow for the transfer and exchange of stack up information with 3rd party systems that also support this format

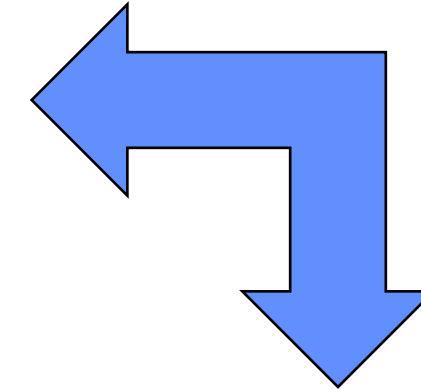


Polar Instruments are a member of the IPC-2581 Consortium

New File | Import / Export | IPC-2581 Rev C options



Rev C options allow for the transfer and exchange of stack up information with 3rd party systems that also support this format



Rev B Speedstack output supports one impedance structure per layer – Rev C supports multiple structures per layer.

Ohmega Ticer materials added to the Online Library

Online Library

Filter by Supplier


Subsidiary of Park Electrochemical Corp.

OAK-MITSUI TECHNOLOGIES


OhmegaTicer

Panasonic

File Type

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

Library Files Available : Ohmega_Ticer

- Quantic_Ohmega_Ticer_OhmegaPly_PT_2601.mlbx
- Quantic_Ohmega_Ticer_OhmegaPly_TOC_2601.mlbx
- Quantic_Ohmega_Ticer_TCR_2601.mlbx
- Quantic_Ohmega_Ticer_TCR_EHF_2601.mlbx

Append

Close

☐ Clear
Use this option to clear data from the existing library data table

Filter by Frequency

☒ All

☐ 1 GHz ☐ 20 GHz

☐ 5 GHz ☐ 50 GHz

☐ 10 GHz ☐ 75 GHz

Library Files Selected during this session

File Access Mode

☒ Online Polar Library (<ftp://polarinstruments.com>)

☐ On-Premise Mode [Application Note](#)

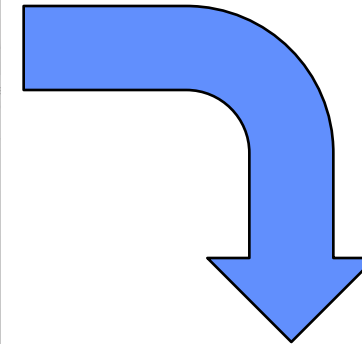
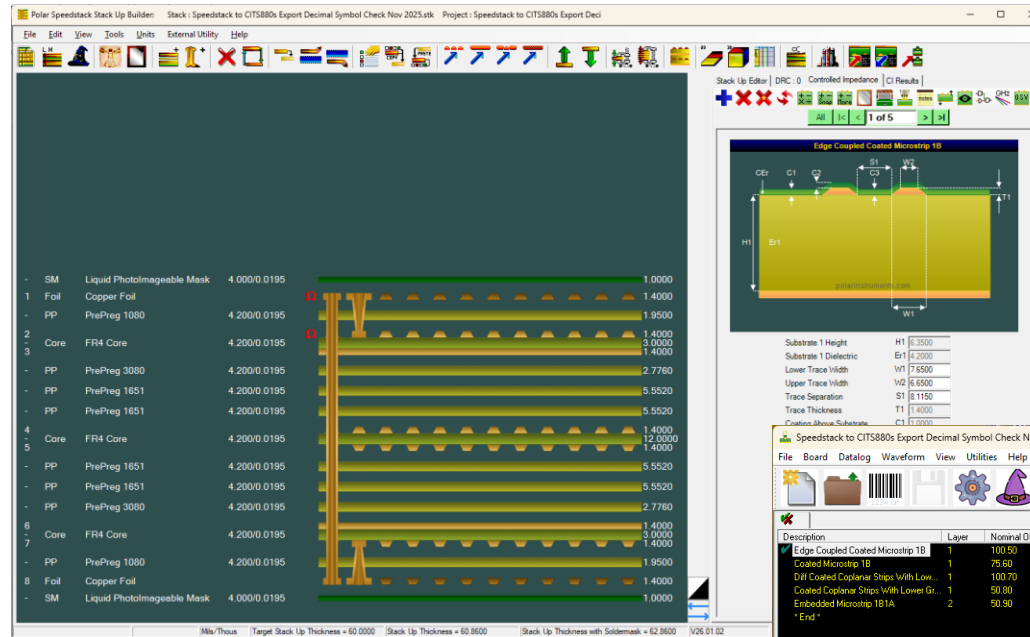
Please Note: This data is accurate to the best of our knowledge, however it is provided, as is from our Material supplier partners. Please feedback any errors or inaccuracies to Polarcare and we will contact the material partner for clarification or rectification. Polar libraries may contain just the preferred materials specified in the supplier's data sheets.

Enhancements

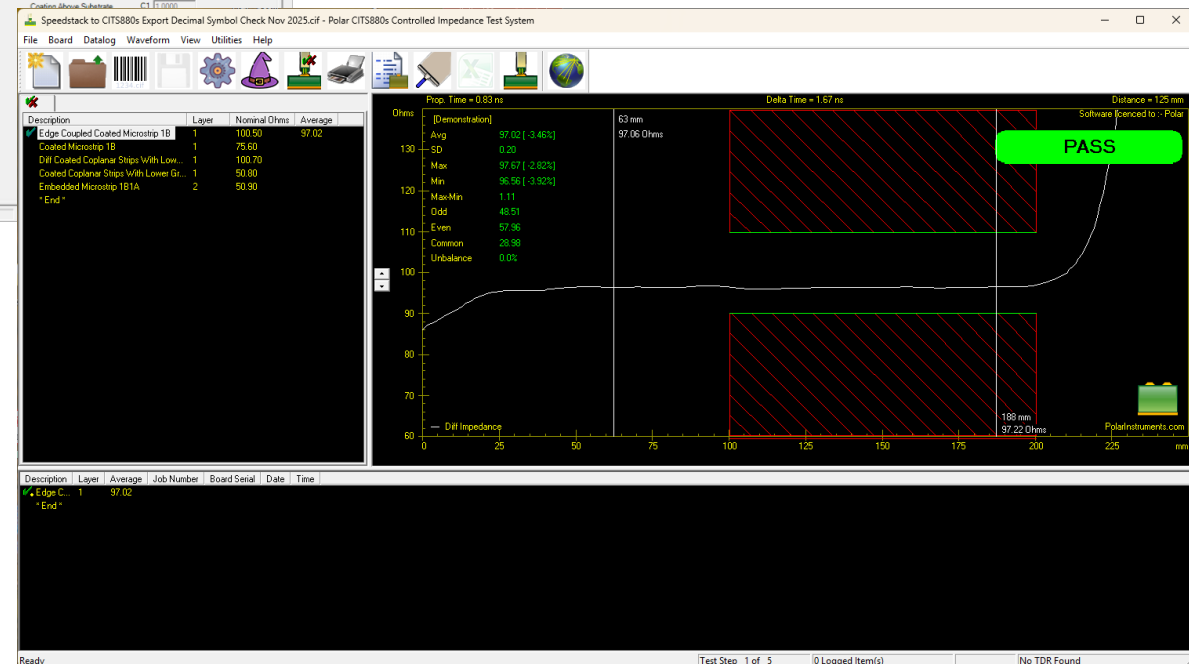
- FlexNet Publisher / FLEXIm v11.19.9.0 now supported

Speedstack v26.01.02 (Jan 2026)

File | Export | CITS File enhancements



File | Export | CITS File enhancements include improved support for locales that use a comma as the decimal symbol

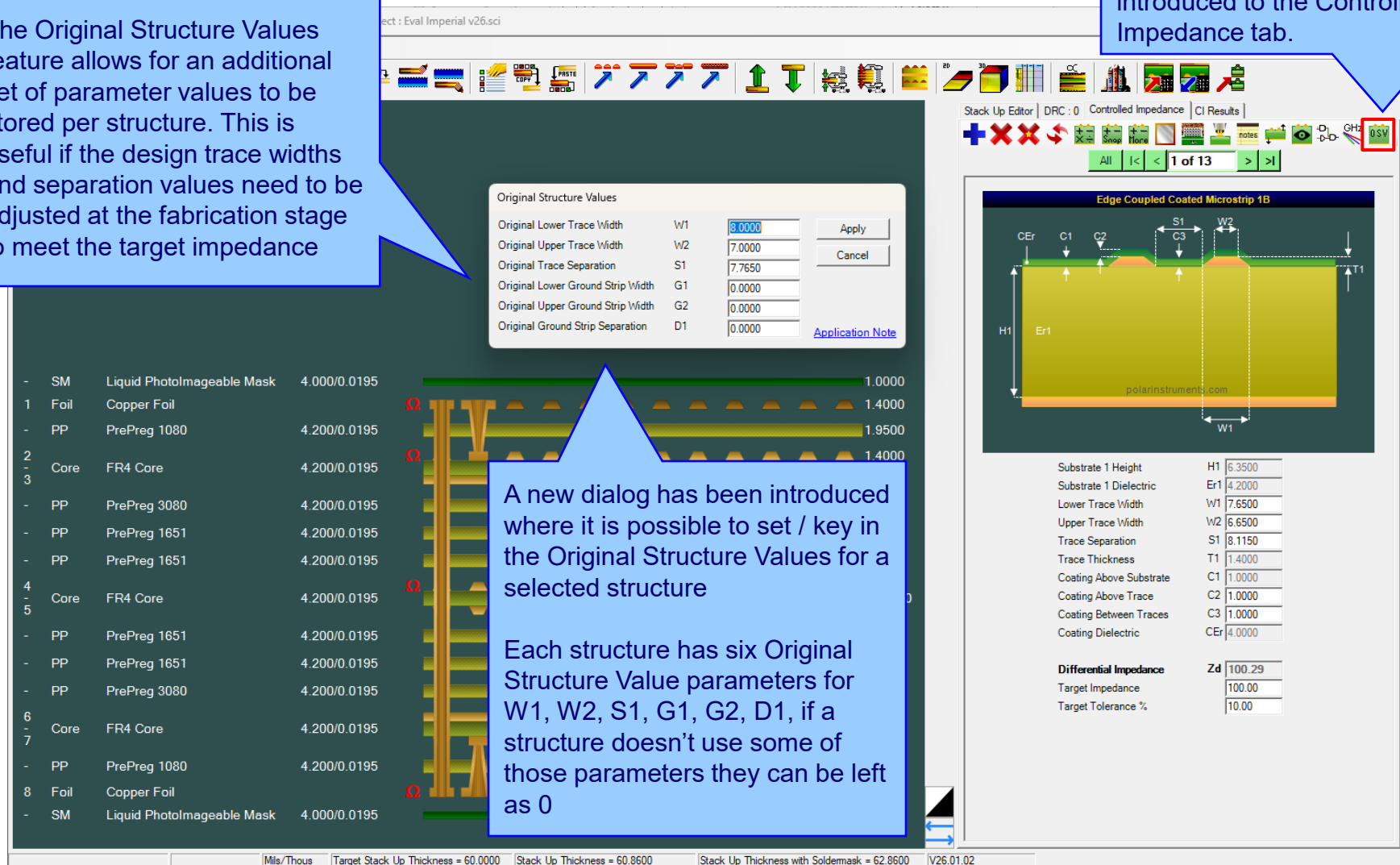


Speedstack v26.01.01 (Jan 2026)

New Original Structure Values feature*

The Original Structure Values feature allows for an additional set of parameter values to be stored per structure. This is useful if the design trace widths and separation values need to be adjusted at the fabrication stage to meet the target impedance

A new Original Structure Values toolbar icon has been introduced to the Controlled Impedance tab.



The screenshot shows the Polar Instruments Speedstack software interface. The main window displays a stack of materials with their properties and thicknesses. A dialog box titled 'Original Structure Values' is open, allowing users to set parameters for a selected structure. The parameters include Original Lower Trace Width (W1), Original Upper Trace Width (W2), Original Trace Separation (S1), Original Lower Ground Strip Width (G1), Original Upper Ground Strip Width (G2), and Original Ground Strip Separation (D1). The 'Controlled Impedance' tab is active, showing a cross-section diagram of the stack and a table of parameters.

Original Structure Values Dialog:

Parameter	Value
Original Lower Trace Width (W1)	8.0000
Original Upper Trace Width (W2)	7.0000
Original Trace Separation (S1)	7.7650
Original Lower Ground Strip Width (G1)	0.0000
Original Upper Ground Strip Width (G2)	0.0000
Original Ground Strip Separation (D1)	0.0000

Controlled Impedance Tab:

Edge Coupled Coated Microstrip 1B

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

A new dialog has been introduced where it is possible to set / key in the Original Structure Values for a selected structure

Each structure has six Original Structure Value parameters for W1, W2, S1, G1, G2, D1, if a structure doesn't use some of those parameters they can be left as 0

- Supports commonly used structures: See slide 12

New Original Structure Values feature

Mils

Original Structure Values			
Original Lower Trace Width	W1	8.0000	Apply Cancel
Original Upper Trace Width	W2	7.0000	
Original Trace Separation	S1	7.7650	Application Note
Original Lower Ground Strip Width	G1	0.0000	
Original Upper Ground Strip Width	G2	0.0000	
Original Ground Strip Separation	D1	0.0000	

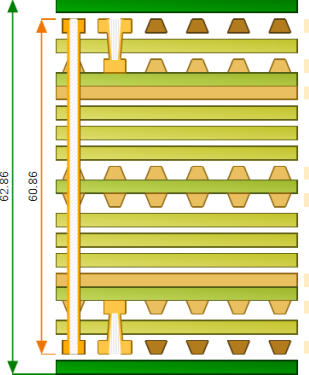
The new Original Structure Values feature supports unit switching. This allows for reporting of these parameters in units that match your user / customer preference

Microns

Original Structure Values			
Original Lower Trace Width	W1	203.20	Apply Cancel
Original Upper Trace Width	W2	177.80	
Original Trace Separation	S1	197.23	Application Note
Original Lower Ground Strip Width	G1	0.00	
Original Upper Ground Strip Width	G2	0.00	
Original Ground Strip Separation	D1	0.00	

New Original Structure Values feature

C:\Apps\Samples\Eval Imperial v26.sci Units: Mils


Layer	Stack up	Supplier	Description	Type	Processed Thickness	Impedance ID
1		Polar Samples	Liquid Photoimageable Mask	SolderMask	1.000	
		Polar Samples	Copper Foil	Copper	1.400	1, 2, 3, 4
		Polar Samples	PrePreg 1080	Dielectric	1.950	
2					1.400	5, 6, 7
		Polar Samples	FR4 Core	FR4	3.000	
					1.400	
3		Polar Samples	PrePreg 3080	Dielectric	2.776	
		Polar Samples	PrePreg 1651	Dielectric	5.552	
		Polar Samples	PrePreg 1651	Dielectric	5.552	
4					1.400	8, 9, 10, 11, 12
		Polar Samples	FR4 Core	FR4	12.000	
					1.400	
5		Polar Samples	PrePreg 1651	Dielectric	5.552	
		Polar Samples	PrePreg 1651	Dielectric	5.552	
		Polar Samples	PrePreg 3080	Dielectric	2.776	
6					1.400	
		Polar Samples	FR4 Core	FR4	3.000	
					1.400	
7		Polar Samples	PrePreg 1080	Dielectric	1.950	
		Polar Samples	Copper Foil	Copper	1.400	13
		Polar Samples	Liquid Photoimageable Mask	SolderMask	1.000	

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

The six new Original Structure Value parameters have been introduced to the Controlled Impedance Table on the technical report. The position of the new Original Structure Value columns can be defined by the user

Notes

Impedance ID	Structure Image	Impedance Signal Layer	Ref. Plane 1 in Layer	Ref. Plane 2 in Layer	Lower Trace Width (W1)	Original Lower Trace Width (W1)	Upper Trace Width (W2)	Original Upper Trace Width (W2)	Trace Separation (S1)	Original Trace Separation (S1)	Lower Ground Strip Width (G1)	Original Lower Ground Strip Width (G1)	Upper Ground Strip Width (G2)	Original Upper Ground Strip Width (G2)	Ground Strip Separation (D1)	Original Ground Strip Separation (D1)	Target Impedance	Tol (+/- %)	Calculated Impedance
1		1	3	0	7.650	8.000	6.650	7.000	8.115	7.765	0.000	0.000	0.000	0.000	0.000	0.000	100.000	10.000	100.290
2		1	3	0	4.000	4.500	3.000	3.500	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	75.000	10.000	75.800
3		1	3	0	9.313	9.500	8.313	8.500	15.688	15.500	100.000	90.000	99.000	89.000	10.000	15.000	100.000	10.000	99.600

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

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Other enhancements

- New import / export XML STKX v26.00 and SSX v16.00 file formats to support the new Original Structure Values.
- Please note: This feature has been introduced to the most commonly used structures supported by Speedstack:

Coated Microstrip 1B

Edge-Coupled Coated Microstrip 1B

Coated Coplanar Strips with Ground 1B

Coated Coplanar Waveguide with Ground 1B

Diff Coated Coplanar Strips with Ground 1B

Embedded Microstrip 1B1A

Edge Coupled Embedded Microstrip 1B1A

Edge Coupled Embedded Microstrip 1B1A1R

Offset Stripline 1B1A

Offset Coplanar Stripline 1B1A

Offset Coplanar Waveguide Stripline 1B1A

Edge Coupled Offset Stripline 1B1A

Edge Coupled Offset Stripline 1B1A1R

Diff Offset Coplanar Waveguide 1B1A

Offset Stripline 2B2A

Edge Coupled Offset Stripline 2B2A

Broadside-Coupled Stripline 2S

Speedstack v25.09.01 (Sept 2025)

Enhancements

- Updated to support latest Boundary Element Method (BEM) Calculation Engine v25.07.23

Speedstack v25.05.01 (May 2025)

Advanced Chip & Circuit Materials added to the Online Library

Online Library

Filter by Supplier

All Suppliers



Advanced Chip & Circuit Materials

AGC

File Type

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

Library Files Available : ACCM

ACCM_Celeritas_SF_PO1600_10GHz_2505.mlbx
ACCM_Celeritas_SF_PO1600_20GHz_2505.mlbx
ACCM_Celeritas_SF_PO1600_2GHz_2505.mlbx
ACCM_Celeritas_SF_PO1600_40GHz_2505.mlbx
ACCM_Celeritas_SF_PO1600_5GHz_2505.mlbx
ACCM_Celeritas_SF_PO400_10GHz_2505.mlbx
ACCM_Celeritas_SF_PO400_20GHz_2505.mlbx
ACCM_Celeritas_SF_PO400_2GHz_2505.mlbx
ACCM_Celeritas_SF_PO400_40GHz_2505.mlbx
ACCM_Celeritas_SF_PO400_5GHz_2505.mlbx
ACCM_Celeritas_SF_PO800_10GHz_2505.mlbx
ACCM_Celeritas_SF_PO800_20GHz_2505.mlbx
ACCM_Celeritas_SF_PO800_2GHz_2505.mlbx
ACCM_Celeritas_SF_PO800_40GHz_2505.mlbx
ACCM_Celeritas_SF_PO800_5GHz_2505.mlbx

Append

Close

☐ Clear

Use this option to clear data from the existing library data table

Filter by Frequency

☒ All
☐ 1 GHz ☐ 20 GHz
☐ 5 GHz ☐ 50 GHz
☐ 10 GHz ☐ 75 GHz

Library Files Selected during this session

File Access Mode

☒ Online Polar Library (<ftp://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. Polar libraries may contain just the preferred materials specified in the supplier's data sheets.

Qnity materials added to the Online Library

Online Library

Filter by Supplier









File Type

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

Library Files Available : Qnity

- Dupont_Qnity_Pyralux_AC_Z_only_1901.mlbx
- Dupont_Qnity_Pyralux_AP_Z_only_1901.mlbx
- Dupont_Qnity_Pyralux_FR_Z_only_1901.mlbx
- Dupont_Qnity_Pyralux_LF_Z_only_1901.mlbx

Append

Close

☐ Clear
Use this option to clear data from the existing library data table

Filter by Frequency

☒ All

☐ 1 GHz ☐ 20 GHz

☐ 5 GHz ☐ 50 GHz

☐ 10 GHz ☐ 75 GHz

Library Files Selected during this session

File Access Mode

☒ Online Polar Library (<ftp://polarinstruments.com>)

☐ On-Premise Mode [Application Note](#)

Browse... Download...

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. Polar libraries may contain just the preferred materials specified in the supplier's data sheets.

Speedstack v25.01.01 (Jan 2025)

Design Rule Checks (DRC) now include more informative messages

Stack Up Editor | DRC : 6 | Controlled Impedance | CI Results

DRC Test Selection

☒ Design Logic ☒ Symmetry ☒ Copper Balance

☒ Board Thickness

☒ Manufacturing Tests (Tools | Manufacturing Constraints)

Active Constraint : Polar Mills

☒ Min. Trace Width ☒ Min. Gap Width

Aspect Ratios

☒ Mechanical Drill ☒ Buried Laser Microvia

☒ Blind Laser Microvia ☒ Trace

☐ Resin Starvation

Isolation Distance is 0
Isolation Distance is 0
Isolation Distance is 0
External Dielectric. Please note, structures are not supported on this stack up
External Dielectric. Please note, structures are not supported on this stack up
Copper not Balanced

The Design Rule Check messages have been enhanced. These new messages offer improved guidance to the user

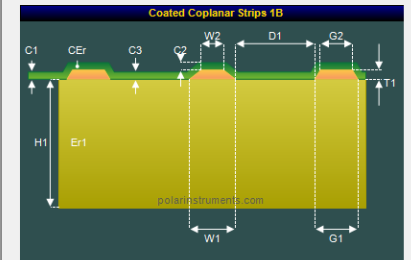
Structure View enhancements

Structure View now support coplanar without ground structures and offset stripline structures where one reference plane is hatched

Displaying 2 structures on All Layers

Target Zo : 50 Single-Ended Layer 1		Target Zo : 75 Single Ended Coplanar Strips Layer 1	
Zo	W1/W2	Zo	G1/G2
1 49.61	1.7031 / 2.7031	75.09	99.0000 / 100.0000
2			
3			
4			

Coated Coplanar Strips 1B



Substrate 1 Height	H1	9.7000
Substrate 1 Dielectric	Er1	4.2000
Lower Trace Width	W1	17.7500
Upper Trace Width	W2	16.7500
Lower Ground Strip Width	G1	100.0000
Upper Ground Strip Width	G2	99.0000
Ground Strip Separation	D1	10.0000
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

Impedance	
Target Impedance	Zo 75.09
Target Tolerance %	10.00

Mils/Thous | Target Stack Up Thickness = 60.0000 | Stack Up Thickness = 12.5000 | Stack Up Thickness with Soldermask = 14.5000 | V25.01.01

Full list of enhancements & fixes included with v25.01.01

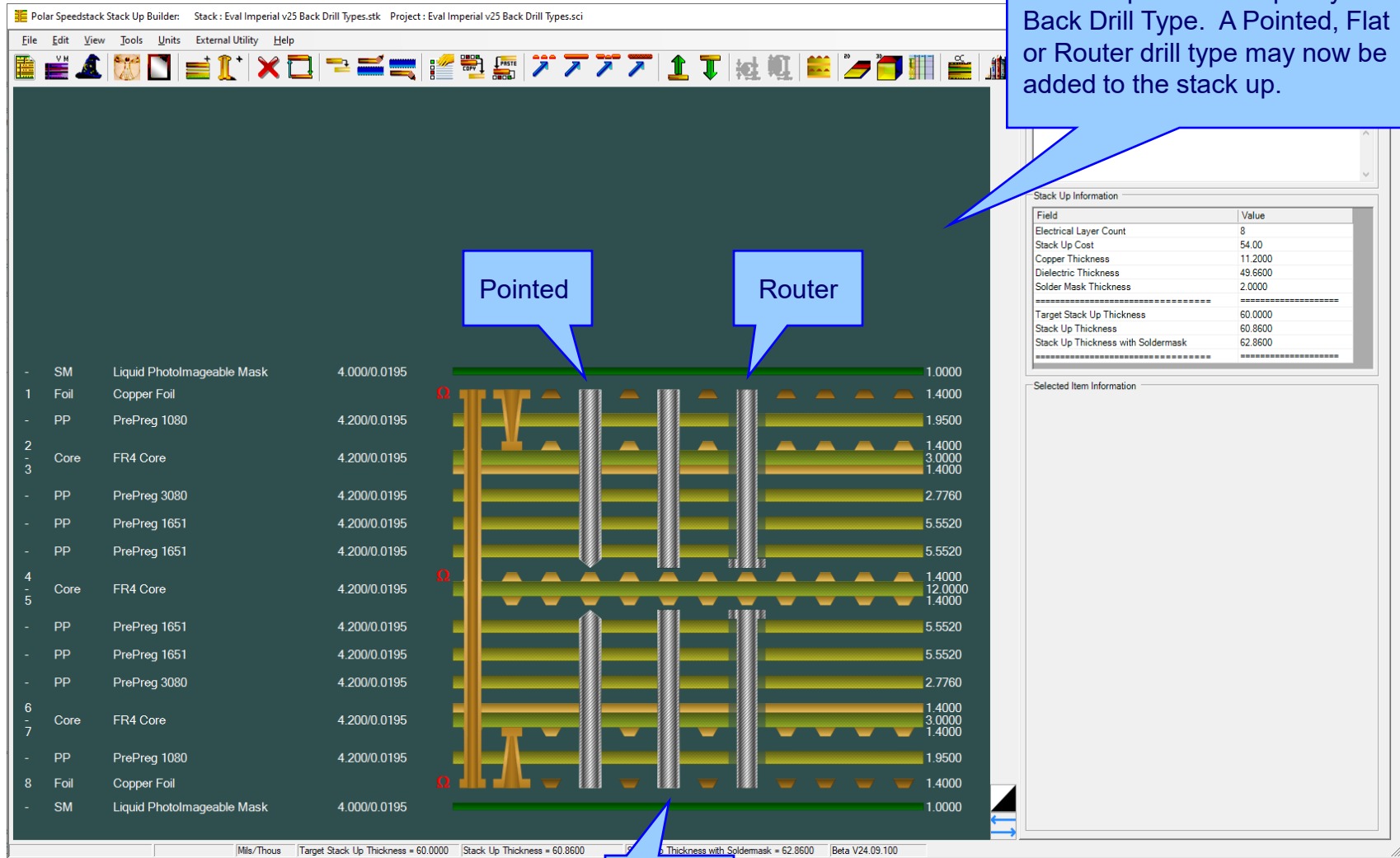
1. Printing: The Solder Mask to Solder Mask dimension arrow now detects when only a single Solder Mask exists and suppresses the dimension arrow when the stack up spans two or more pages
2. Drilling: When adding a drill to a stack that contains just prepregs and no copper layers an exception error was displayed. This is now resolved
3. DRC: The 'Stack is impossible to build' message was rather vague. Now replaced with the more informative 'Isolation Distance is 0' message
4. DRC: The 'External Dielectrics' message now replaced with 'External Dielectric. Please note, structures are not supported on this stack up' message
5. Messaging: More detail added to the messaging when Speedstack is unable to add structures to stack up - 001-00-000965

Full list of enhancements & fixes included with v25.01.01

6. Messaging: When the stack up is modified after structures have been added a 'No Valid Mnemonic' message is sometimes displayed. A more detailed explanation of how to resolve the issue is now provided
7. Structure View Graphics: Fixed problem where inverted offset structures when using one hatched plane, shows the hatched plane in wrong position. This is now resolved
8. Structure View Graphics: When a coplanar without ground is added Structure View will not display. This is now resolved
9. Controlled Impedance Toolbar. When adding the first structure to a sub-stack with mini-stacks or air gaps in the sub-stack the toolbar is disabled. This is now resolved
10. Mini Stacks with Air Gaps: Display a warning message, when adding structures, that those types of stack up are not supported by the Simple Percentage Method finishing method

Speedstack v24.09.01 (Sept 2024)

New Back Drill Types – Pointed, Flat and Router



It is now possible to specify the Back Drill Type. A Pointed, Flat or Router drill type may now be added to the stack up.

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
=====	

Stack Up Information

Selected Item Information

Pointed Router

Flat

SM Liquid Photolimageable 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 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

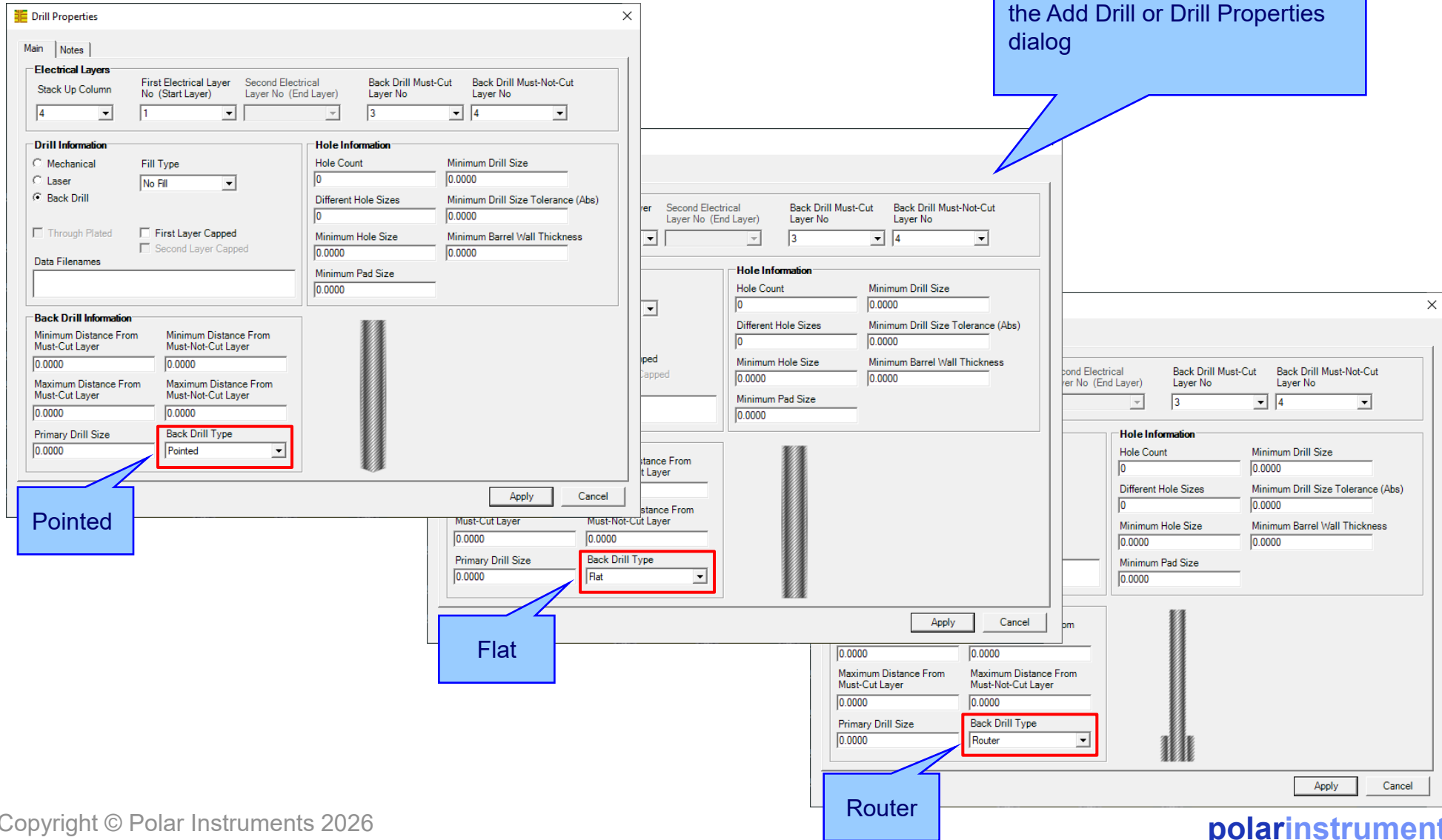
8 Foil Copper Foil 1.4000

SM Liquid Photolimageable Mask 4.000/0.0195 1.0000

Mils/Thous Target Stack Up Thickness = 60.0000 Stack Up Thickness = 60.8600 Thickness with Soldermask = 62.8600 Beta V24.09.100

New Back Drill Types – Pointed, Flat and Router

Specify the Back Drill Type in the Add Drill or Drill Properties dialog

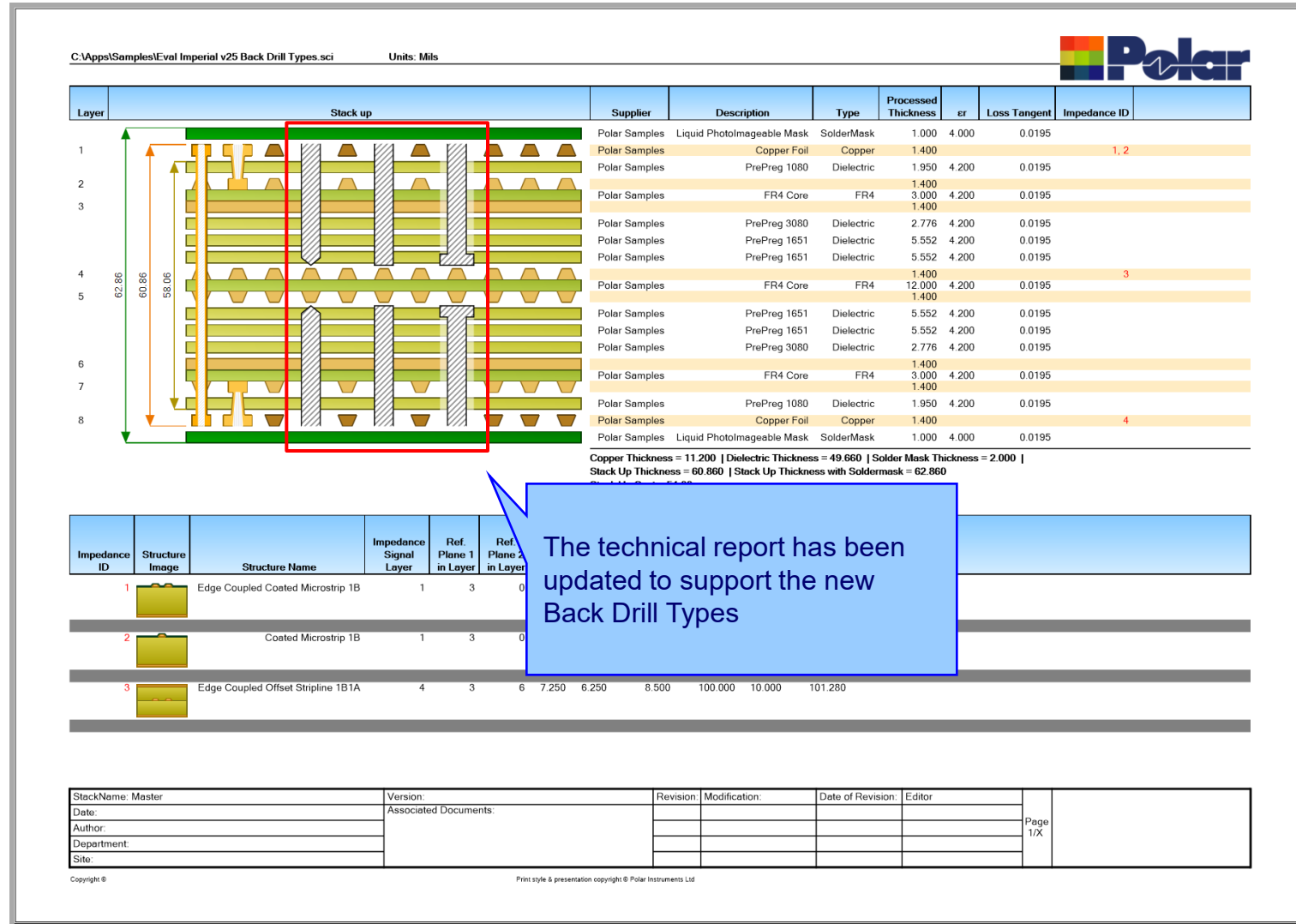


The image displays three overlapping screenshots of the 'Drill Properties' dialog box, illustrating the new Back Drill Type options. Each screenshot shows the 'Back Drill Information' section with the 'Back Drill Type' dropdown menu highlighted in red.

- Pointed:** The first screenshot shows the 'Back Drill Type' set to 'Pointed'.
- Flat:** The second screenshot shows the 'Back Drill Type' set to 'Flat'.
- Router:** The third screenshot shows the 'Back Drill Type' set to 'Router'.

The dialog box includes various fields for drill properties, such as 'Electrical Layers', 'Hole Information', and 'Back Drill Information'. The 'Back Drill Information' section also includes fields for 'Minimum Distance From Must-Cut Layer', 'Maximum Distance From Must-Cut Layer', 'Primary Drill Size', and 'Back Drill Type'.

New Back Drill Types – Pointed, Flat and Router



New Back Drill Types – Pointed, Flat and Router

C:\Apps\Samples\Eval Imperial v25 Back Drill Types.sci
Units: Mils


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
4		Coated Microstrip 1B	8	6	0	4.000	3.000	0.000	75.000	10.000	75.800

Drill Image	Column Position	Drill Type	1st Layer	2nd Layer	Must-Cut Layer No	Must-Not-Cut Layer No	Calculated Drill Depth - Mechanical	Calculated Drill Depth - Laser	Calculated Drill Depth - Back Drill Must-Cut	Calculated Drill Depth - Back Drill Must-Not-Cut
	2	Laser PTH	1	2	-	-	0.000	3.350	0.000	0.000
	4	Back Drill	1	-	3	4	0.000	0.000	9.150	24.430
	6	Back Drill	1	-	3	4	0.000	0.000	9.150	24.430
	8	Back Drill	1	-	3	4	0.000	0.000	9.150	24.430
	1	Mechanical PTH	1	8	-	-	60.860	0.000	0.000	0.000
	6	Back Drill	8	-	6	5	0.000	0.000	9.150	24.430
	8	Back Drill	8	-	6	5	0.000	0.000	9.150	24.430
	4	Back Drill	8	-	6	5	0.000	0.000	9.150	24.430
	2	Laser PTH	8	7	-	-	0.000	3.350	0.000	0.000

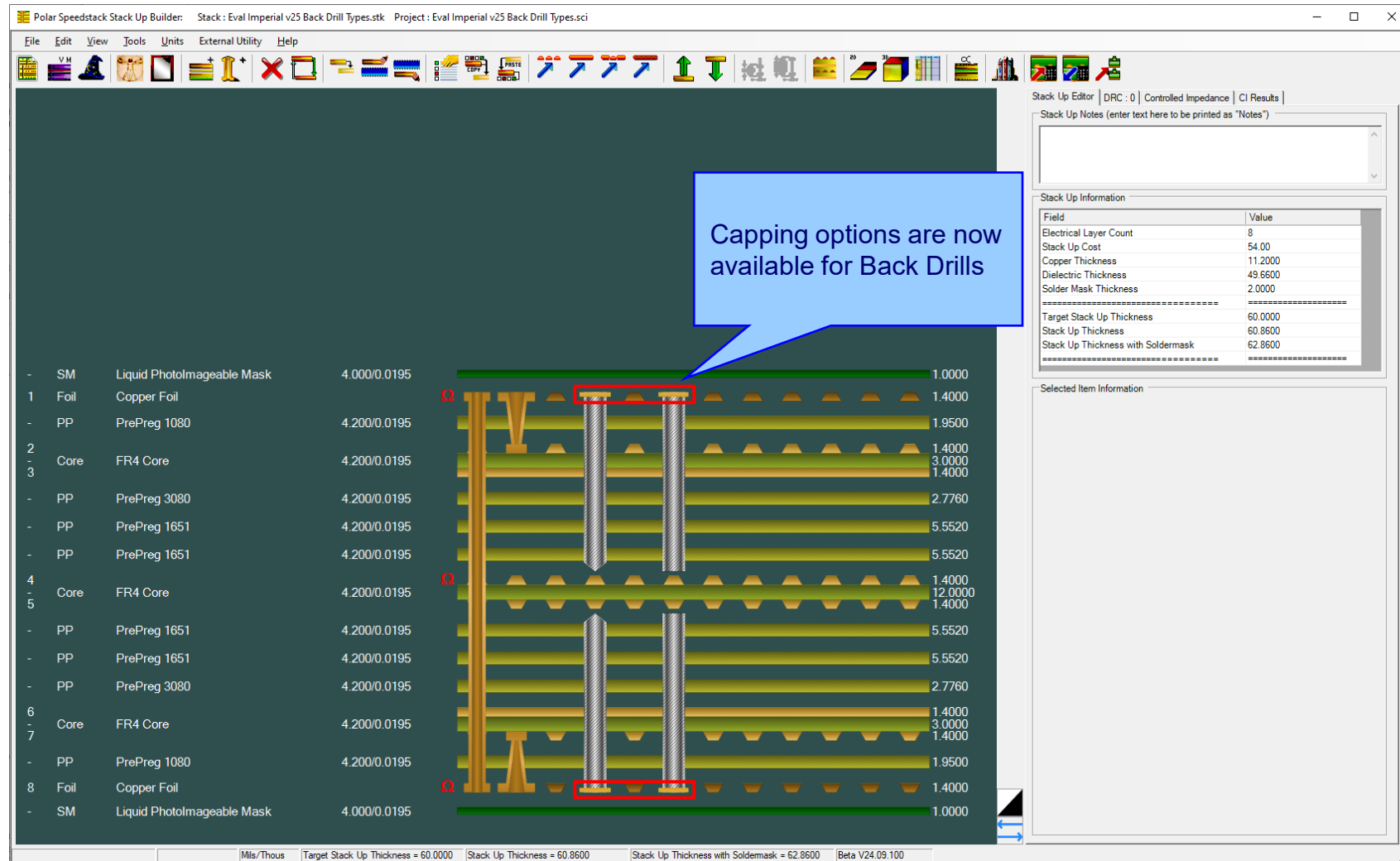
The technical report has been updated to support the new Back Drill Types

StackName:	Version:	Revision:	Modification:	Date of Revision:	Editor:
Date:	Associated Documents:				
Author:					
Department:					
Site:					

Page 2/X

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New capping options for Back Drills



Stack : Eval Imperial v25 Back Drill Types.stk Project : Eval Imperial v25 Back Drill Types.sci

File Edit View Tools Units External Utility Help

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

Stack Up Notes (enter text here to be printed as "Notes")

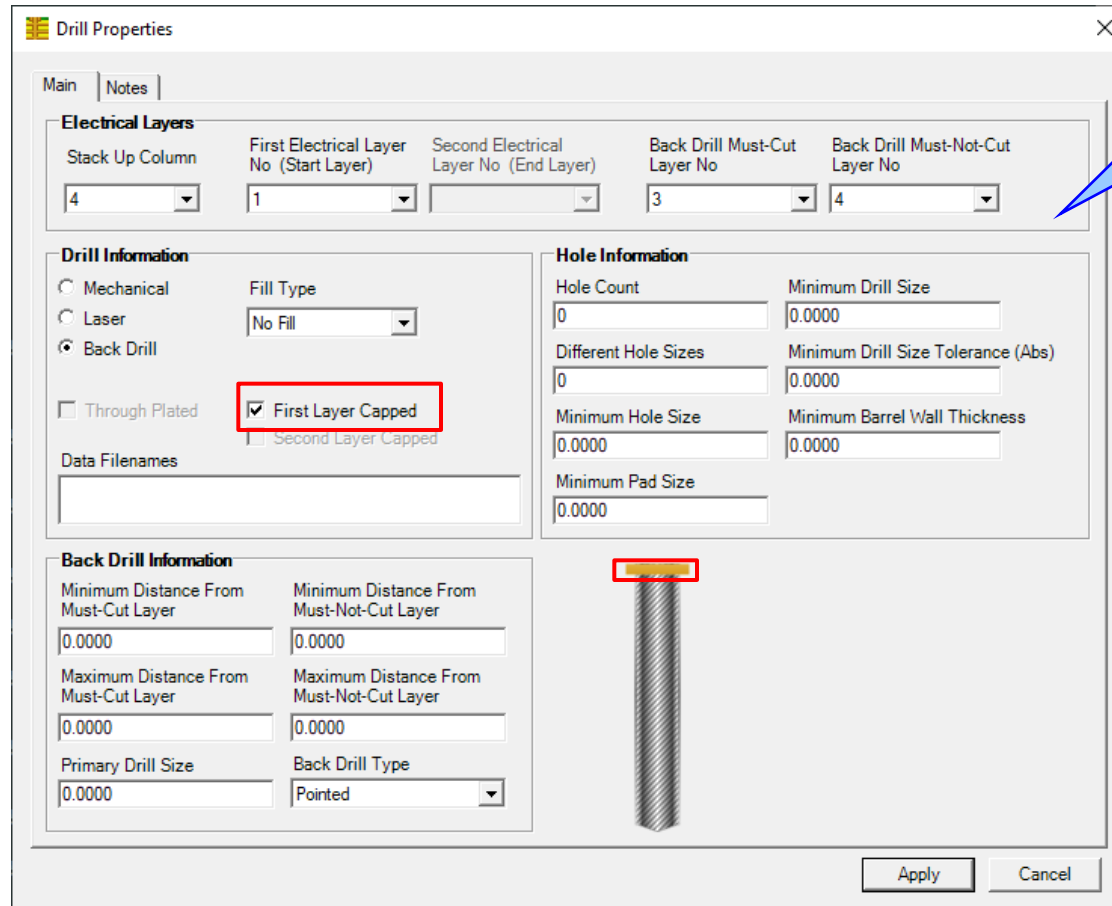
Stack Up Information

Field	Value
Electrical Layer Count	8
Stack Up Cost	54.00
Copper Thickness	11.2000
Dielectric Thickness	49.5600
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 Beta V24.09.100

New capping options for Back Drills

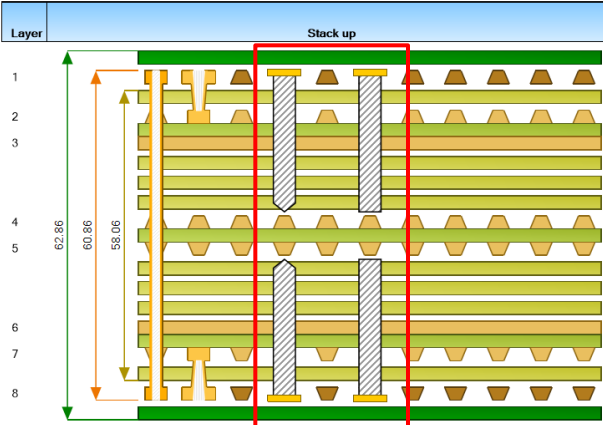


The screenshot shows the 'Drill Properties' dialog box with the 'Main' tab selected. The 'Electrical Layers' section at the top has five dropdown menus: 'Stack Up Column' (4), 'First Electrical Layer No (Start Layer)' (1), 'Second Electrical Layer No (End Layer)' (empty), 'Back Drill Must-Cut Layer No' (3), and 'Back Drill Must-Not-Cut Layer No' (4). Below this, the 'Drill Information' section has three radio buttons: 'Mechanical', 'Laser', and 'Back Drill' (selected). Under 'Back Drill', there are two checkboxes: 'Through Plated' (unchecked) and 'First Layer Capped' (checked, highlighted with a red box). Below these is a 'Data Filenames' text box. To the right, the 'Hole Information' section contains several input fields: '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), and 'Minimum Pad Size' (0.0000). At the bottom, the 'Back Drill Information' section has four input fields for 'Minimum Distance From Must-Cut Layer' and 'Maximum Distance From Must-Cut Layer' (all set to 0.0000), and a 'Primary Drill Size' (0.0000). The 'Back Drill Type' dropdown is set to 'Pointed'. A 3D model of a drill bit is shown in the center, with a red box highlighting the top capping area. The 'Apply' and 'Cancel' buttons are at the bottom right.

Specify the Back Drill capping within the Add Drill or Drill Properties dialog

New capping options for Back Drills

C:\Apps\Samples\Eval Imperial v25 Back Drill Types.sci
Units: Mils

Layer	Supplier	Description	Type	Processed Thickness	cr	Loss Tangent	Impedance ID
1	Polar Samples	Liquid PhotoImageable Mask	SolderMask	1.000	4.000	0.0195	
2	Polar Samples	Copper Foil	Copper	1.400			1, 2
3	Polar Samples	PreReg 1080	Dielectric	1.950	4.200	0.0195	
4	Polar Samples	FR4 Core	FR4	3.000	4.200	0.0195	
5	Polar Samples	PreReg 3080	Dielectric	2.776	4.200	0.0195	
6	Polar Samples	PreReg 1651	Dielectric	5.552	4.200	0.0195	
7	Polar Samples	PreReg 1651	Dielectric	5.552	4.200	0.0195	
8	Polar Samples	PreReg 1651	Dielectric	5.552	4.200	0.0195	
	Polar Samples	FR4 Core	FR4	12.000	4.200	0.0195	3
	Polar Samples	PreReg 1651	Dielectric	5.552	4.200	0.0195	
	Polar Samples	PreReg 1651	Dielectric	5.552	4.200	0.0195	
	Polar Samples	PreReg 3080	Dielectric	2.776	4.200	0.0195	
	Polar Samples	FR4 Core	FR4	3.000	4.200	0.0195	
	Polar Samples	PreReg 1080	Dielectric	1.950	4.200	0.0195	
	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 | 2.860

The technical report has been updated to support the new Back Drill capping options

Impedance ID	Structure Image	Structure Name	Impedance Signal Layer	Ref. Plane 1 in Layer	Ref. Plane 2 in Layer	6	7.250	6.250	8.500	100.000	10.000	101.280
1		Edge Coupled Coated Microstrip 1B	1	3								
2		Coated Microstrip 1B	1	3								
3		Edge Coupled Offset Stripline 1B1A	4	3								

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

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Grid View now supports Copper Coverage Percentage

Grid View

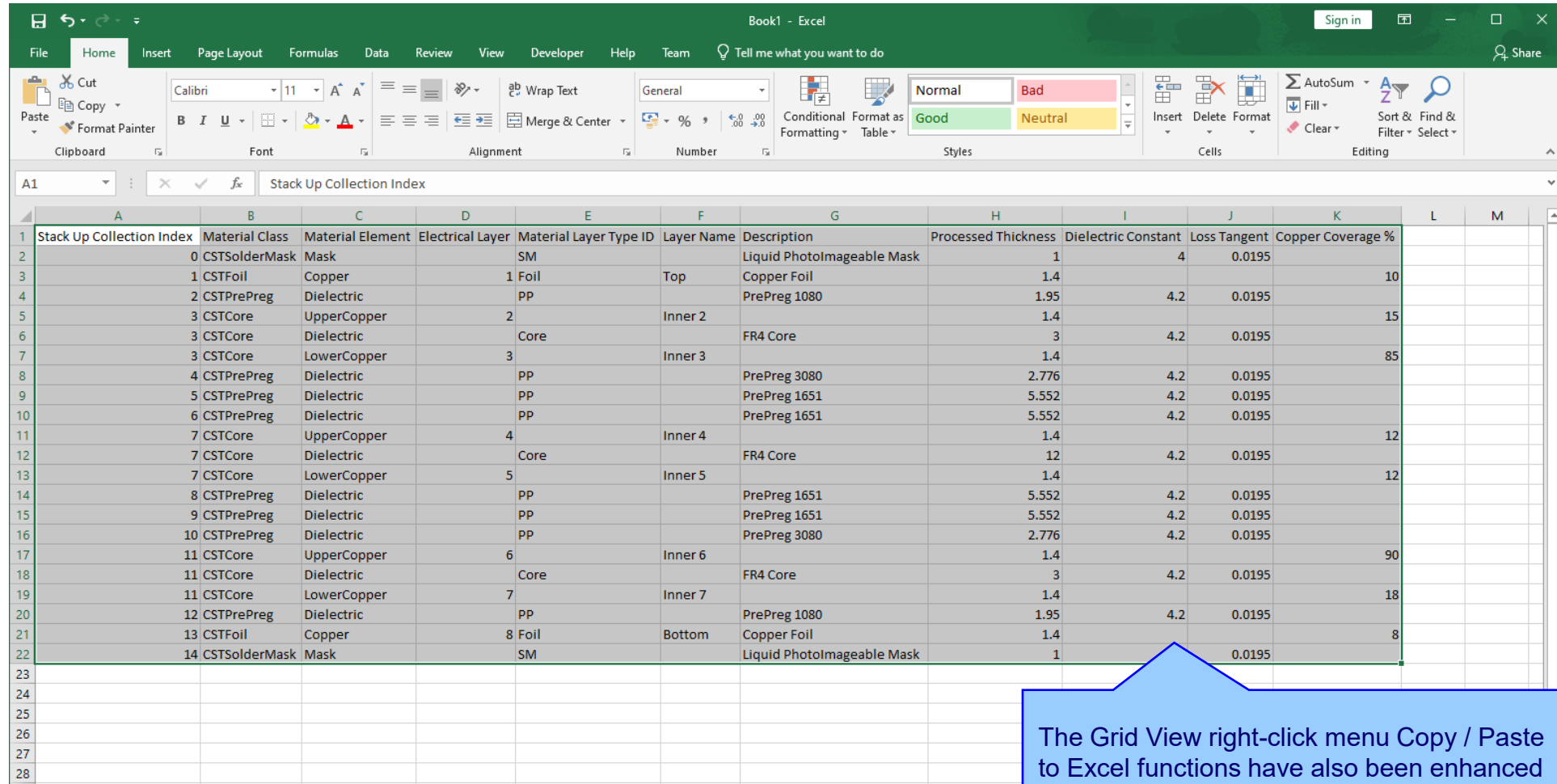
Stack Up Collection Index	Material Class	Material Element	Electrical Layer	Material Layer Type ID	Layer Name	Description	Processed Thickness	Dielectric Constant	Loss Tangent	Copper Coverage %
0	CSTSolderMask	Mask		SM		Liquid PhotoImageable Mask	1.0000	4.0000	0.0195	
1	CSTFoil	Copper	1	Foil	Top	Copper Foil				10.00
2	CSTPrePreg	Dielectric		PP		PrePreg 1080			0.0195	
3	CSTCore	UpperCopper	2		Inner 2					15.00
3	CSTCore	Dielectric		Core		FR4 Core			0.0195	
3	CSTCore	LowerCopper	3		Inner 3					85.00
4	CSTPrePreg	Dielectric		PP		PrePreg 1080			0.0195	
5	CSTPrePreg	Dielectric		PP		PrePreg 1080			0.0195	
6	CSTPrePreg	Dielectric		PP		PrePreg 1080			0.0195	
7	CSTCore	UpperCopper	4		Inner 4					12.00
7	CSTCore	Dielectric		Core		FR4 Core			0.0195	
7	CSTCore	LowerCopper	5		Inner 5					12.00
8	CSTPrePreg	Dielectric		PP		PrePreg 1080			0.0195	
9	CSTPrePreg	Dielectric		PP		PrePreg 1080			0.0195	
10	CSTPrePreg	Dielectric		PP		PrePreg 1080			0.0195	
11	CSTCore	UpperCopper	6		Inner 6					90.00
11	CSTCore	Dielectric		Core		FR4 Core	3.0000	4.2000	0.0195	
11	CSTCore	LowerCopper	7		Inner 7		1.4000			18.00
12	CSTPrePreg	Dielectric		PP		PrePreg 1080	1.9500	4.2000	0.0195	
13	CSTFoil	Copper	8	Foil	Bottom	Copper Foil	1.4000			8.00
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 Microsoft Excel
 Layer Name, Description, Processed Thickness, Dielectric Constant, Loss Tangent and Copper Coverage % columns are editable, other columns are read-only
 Processed Thickness = Copper.FinishedThickness, Dielectric.IsolationDistance, SolderMask.MaskThickness, Coverlay.FinishedThickness

Apply Cancel

The Grid View now supports an additional Copper Coverage Percentage column.
 This provides a convenient and quicker way to key in the Copper Coverage for each electrical layer on the stack up. Individual layers may still be edited from the Properties dialog but having a single dialog where all layers are accessible speeds the data entry process significantly

Grid View now supports Copper Coverage Percentage



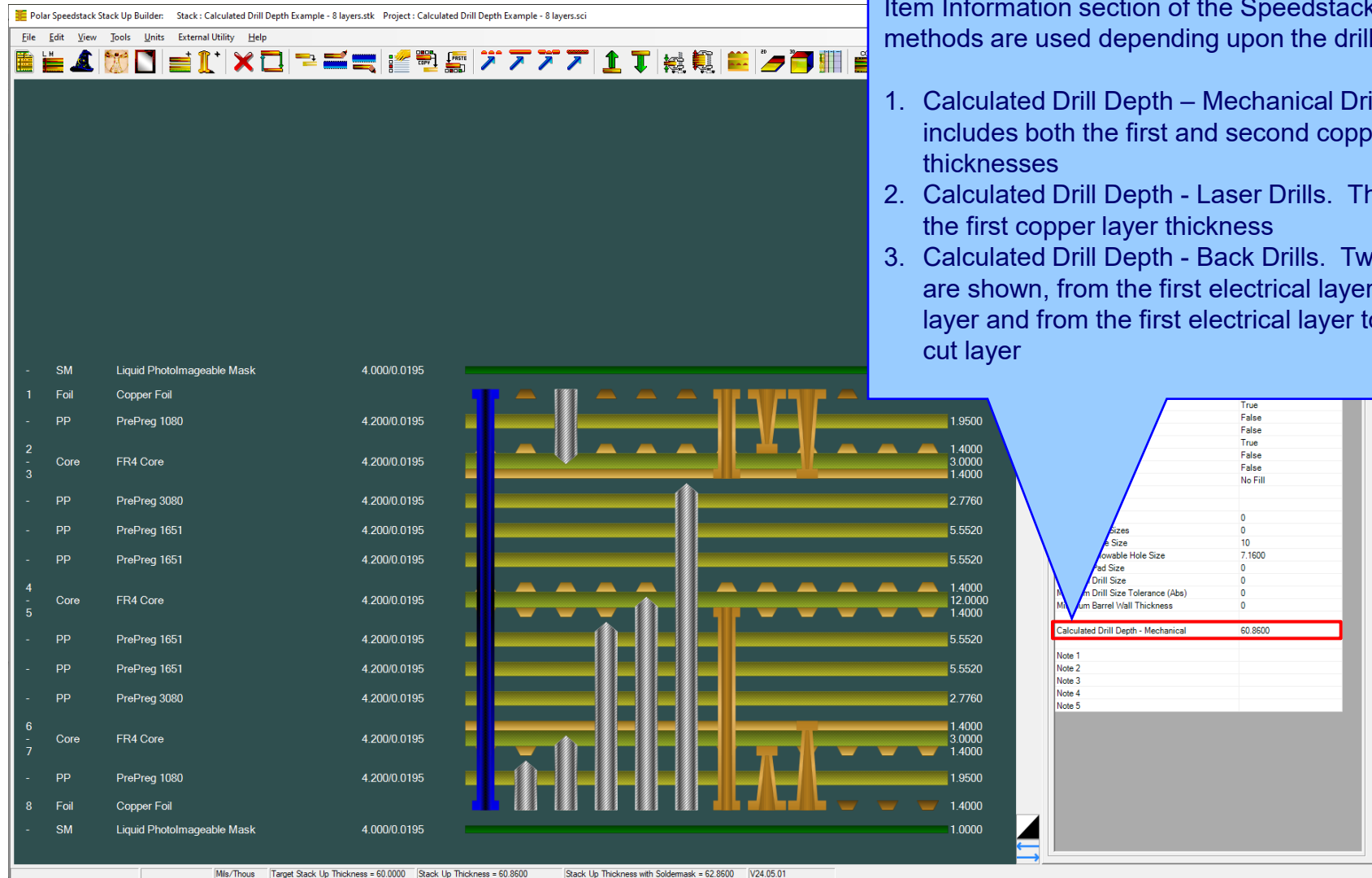
	A	B	C	D	E	F	G	H	I	J	K	L	M
1	Stack Up Collection Index	Material Class	Material Element	Electrical Layer	Material Layer Type ID	Layer Name	Description	Processed Thickness	Dielectric Constant	Loss Tangent	Copper Coverage %		
2		0 CSTSolderMask	Mask		SM		Liquid PhotoImageable Mask	1	4	0.0195			
3		1 CSTFoil	Copper	1	Foil	Top	Copper Foil	1.4			10		
4		2 CSTPrePreg	Dielectric		PP		PrePreg 1080	1.95	4.2	0.0195			
5		3 CSTCore	UpperCopper	2		Inner 2		1.4			15		
6		3 CSTCore	Dielectric		Core		FR4 Core	3	4.2	0.0195			
7		3 CSTCore	LowerCopper	3		Inner 3		1.4			85		
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		
12		7 CSTCore	Dielectric		Core		FR4 Core	12	4.2	0.0195			
13		7 CSTCore	LowerCopper	5		Inner 5		1.4			12		
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			90		
18		11 CSTCore	Dielectric		Core		FR4 Core	3	4.2	0.0195			
19		11 CSTCore	LowerCopper	7		Inner 7		1.4			18		
20		12 CSTPrePreg	Dielectric		PP		PrePreg 1080	1.95	4.2	0.0195			
21		13 CSTFoil	Copper	8	Foil	Bottom	Copper Foil	1.4			8		
22		14 CSTSolderMask	Mask		SM		Liquid PhotoImageable Mask	1		0.0195			
23													
24													
25													
26													
27													
28													

Other enhancements

- New import / export XML STKX v25.00 and SSX v15.00 file formats to support the new Back Drill Type and Capped Drill options.
- Drilling: When the Add Drill and Drill Properties dialogs are dismissed the current pan position is now retained. Previously, on high layer stack ups, the graphical image panned to the top of the stack up.
- Printing: The Isolation Distance (Summed) column calculation has been improved to offer better support when the stack up contains single-sided cores.

Speedstack v24.05.01 (May 2024)

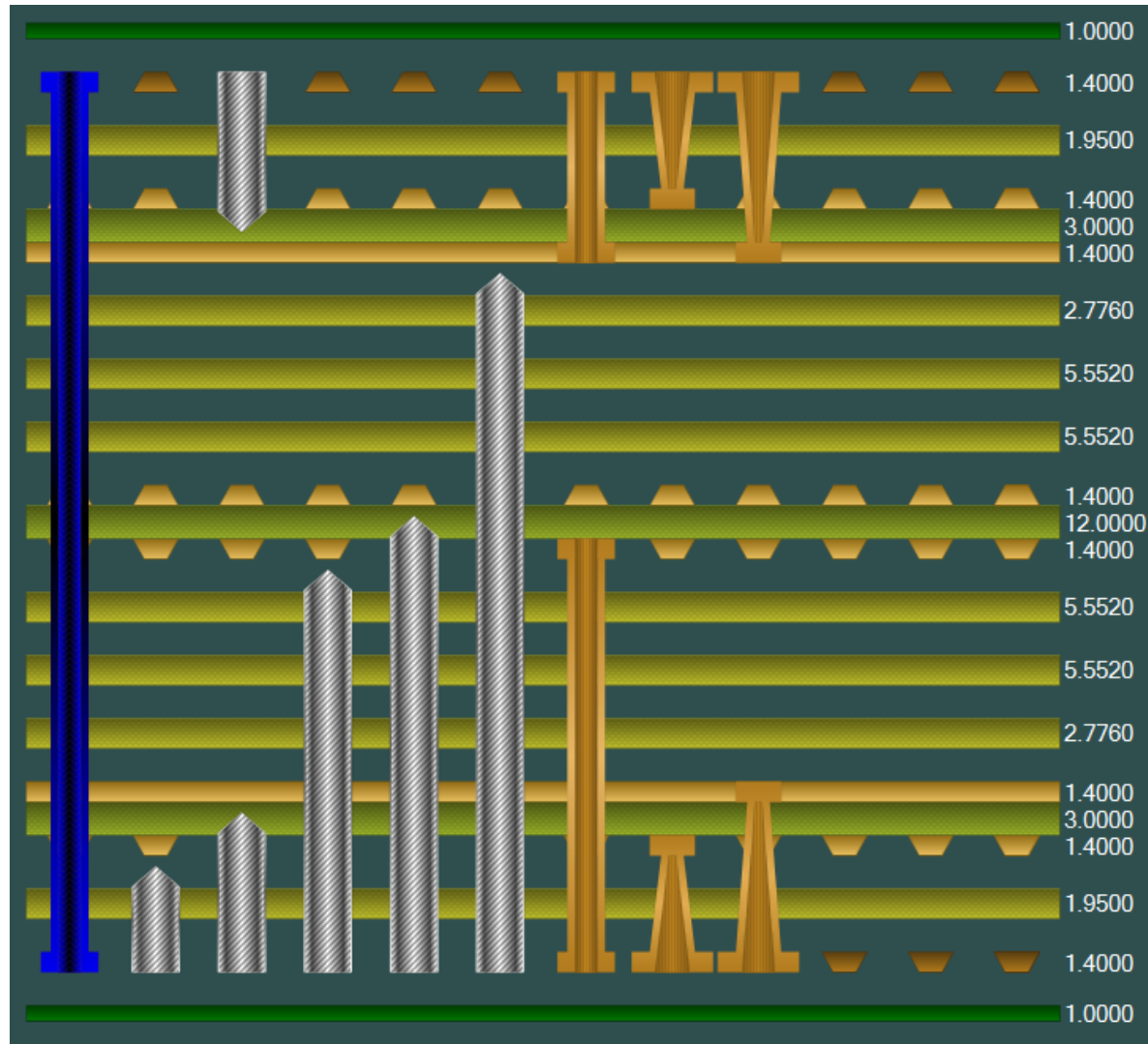
New Calculated Drill Depth enhancements



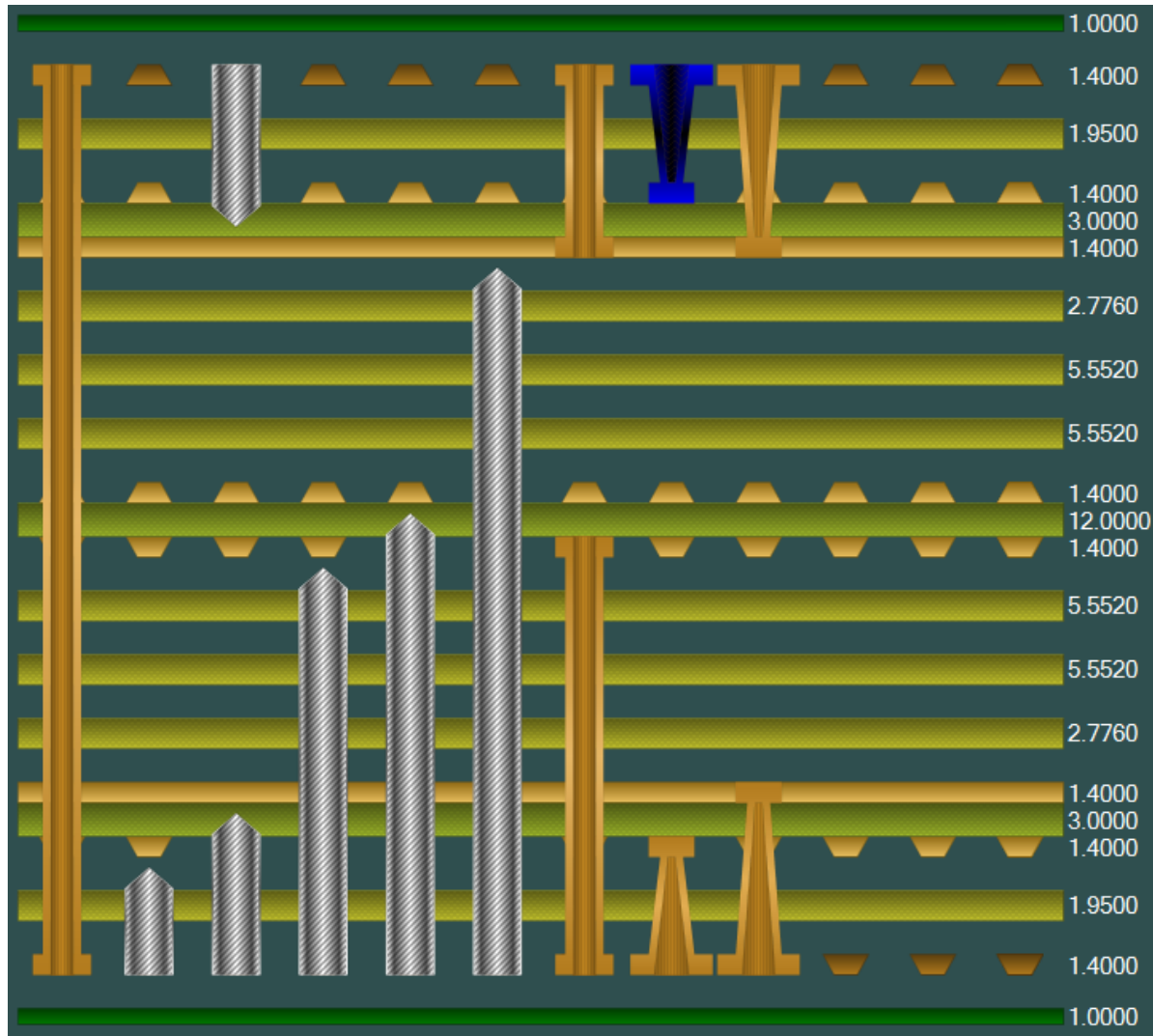
Calculate and display the Drill Depth under the Selected Item Information section of the Speedstack editor. Three methods are used depending upon the drill type:

1. Calculated Drill Depth – Mechanical Drills. This includes both the first and second copper layer thicknesses
2. Calculated Drill Depth - Laser Drills. This includes just the first copper layer thickness
3. Calculated Drill Depth - Back Drills. Two Drill Depths are shown, from the first electrical layer to the must-cut layer and from the first electrical layer to the must-not-cut layer

New Calculated Drill Depth – Mechanical Drills



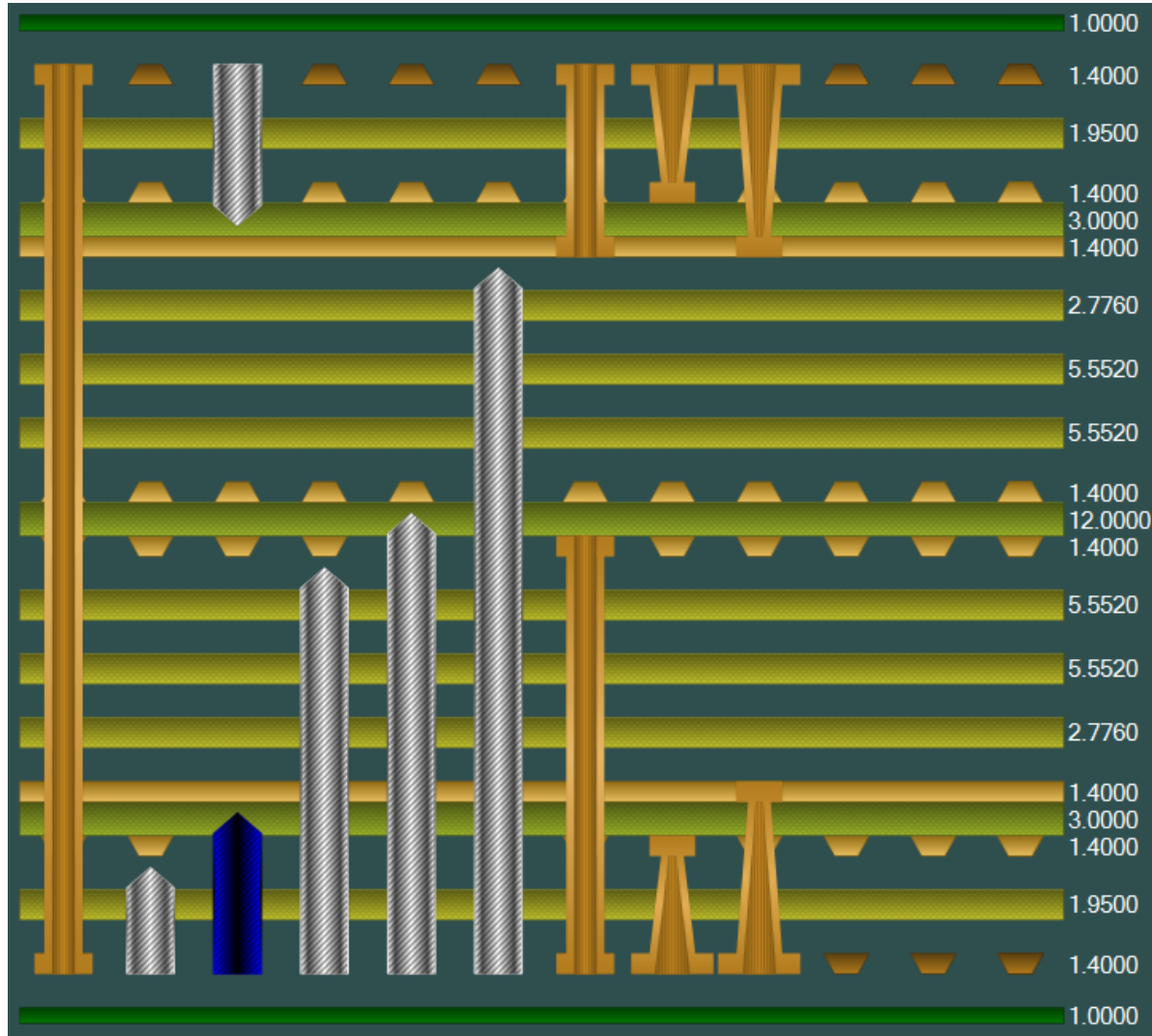
New Calculated Drill Depth – Laser Drills



Calculated Drill Depth - Laser Drills. This includes just the first copper layer thickness

Calculated Drill Depth - Laser	3.3500
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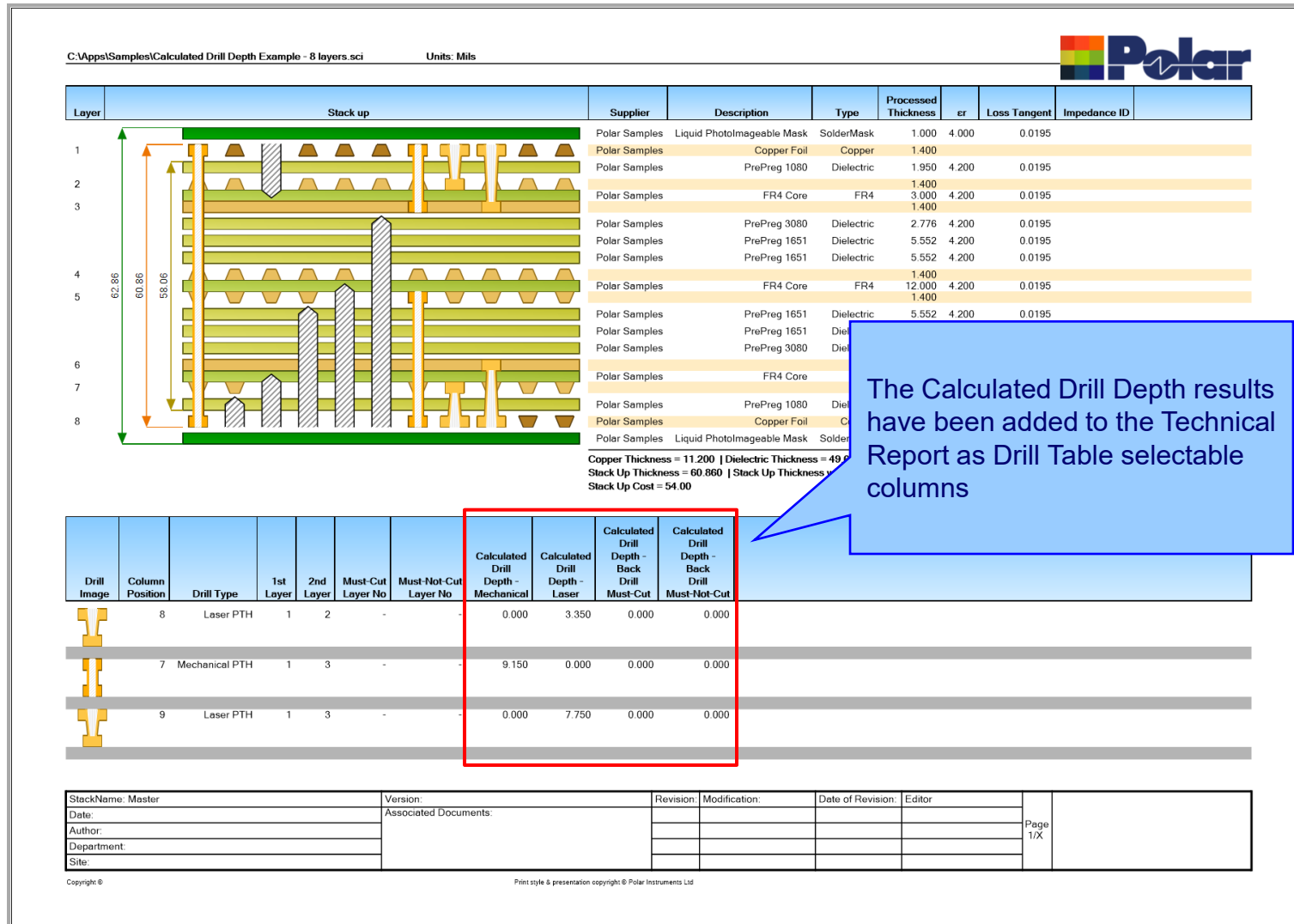
New Calculated Drill Depth – Back Drills



Calculated Drill Depth - Back Drills. Two Drill Depths are shown, from the first electrical layer to the must-cut layer and from the first electrical layer to the must-not-cut layer

Calculated Drill Depth - Back Drill Must-Cut	4.7500
Calculated Drill Depth - Back Drill Must-Not-Cut	9.1500

New Calculated Drill Depth enhancements



New Calculated Drill Depth enhancements

C:\Apps\Samples\Calculated Drill Depth Example - 8 layers.sci Units: Mils



Drill Image	Column Position	Drill Type	1st Layer	2nd Layer	Must-Cut Layer No	Must-Not-Cut Layer No	Calculated Drill Depth - Mechanical	Calculated Drill Depth - Laser	Calculated Drill Depth - Back Drill Must-Cut	Calculated Drill Depth - Back Drill Must-Not-Cut
	3	Back Drill	1	-	2	3	0.000	0.000	4.750	9.150
	1	Mechanical PTH	1	8	-	-	60.860	0.000	0.000	0.000
	6	Back Drill	8	-	4	3	0.000	0.000	37.830	53.110
	5	Back Drill	8	-	5	4	0.000	0.000	24.430	37.830
	4	Back Drill	8	-	6	5	0.000	0.000	9.150	24.430
	7	Mechanical PTH	8	5	-	-	24.430	0.000	0.000	0.000
	3	Back Drill	8	-	7	6	0.000	0.000	4.750	9.150
	9	Laser PTH	8	6	-	-	0.000	7.750	0.000	0.000
	8	Laser PTH	8	7	-	-	0.000	3.350	0.000	0.000
	2	Back Drill	8	-	8	7	0.000	0.000	1.400	4.750

Notes

The Calculated Drill Depth results have been added to the Technical Report as Drill Table selectable columns

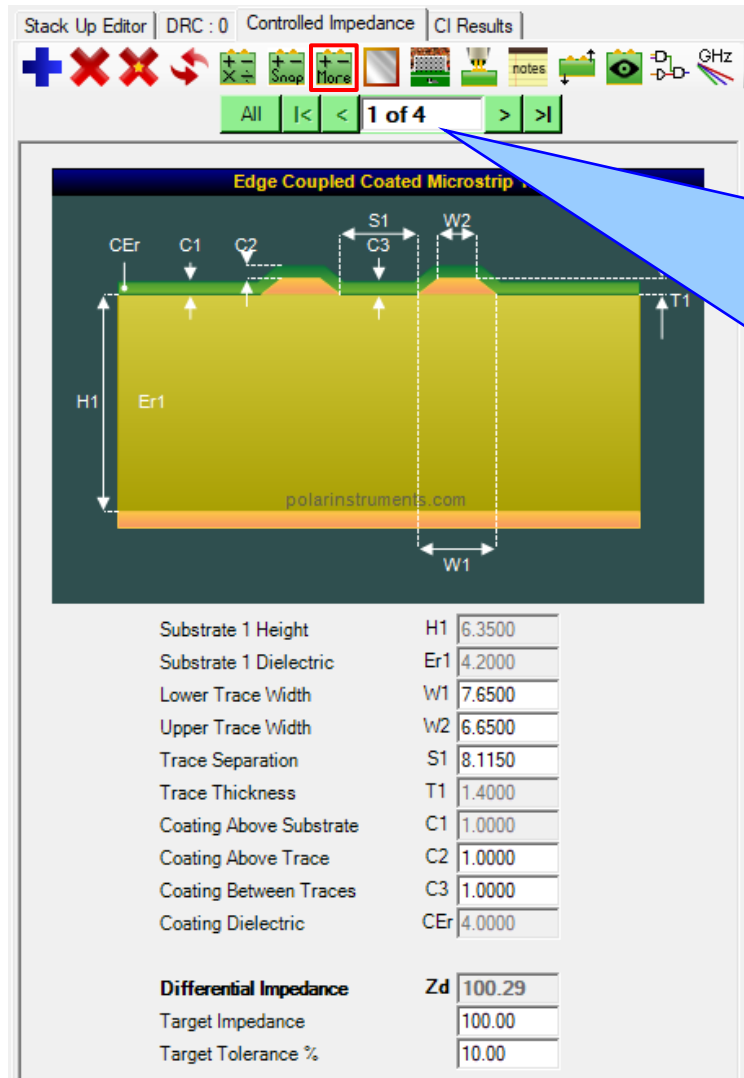
StackName:	Version:	Revision:	Modification:	Date of Revision:	Editor:	Page 2/X
Date:	Associated Documents:					
Author:						
Department:						
Site:						

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Speedstack v24.04.08 (April 2024)

New Structure More Calculations option



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

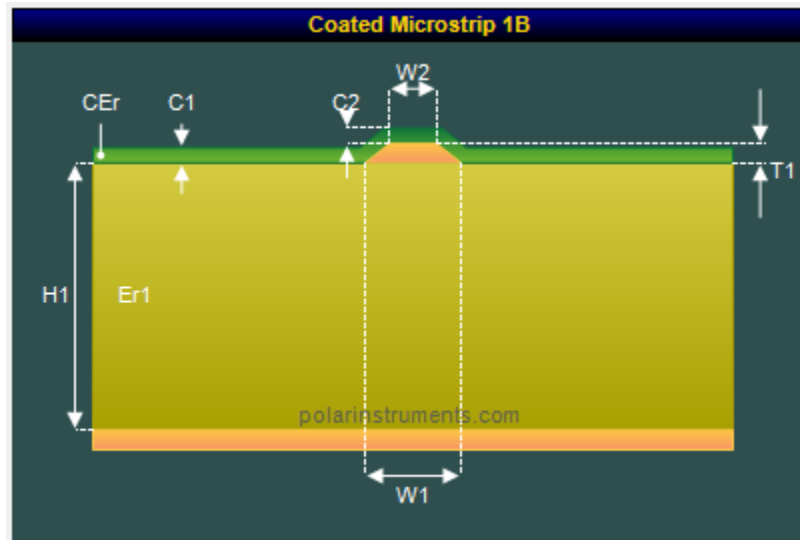
On the structure toolbar there is a new More Calculations button. On selecting this option the following field solver results will be calculated:

Singled-Ended Structures: Impedance (Z_0), Delay, Inductance, Capacitance, Effective Dielectric Constant, Velocity of Propagation

Differential Structures: Differential Impedance (Z_{diff}), Delay (Odd Mode), Odd Mode Impedance (Z_{odd}), Even Mode Impedance (Z_{even}), Common Mode Impedance (Z_{common}), Effective Dielectric Constant, Velocity of Propagation, Near-End Crosstalk (NEXT), Coupling Percentage

New Structure More Calculations option

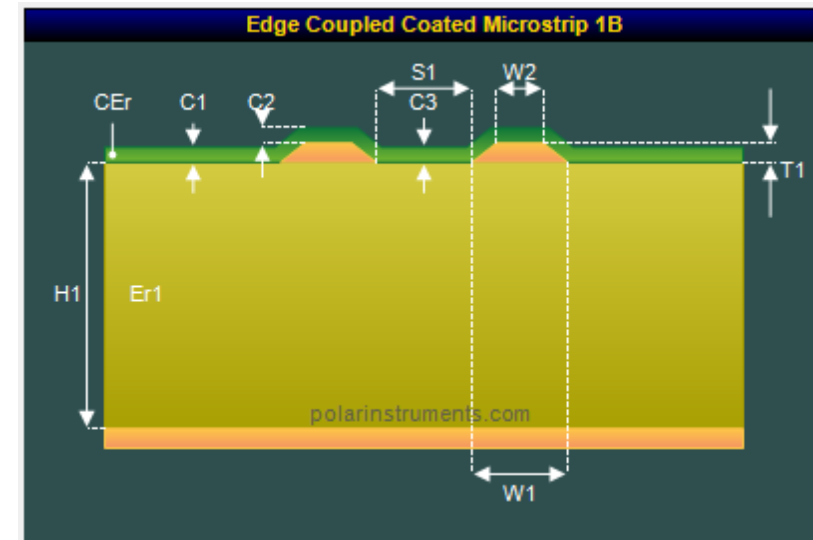
Single-ended structure results



More Calculations

Impedance	Zo	75.802	Close
Delay (ps/in)	D	152.272	
Inductance (nH/in)	L	11.543	
Capacitance (pF/in)	C	2.009	
Effective Dielectric Constant	EEr	3.230	
Velocity of Propagation (CITS)	Vp	0.556	

Differential structure results

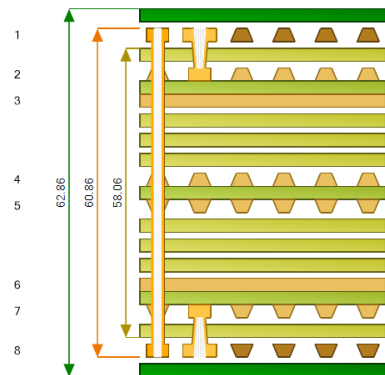


More Calculations

Differential Impedance	Zdiff	100.289	Close
Delay (Odd Mode) (ps/in)	D	147.683	
Odd Mode Impedance	Zodd	50.144	
Even Mode Impedance	Zeven	67.086	
Common Mode Impedance	Zcommon	33.543	
Effective Dielectric Constant	EEr	3.038	
Velocity of Propagation (CITS)	Vp	0.574	
Near-End Crosstalk (NEXT)	Kb	7.2257E-02	
Coupling Percentage	CP	7.226	

New Structure More Calculations option

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



Layer	Stack up	Supplier	Supplier Description	Description	Type	Processed Thickness	Mask Thickness	er	Impedance ID
1		Polar Samples	SM/001	Liquid PhotoImageable Mask	SolderMask	1.000	1.000	4.000	
2		Polar Samples	FO/001	Copper Foil	Copper	1.400			1.2
3		Polar Samples	PP/001	PrePreg 1080	Dielectric	1.950		4.200	
4		Polar Samples	CO/005	FR4 Core	FR4	1.400		4.200	
5		Polar Samples	PP/002	PrePreg 3080	Dielectric	2.776		4.200	
6		Polar Samples	PP/004	PrePreg 1651	Dielectric	5.552		4.200	
7		Polar Samples	PP/004	PrePreg 1651	Dielectric	5.552		4.200	
8		Polar Samples	CO/020	FR4 Core	FR4	12.000		4.200	3
		Polar Samples	PP/004	PrePreg 1651	Dielectric	5.552		4.200	
		Polar Samples	PP/004	PrePreg 1651	Dielectric	5.552		4.200	
		Polar Samples	PP/002	PrePreg 3080	Dielectric	2.776		4.200	
		Polar Samples	CO/005	FR4 Core	FR4	1.400		4.200	
		Polar Samples	PP/001	PrePreg 1080	Dielectric	1.950		4.200	
		Polar Samples	FO/001	Copper Foil	Copper	1.400			4
		Polar Samples	SM/001	Liquid PhotoImageable Mask	SolderMask	1.000	1.000	4.000	

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

Impedance ID	Structure Image	Impedance Signal Layer	Ref. Plane 1 in Layer	Ref. Plane 2 in Layer	Impedance (Zo)	Delay (D) (ps/in)	Inductance (L) (nH/in)	Capacitance (C) (pF/in)	Differential Impedance (Zdiff)	Delay (Odd Mode) (D) (ps/in)	Odd Mode Impedance (Zodd)	Even Mode Impedance (Zeven)	Common Mode Impedance (Zcommon)	Effective Dielectric Constant (Eer)	Velocity of Propagation (CITS) (Vp)	Near-End Crosstalk (NEXT) (Kb)	Coupling Percentage (CP)
1		1	3	0	0.000	0.000	0.000	0.000	100.289	147.683	50.144	67.086	33.543	3.038	0.574	7.2257E-02	7.226
2		1	3	0	75.802	152.272	11.543	2.009	0.000	0.000	0.000	0.000	0.000	3.230	0.556	0.0000E+00	0.000
3		4	3	6	0.000	0.000	0.000	0.000	101.278	173.635	50.639	85.202	42.601	4.200	0.488	1.2722E-01	12.722
4		8	6	0	75.802	152.272	11.543	2.009	0.000	0.000	0.000	0.000	0.000	3.230	0.556	0.0000E+00	0.000

StackName: Master		Version:		Revision:		Modification:		Date of Revision:		Editor		Page 1/X
Date:		Associated Documents:										
Author:												
Department:												
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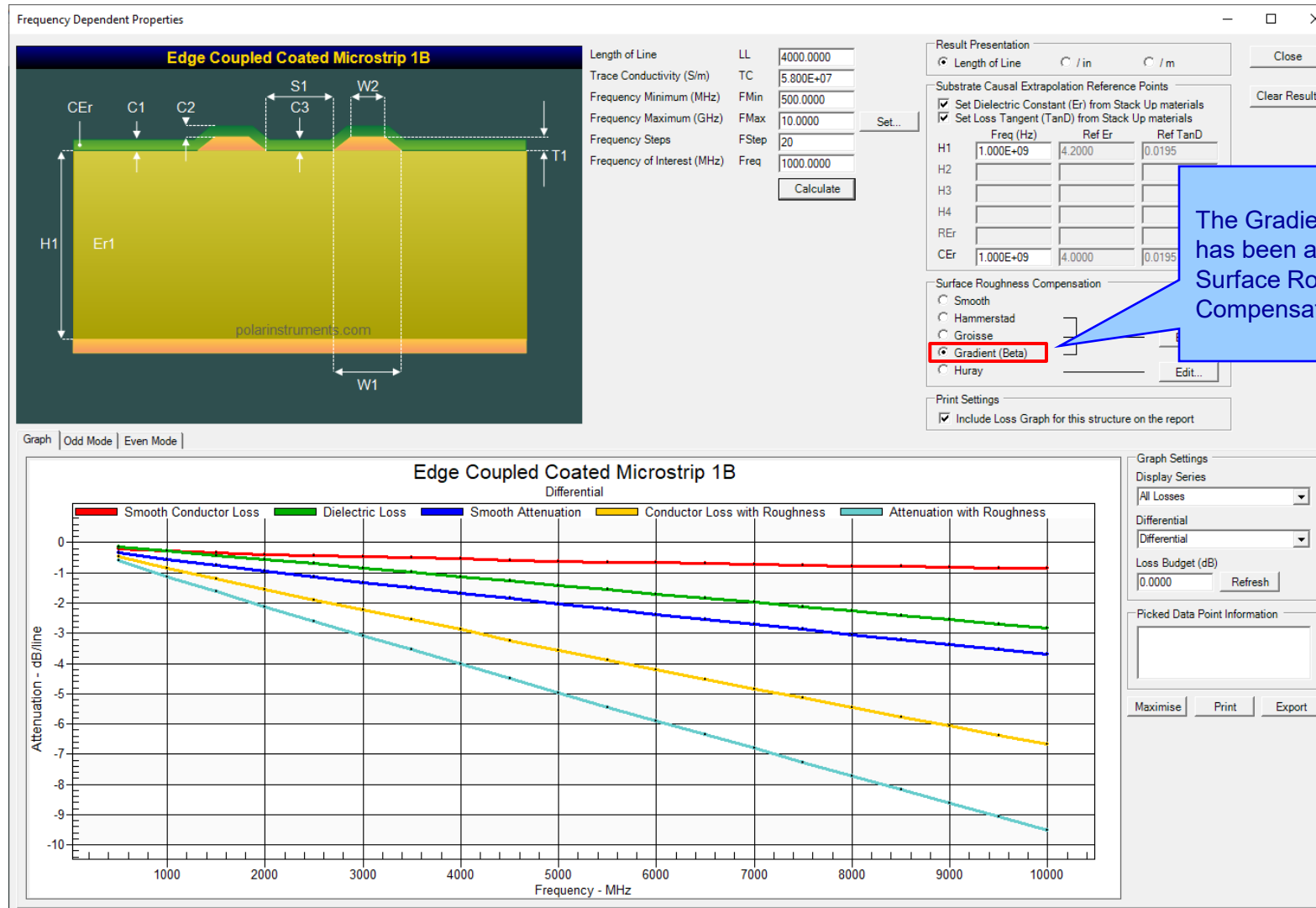
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The technical report has been enhanced with 13 new user-selectable columns on the impedance table – see red box.

In this example we have selected all 13 columns, which is unlikely in production use, but is good to show the new functionality.

As the impedance table contains both Single-Ended or Differential structures the columns that aren't appropriate for a given structure type are set to 0.

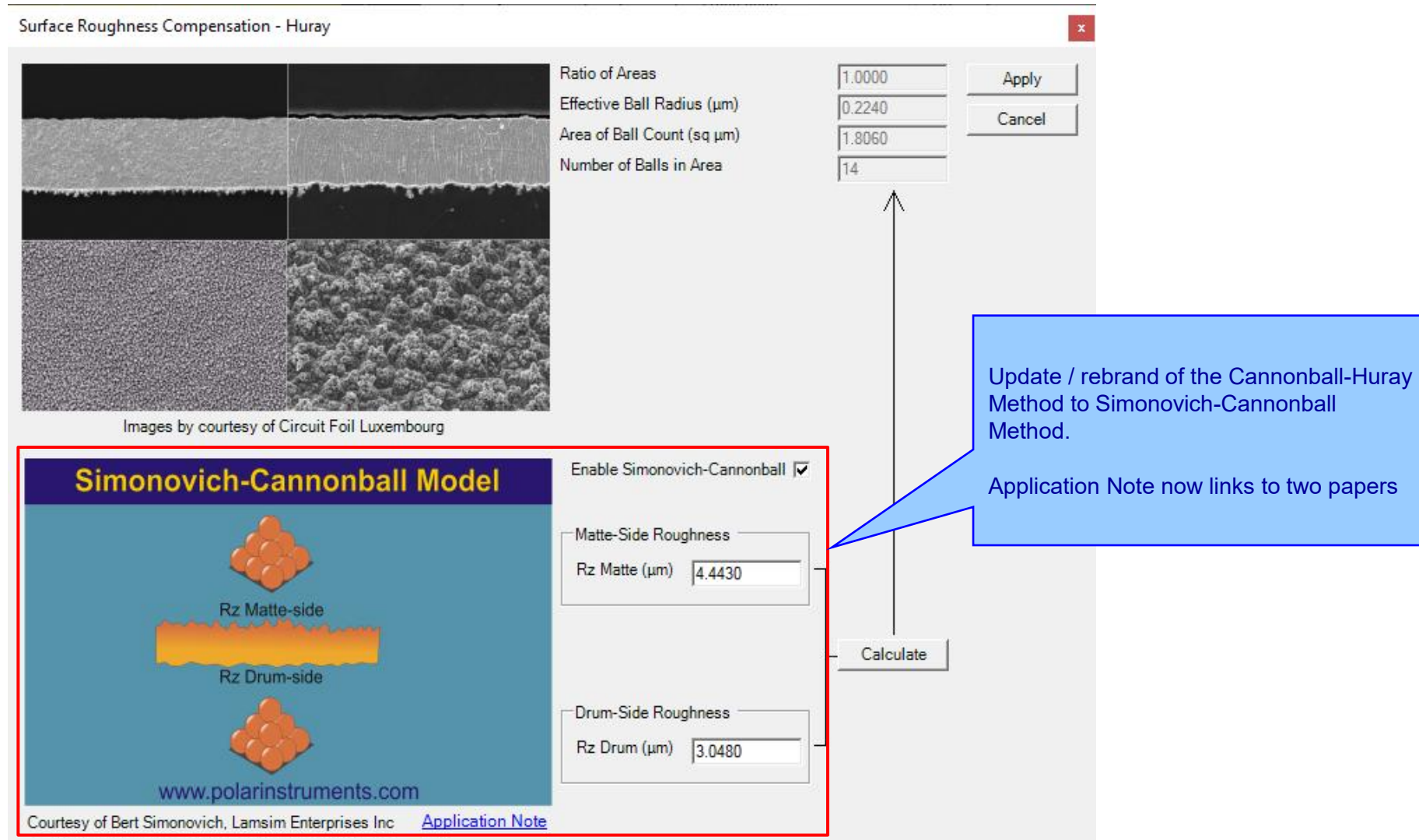
Gradient Roughness Method



The Gradient method has been added to the Surface Roughness Compensation options

Update Cannonball-Huray Method to Simonovich-Cannonball Method

Surface Roughness Compensation - Huray



Images by courtesy of Circuit Foil Luxembourg

Ratio of Areas: 1.0000
Effective Ball Radius (μm): 0.2240
Area of Ball Count ($\text{sq } \mu\text{m}$): 1.8060
Number of Balls in Area: 14

Apply
Cancel

Simonovich-Cannonball Model

Enable Simonovich-Cannonball ☒

Matte-Side Roughness
Rz Matte (μm): 4.4430

Drum-Side Roughness
Rz Drum (μm): 3.0480

Calculate

Update / rebrand of the Cannonball-Huray Method to Simonovich-Cannonball Method.
Application Note now links to two papers

www.polarinstruments.com
Courtesy of Bert Simonovich, Lamsim Enterprises Inc [Application Note](#)

Other enhancements

- New import / export XML STKX v24.00 and SSX v14.00 file formats to support the new Gradient Surface Roughness Compensation Method
- Updated to support latest BEM Calculation Engine
- FlexNet Publisher / FLEXIm v11.19.0.0 supported
- Printing: Fixed problem where the Laminate to Laminate dimension was not calculated corrected when materials spanned multiple print pages

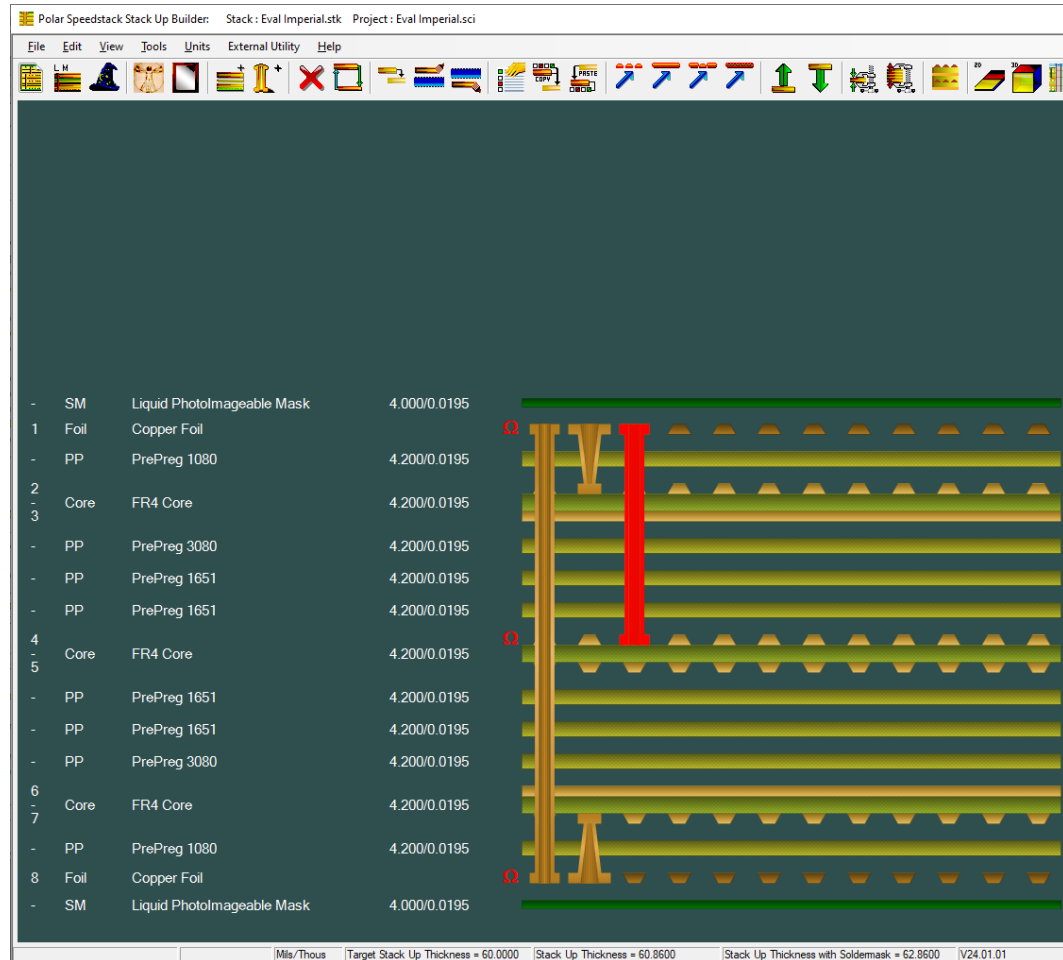
Speedstack v24.01.01 (Jan 2024)

Enhancements

- From 2024 Speedstack will be running on the Microsoft .Net Framework 4.8. It has migrated as a result of customer IT policy requests and we are working on new functionality for releases later in Q1 based on this new platform

Speedstack v23.09.01 (Sept 2023)

Design Rule Check (DRC) Enhancements



Stack Up Editor DRC : 1 Controlled Impedance CI Results

DRC Test Selection

- ☒ Design Logic
- ☒ Symmetry
- ☒ Copper Balance
- ☒ Board Thickness
- ☒ Manufacturing Tests (Tools | Manufacturing Constraints)
 - Active Constraint : Polar Microns
 - ☒ Min. Trace Width
 - ☒ Min. Gap Width
 - Aspect Ratios
 - ☒ Mechanical Drill
 - ☒ Buried Laser Microvia
 - ☒ Blind Laser Microvia
 - ☒ Trace
 - ☐ Resin Starvation

Maximum Drill Aspect Ratio Exceeded L1 - L4, Col3

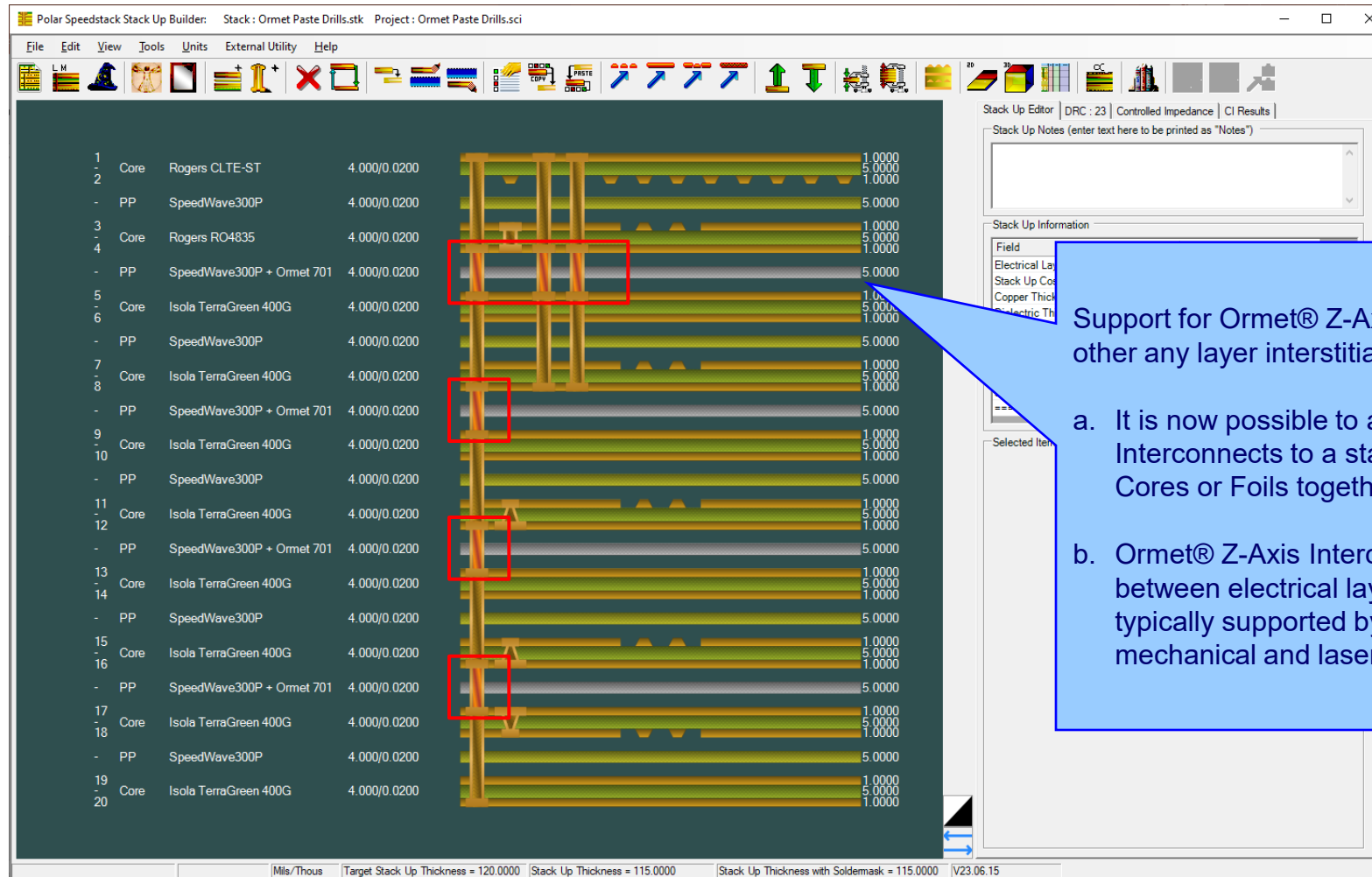
Design Rule Check information for Drills has been enhanced to provide more information, including start / end electrical layers and the column where the errant drill is located

Other enhancements

- Printing: Improvements to the Solder Mask to Solder Mask thickness line, particularly when an ident / coverlay / peelable material is above or below the Solder Mask
- Printing: Bill of Materials (BOM) table enhancements including options to enable / disable Number of Panels, Circuits Per Panel, Cost Per Circuit that appear under BOM table
- Editor: Multi-selected materials will now stay selected when right-mouse menu is used to bring up context menu

Speedstack v23.06.15 (June 2023)

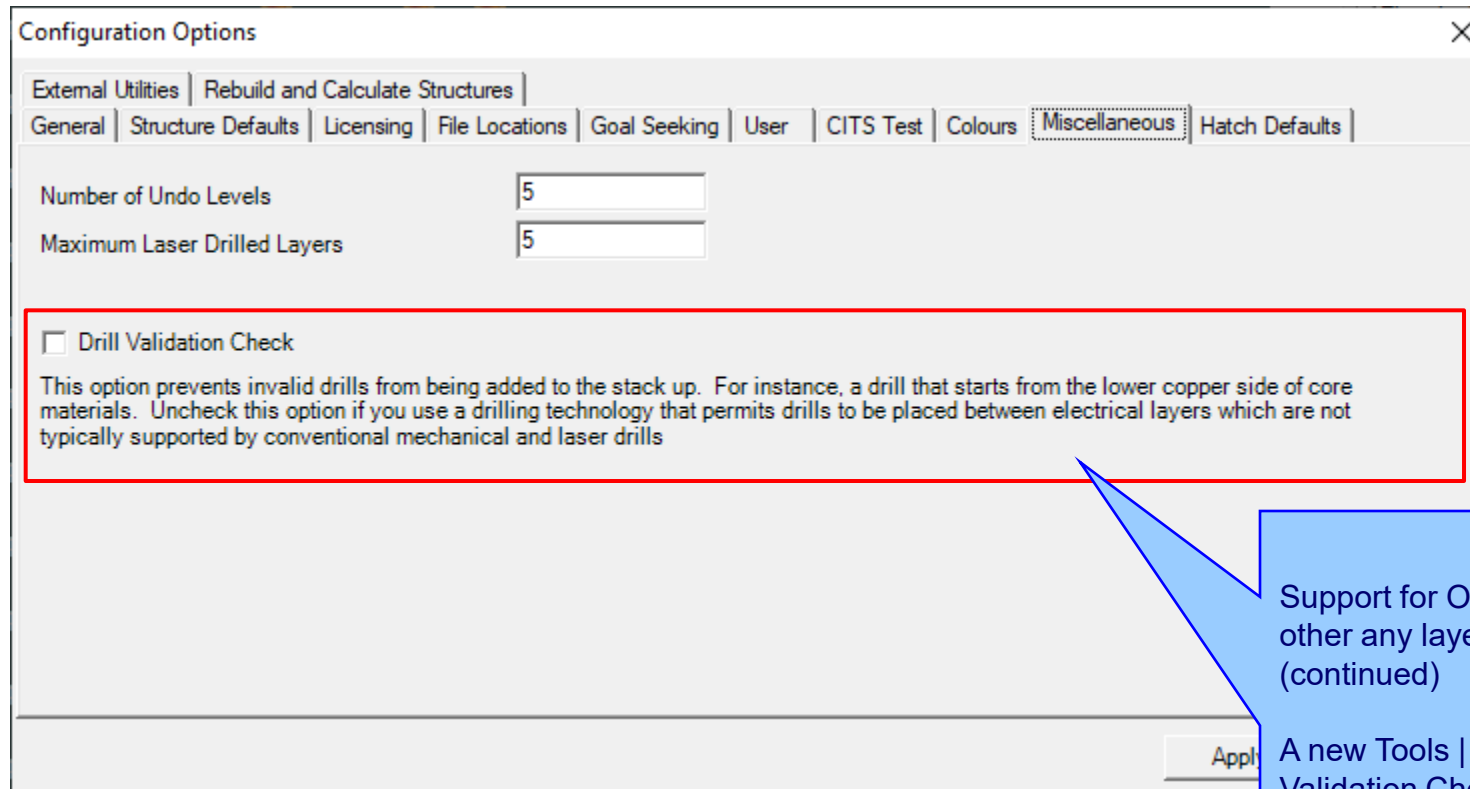
Drill Enhancements including support for Ormet® Z-Axis Interconnects or other any layer interstitial via technology



Support for Ormet® Z-Axis Interconnects or other any layer interstitial via technology

- It is now possible to add Ormet® Z-Axis Interconnects to a stack up to connect two Cores or Foils together
- Ormet® Z-Axis Interconnects can be placed between electrical layers which are not typically supported by conventional mechanical and laser drills

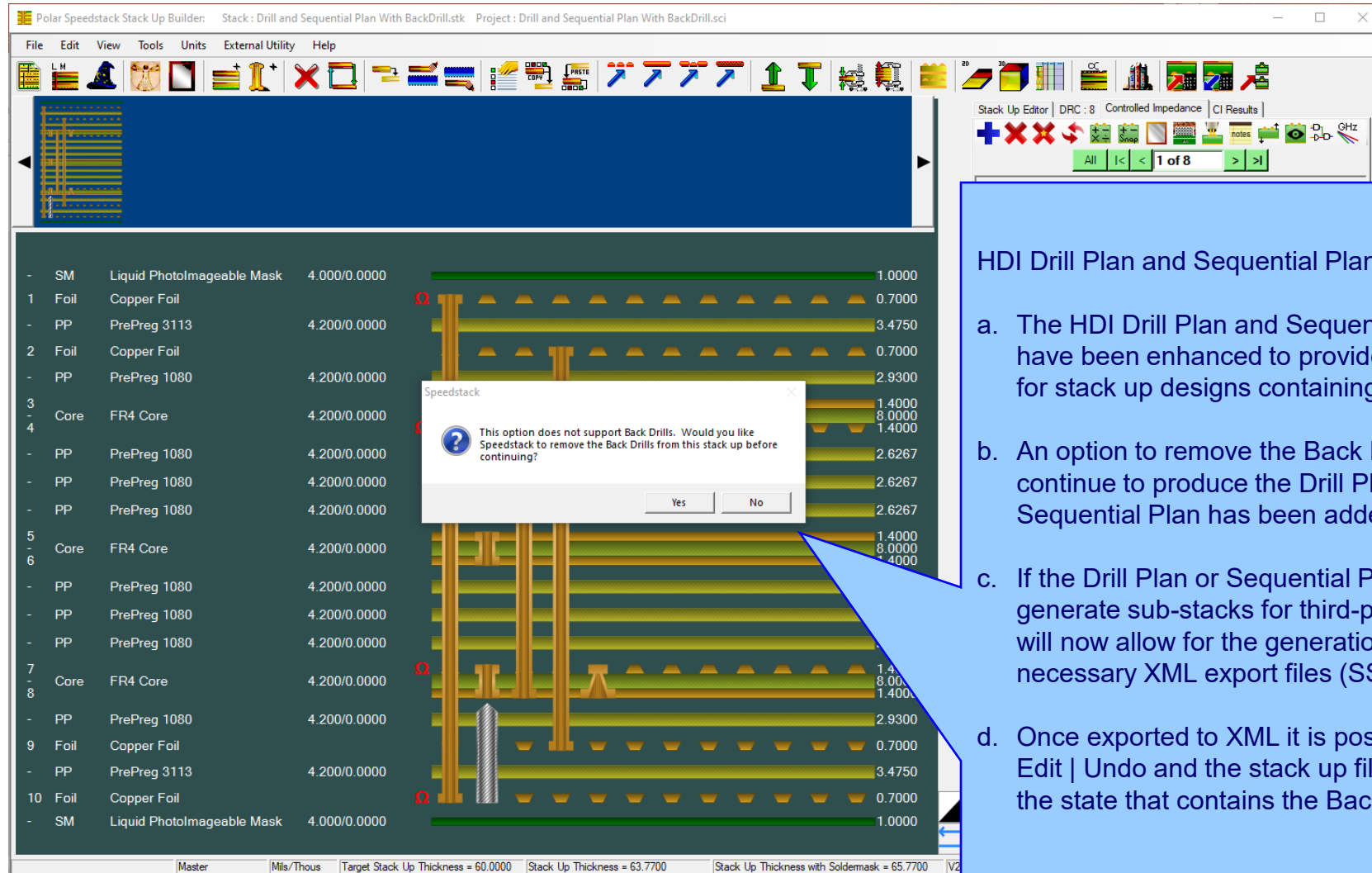
Enhancements including support for Ormet® Z-Axis Interconnects or other any layer interstitial via technology



Support for Ormet® Z-Axis Interconnects or other any layer interstitial via technology (continued)

A new Tools | Options | Miscellaneous tab Drill Validation Check option has been introduced. Unchecking this option will disable the Speedstack invalid drills check in order to support the Ormet® Z-Axis Interconnects technology

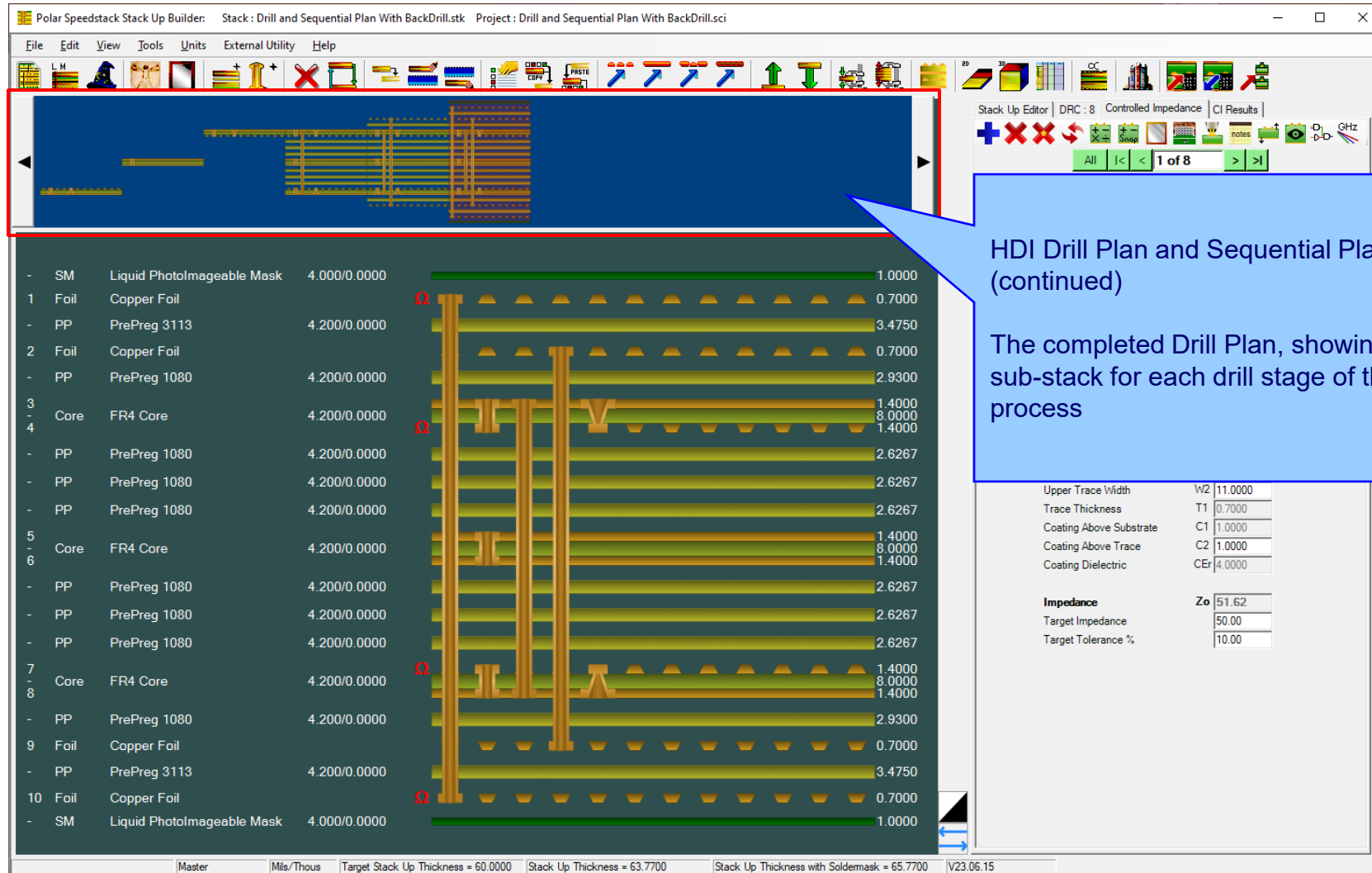
HDI Drill Plan and Sequential Plan Enhancements



HDI Drill Plan and Sequential Plan Enhancements

- The HDI Drill Plan and Sequential Plan options have been enhanced to provide better support for stack up designs containing Back Drills
- An option to remove the Back Drills and continue to produce the Drill Plan or Sequential Plan has been added
- If the Drill Plan or Sequential Plan is used to generate sub-stacks for third-party tools, this will now allow for the generation of the necessary XML export files (SSX)
- Once exported to XML it is possible to select Edit | Undo and the stack up file will return to the state that contains the Back Drills

HDI Drill Plan and Sequential Plan Enhancements

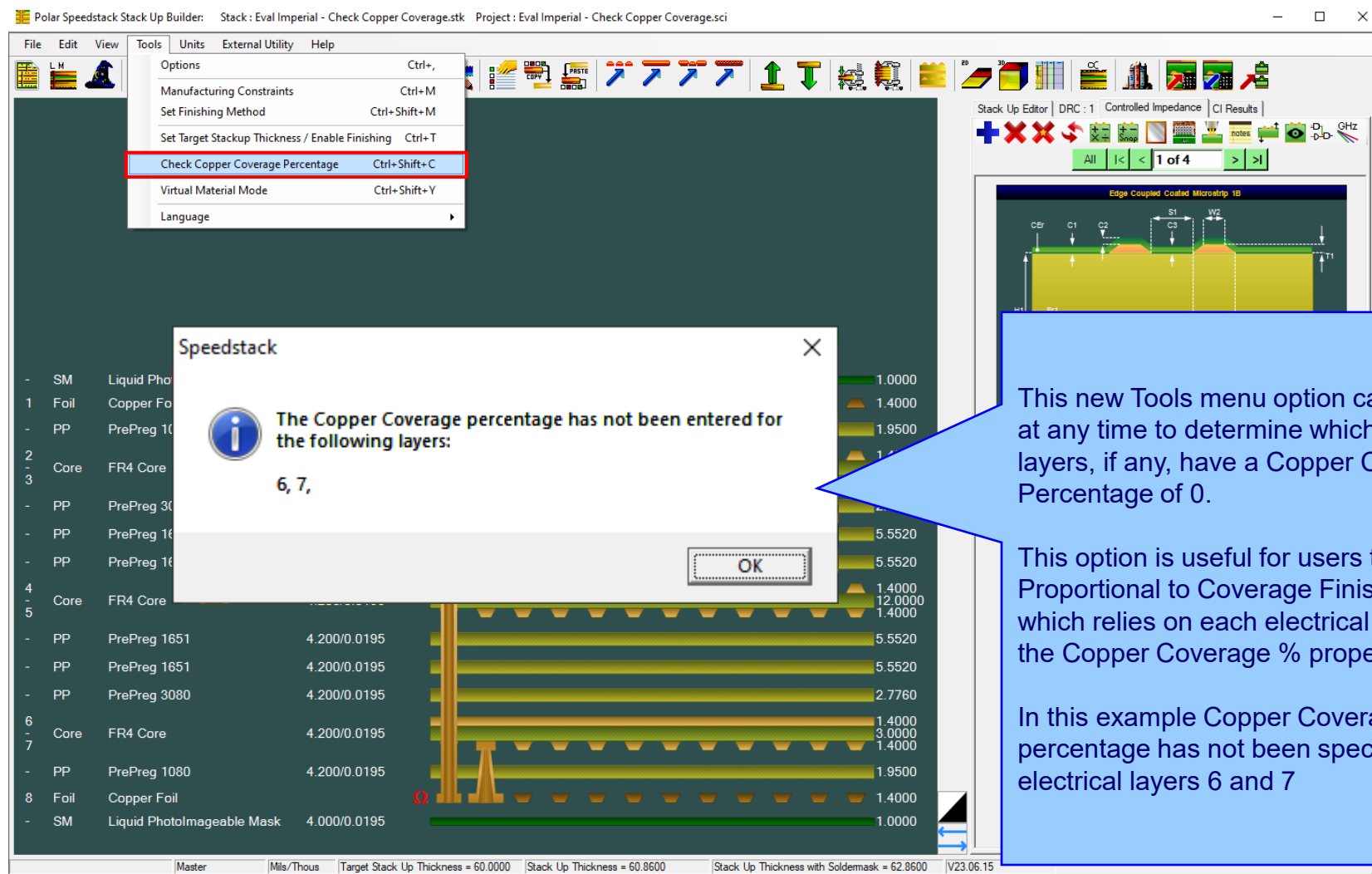


HDI Drill Plan and Sequential Plan Enhancements (continued)

The completed Drill Plan, showing a separate sub-stack for each drill stage of the fabrication process

Speedstack v23.05.01 (May 2023)

New Check Copper Coverage Percentage option



Speedstack

The Copper Coverage percentage has not been entered for the following layers:

6, 7,

OK

Layer	Material	Thickness (mm)	Copper Coverage (%)
1	Foil Copper Foil	0.0195	100
2	Core FR4 Core	1.4000	0
3	PP PrePreg 1651	0.0195	0
4	Core FR4 Core	1.4000	0
5	PP PrePreg 1651	0.0195	0
6	Core FR4 Core	1.4000	0
7	PP PrePreg 1651	0.0195	0
8	Foil Copper Foil	0.0195	100
9	SM Liquid PhotoImageable Mask	0.0195	0

This new Tools menu option can be selected at any time to determine which electrical layers, if any, have a Copper Coverage Percentage of 0.

This option is useful for users that select the Proportional to Coverage Finishing method, which relies on each electrical layer having the Copper Coverage % property populated

In this example Copper Coverage percentage has not been specified for electrical layers 6 and 7

Virtual Material Wizard Improvements

Stack Up Wizard (Virtual Material Mode)

Number of Layers: 8
 Target Stack Up Thickness: 60.0000
 Positive Tolerance %: 10
 Negative Tolerance %: 10

Symmetrical ☒

Plane Layers: 1, 2, 3, 4, 5, 6, 7, 8
 Mixed Layers: 1, 2, 3, 4, 5, 6, 7, 8

Nominal Dielectric Constant: 4.2000
 Nominal Loss Tangent: 0.0195

Solder Mask Top ☒ **Solder Mask Bottom** ☒

Solder Mask Dielectric Constant: 4.0000
 Solder Mask Loss Tangent: 0.0195
 Solder Mask Thickness: 0.0000

Preferred Core Thickness:
 Copper Thickness:

Build Type: ☒ Foil ☐ Core

<Previous Next >

When the Symmetrical mode is selected, the Solder Mask Bottom checkbox now matches Solder Mask Top when the checkbox is selected

Under the wizard, Define Sequential Build, the colour of the core dielectric is now set to the Core Dielectric colour as defined under the Tools | Options | Colours. Previously, the core dielectric was set to the Speedstack default colour

Resonac materials added to the Online Library

Online Library

Filter by Supplier






File Type

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

Library Files Available : Resonac

Resonac_GEA_679_1GHz_1901.mlbx
Resonac_GEA_678E_1GHz_1901.mlbx
Resonac_GEA_67N_1GHz_1901.mlbx
Resonac_GEA_705G(L)_1GHz_2201.mlbx
Resonac_GEA_705G_1GHz_2201.mlbx
Resonac_GFA_2_1GHz_1901.mlbx
Resonac_GHA_679G(S)_1GHz_1901.mlbx
Resonac_GHA_679G_1GHz_1901.mlbx
Resonac_GWA_900G_1GHz_1901.mlbx
Resonac_GWA_910G_1GHz_1901.mlbx

Append

Close

☐ Clear
Use this option to clear data from the existing library data table

Filter by Frequency

☒ All
☐ 1 GHz ☐ 20 GHz
☐ 5 GHz ☐ 50 GHz
☐ 10 GHz ☐ 75 GHz

Library Files Selected during this session

File Access Mode

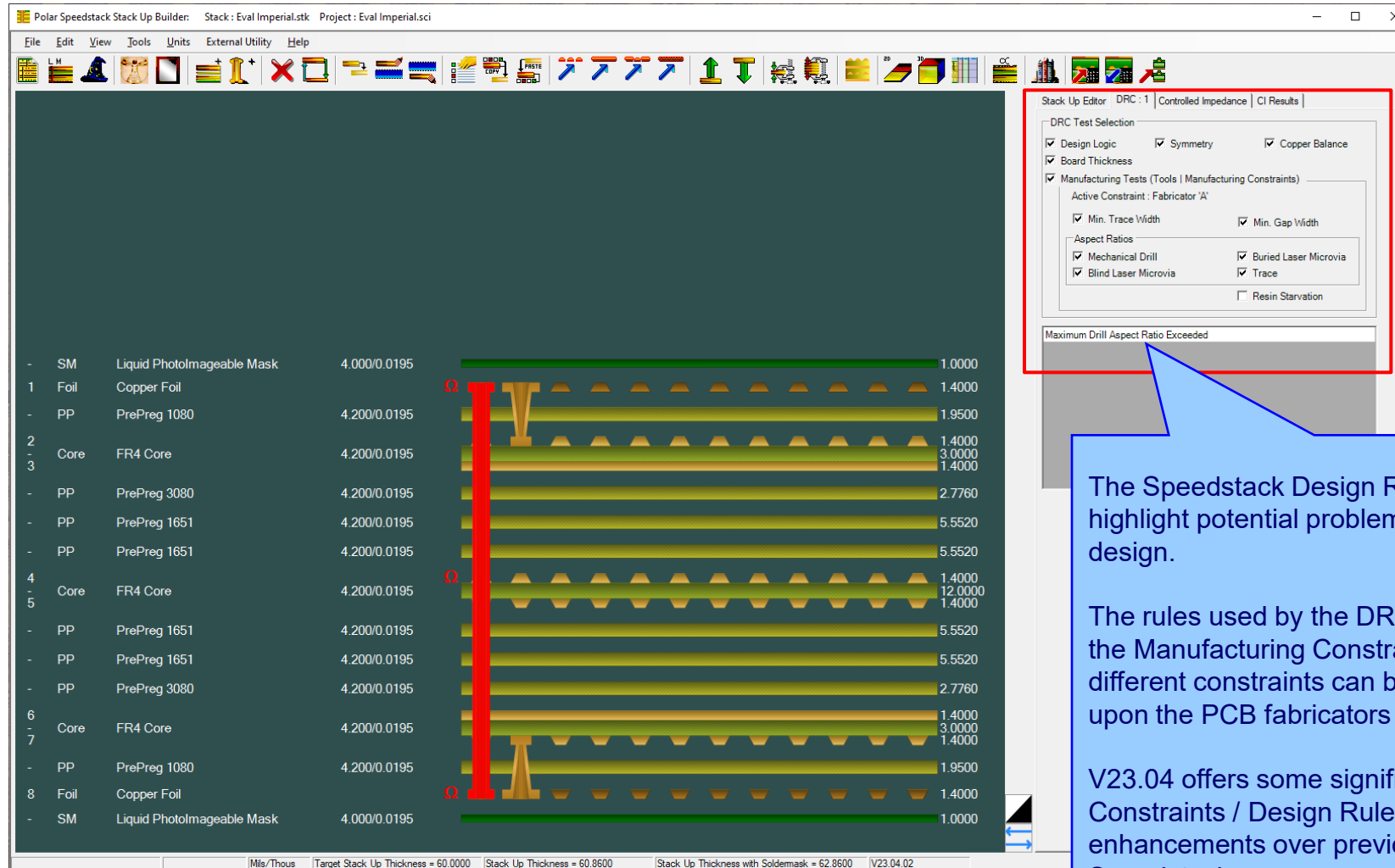
☐ Online Polar Library (<ftp://polarinstruments.com>)
☒ On-Premise Mode [Application Note](#)

Browse... Download...

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 v23.04.02 (April 2023)

Manufacturing Constraints / Design Rule Check Enhancements

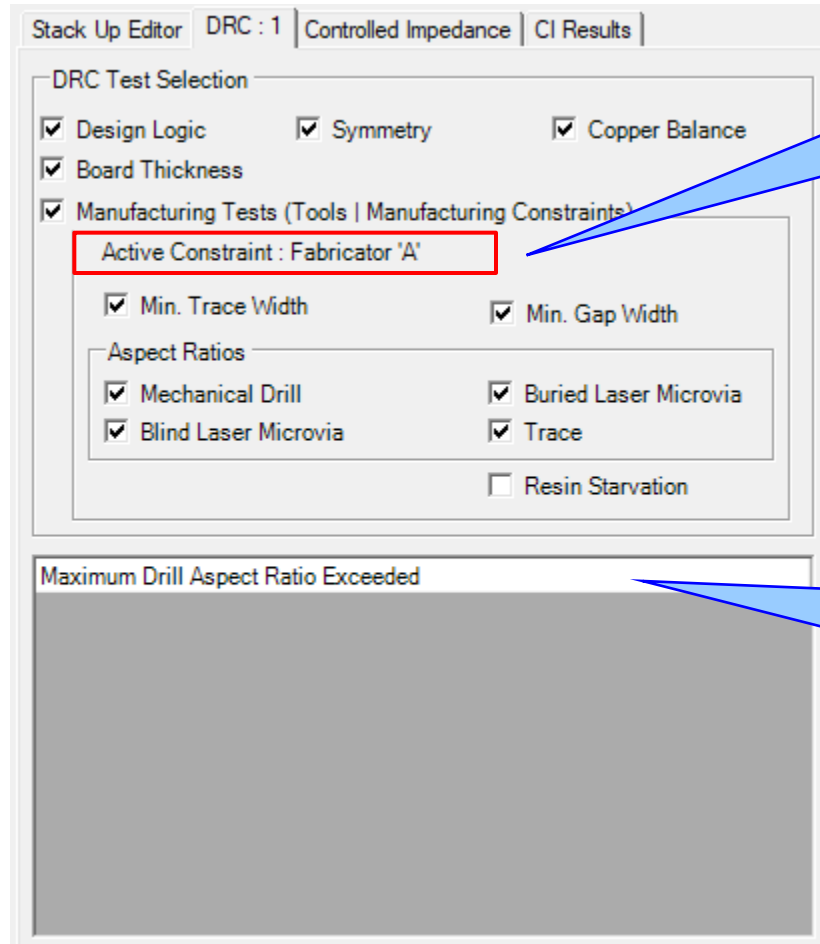


The Speedstack Design Rule Checks (DRC) highlight potential problems with the stack up design.

The rules used by the DRC are held within the Manufacturing Constraints, where different constraints can be configured based upon the PCB fabricators capabilities.

V23.04 offers some significant Manufacturing Constraints / Design Rule Check enhancements over previous versions of Speedstack.

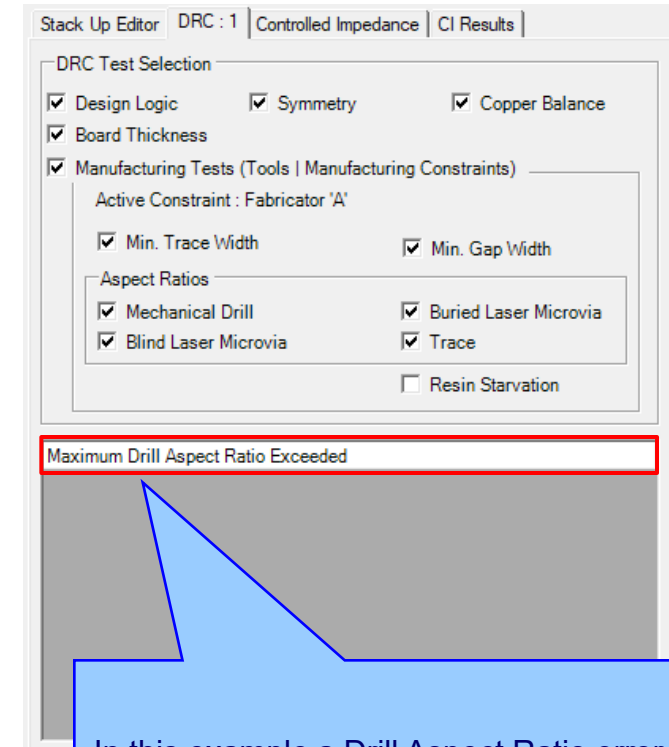
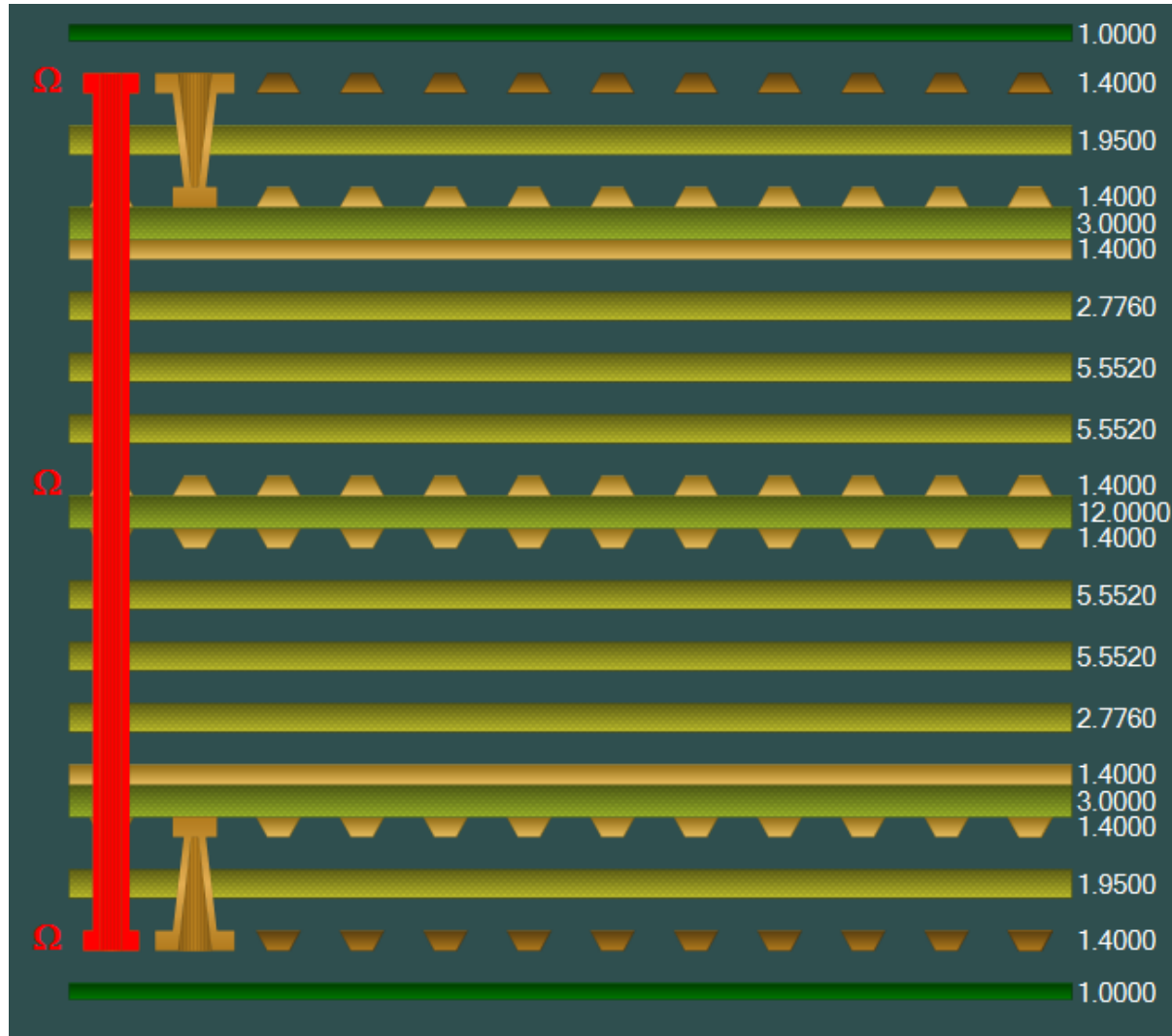
Manufacturing Constraints / Design Rule Check Enhancements



The Active Constraint name is now displayed here so the current selected set of Manufacturing Constraints is easily identifiable

DRC errors are listed here. Clicking the error will graphically highlight the problem on the stack up

Manufacturing Constraints / Design Rule Check Enhancements



In this example a Drill Aspect Ratio error has been identified, clicking on the error will highlight the offending drill in red.

Drill Aspect Ratio checks the length of the drill against the diameter to determine whether plating problems might occur

Manufacturing Constraints / Design Rule Check Enhancements

Manufacturing Constraints

Active Constraint : Fabricator 'A'

	Manufacturer's Name	Blind Laser Via A. R.	Buried Laser Via A.	Mechanical Drill A. R.	Minimum Gap	Minimum Trace Width	Trace A. R.	Units
	Polar Microns	0.5	0.5	8.5	75	75	1	Microns
	Polar Mils	0.5	0.5	8.5	3	3	1	Mils
	Polar Millimetres	0.5	0.5	8.5	0.075	0.075	1	Millimetres
	Polar Inches	0.5	0.5	8.5	0.003	0.003	1	Inches
▶	Fabricator 'A'	0.5	0.5	6	3	3	1	Mils

Instructions: Double-Click the Data Grid row to edit, add or delete a constraint

Highlight and Set Active Constraint

Highlight Set

Switching the active constraint is achieved by selecting the required Data Grid row and clicking Set

The Tools | Manufacturing Constraints option provides options to Add, Delete and Edit the constraints. Multiple sets of constraints are supported, allowing the stack up design to be checked against different fabricators capabilities.

The current active constraint used by the DRC tab, Fabricator 'A', is displayed above the Data Grid

Manufacturing Constraints / Design Rule Check Enhancements

Manufacturing Constraints

Active Constraint : Fabricator 'A'

	Manufacturer's Name	Blind Laser Via A. R.	Buried
	Polar Microns	0.5	
	Polar Mils	0.5	
	Polar Millimetres	0.5	
	Polar Inches	0.5	
▶	Fabricator 'A'	0.5	

add or delete a constraint

Highlight Set

Double-clicking the Data Grid row presents the Edit Constraints dialog, allowing parameters to be specified based upon the PCB fabricators' capabilities

Edit Constraints

Units

☒ Mils ☐ Microns

☐ Inches ☐ Millimetres

Option Name: Fabricator 'A'

Minimum Gap: 3

Minimum Trace Width: 3

Mechanical Drill A.R.: 6

Blind Via A.R.: 0.5

Buried Via A.R.: 0.5

Trace A.R.: 1

<< < 5 of 5 > >>

Add Delete Done Cancel

Instructions

Add: Press Add, which will add a new blank constraint. Notice the 'n of n' record number will increase. Now key in the constraint details and select Done.

Delete: Press Delete to remove the existing constraint. Notice the 'n of n' record number will reduce. Then select Done to close the dialog.

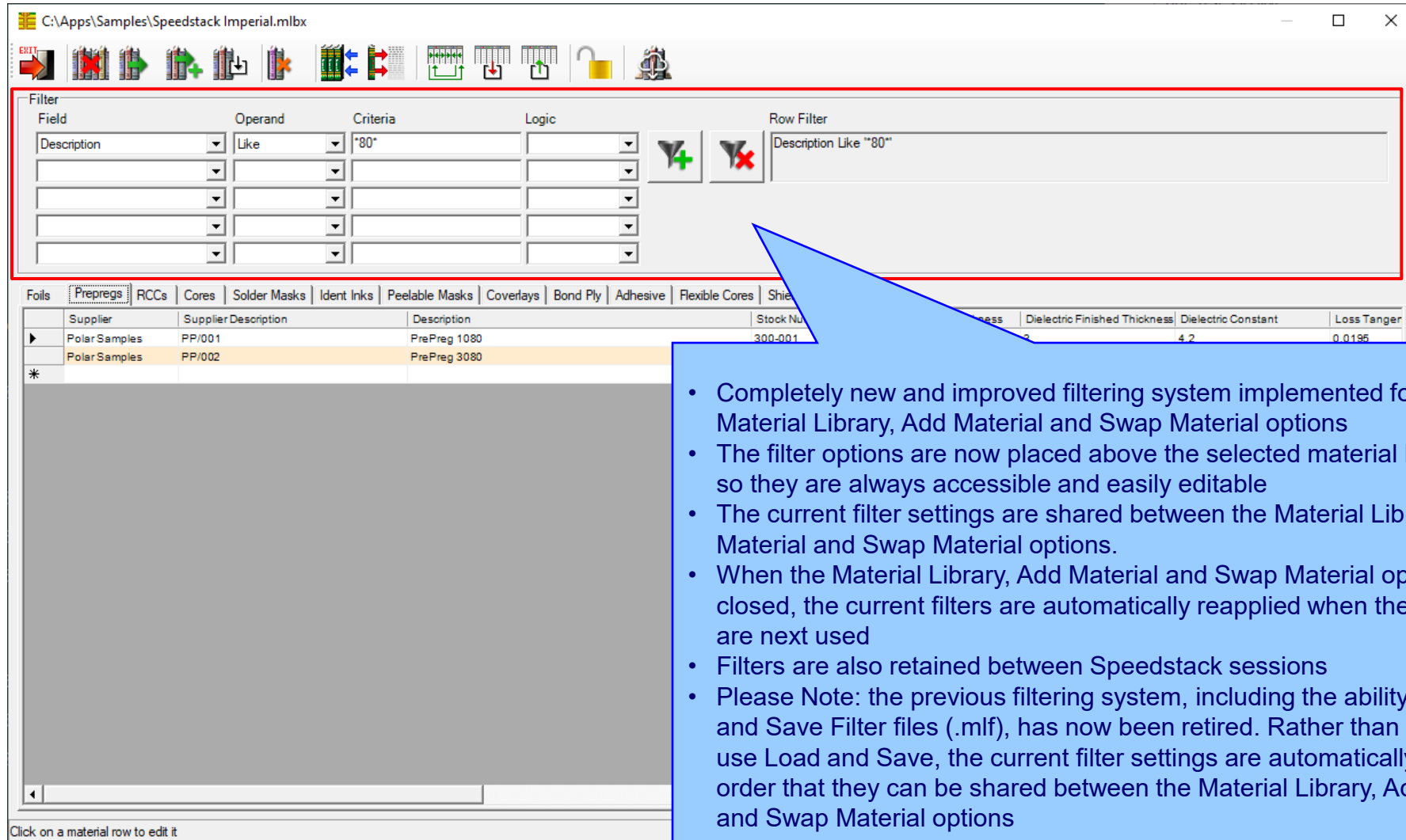
Edit: Edit the existing constraint and select Done to close the dialog.

Width	Trace A. R.	Units
	1	Microns
	1	Mils
	1	Millimetres
	1	Inches
	1	Mils

Close

Speedstack v23.03.01 (March 2023)

Material Library Filter / Search Enhancements



Filter

Field	Operand	Criteria	Logic	Row Filter
Description	Like	*80*		Description Like "*80"

Row Filter: Description Like "*80"

Supplier	Supplier Description	Description	Stock Number	Thickness	Dielectric Finished Thickness	Dielectric Constant	Loss Tangent
Polar Samples	PP/001	PrePreg 1080	300-001			4.2	0.0195
Polar Samples	PP/002	PrePreg 3080					

Click on a material row to edit it

- Completely new and improved filtering system implemented for the Material Library, Add Material and Swap Material options
- The filter options are now placed above the selected material Data Grid, so they are always accessible and easily editable
- The current filter settings are shared between the Material Library, Add Material and Swap Material options.
- When the Material Library, Add Material and Swap Material options are closed, the current filters are automatically reapplied when these options are next used
- Filters are also retained between Speedstack sessions
- Please Note: the previous filtering system, including the ability to Load and Save Filter files (.mlf), has now been retired. Rather than needing to use Load and Save, the current filter settings are automatically saved in order that they can be shared between the Material Library, Add Material and Swap Material options

Material Library Filter / Search Enhancements

Swap Foil C:\Apps\Samples\Speedstack Imperial.mlbx

EXIT

Filter

Field	Operand	Criteria	Logic
CuThickness	=	1.4	

Row Filter

CuThickness = 1.4

Supplier	Supplier Description	Description	Stock Number	Cu Base Thickness	Cost	Lead Time
Polar Samples	FO/002	Copper Foil	100-002	1.4		0

Example #1

Search for Foil materials where the Copper Thickness = 1.4 mils

Material Library Filter / Search Enhancements

Swap Core C:\Apps\Samples\Speedstack Imperial.mlbx

EXIT

Filter

Field	Operand	Criteria	Logic
BaseThickness	>=	5	AND
BaseThickness	<=	10	

Row Filter

BaseThickness >= 5 AND BaseThickness <= 10

Supplier	Supplier Description	Description	Stock Number	Dielectric Base Thickness	Dielectric Thickness	Dielectric Constant	Loss Tangent
Polar Samples	CO/010	FR4 Core	400-010	5	5	4.2	0.0195
Polar Samples	CO/011	FR4 Core	400-011	5			
Polar Samples	CO/012	FR4 Core	400-012	5			
Polar Samples	CO/013	FR4 Core	400-013	6			
Polar Samples	CO/014	FR4 Core	400-014	6			
Polar Samples	CO/015	FR4 Core	400-015	6			
Polar Samples	CO/016	FR4 Core	400-016	8			
Polar Samples	CO/017	FR4 Core	400-017	8			
Polar Samples	CO/018	FR4 Core	400-018	8			

Example #2

Two search criteria are specified, for Core materials where the Base Thickness >= 5 mils and Base Thickness <= 10 mils

Material Library Filter / Search Enhancements

Swap Prepreg C:\Apps\Samples\Speedstack Imperial.mlbx

EXIT

Filter

Field	Operand	Criteria	Logic
Description	Like	*80*	

Row Filter

Description Like "*80"

Supplier	Supplier Description	Description	Stock Number	Dielectric Base Thickness	Dielectric Thickness	Dielectric Constant	Loss Tangent
Polar Samples	PP/001	PrePreg 1080	300-001	3	3	4.2	0.0195
Polar Samples	PP/002	PrePreg 3080	300-002	3			

Example #3

A wildcard search criteria has been specified, search for Prepreg materials where the Description contains '80'. Description Like *80* will search a text / string field for the presence of 80 anywhere in the field

Online Library – Now supports three modes

Online Library

Filter by Supplier

All Suppliers







File Type

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

Library Files Available : All

CircuitFoil_BF-ANP_1901.mlbx
CircuitFoil_BF-TZA_1901.mlbx
CircuitFoil_TWS_1901.mlbx
CircuitFoil_TZA-B_1901.mlbx
CircuitFoil_TZA_1901.mlbx
Mitsui_3EC-M3S-HTE_1901.mlbx
Mitsui_HS-VSP_1901.mlbx
Mitsui_MLS-G_1901.mlbx
Mitsui_TQ-M4-VSP_1901.mlbx
Mitsui_TQ-M7-VSP_1901.mlbx
Polar_Foils_1901.mlbx
Rogers_CU4000_2105.mlbx
Rogers_CU4000_LoPro_2105.mlbx

Append
Close
☐ Clear

Filter by Frequency

☒ All
☐ 1 GHz ☐ 20 GHz
☐ 5 GHz ☐ 50 GHz
☐ 10 GHz ☐ 75 GHz

Library Files Selected during this session

File Access Mode

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

Browse... Download...

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.

Mode #1 Online Polar Library

This connects to Polar's FTP server and appends selected library files to the existing Speedstack library. This requires an internet connection and security settings that permits use of FTP. If IT policies prevents connection to our FTP server, select mode #2 or #3

Online Library – Now supports three modes

Online Library

Filter by Supplier

All Suppliers

Polar

AGC

ARLON
MATERIALS FOR ELECTRONICS

File Type

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

Library Files Available : All

CircuitFoil_BF-ANP_1901.mlbx
CircuitFoil_BF-TZA_1901.mlbx
CircuitFoil_TWS_1901.mlbx
CircuitFoil_TZA-B_1901.mlbx
CircuitFoil_TZA_1901.mlbx
Mitsui_3EC-M3S-HTE_1901.mlbx
Mitsui_HS-VSP_1901.mlbx
Mitsui_MLS-G_1901.mlbx
Mitsui_TQ-M4-VSP_1901.mlbx
Mitsui_TQ-M7-VSP_1901.mlbx
Polar_Foils_1901.mlbx
Rogers_CU4000_2105.mlbx
Rogers_CU4000_LoPro_2105.mlbx

Append

Close

Clear

Filter by Frequency

All
1 GHz 20 GHz
5 GHz 50 GHz
10 GHz 75 GHz

Library Files Selected during this session

File Access Mode

Online Polar Library (ftp://polarinstruments.com)

On-Premise Mode [Application Note](#)

C:\Users\vicha\AppData\Roaming\Polar\Speedstack\MaterialLibrary

Browse...

Download...

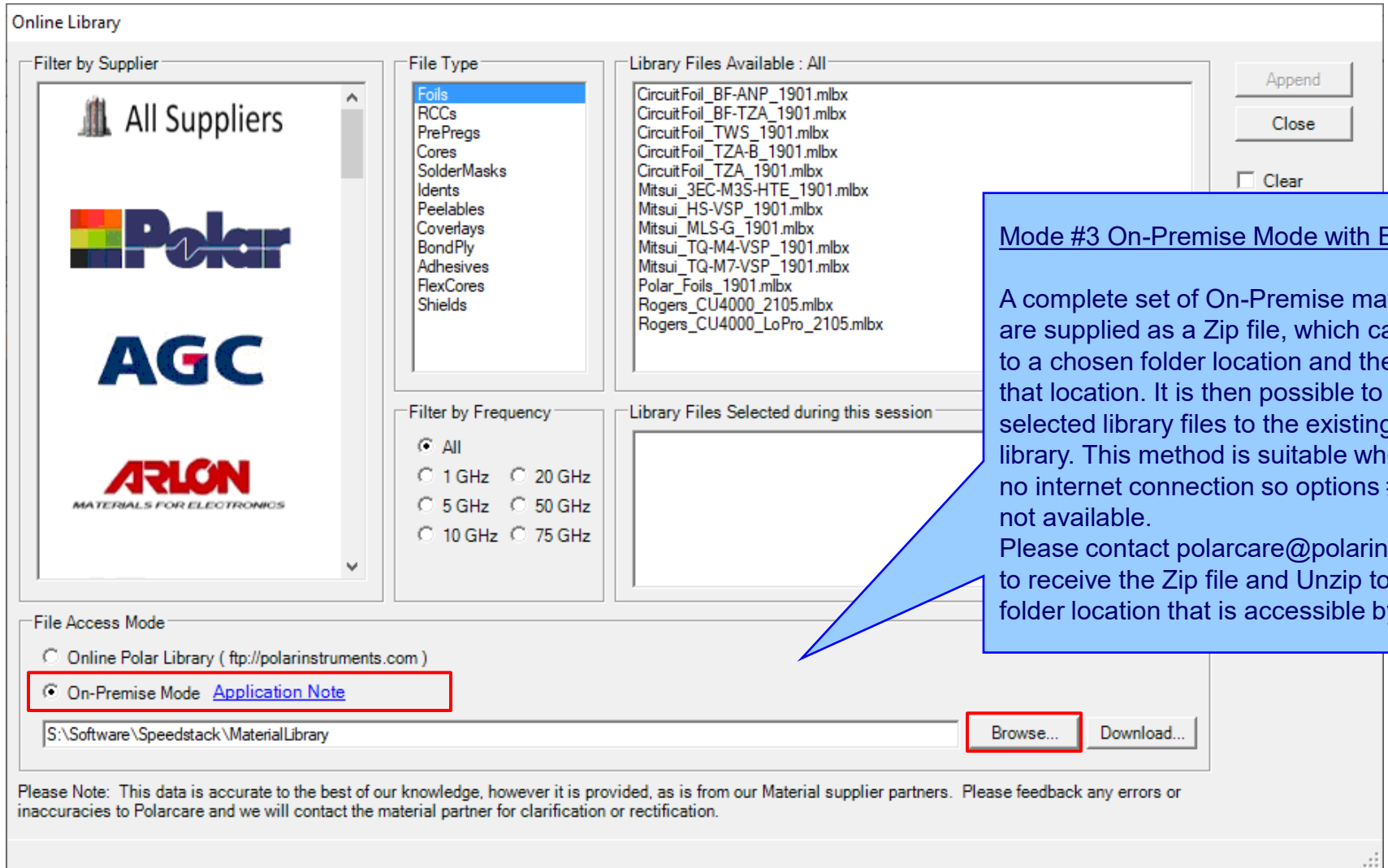
Please Note: This data is accurate to the best of our knowledge, however it is provided, as is from our Material supplier partners. Please feedback any errors or inaccuracies to Polarcare and we will contact the material partner for clarification or rectification.

Mode #2 On-Premise Mode with Download option (new for 2023)

This option downloads the complete set of On-Premise material libraries so that they are stored locally.

It is then possible to append selected library files to the existing Speedstack library. This requires an internet connection but overcomes the problem where FTP access is not permitted as it uses the HTTPS protocol for downloading the complete set of material library files.

Online Library – Now supports three modes



The screenshot shows the 'Online Library' window. On the left, under 'Filter by Supplier', are logos for 'All Suppliers', 'Polar', 'AGC', and 'ARLON MATERIALS FOR ELECTRONICS'. In the center, 'File Type' includes Foils, RCCs, PrePregs, Cores, SolderMasks, Idents, Peelables, Coverlays, BondPly, Adhesives, FlexCores, and Shields. Below that, 'Filter by Frequency' has radio buttons for All, 1 GHz, 20 GHz, 5 GHz, 50 GHz, 10 GHz, and 75 GHz. On the right, 'Library Files Available : All' lists various .mlbx files. Below this is 'Library Files Selected during this session'. At the bottom, 'File Access Mode' has two options: 'Online Polar Library (ftp://polarinstruments.com)' and 'On-Premise Mode [Application Note](#)'. The 'On-Premise Mode' is selected and highlighted with a red box. Below it is a text field containing 'S:\Software\Speedstack\MaterialLibrary', with a 'Browse...' button (also highlighted with a red box) and a 'Download...' button. A blue callout box points to the 'On-Premise Mode' section.

Mode #3 On-Premise Mode with Browse option

A complete set of On-Premise material libraries are supplied as a Zip file, which can be Unzipped to a chosen folder location and then Browse to that location. It is then possible to append selected library files to the existing Speedstack library. This method is suitable where users have no internet connection so options #1 and #2 are not available.

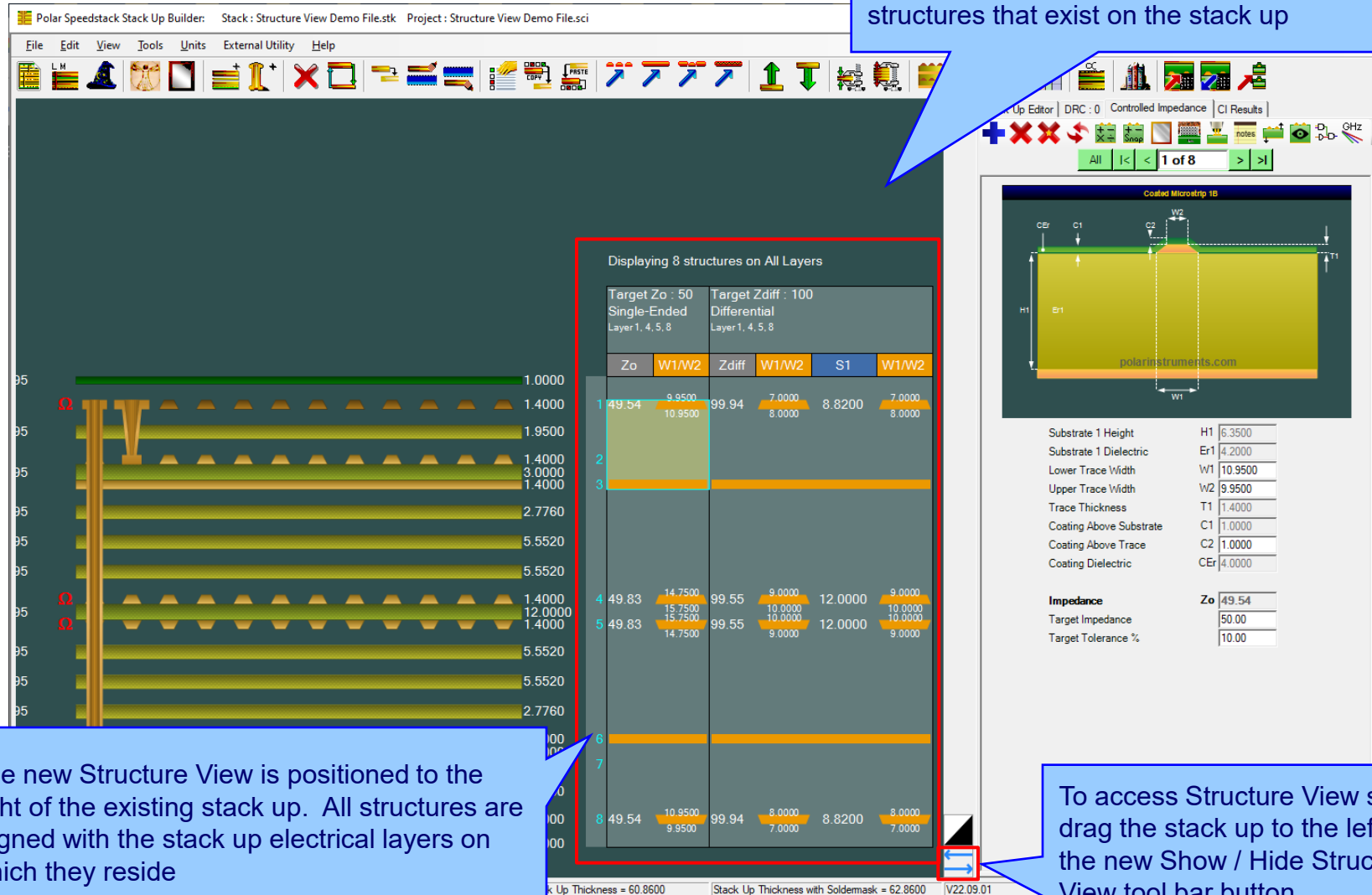
Please contact polarcare@polarinstruments.com to receive the Zip file and Unzip to a suitable folder location that is accessible by Speedstack

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 v22.11.01 (November 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:

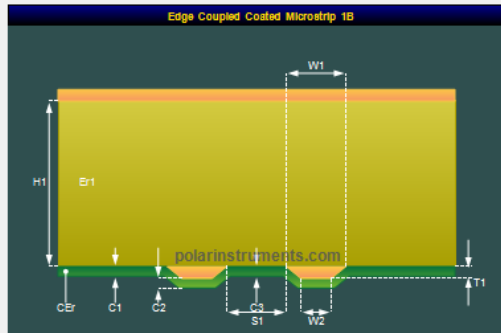
4 x 50 ohm singled-ended (column 1)
4 x 100 ohm differential (column 2)

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

Displaying 8 structures on All Layers

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

Edge Coupled Coated Microstrip 1B



Substrate 1 Height	H1	6.3500
Substrate 1 Dielectric	Er1	4.2000
Lower Trace Width	W1	8.0000
Upper Trace Width	W2	7.0000
Trace Separation	S1	8.8200
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	99.94
Target Impedance		100.00

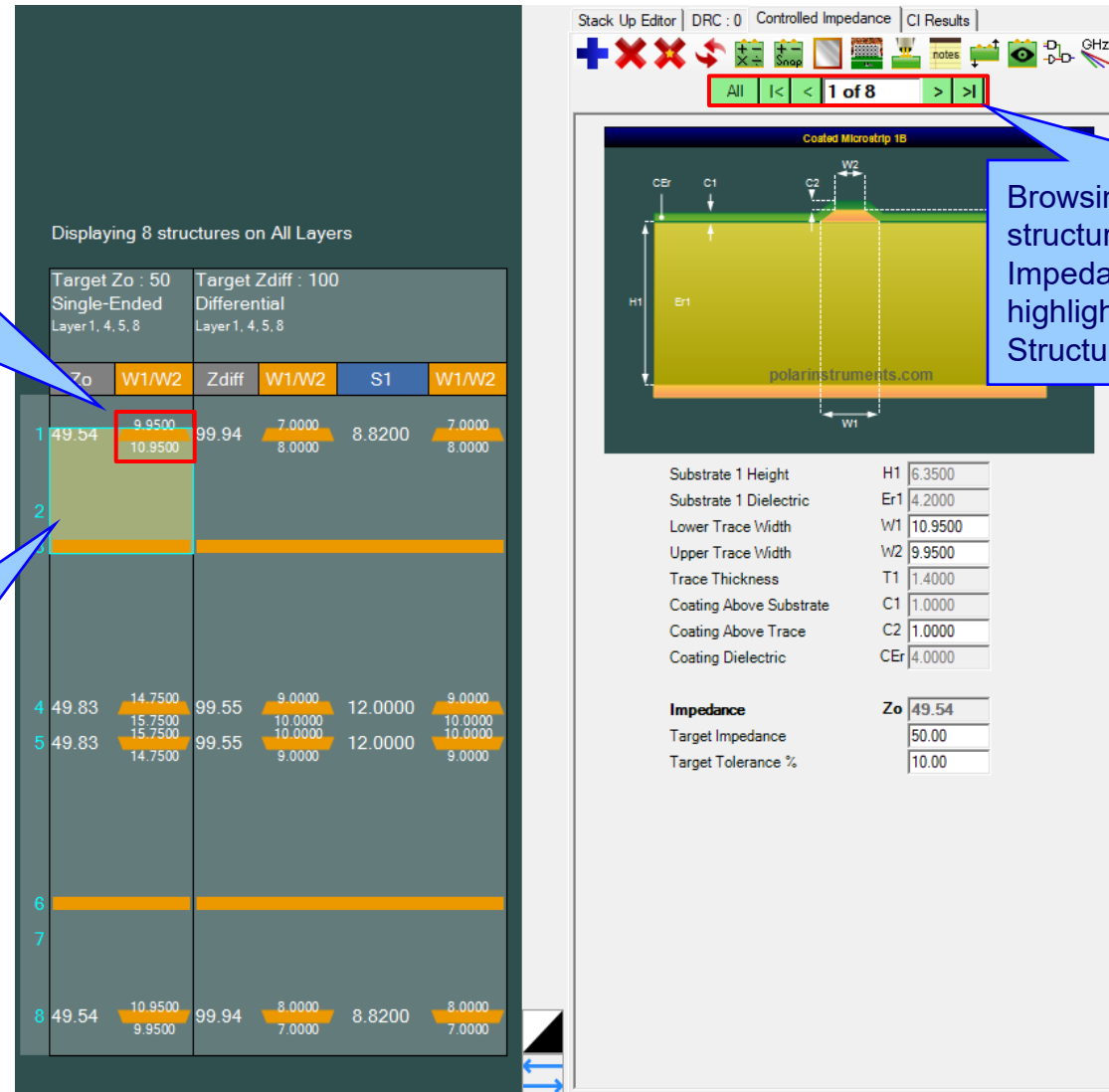
Within the column cell the structure calculated impedance and Lower / Upper Trace Widths (W1 / W2) and Trace Separation (S1) are shown.

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



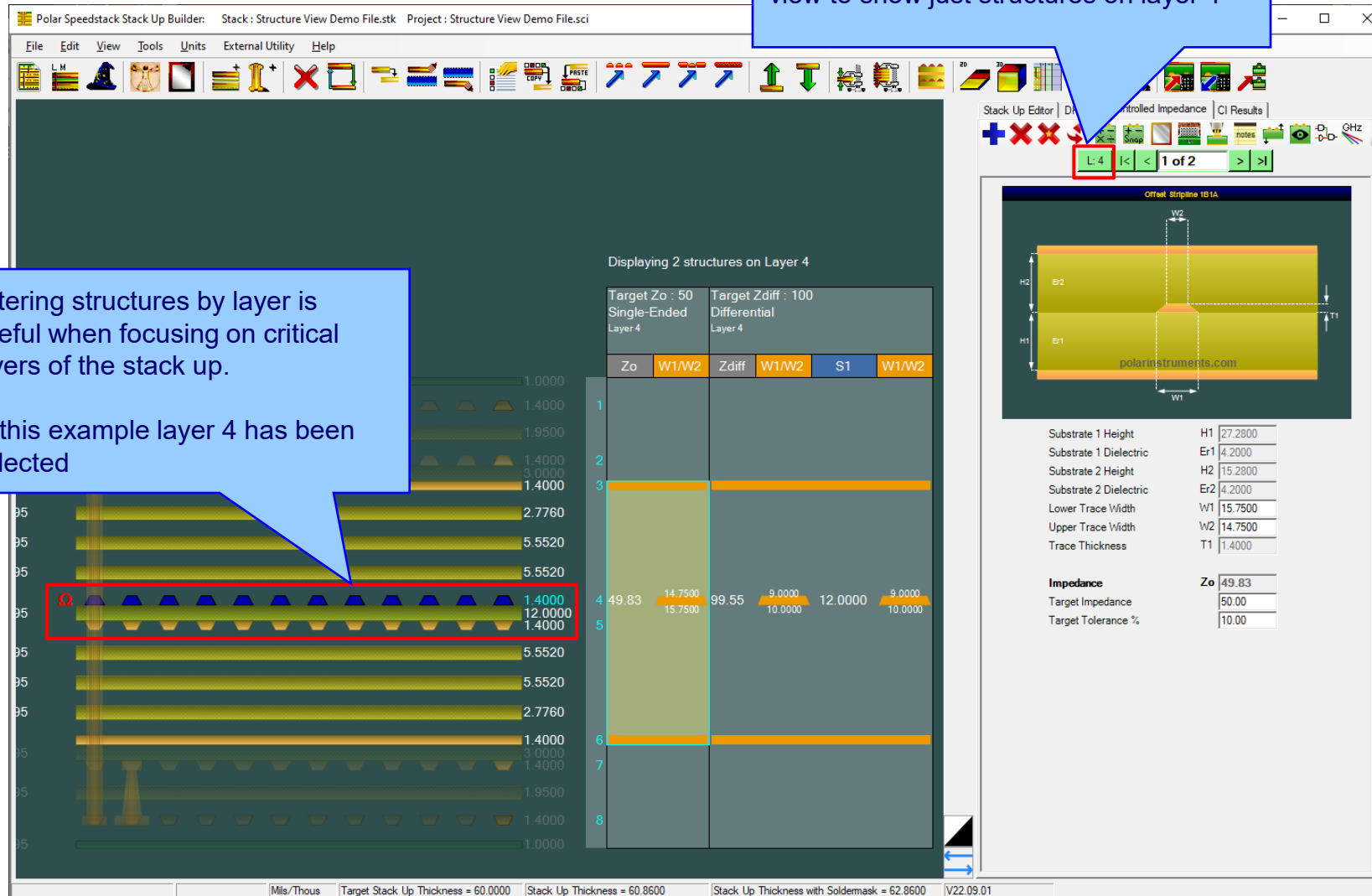
Browsing through the structures on the Controlled Impedance tab will auto highlight the structure on Structure View

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.

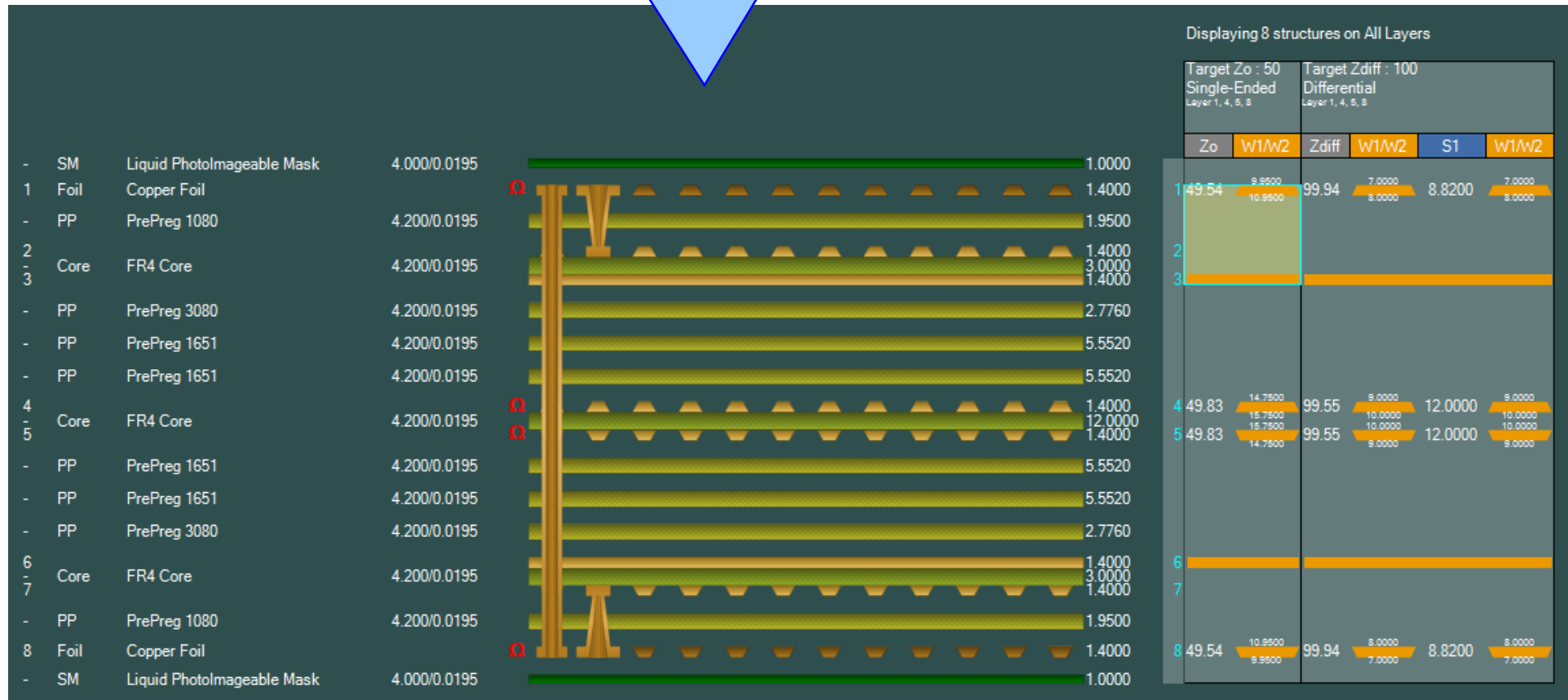
In this example layer 4 has been selected



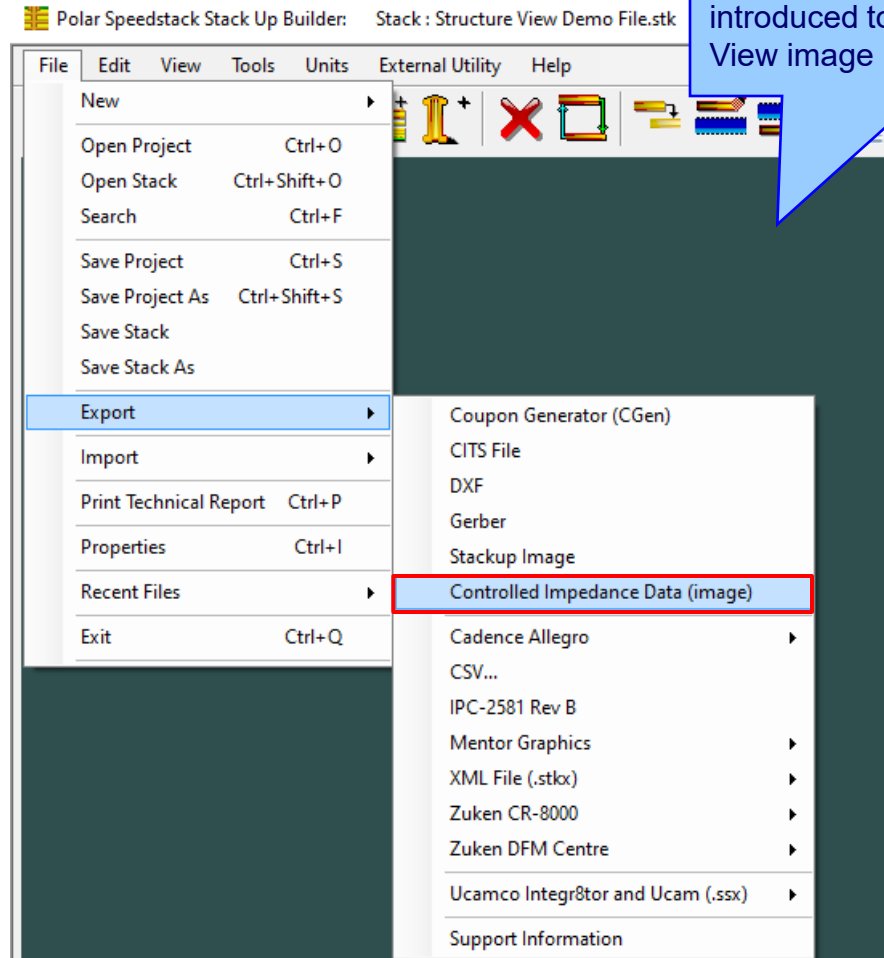
Introducing Structure View

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

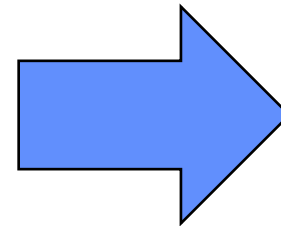
All data is now visible in one view



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	99.94	7.0000	8.8200	7.0000
2					
3					
4	49.83	99.55	9.0000	12.0000	9.0000
5	49.83	99.55	10.0000	12.0000	10.0000
6					
7					
8	49.54	99.94	8.0000	8.8200	8.0000

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

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>)

☐ 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.

Regular updates of materials and suppliers

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

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

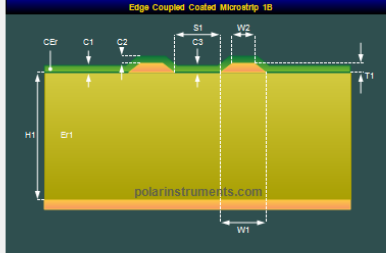
Polar Speedstack Stack Up Builder: Stack: Eval Imperial.stk Project: Eval Imperial.sci

File Edit View Tools Units External Utility Help

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

All | 1 of 4

Edge Coupled Coated Microstrip 1B



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

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

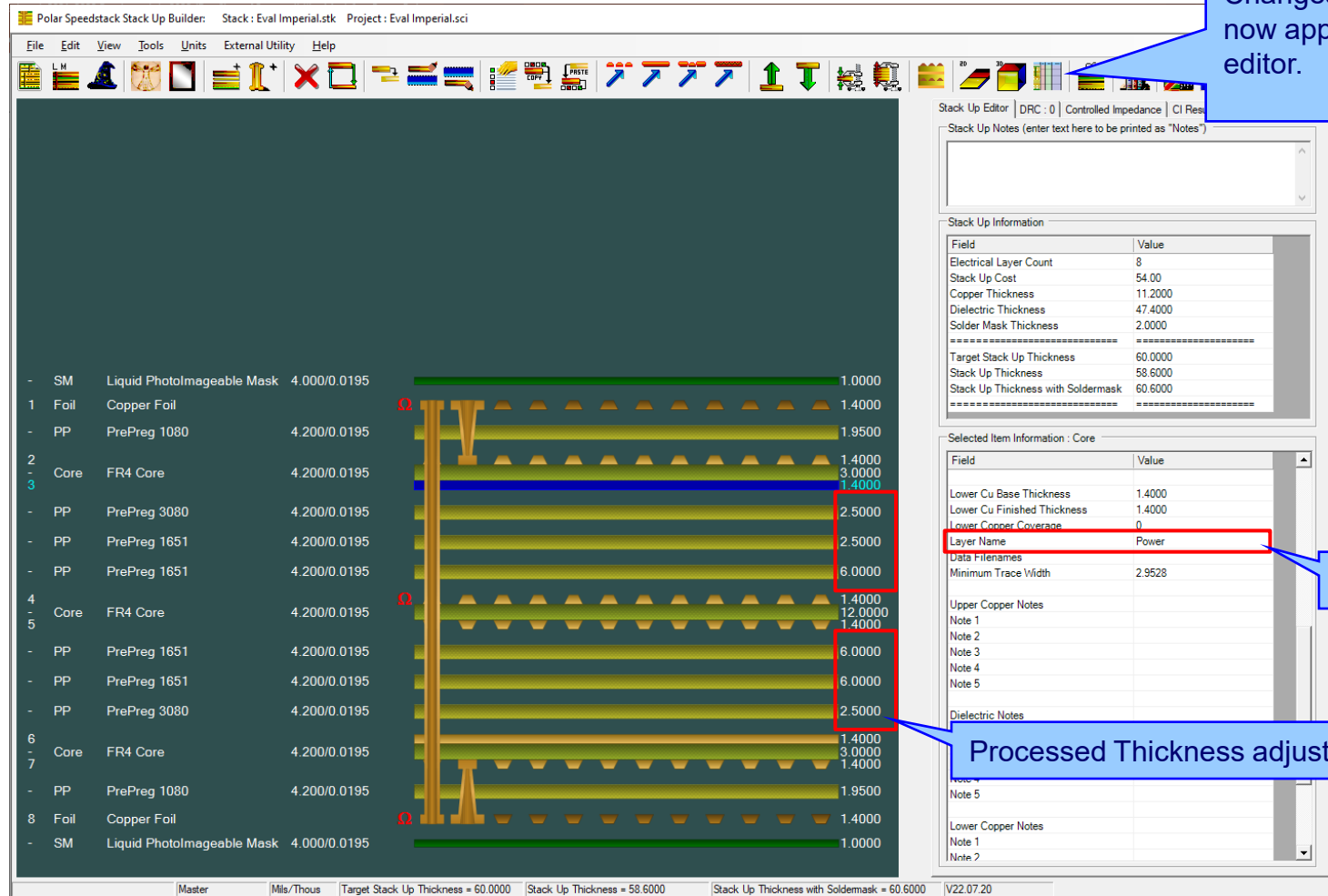
Grid View

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

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

Grid View – Walkthrough Step #3



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

Stack Up Notes (enter text here to be printed as "Notes")

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

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	

Master | Mis/Thous | Target Stack Up Thickness = 60.0000 | Stack Up Thickness = 58.6000 | Stack Up Thickness with Soldermask = 60.6000 | V22.07.20

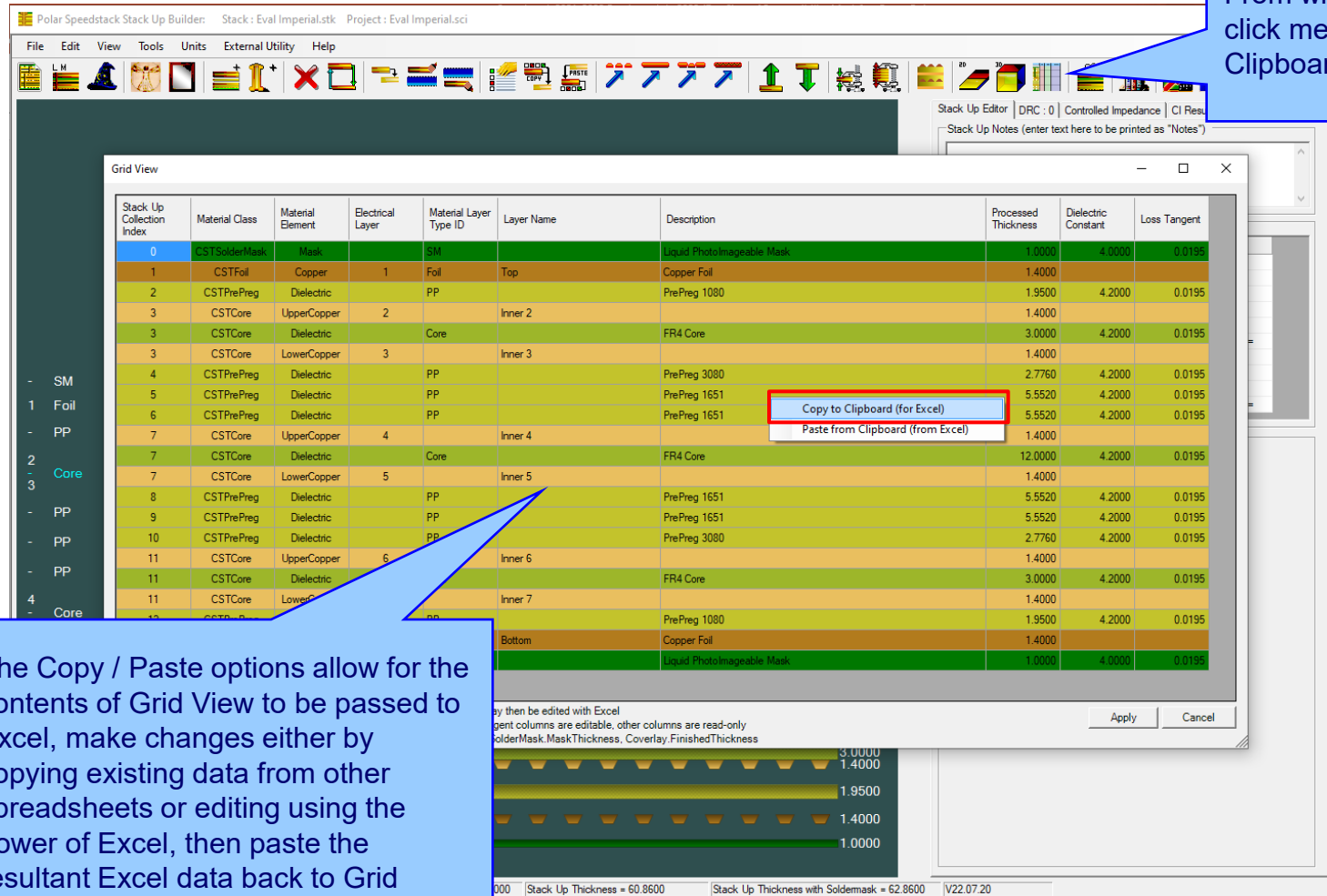
Step #3
Changes made under Grid View are now applied back to the stack up editor.

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.

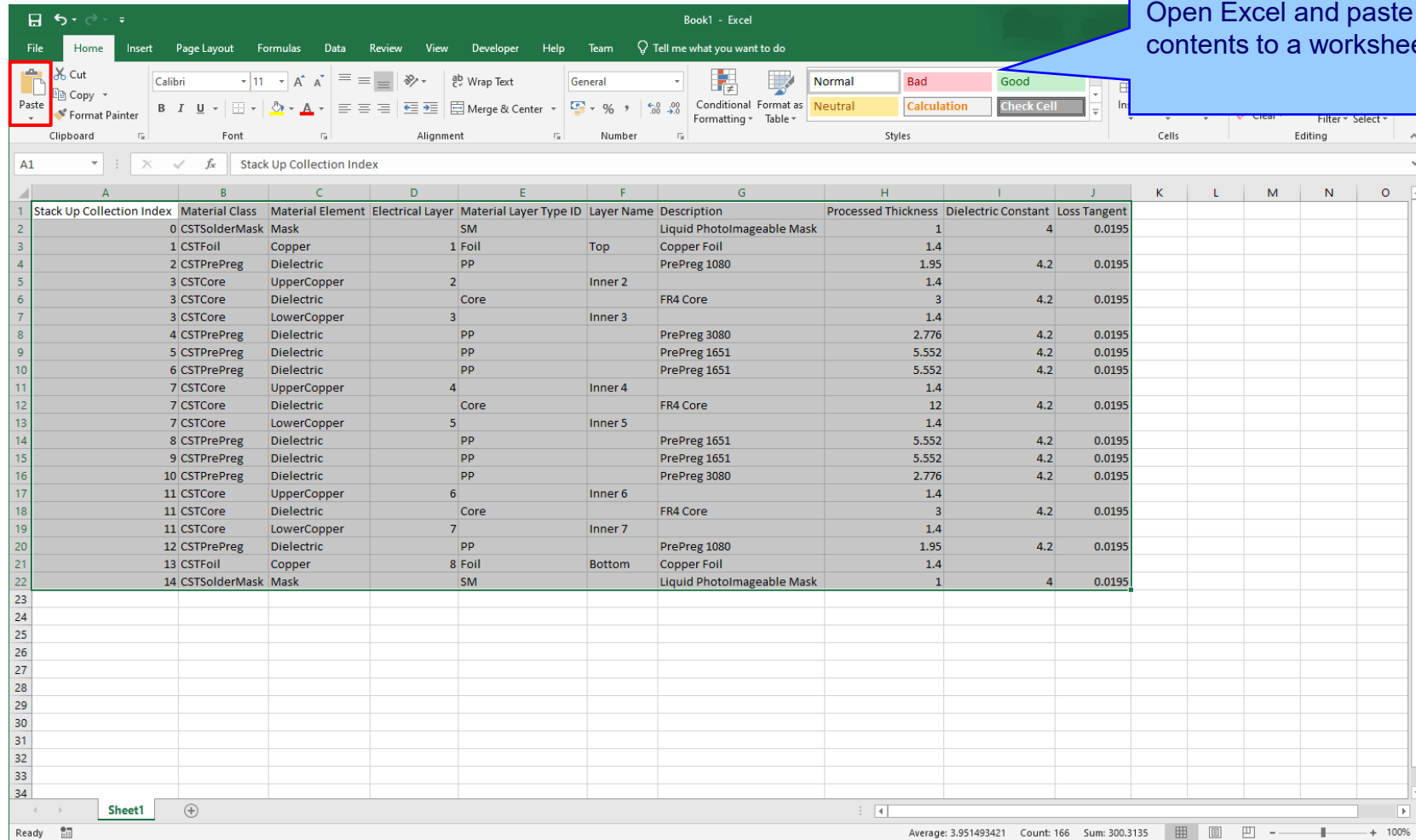
Stack Up Collection Index	Material Class	Material Element	Electrical Layer	Material Layer Type ID	Layer Name	Description	Processed Thickness	Dielectric Constant	Loss Tangent
0	CSTSolderMask	Mask		SM		Liquid PhotoImageable Mask	1.0000	4.0000	0.0195
1	CSTFoil	Copper	1	Foil	Top	Copper Foil	1.4000		
2	CSTPrePreg	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

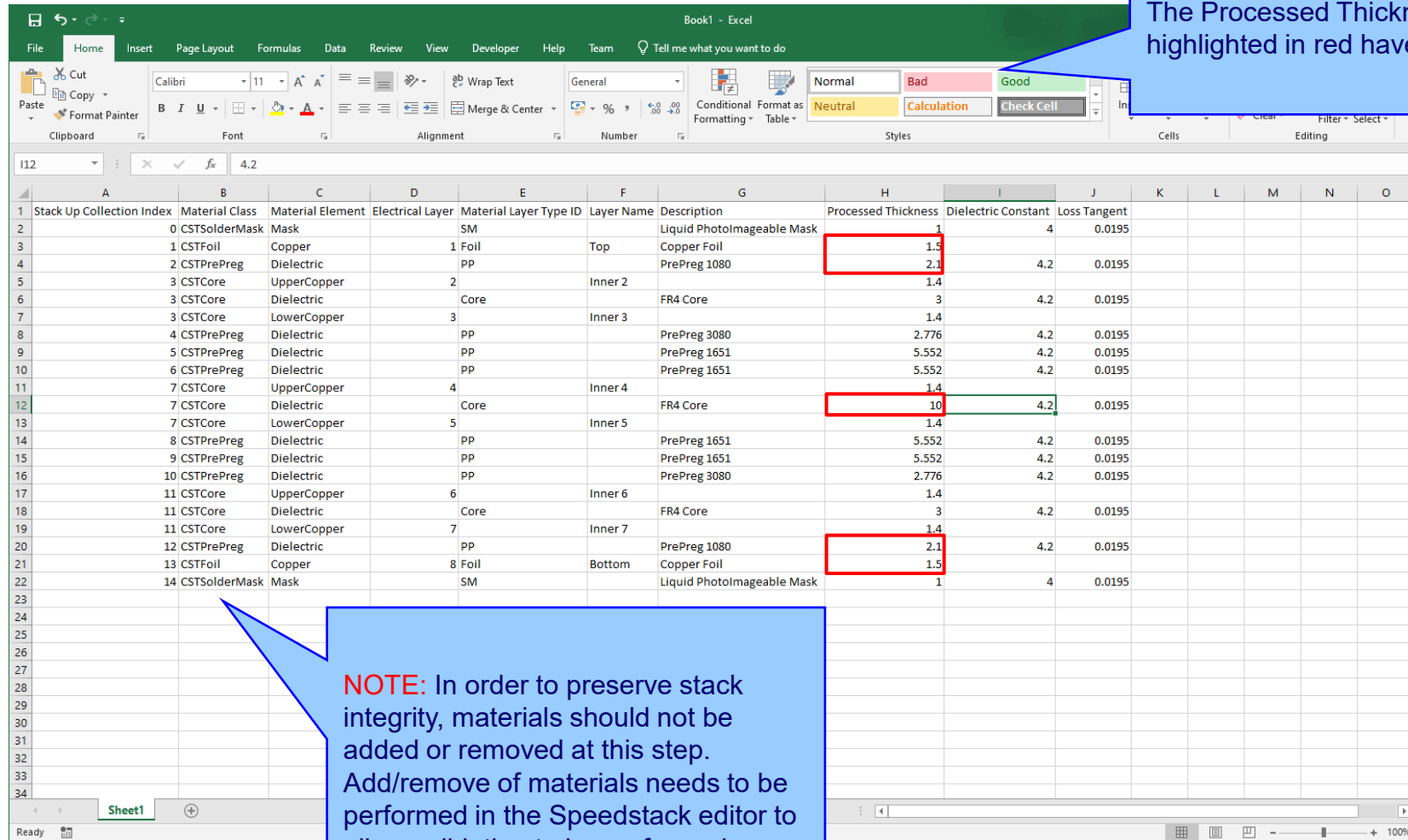
Step #2
Open Excel and paste the clipboard contents to a worksheet



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

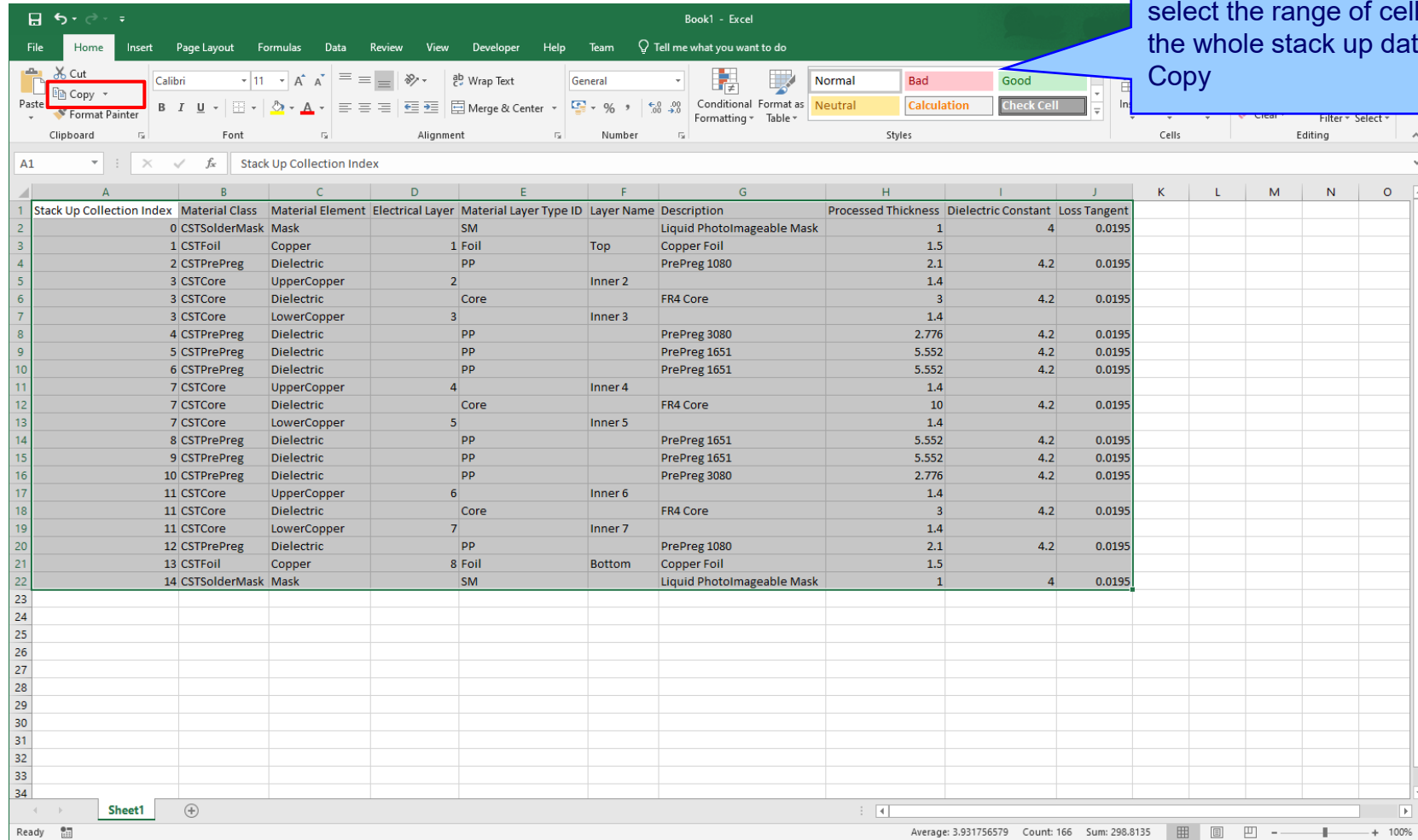


Stack Up Collection Index	Material Class	Material Element	Electrical Layer	Material Layer Type ID	Layer Name	Description	Processed Thickness	Dielectric Constant	Loss Tangent
0	CSTSolderMask	Mask		SM		Liquid PhotoImageable Mask	1	4	0.0195
1	CSTFoil	Copper	1	Foil	Top	Copper Foil	1.5		
2	CSTPrePreg	Dielectric		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



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

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

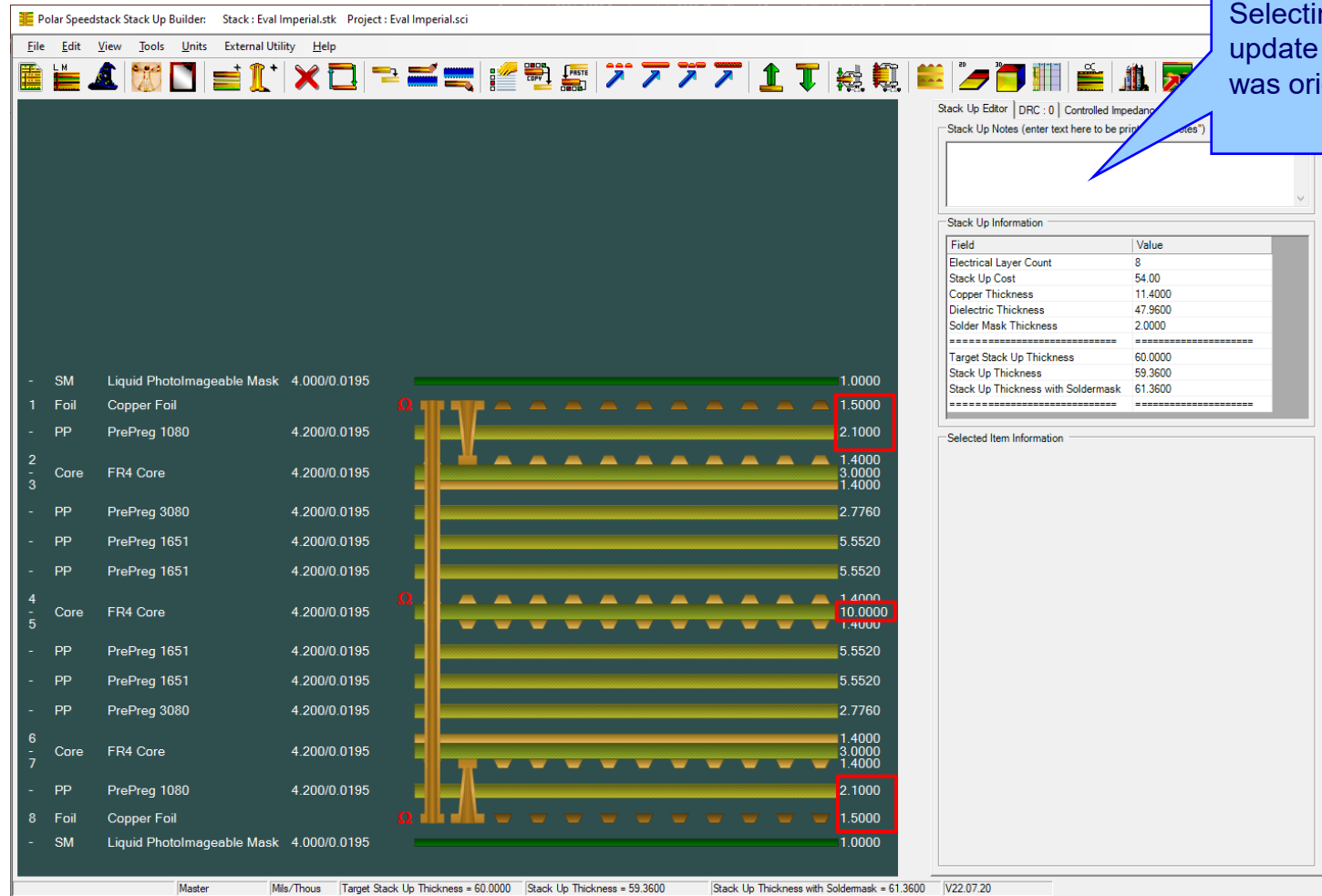
Stack Up Collection Index	Material Class	Material Element	Electrical Layer	Material Layer Type ID	Layer Name	Description	Processed Thickness	Dielectric Constant	Loss Tangent
0	CSTSolderMask	Mask		SM		Liquid PhotoImageable Mask	1.0000	4.0000	0.0195
1	CSTFoil	Copper	1	Foil	Top	Copper Foil	1.5000		
2	CSTPrePreg	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

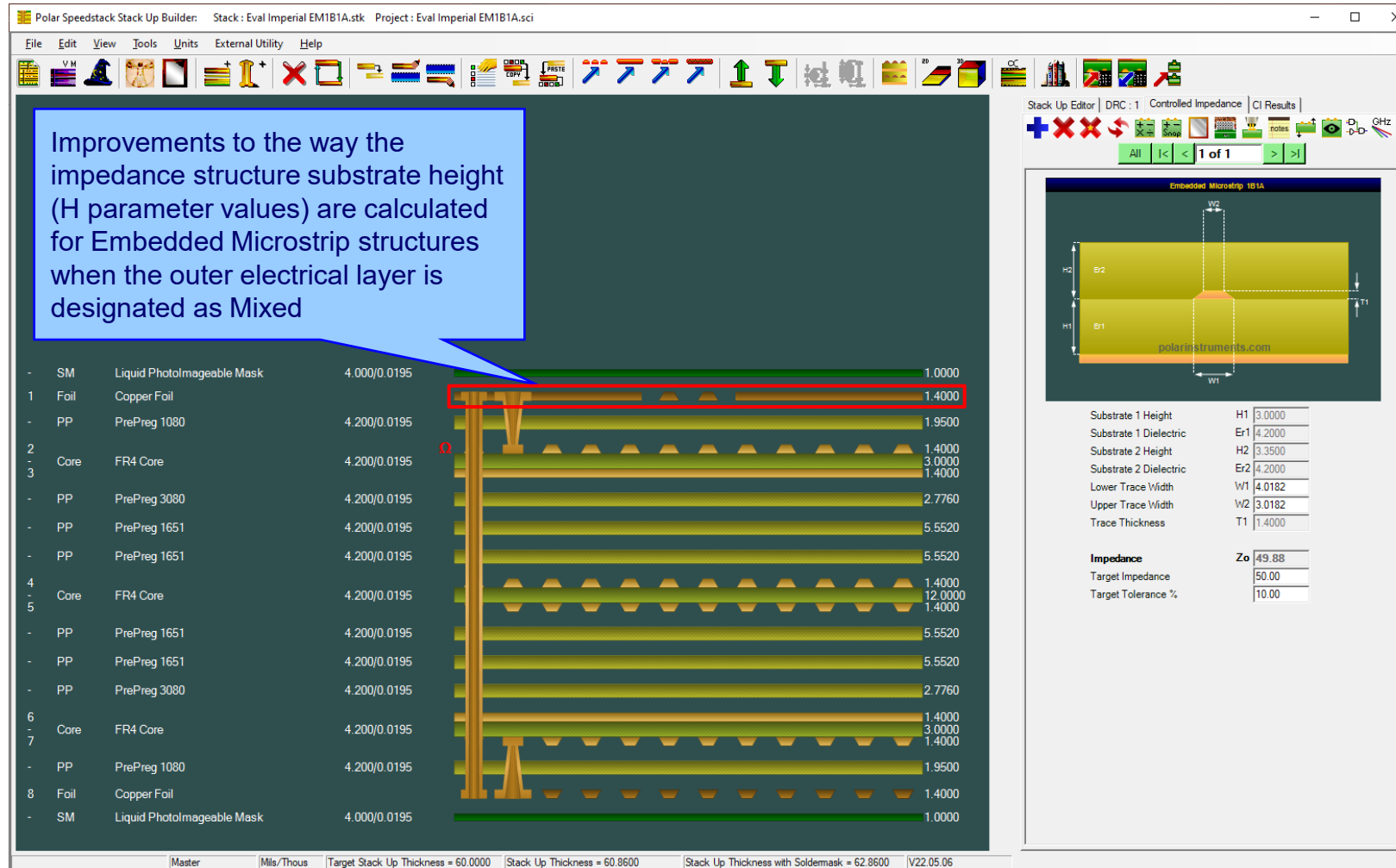
File Access Mode

☒ 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



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

Stack up

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	
2		Polar Samples	Copper Foil	Copper	1.400			1, 2
3		Polar Samples	PrePreg 1080	Dielectric	1.950	4.200	0.0195	
4		Polar Samples	FR4 Core	FR4	1.400	4.200	0.0195	
5		Polar Samples	PrePreg 3080	Dielectric	2.776	4.200	0.0195	
6		Polar Samples	PrePreg 1651	Dielectric	5.552	4.200	0.0195	
7		Polar Samples	PrePreg 1651	Dielectric	5.552	4.200	0.0195	
8		Polar Samples	FR4 Core	FR4	1.400	4.200	0.0195	3
9		Polar Samples	PrePreg 1651	Dielectric	5.552	4.200	0.0195	
10		Polar Samples	PrePreg 1651	Dielectric	5.552	4.200	0.0195	
11		Polar Samples	PrePreg 3080	Dielectric	2.776	4.200	0.0195	
12		Polar Samples	FR4 Core	FR4	1.400	4.200	0.0195	
13		Polar Samples	PrePreg 1080	Dielectric	1.950	4.200	0.0195	
14		Polar Samples	Copper Foil	Copper	1.400	4.200	0.0195	4
15		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 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 ©

CONFIDENTIAL

Page 1/X

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

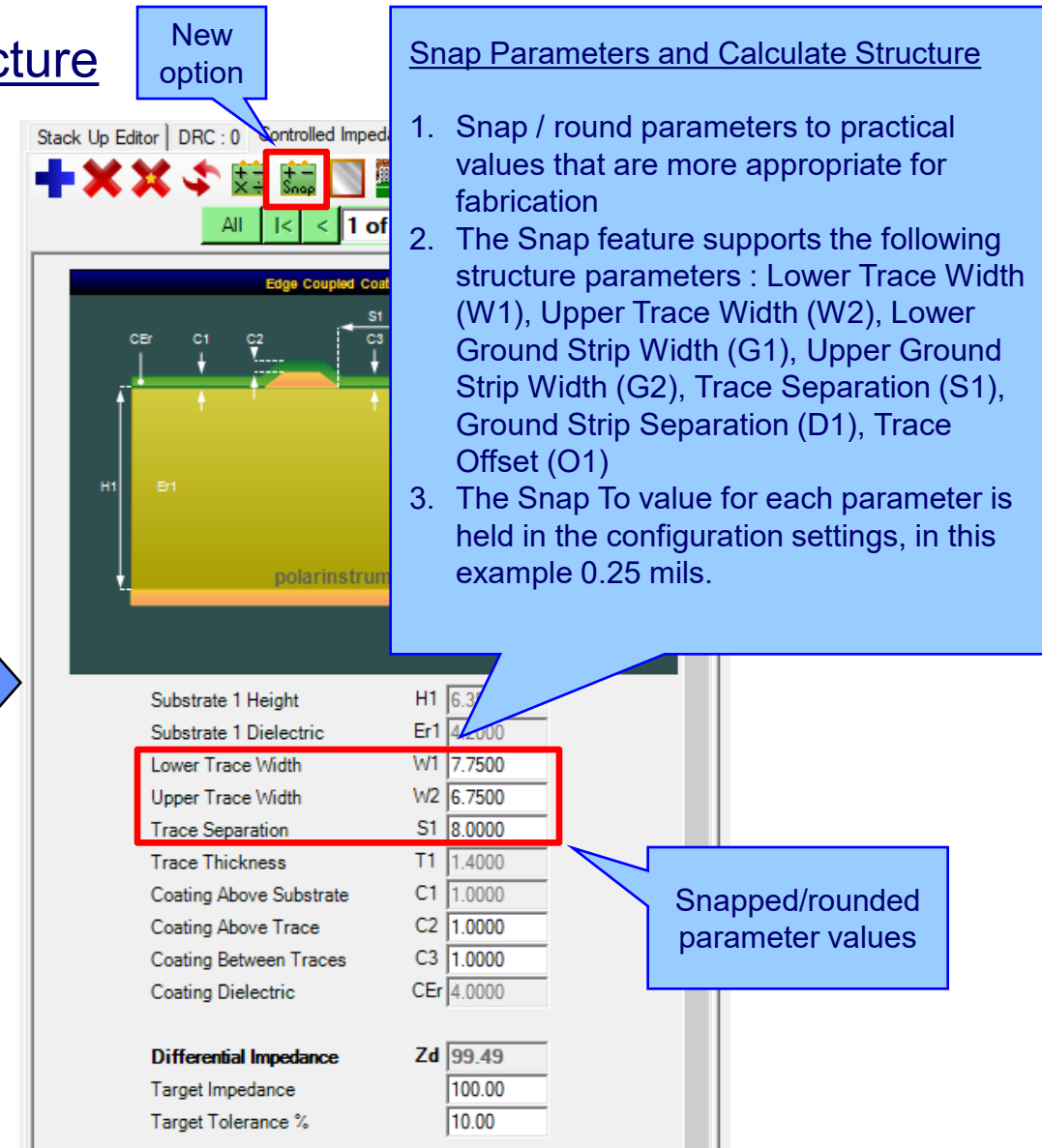
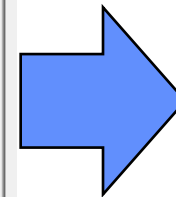
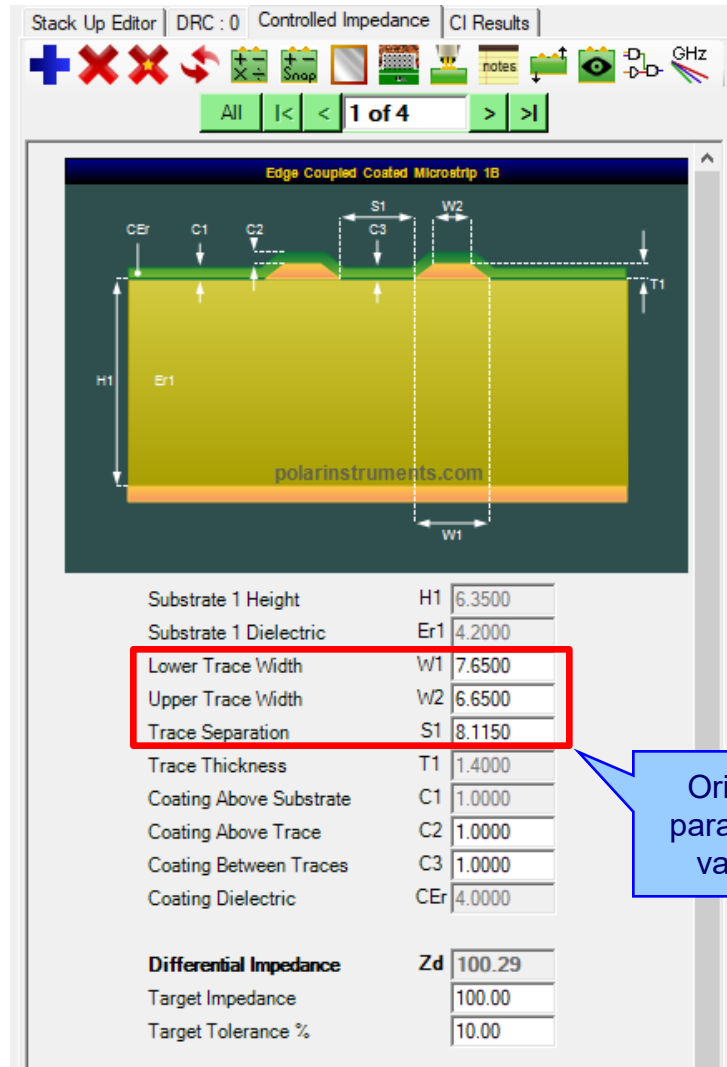
☒ Location 2 ☐ Location 4

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)

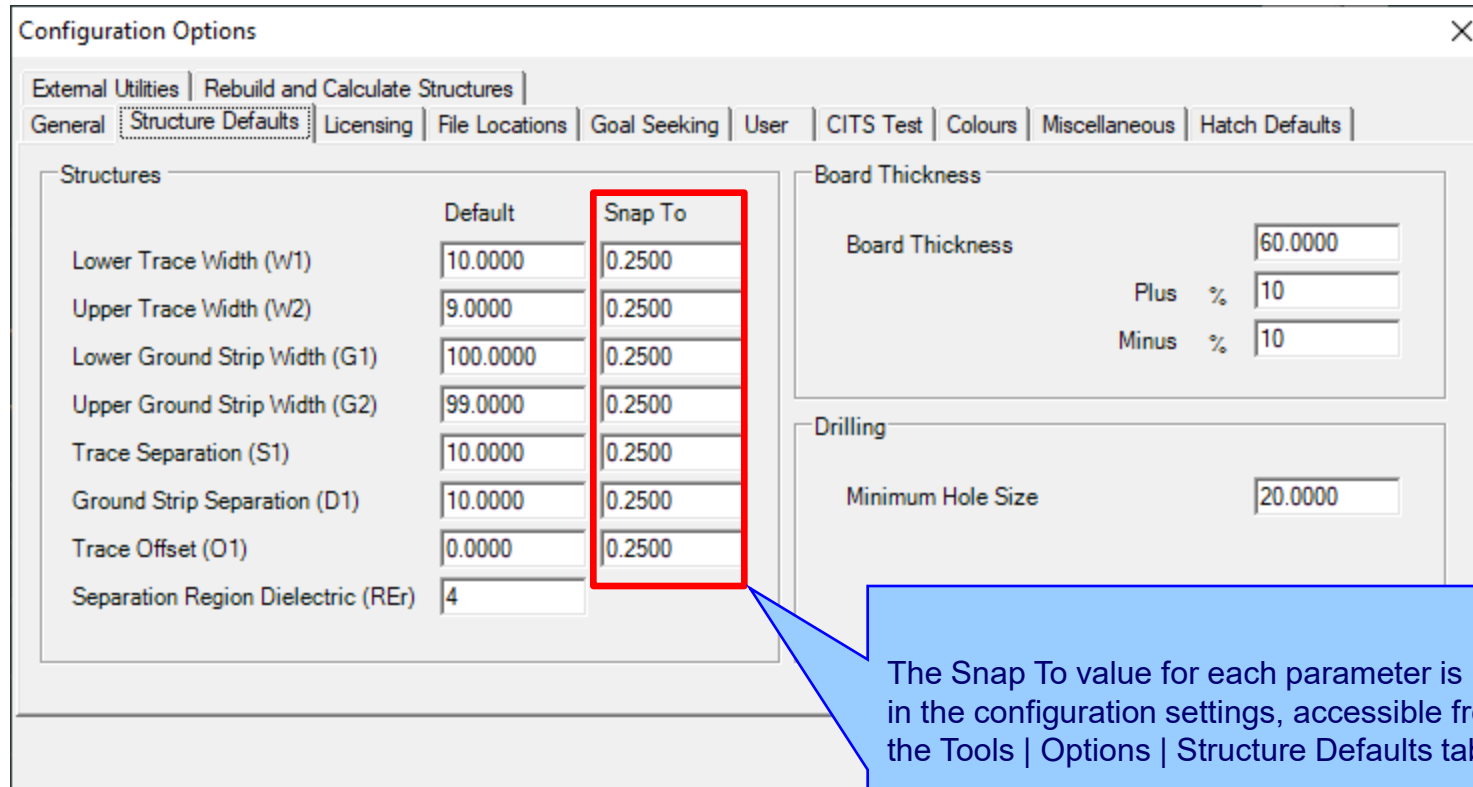
Snap Parameters and Calculate Structure



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

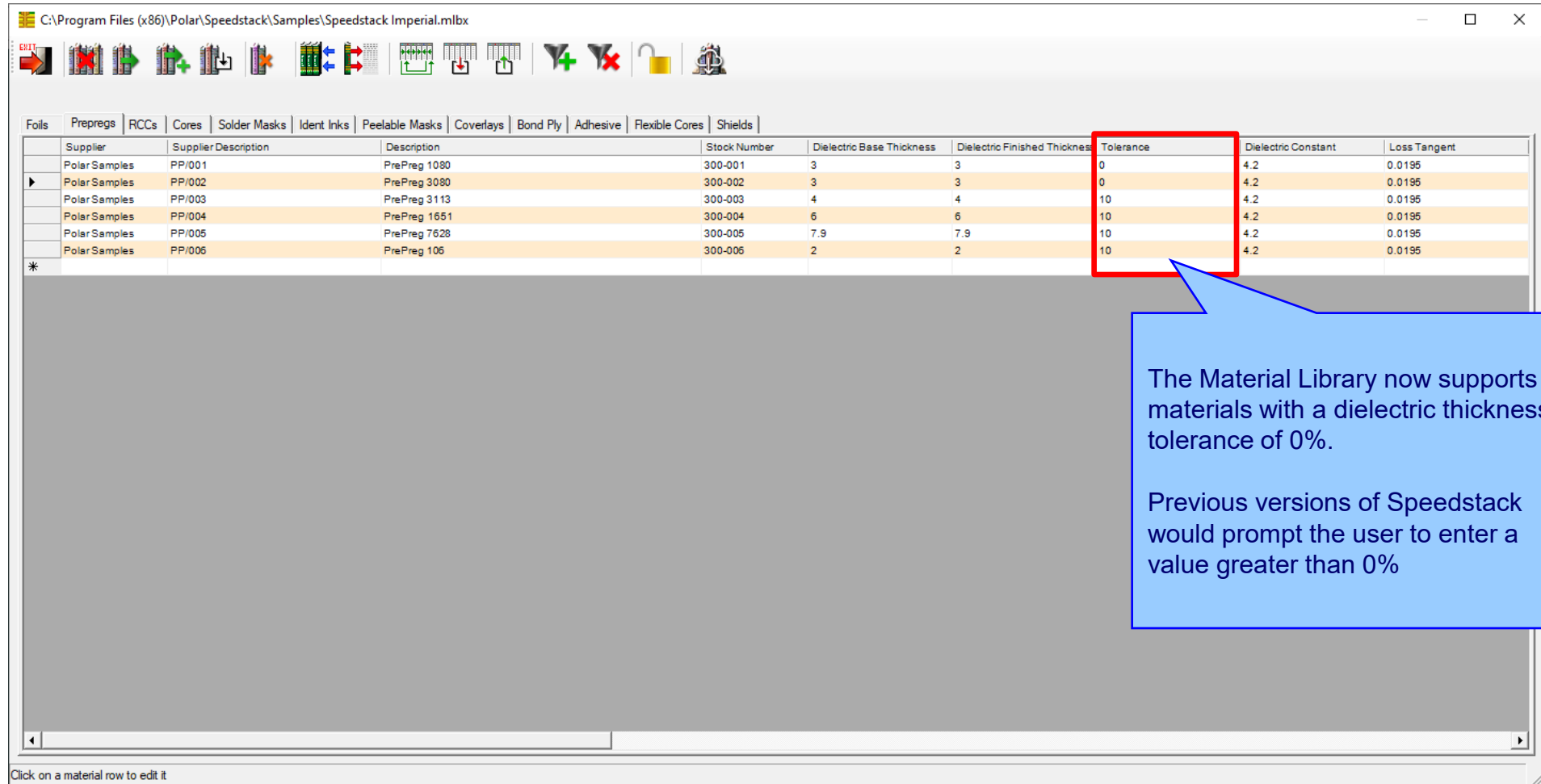
Drilling

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. The 'Prepregs' tab is selected. The table lists materials with columns: Supplier, Supplier Description, Description, Stock Number, Dielectric Base Thickness, Dielectric Finished Thickness, Tolerance, Dielectric Constant, and Loss Tangent. A red box highlights the 'Tolerance' column, which contains values 0, 0, 10, 10, 10, and 10. A blue callout box points to the '0' values in the Tolerance column.

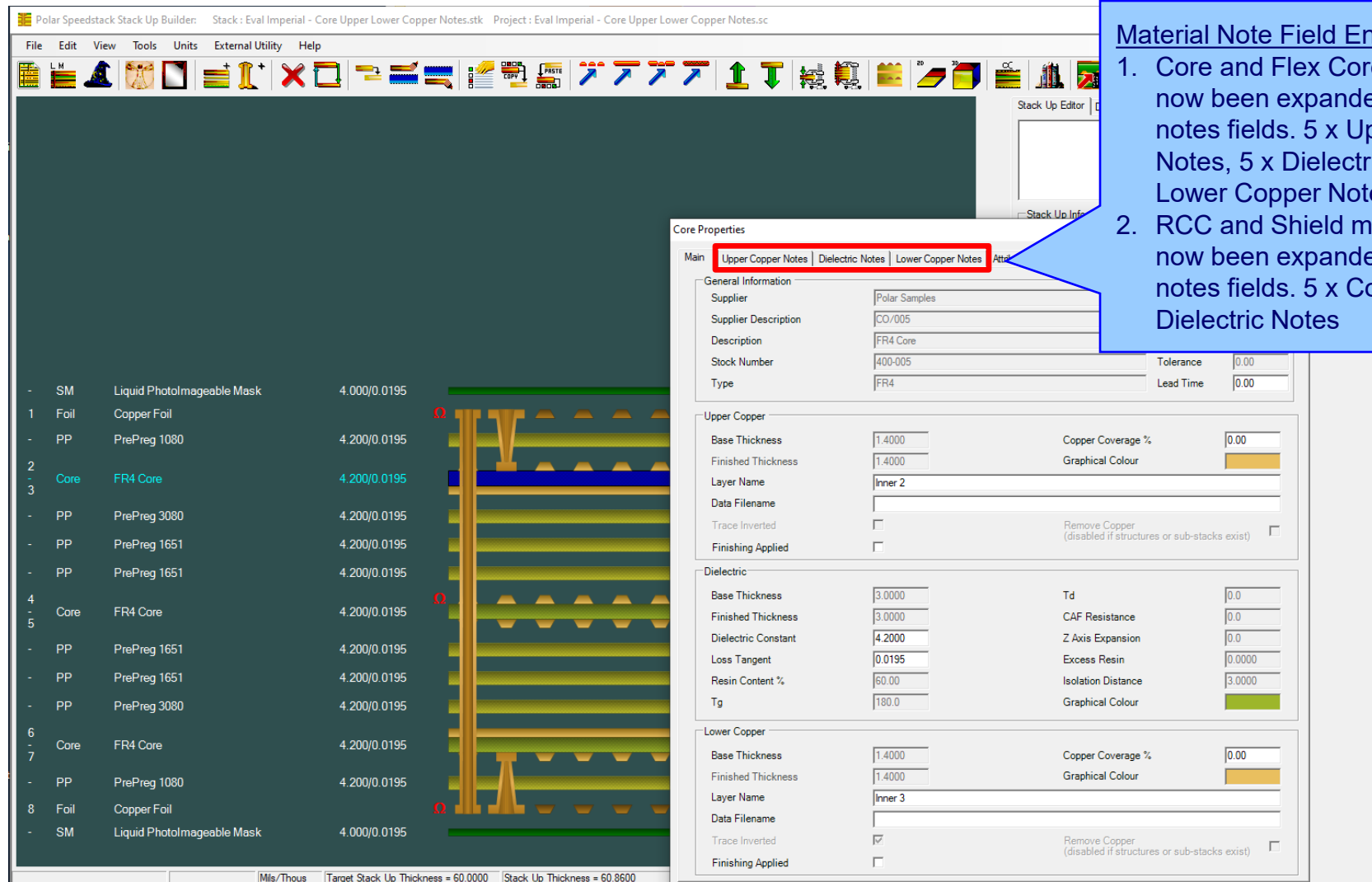
Supplier	Supplier Description	Description	Stock Number	Dielectric Base Thickness	Dielectric Finished Thickness	Tolerance	Dielectric Constant	Loss Tangent
Polar Samples	PP/001	PrePreg 1080	300-001	3	3	0	4.2	0.0195
Polar Samples	PP/002	PrePreg 3080	300-002	3	3	0	4.2	0.0195
Polar Samples	PP/003	PrePreg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

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. The main window displays a stack up of materials with a 3D cross-section view on the right. The stack up table lists the following materials from top to bottom:

Layer	Material	Thickness
SM	Liquid Photolmageable 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 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	
SM	Liquid Photolmageable Mask	4.000/0.0195

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

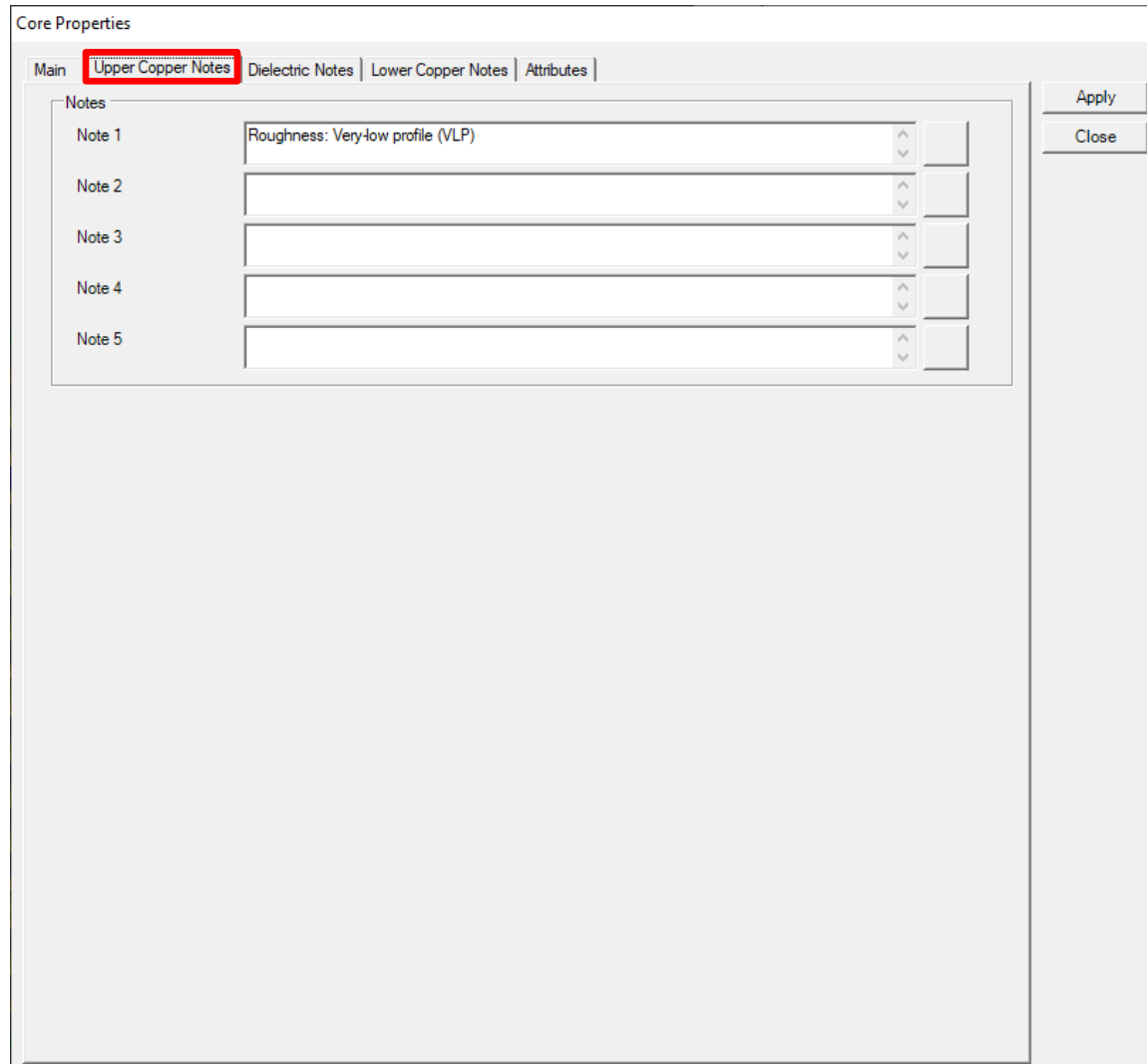
- General Information:**
 - Supplier: Polar Samples
 - Supplier Description: CO/005
 - Description: FR4 Core
 - Stock Number: 400-005
 - Type: FR4
 - Tolerance: 0.00
 - Lead Time: 0.00
- Upper Copper:**
 - Base Thickness: 1.4000
 - Finished Thickness: 1.4000
 - Layer Name: Inner 2
 - Data Filename:
 - Trace Inverted: ☐
 - Finishing Applied: ☐
 - Copper Coverage %: 0.00
 - Graphical Colour: 
 - Remove Copper (disabled if structures or sub-stacks exist): ☐
- 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: 
- Lower Copper:**
 - Base Thickness: 1.4000
 - Finished Thickness: 1.4000
 - Layer Name: Inner 3
 - Data Filename:
 - Trace Inverted: ☒
 - Finishing Applied: ☐
 - Copper Coverage %: 0.00
 - Graphical Colour: 
 - Remove Copper (disabled if structures or sub-stacks exist): ☐

The status bar at the bottom indicates: [Mils/Thous] Target Stack Up Thickness = 60.0000 Stack Up Thickness = 60.8600

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)	↑	↓
Note 2		↑	↓
Note 3		↑	↓
Note 4		↑	↓
Note 5		↑	↓

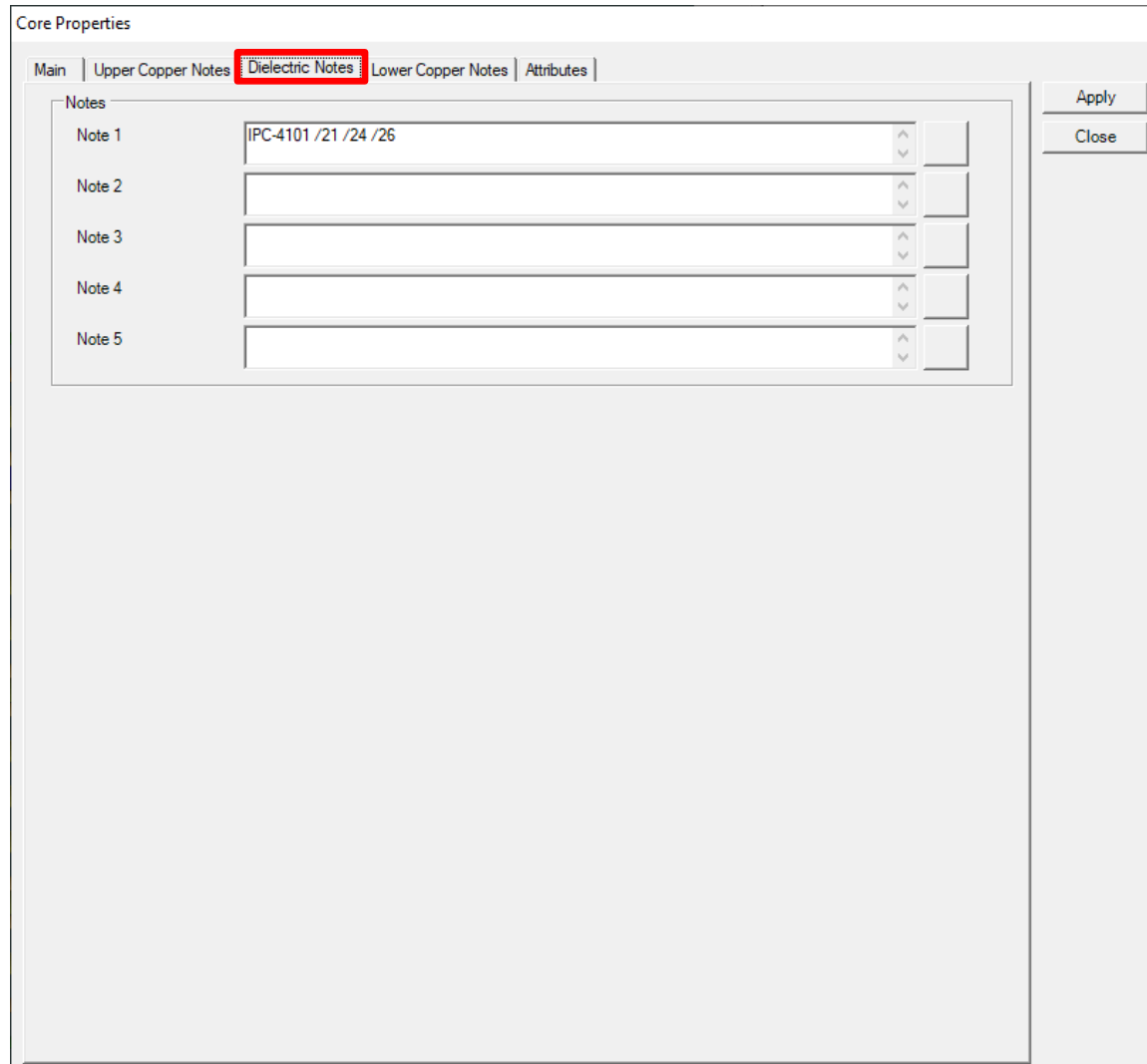
Apply

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



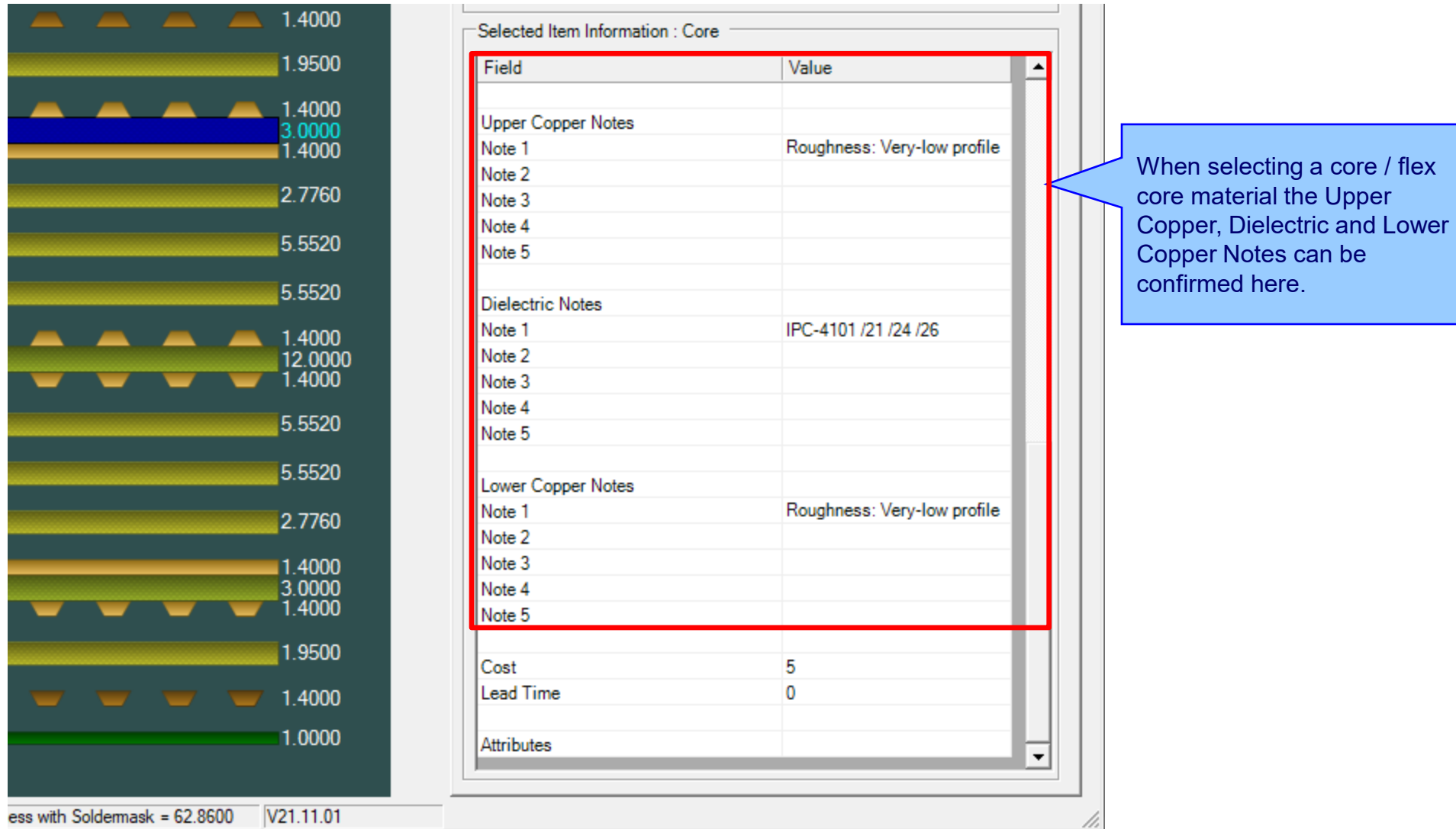
The screenshot shows the 'Core Properties' dialog box with the 'Dielectric Notes' tab selected. The 'Notes' section contains five text fields labeled 'Note 1' through 'Note 5'. 'Note 1' contains the text 'IPC-4101 /21 /24 /26'. To the right of the text fields are five small square buttons, each with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

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

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	

ess with Soldermask = 62.8600 V21.11.01

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

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	☒
Planes Both Sides	☐
Laser Drillable	☒
Add Delete	

Upper Copper Notes

Dielectric Notes

Lower Copper Notes

Note 1 Roughness: Very-low profile (VLP) IPC-4101 /21 /24 /26 Roughness: Very-low profile (VLP)

Note 2

Note 3

Note 4

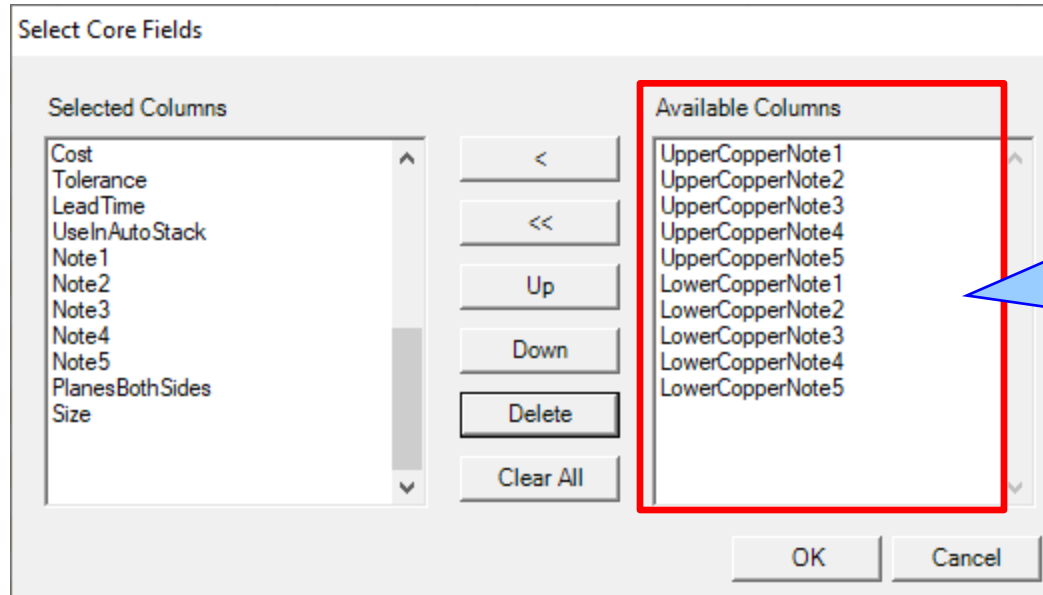
Note 5

<< < 5 of 27 > >>

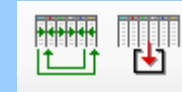
The Speedstack material library has been enhanced to support the extra notes fields.

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

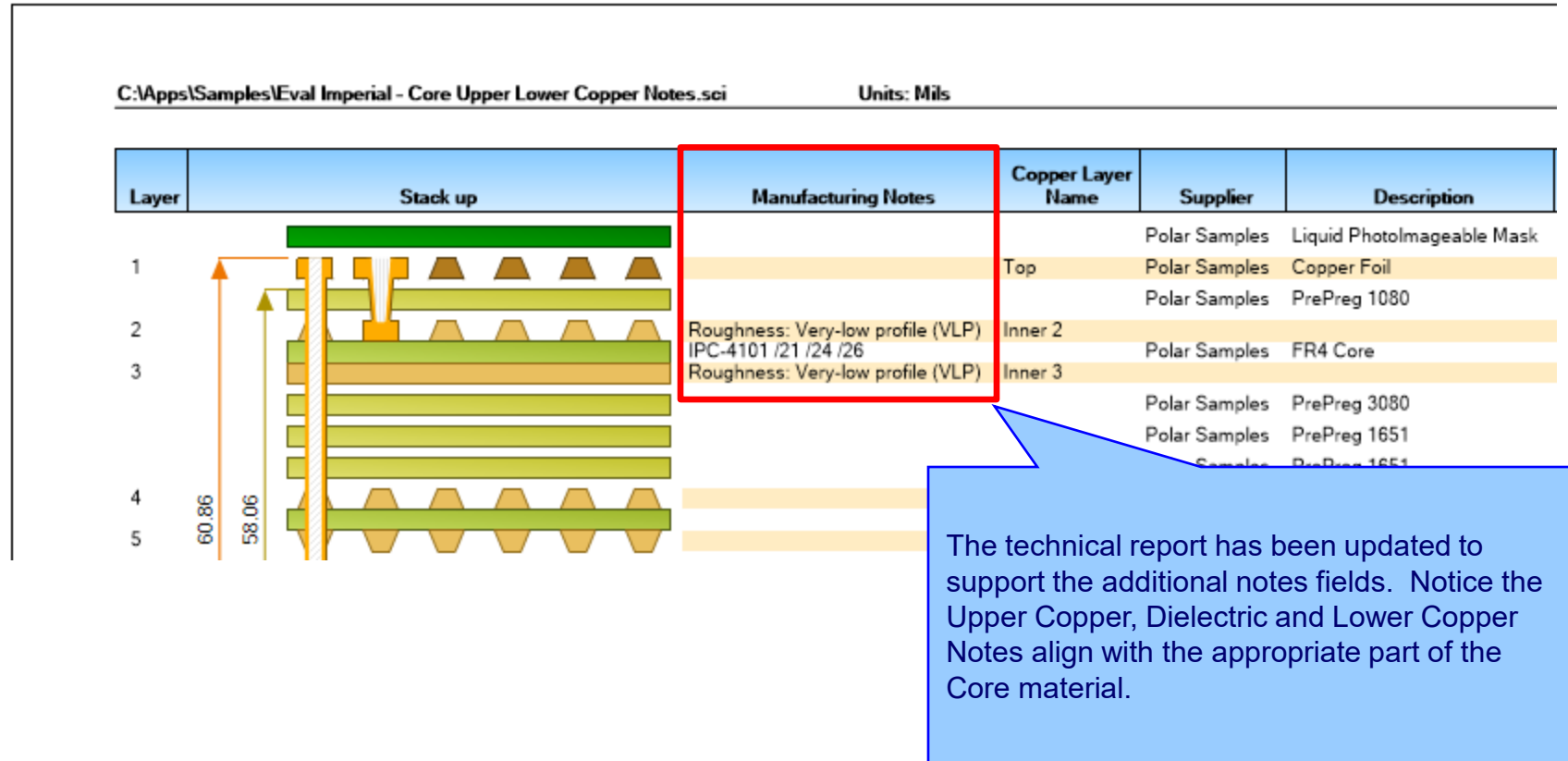


Material Library Import / Export

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



Material Note Field Enhancements – technical report enhancements



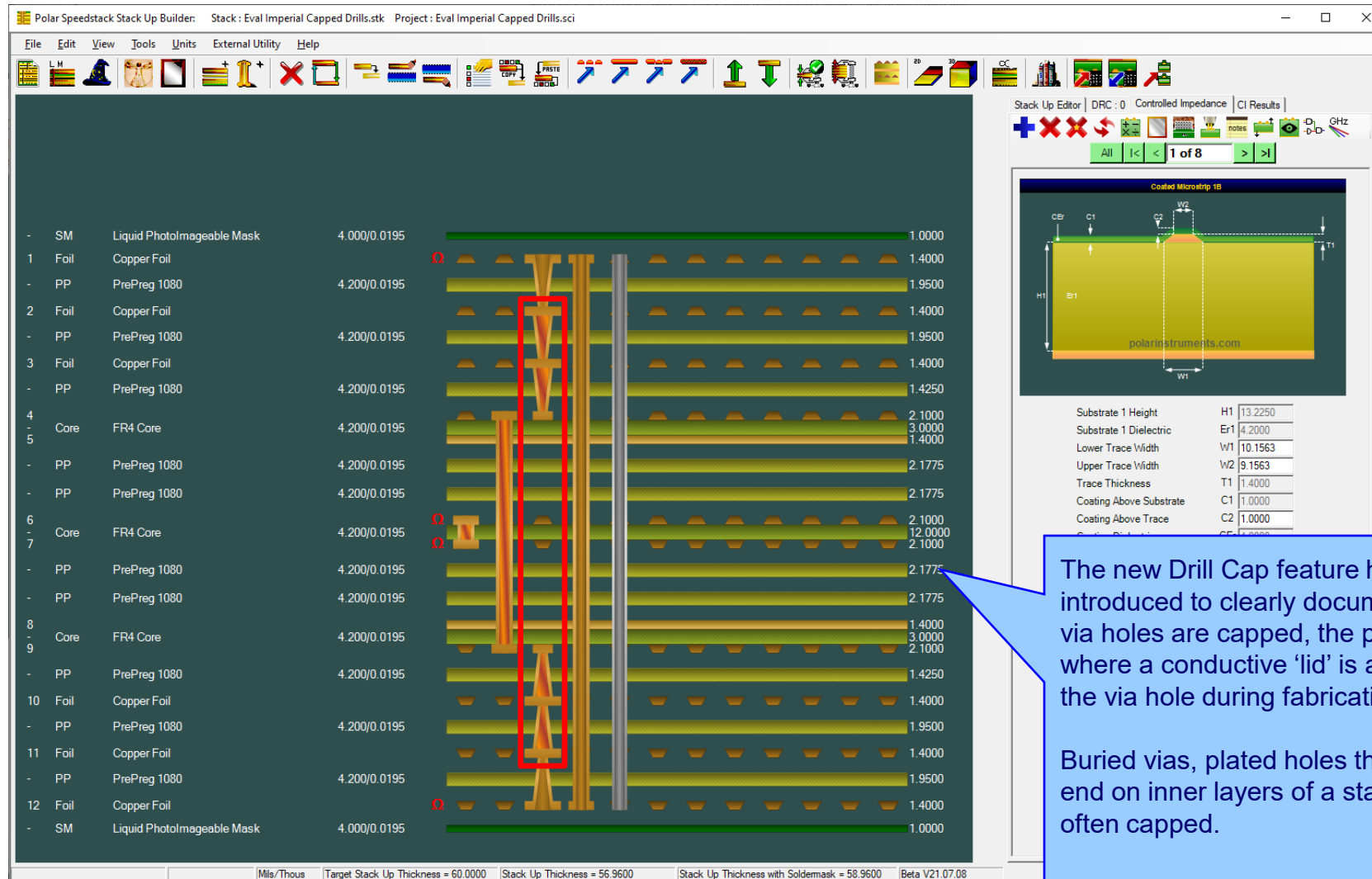
Import / Export enhancements

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)

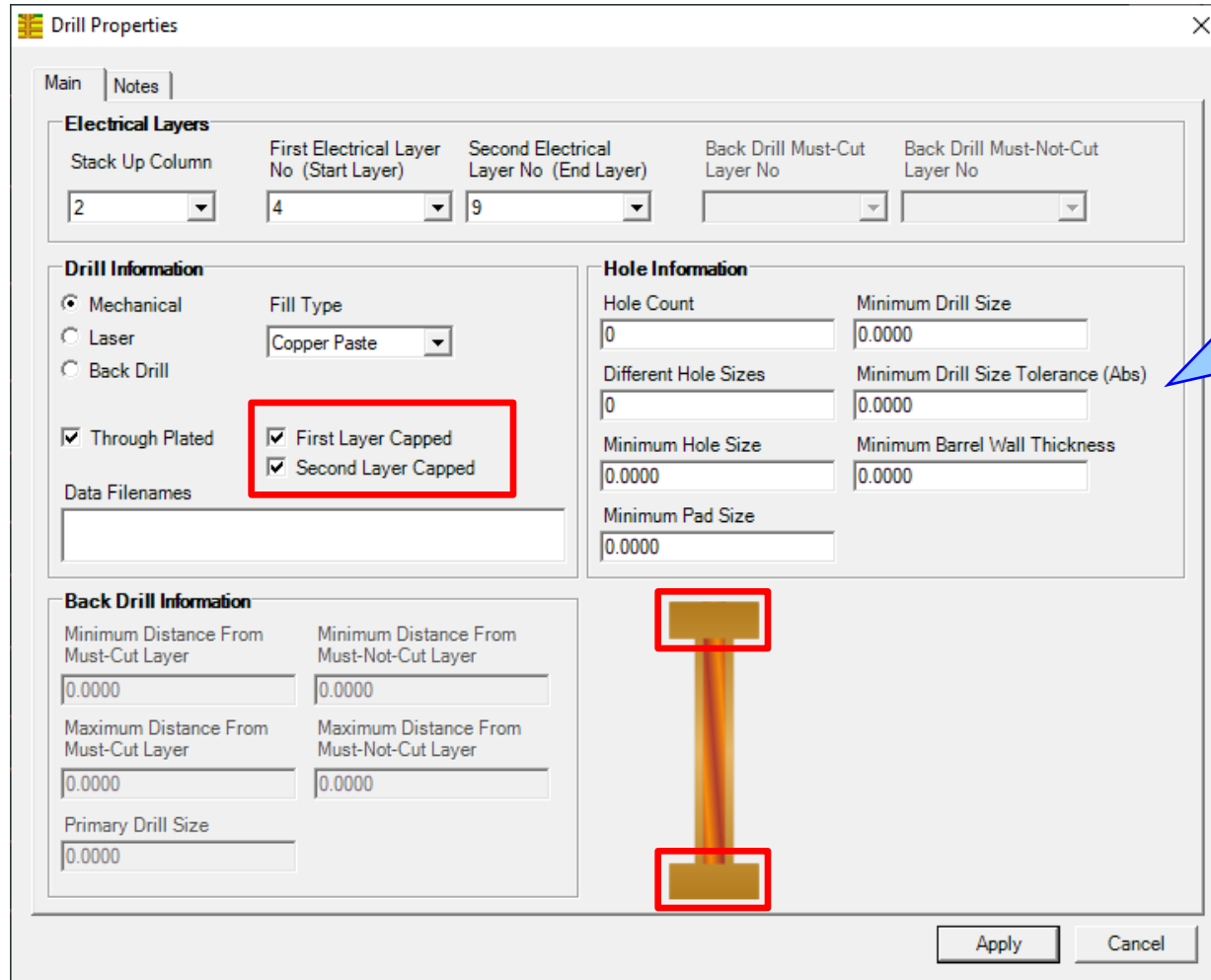
New Drill Cap feature



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

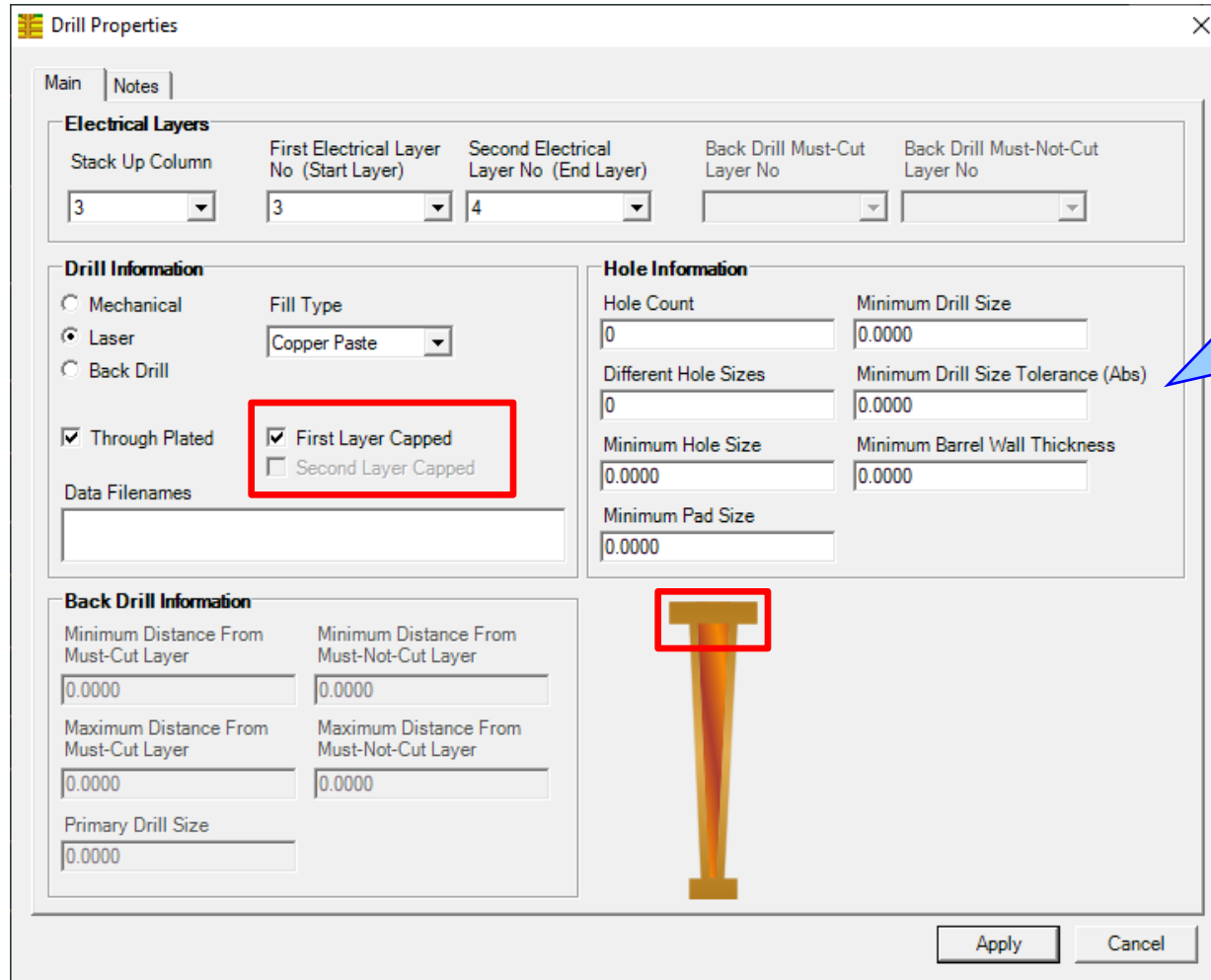
Apply Cancel

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



Drill Properties

Main | Notes

Electrical Layers

Stack Up Column: 3

First Electrical Layer No (Start Layer): 3

Second Electrical Layer No (End Layer): 4

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

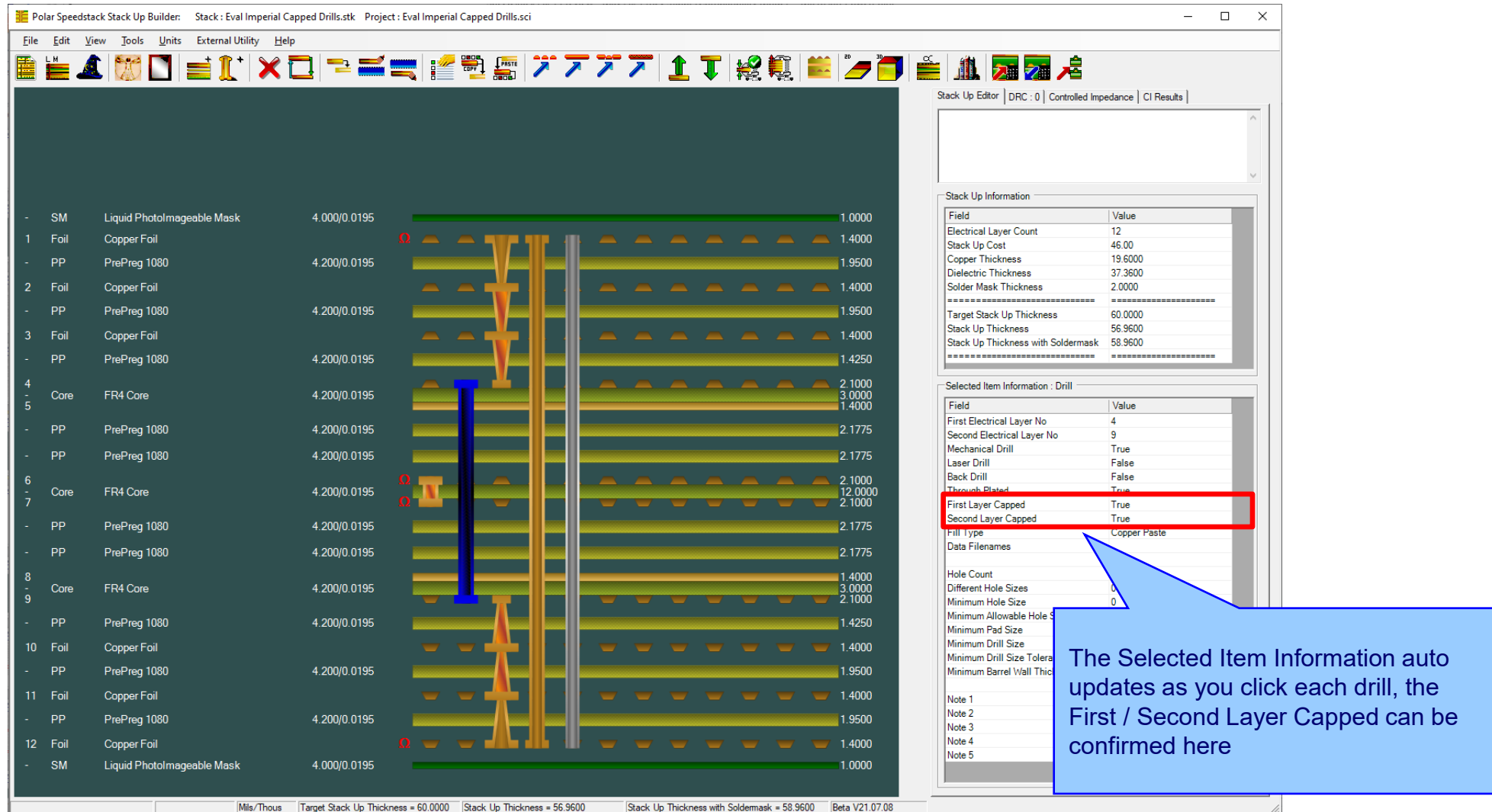
Apply Cancel

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 shows the Polar Speedstack Stack Up Builder interface. The main window displays a stack up of materials with their properties and thicknesses. A drill is highlighted in the center, and its properties are shown in the 'Selected Item Information : Drill' panel on the right.

Stack Up Information:

Field	Value
Electrical Layer Count	12
Stack Up Cost	46.00
Copper Thickness	19.6000
Dielectric Thickness	37.3600
Solder Mask Thickness	2.0000
Target Stack Up Thickness	60.0000
Stack Up Thickness	56.9600
Stack Up Thickness with Soldermask	58.9600

Selected Item Information : Drill:

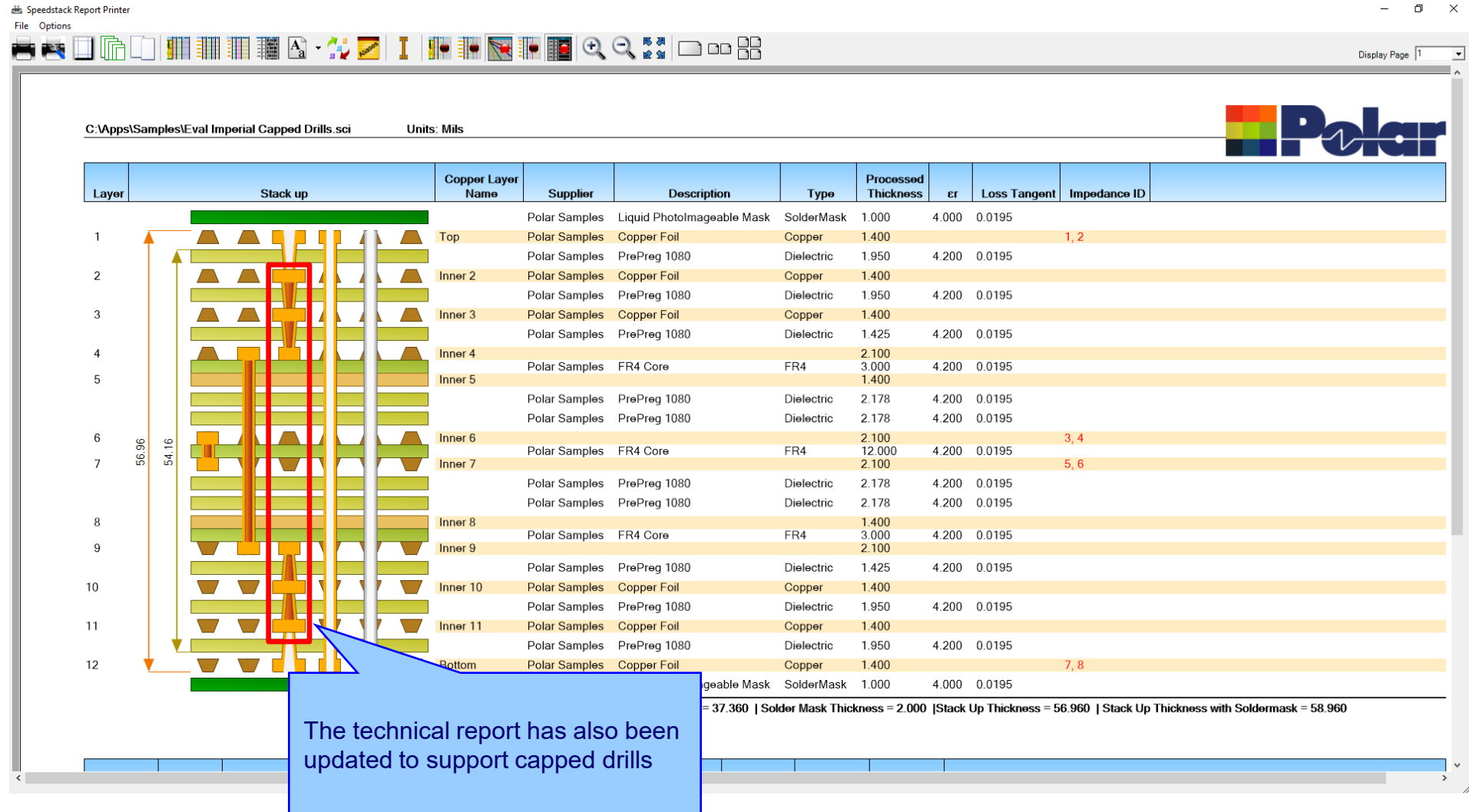
Field	Value
First Electrical Layer No	4
Second Electrical Layer No	9
Mechanical Drill	True
Laser Drill	False
Back Drill	False
Through Plated	True
First Layer Capped	True
Second Layer Capped	True
Fill Type	Copper Paste
Data Filenames	
Hole Count	
Different Hole Sizes	0
Minimum Hole Size	0
Minimum Allowable 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	

The 'First Layer Capped' and 'Second Layer Capped' fields are highlighted with a red box, indicating the new feature.

The status bar at the bottom shows: [Mils/Thous] Target Stack Up Thickness = 60.0000 Stack Up Thickness = 56.9600 Stack Up Thickness with Soldermask = 58.9600 Beta V21.07.08

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



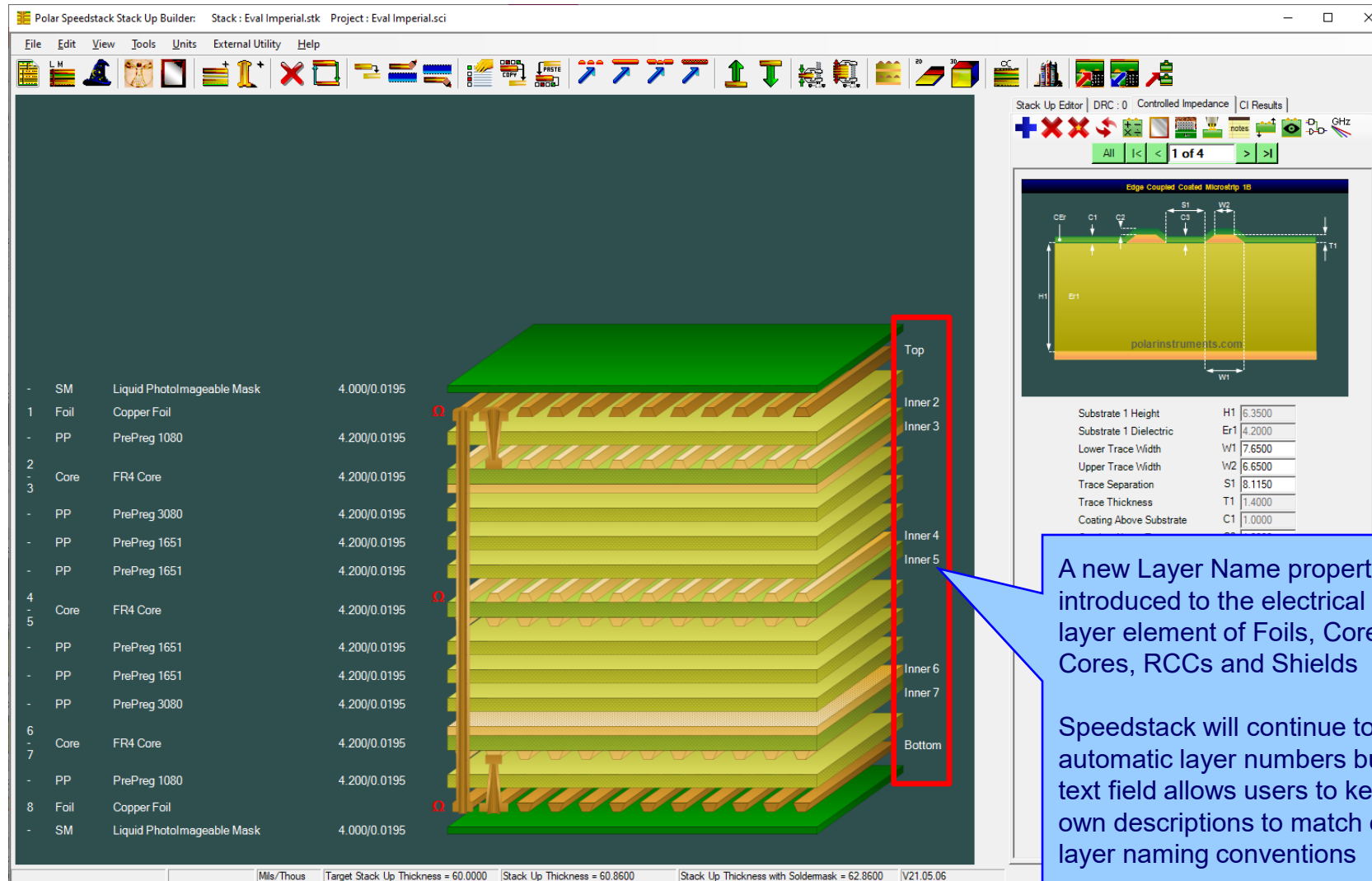
Import / Export enhancements

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



The screenshot shows the Polar Speedstack Stack Up Builder interface. The main window displays a 3D model of a multi-layer PCB stack up. The layers are labeled on the right side: Top, Inner 2, Inner 3, Inner 4, Inner 5, Inner 6, Inner 7, and Bottom. A red box highlights the 'Inner 5' layer, which is a copper foil layer. A callout bubble points to this layer, stating: 'A new Layer Name property has been introduced to the electrical / copper layer element of Foils, Cores, Flex Cores, RCCs and Shields'. Another callout bubble points to the 'Inner 5' layer, stating: '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'.

The interface also includes a table of layer properties on the left side. The table lists the layer type, material, and thickness for each layer in the stack up.

Layer	Type	Material	Thickness
1	SM	Liquid Photolmageable Mask	4.000/0.0195
2	Foil	Copper Foil	4.200/0.0195
3	PP	PrePreg 1080	4.200/0.0195
4	Core	FR4 Core	4.200/0.0195
5	PP	PrePreg 3080	4.200/0.0195
6	PP	PrePreg 1651	4.200/0.0195
7	PP	PrePreg 1651	4.200/0.0195
8	Core	FR4 Core	4.200/0.0195
9	PP	PrePreg 1651	4.200/0.0195
10	PP	PrePreg 1651	4.200/0.0195
11	PP	PrePreg 3080	4.200/0.0195
12	Core	FR4 Core	4.200/0.0195
13	PP	PrePreg 1080	4.200/0.0195
14	Foil	Copper Foil	4.200/0.0195
15	SM	Liquid Photolmageable Mask	4.000/0.0195

The interface also includes a 'Stack Up Editor' panel on the right side, which shows a cross-section of the stack up and a table of properties for the selected layer (Inner 5).

Property	Value
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

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

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

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	☒	Remove Copper (disabled if structures or sub-stacks exist)	☐
Finishing Applied	☐		

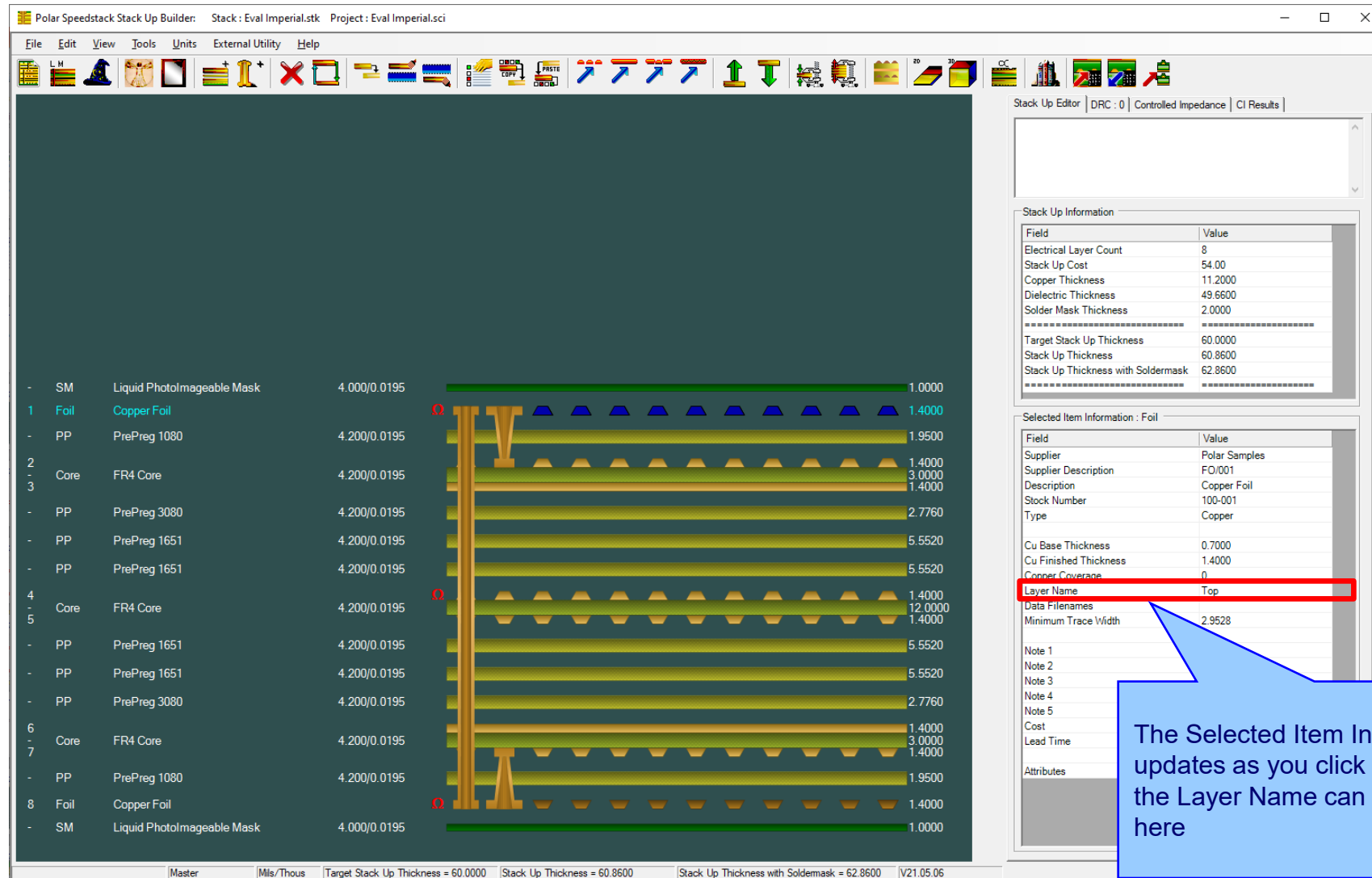
Apply

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 shows the Polar Speedstack Stack Up Builder interface. The main window displays a stack of materials with their properties and thicknesses. The stack is as follows:

Layer	Material	Thickness (Mils/Thous)	Thickness (Mils)
SM	Liquid Photolmageable 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	Core FR4 Core	4.200/0.0195	3.0000
4	Core FR4 Core	4.200/0.0195	1.4000
5	Core FR4 Core	4.200/0.0195	12.0000
6	Core FR4 Core	4.200/0.0195	1.4000
7	Core FR4 Core	4.200/0.0195	3.0000
8	Foil Copper Foil	4.200/0.0195	1.4000
9	Foil Copper Foil	4.200/0.0195	1.4000
SM	Liquid Photolmageable Mask	4.000/0.0195	1.0000

The right-hand panel shows the 'Stack Up Information' and 'Selected Item Information' tabs. The 'Selected Item Information' tab is active, showing details for the selected 'Foil' layer. The 'Layer Name' field is highlighted with a red box, and a callout points to it with the text: 'The Selected Item Information auto updates as you click each material, the Layer Name can be confirmed here'.

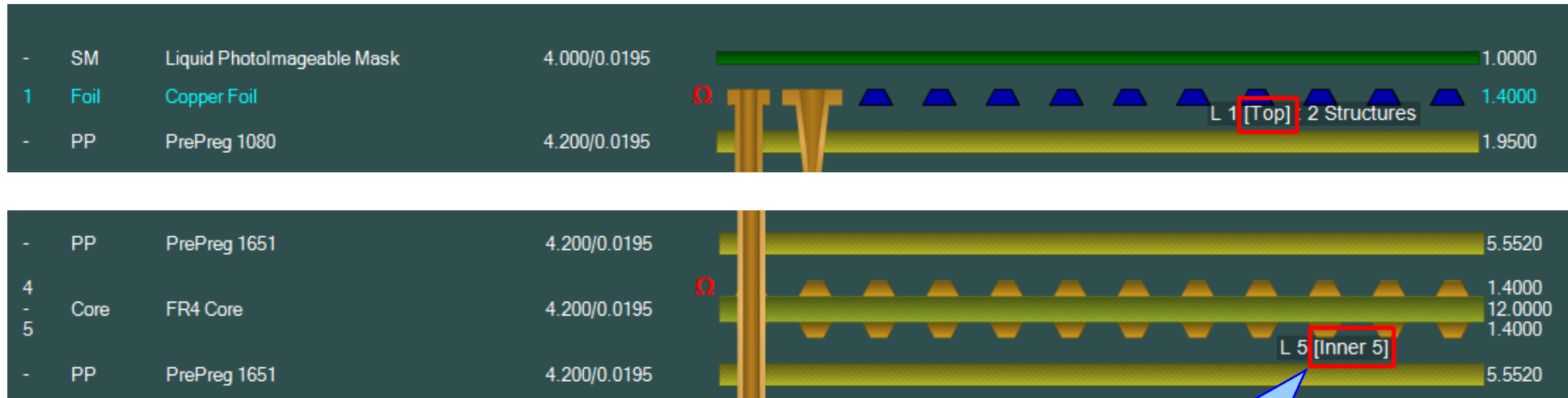
Stack Up Information:

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 : Foil

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 PCB Stackup Editor interface. On the left, a table lists the stackup layers:

Order	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	4.200/0.0195

On the right, a 3D stackup graphic shows the layers with labels: Top, Inner 2, Inner 3, Inner 4, Inner 5, Inner 6, Inner 7, and Bottom. A red box highlights these labels.

A blue callout box points to the Configuration Options dialog box, 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 "Display Data" tab. It contains 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: ☒
- Display Fields 1 and 2 are reserved for Layer Numbers and Layer Types.
- Display Field 3: Description
- Display Field 4: Dielectric Constant/Loss Tangent
- Display Field 5: Layer Name (highlighted with a red box)

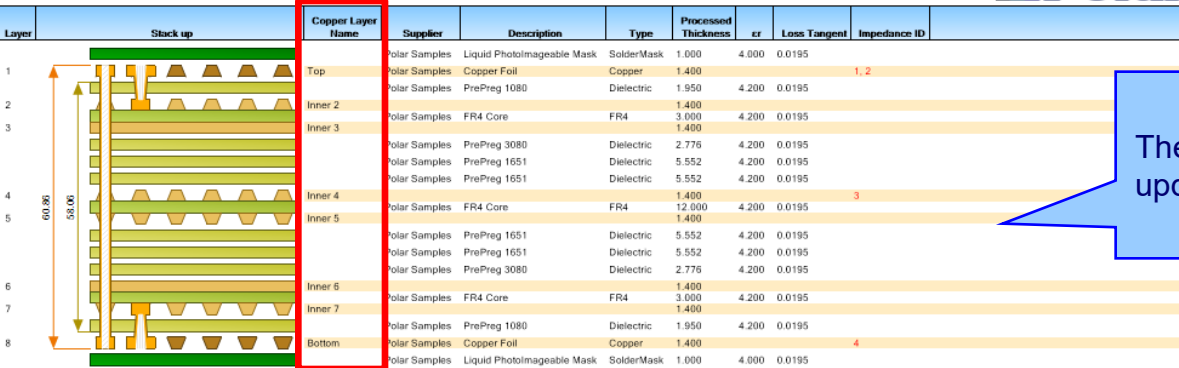
New Layer Name property for electrical / copper layers

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		Inner 2	Polar Samples	PrePreg 1080	Dielectric	1.950	4.200	0.0195	
3		Inner 3	Polar Samples	FR4 Core	FR4	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		Inner 4	Polar Samples	FR4 Core	FR4	1.400			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			
7		Inner 7	Polar Samples	PrePreg 1080	Dielectric	1.950	4.200	0.0195	
		Bottom	Polar Samples	Copper Foil	Copper	1.400			4
8			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

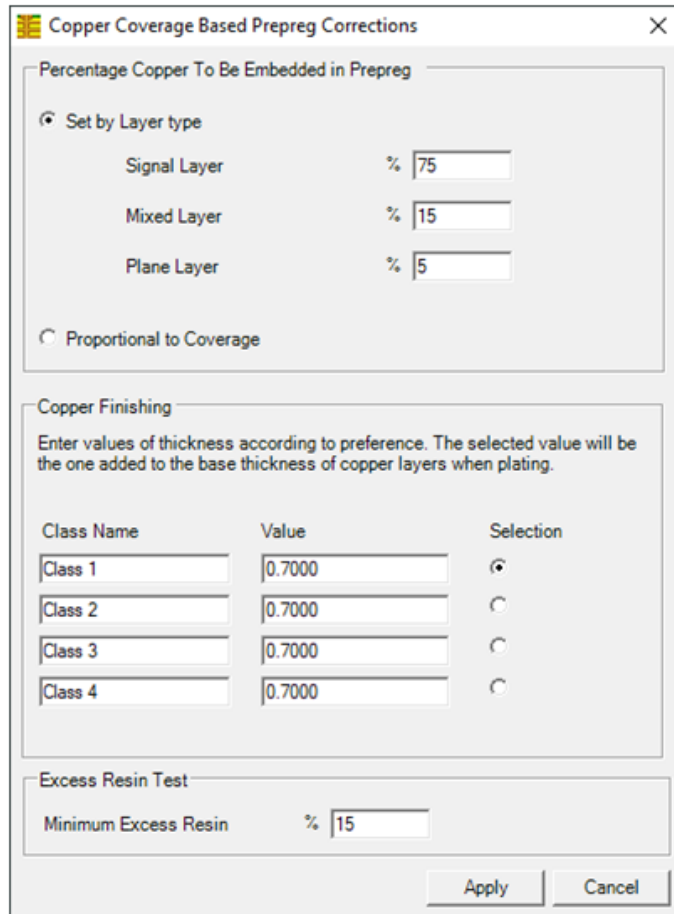
Impedance ID	Structure Image	Structure Name	Impedance Signal Layer	Ref. Plane 1 in Layer	Ref. Plane 2 in Layer	Lower Trace Width (W1)	Upper Trace Width (W2)	Trace Separation (S1)	Target Impedance	Calculated Impedance
1		Edge Coupled Coated Microstrip 1B	1	3	0	7.650	6.650	8.115	100.000	100.290
2		Coated 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:						

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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.

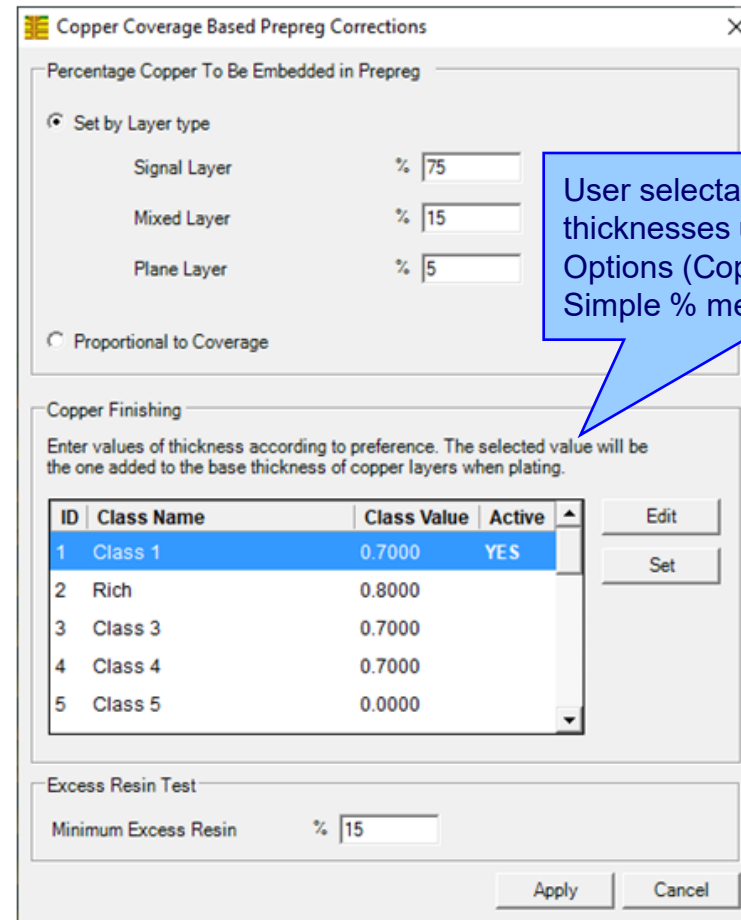
Class Name	Value	Selection
Class 1	0.7000	☒
Class 2	0.7000	☐
Class 3	0.7000	☐
Class 4	0.7000	☐

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

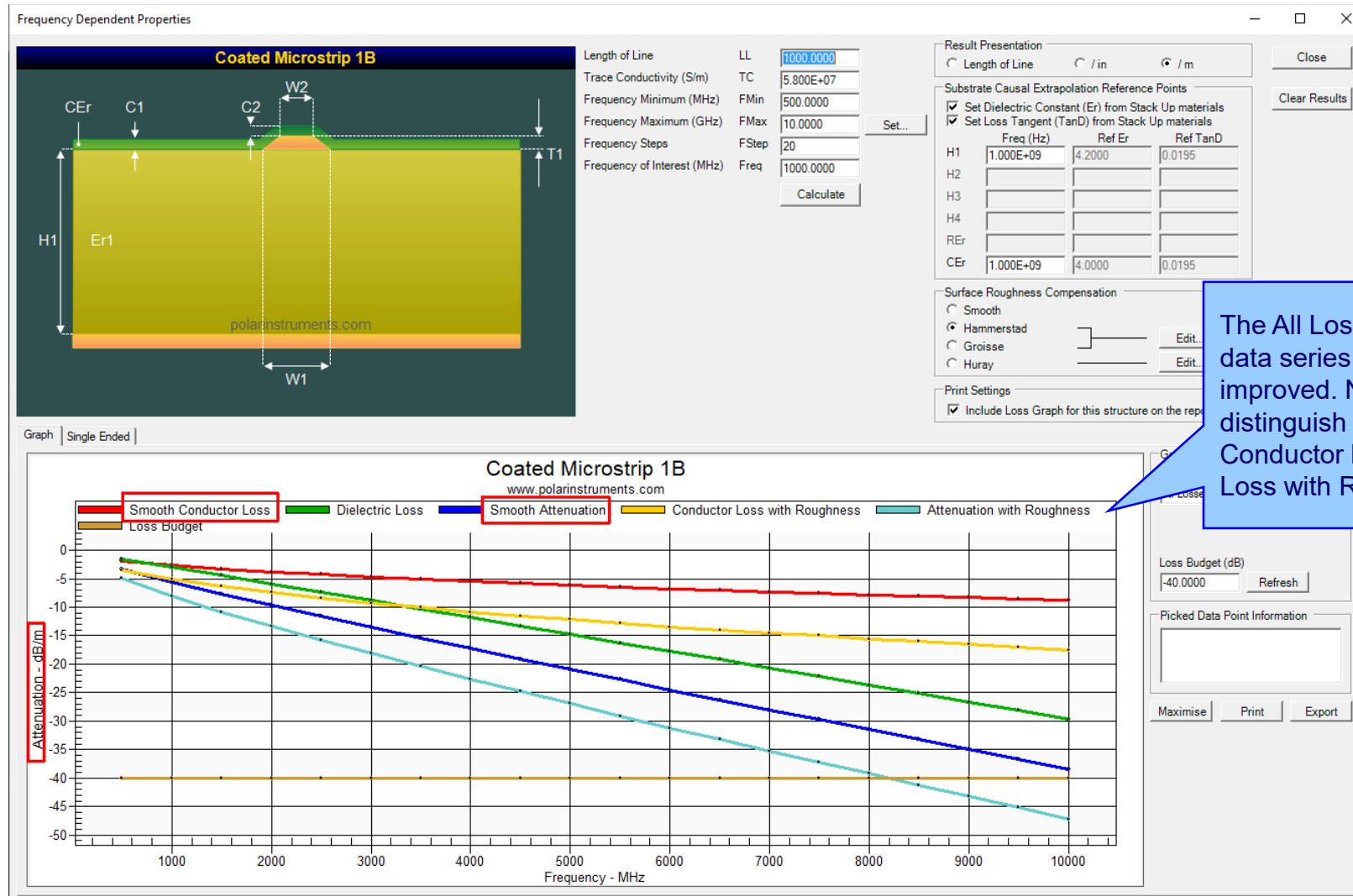
Import / Export enhancements

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



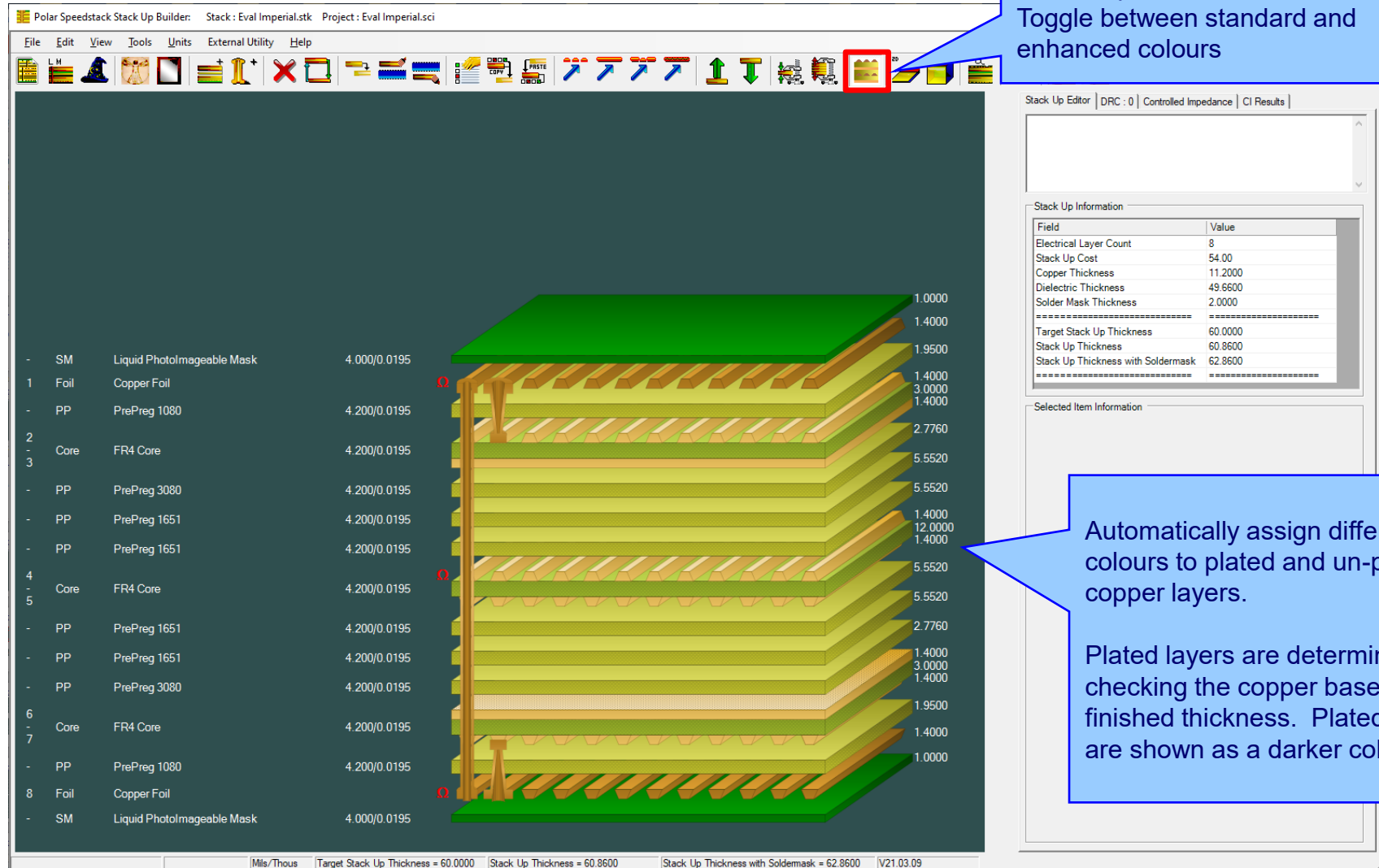
The All Losses plot y-axis and data series labelling has been improved. Now easier to distinguish between Smooth Conductor Loss and Conductor Loss with Roughness

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



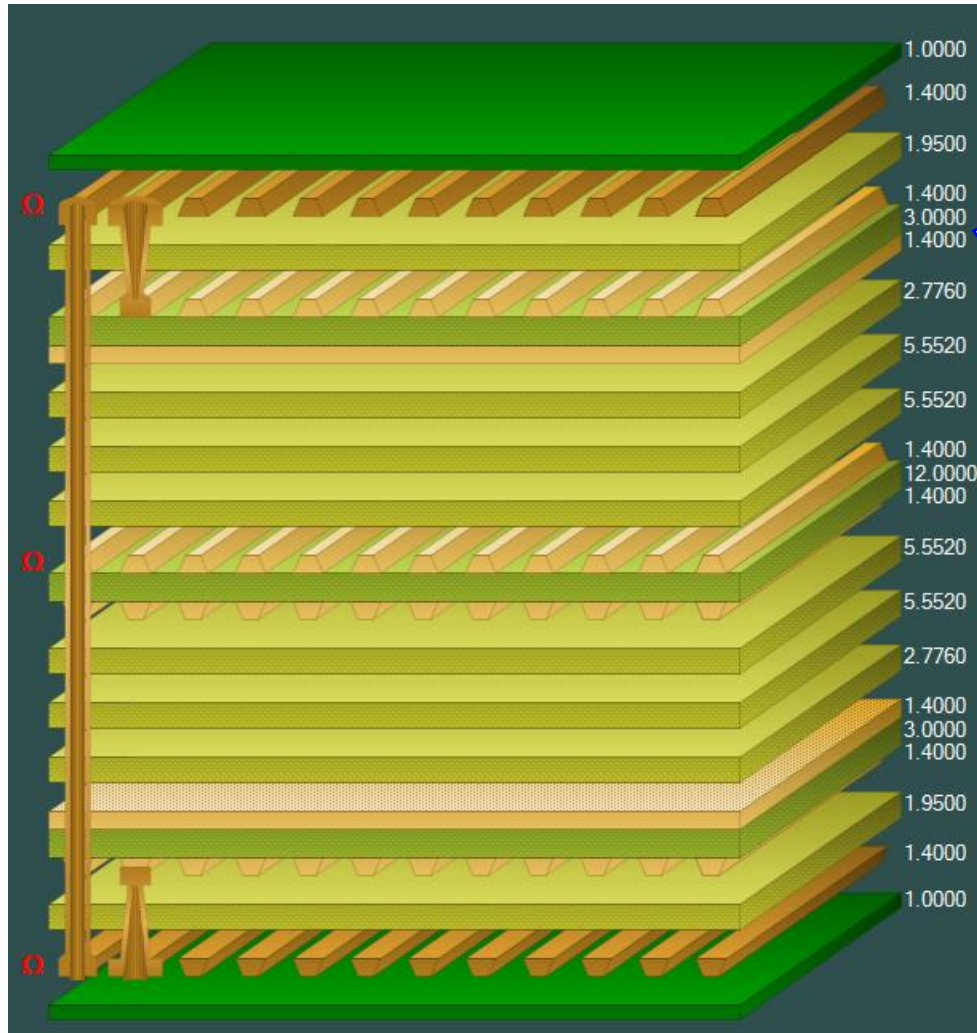
Stack Up Editor | DRC : 0 | Controlled Impedance | CI Results

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.

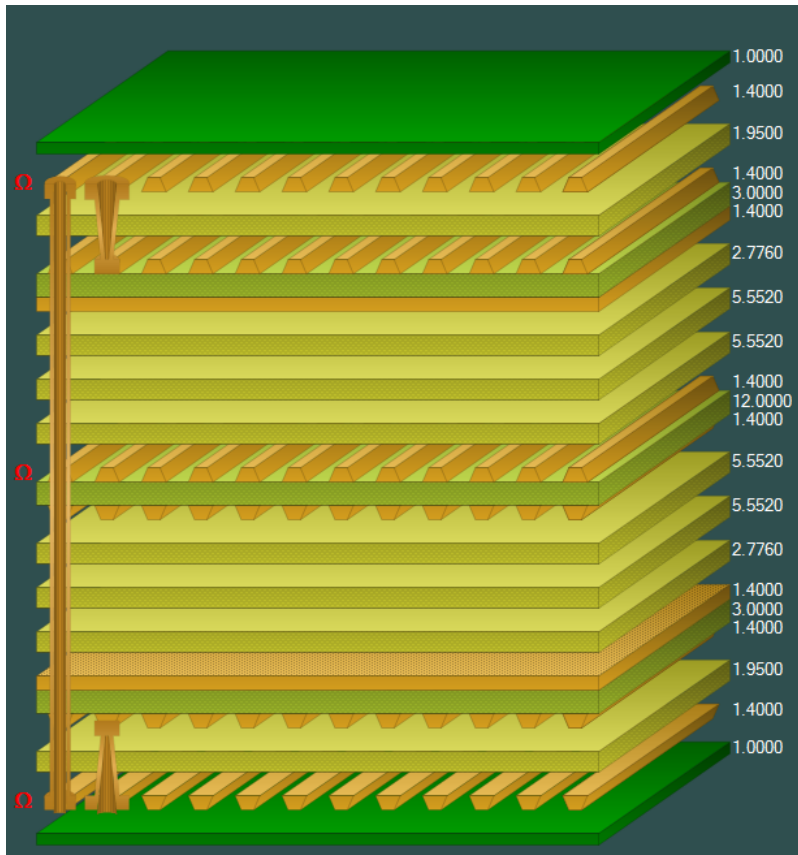
It is important to account for this additional plated copper thickness when calculating the overall stack up thickness and controlled impedance / insertion loss structures.

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

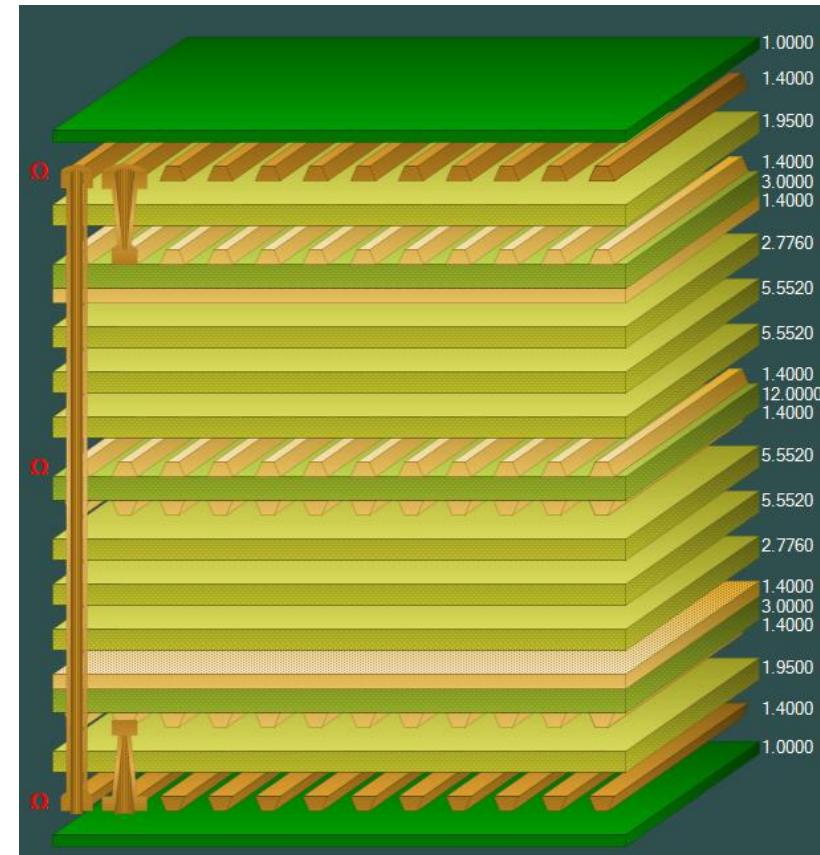
New Apply Plating Colours toolbar option



Standard Colours



Apply Plating Colours



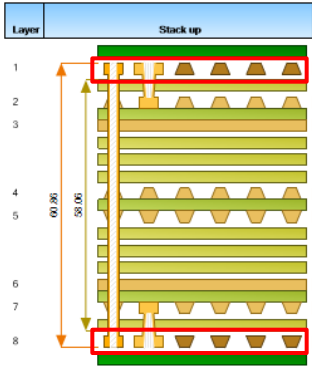
New Apply Plating Colours toolbar option

Speedstack Report Printer

File Options

Display Page 1

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



Layer	Stack up	Supplier	Description	Type	Processed Thickness	ex	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	3
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		Polar Samples	FR4 Core	FR4	1.400	3.000	4.200	0.0195	
7		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

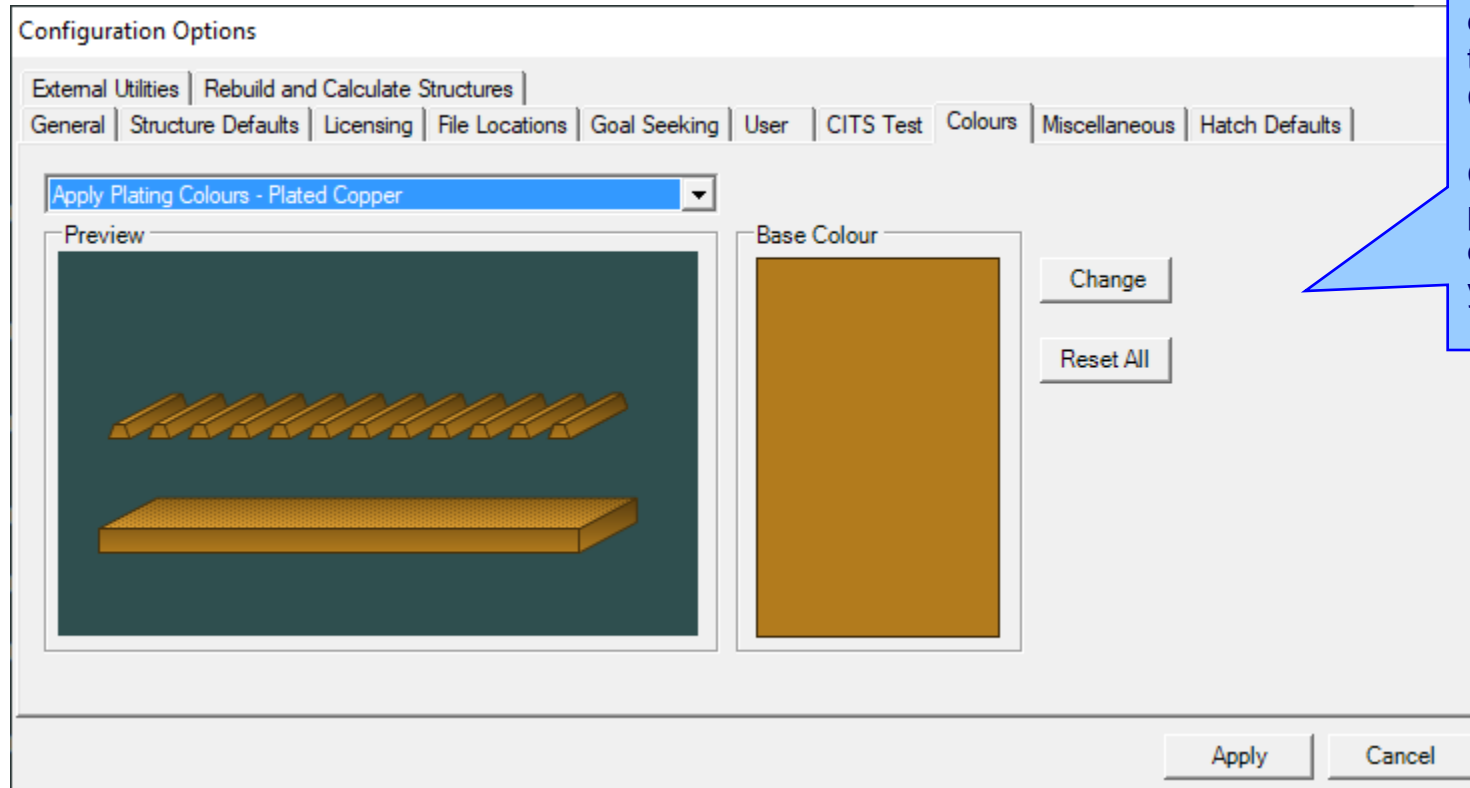
StackName: Master	Version:	Revision:	Modification:	Date of Revision:	Editor:	Page 1/1
Date:	Associated Documents:					
Author:						
Department:						
Site:						

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Plot style & presentation copyright © Polar Instruments Ltd

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

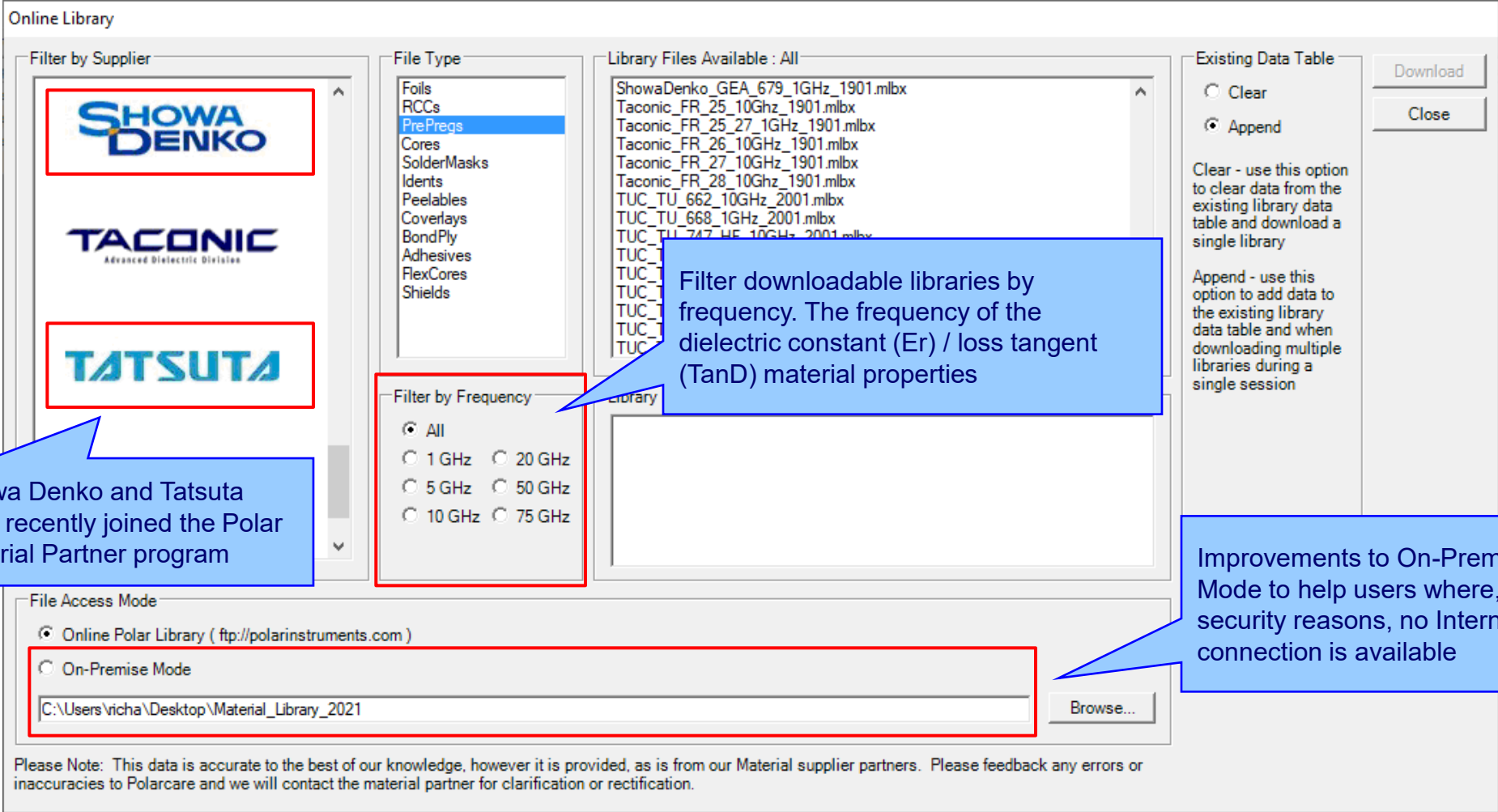
New Apply Plating Colours toolbar option



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



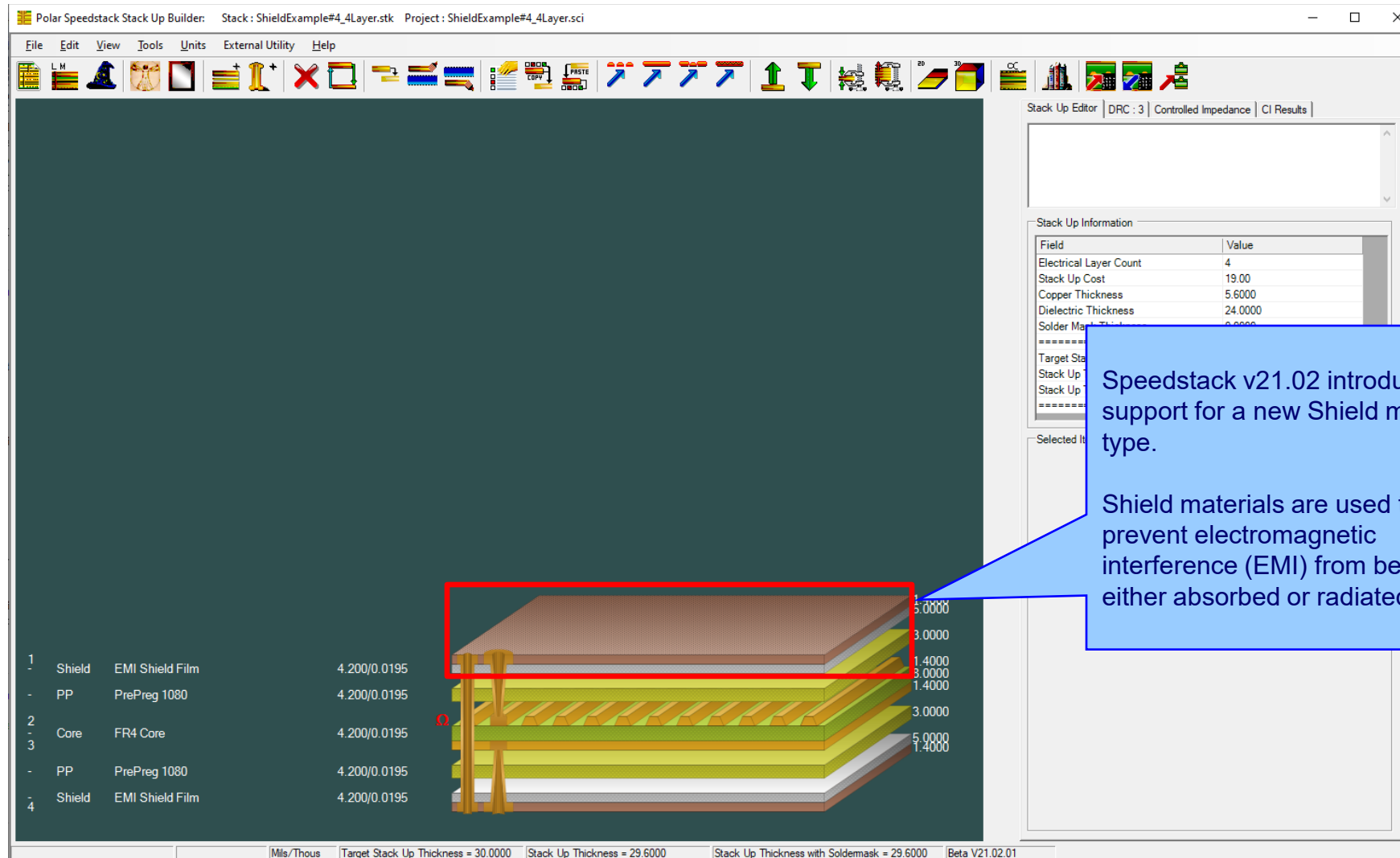
The screenshot shows the 'Online Library' window with several enhancements highlighted by callouts:

- Supplier Filter:** A callout points to the 'Filter by Supplier' section, noting that 'Showa Denko' and 'Tatsuta' have recently joined the Polar Material Partner program.
- File Type Filter:** A callout points to the 'File Type' list, which includes options like Foils, RCCs, PrePregs, Cores, SolderMasks, Idents, Peelables, Coverlays, BondPly, Adhesives, FlexCores, and Shields.
- Frequency Filter:** A callout points to the 'Filter by Frequency' section, which allows users to filter downloadable libraries by frequency (All, 1 GHz, 5 GHz, 10 GHz, 20 GHz, 50 GHz, 75 GHz). The callout text states: 'Filter downloadable libraries by frequency. The frequency of the dielectric constant (Er) / loss tangent (TanD) material properties'.
- Existing Data Table:** A callout points to the 'Existing Data Table' section, which includes 'Clear' and 'Append' options. The 'Append' option is selected. The text explains: 'Clear - use this option to clear data from the existing library data table and download a single library' and '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:** A callout points to the 'File Access Mode' section, which includes 'Online Polar Library (ftp://polarinstruments.com)' and 'On-Premise Mode'. The 'On-Premise Mode' is selected, and a text box shows the path 'C:\Users\vicha\Desktop\Material_Library_2021'. A 'Browse...' button is also visible.

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 cross-section of a 4-layer stack up. The layers are listed in a table on the left:

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 3D model shows the layers with their respective colors and thicknesses. A red box highlights the top and bottom EMI Shield Film layers. The bottom status bar shows the following information:

- Mils/Thous
- Target Stack Up Thickness = 30.0000
- Stack Up Thickness = 29.6000
- Stack Up Thickness with Soldermask = 29.6000
- Beta V21.02.01

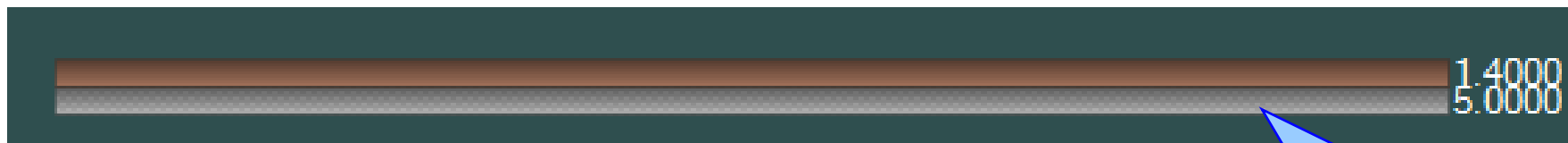
Speedstack v21.02 introduces support for a new Shield material type.

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

New Shield material

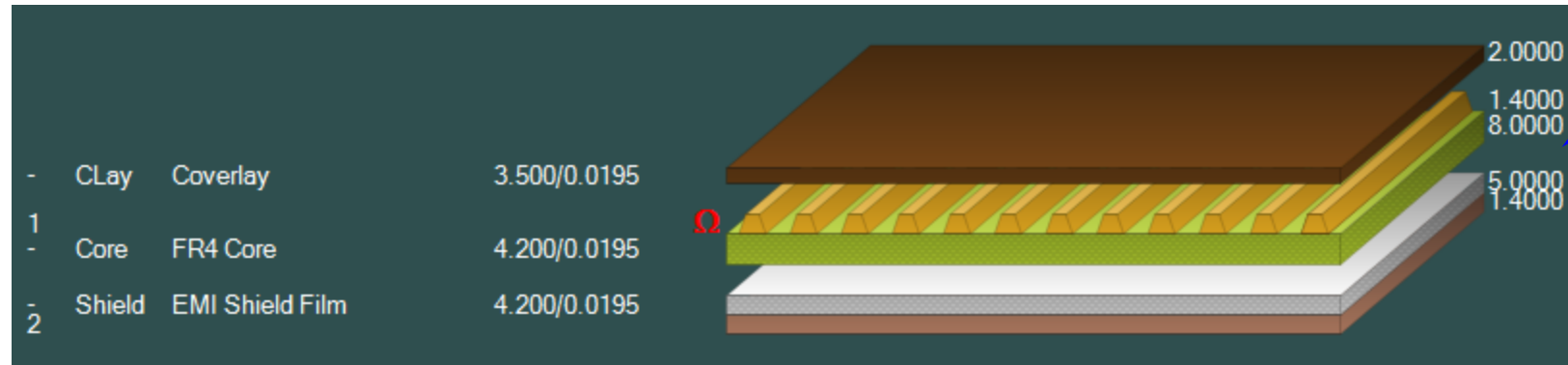
Shields are typically applied to the outer layer(s) of the stack up

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

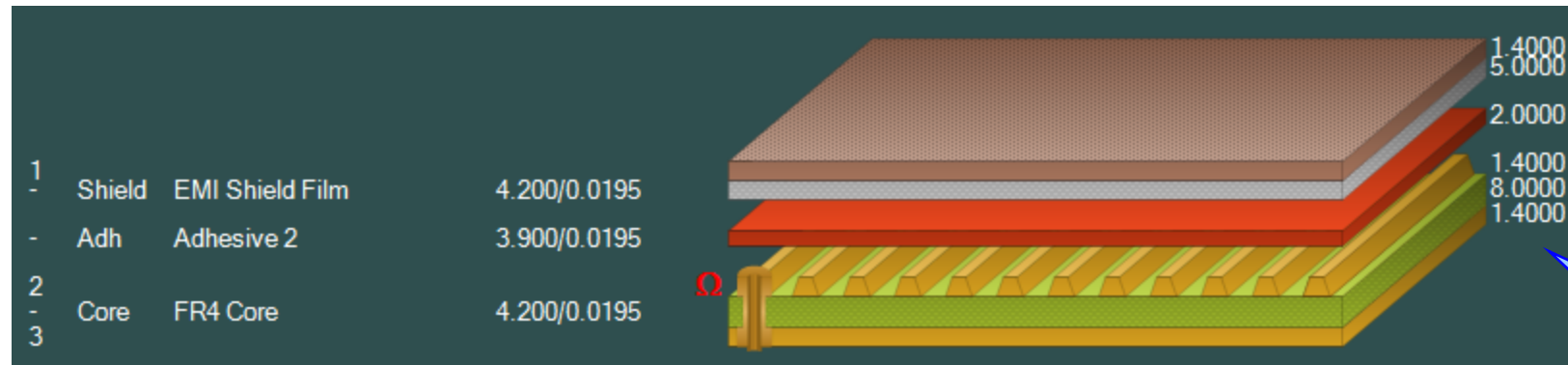


They consist of a shield layer (brown) and dielectric adhesive (silver)

Shield material examples

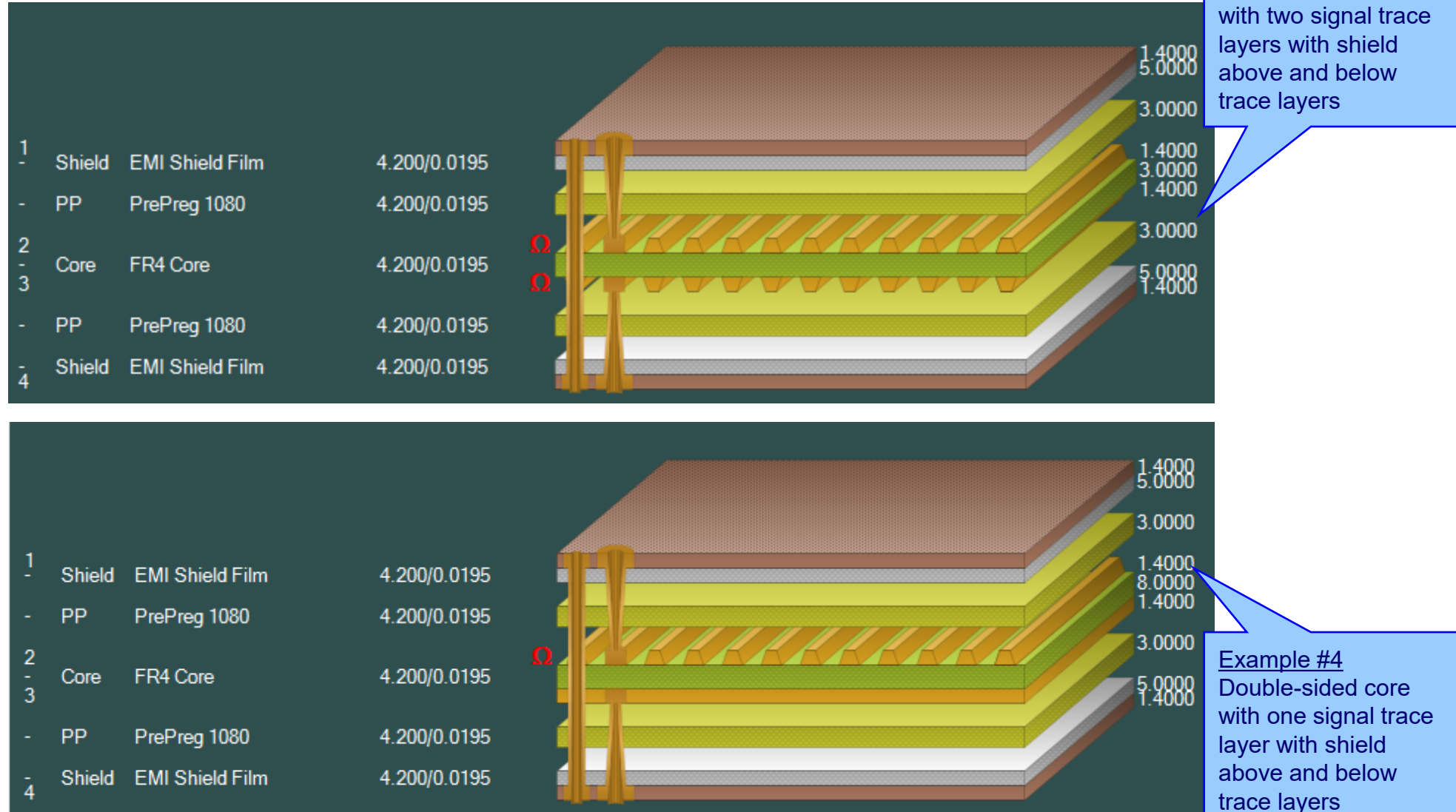


Example #1
Single-sided core,
coverlay above trace,
shield below

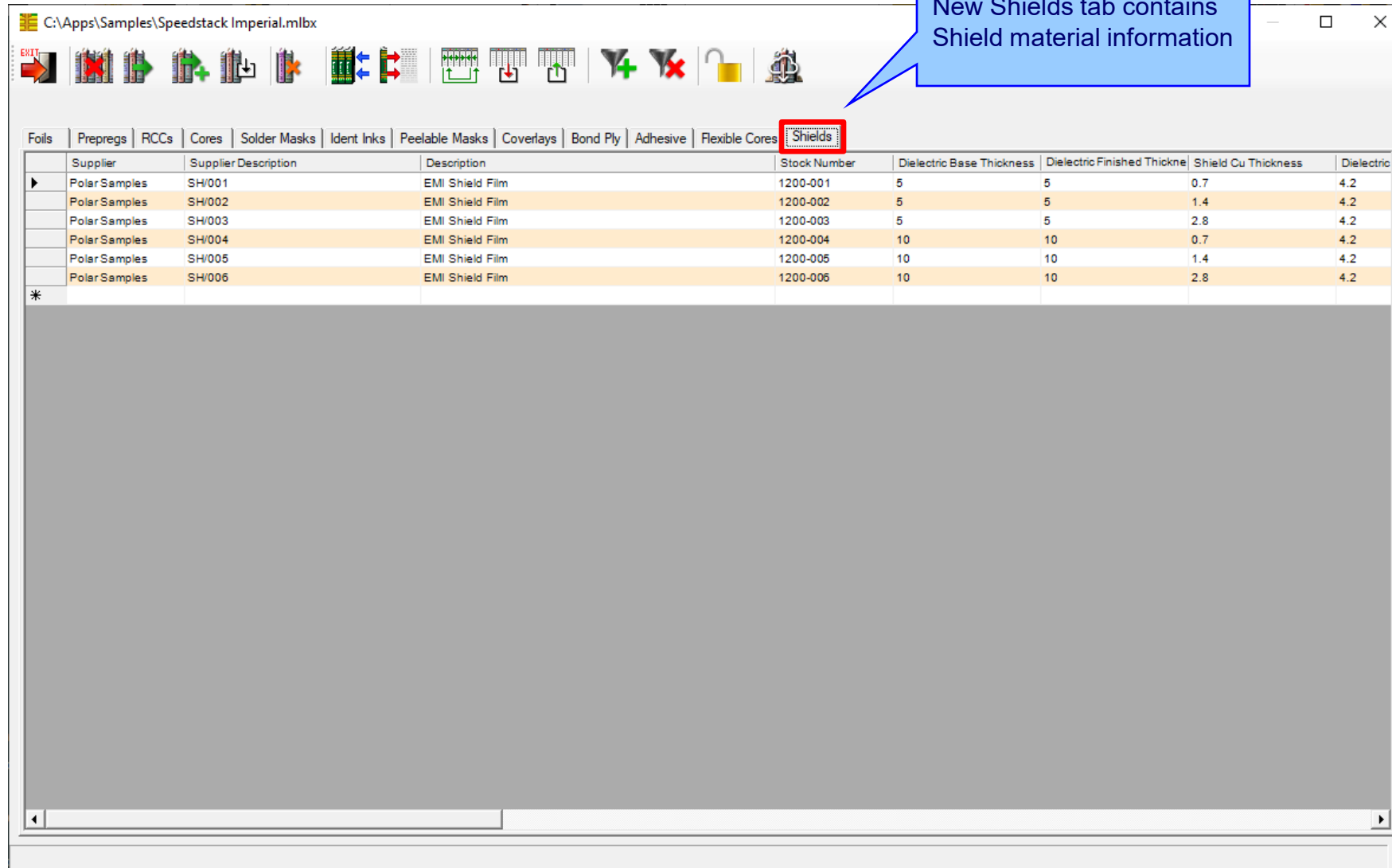


Example #2
Double-sided core,
adhesive and shield
above

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

Material library Edit Shield dialog

Online Library enhanced to support Shield materials

Online Library

Filter by Supplier



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

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

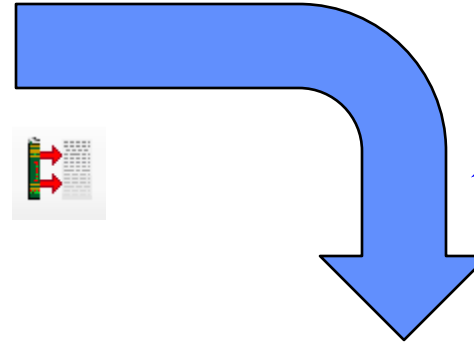
Browse...

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.

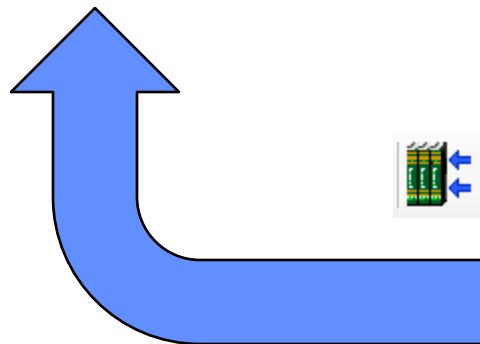
Export / Import Shield library to Excel

C:\Apps\Sample\Speedstack Imperial.mlib

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



Microsoft Excel

FileHomeInsertPage LayoutFormulasDataReviewViewDeveloperTeam

Cut

Copy

Paste

Format Painter

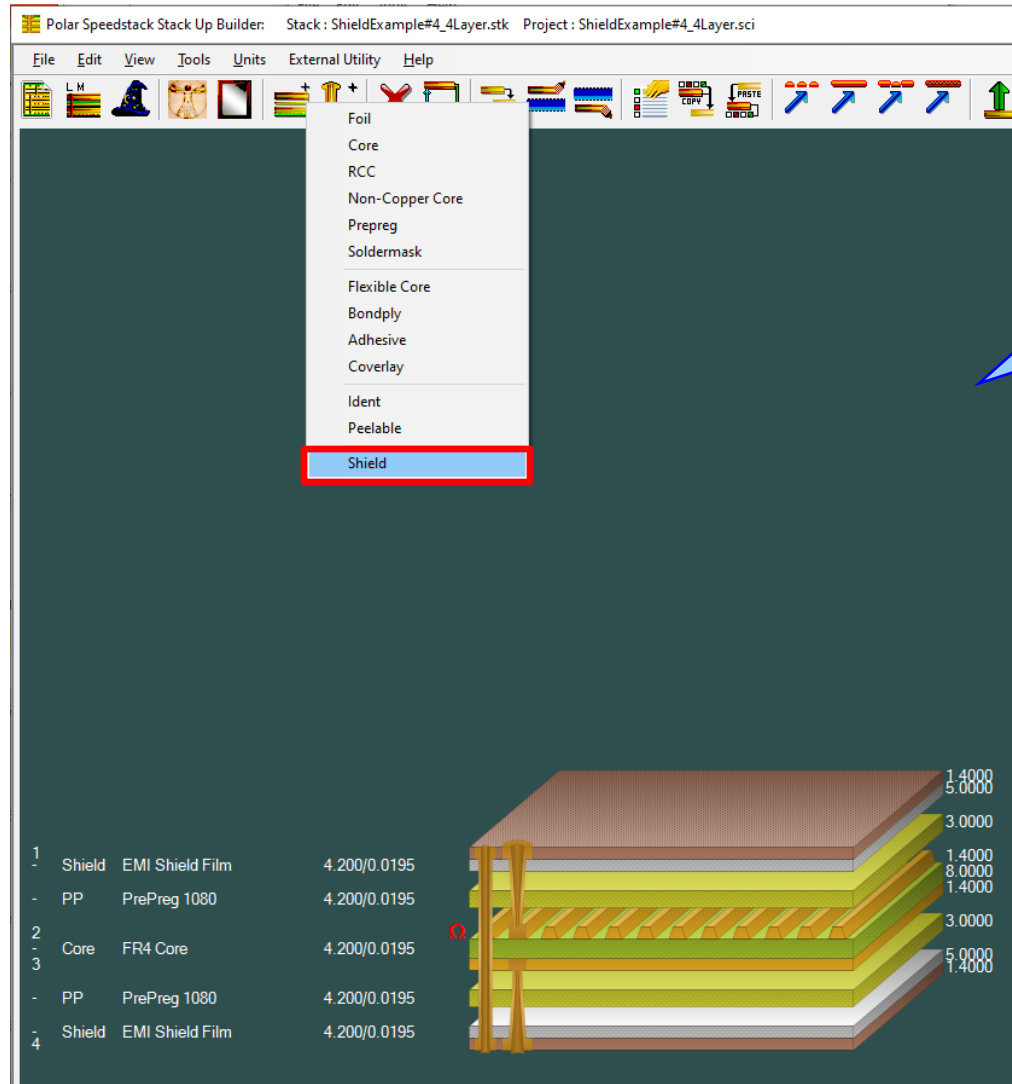
Clipboard

Font

Calibri

11

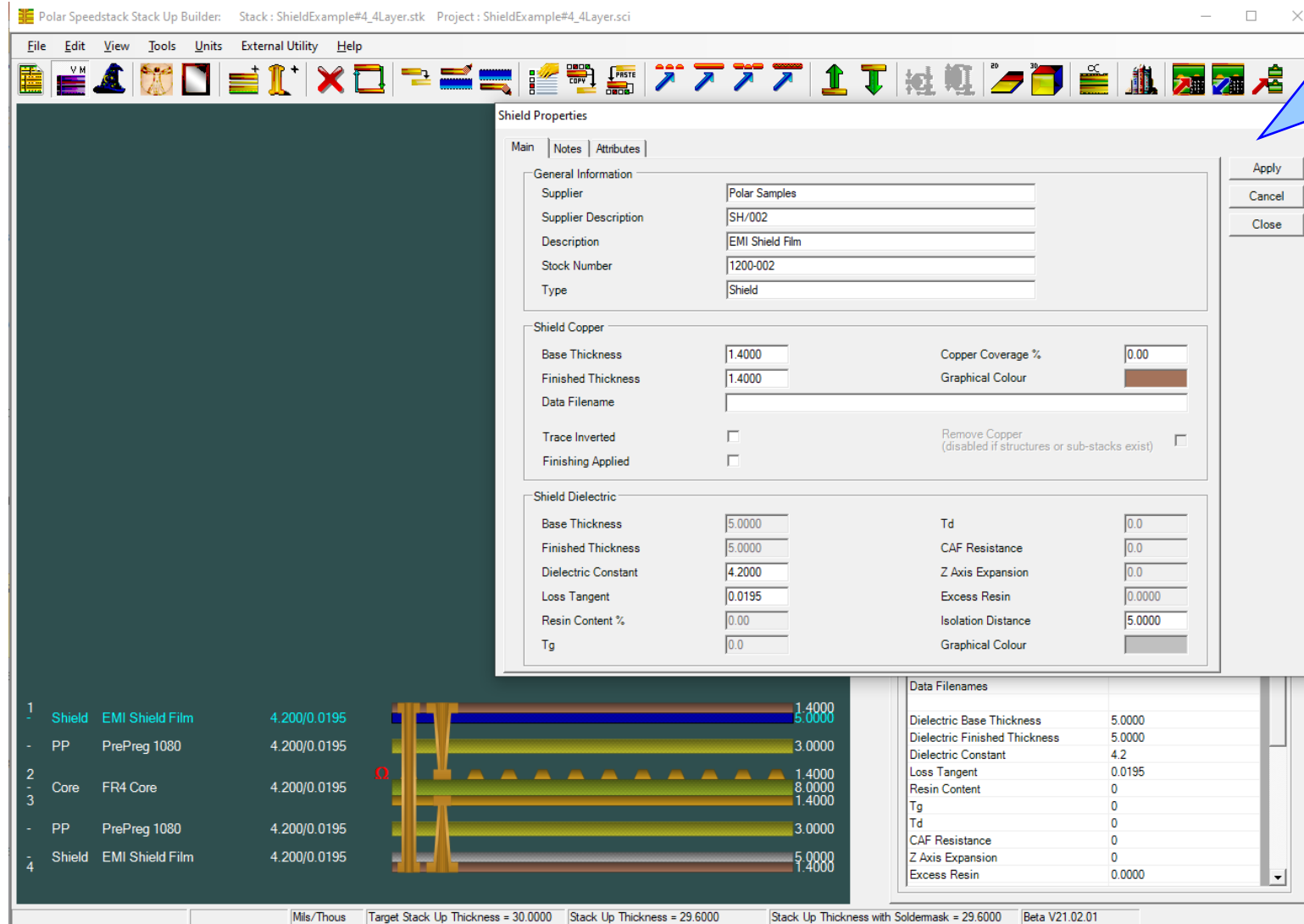
Stack up editor enhancements



Stack Up editor enhancements:

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

Shield properties



Polar Speedstack Stack Up Builder: Stack: ShieldExample#4_4Layer.stk Project: ShieldExample#4_4Layer.sci

File Edit View Tools Units External Utility Help

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:

1 Shield EMI Shield Film 4.200/0.0195 1.4000 5.0000

2 PP PrePreg 1080 4.200/0.0195 3.0000

3 Core FR4 Core 4.200/0.0195 1.4000 8.0000 1.4000

4 PP PrePreg 1080 4.200/0.0195 3.0000

5 Shield EMI Shield Film 4.200/0.0195 5.0000 1.4000

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

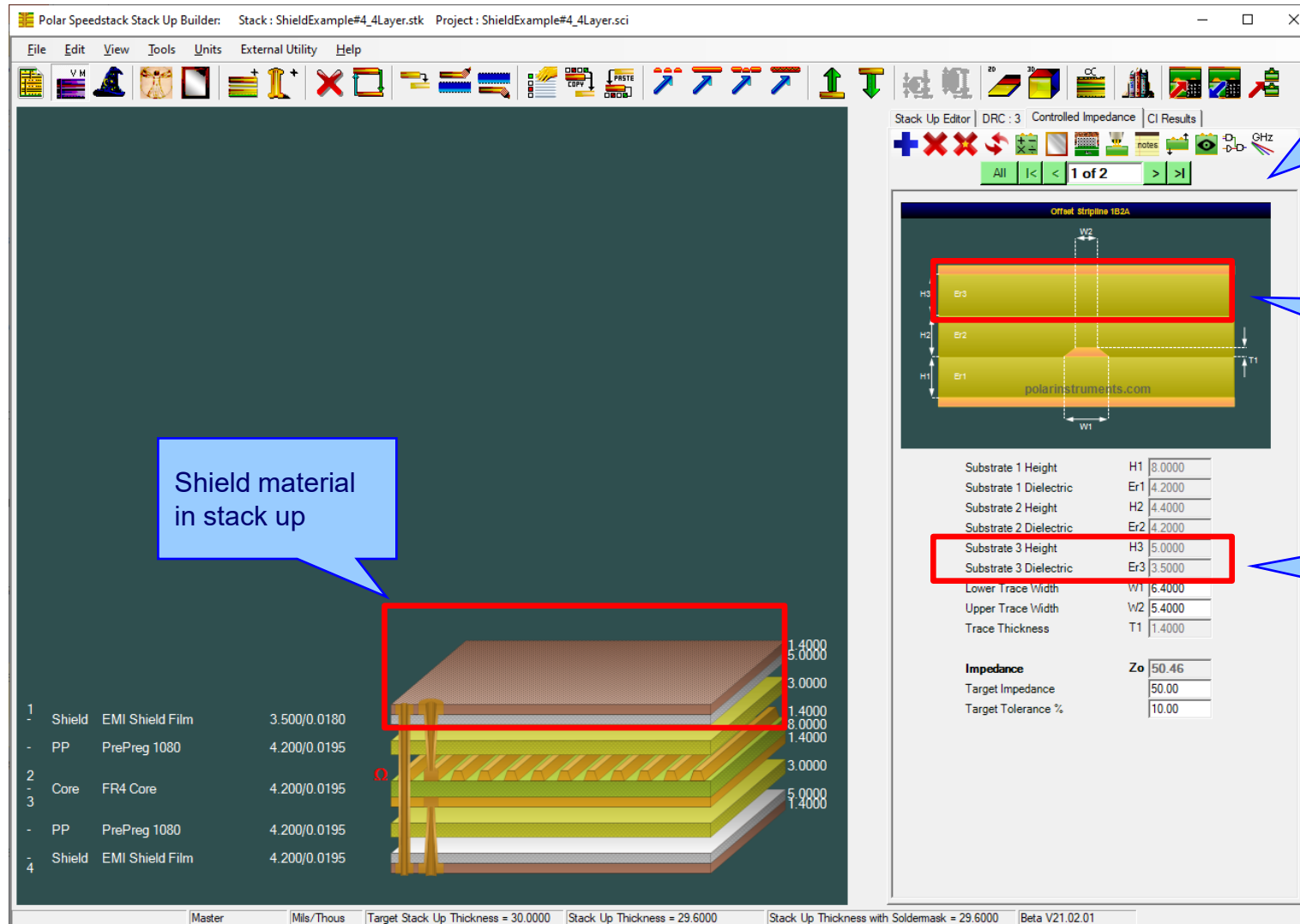
Z Axis Expansion: 0

Excess Resin: 0.0000

Mils/Thous 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 stack up model with a red box highlighting the shield material layer. The left panel lists the stack up layers:

Layer	Material	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
5	Shield EMI Shield Film	4.200/0.0195

The right panel shows the 'Stack Up Editor' with a 'Controlled Impedance' tab. It displays a cross-section diagram of the stack up and a table of parameters:

Parameter	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

The status bar at the bottom shows: Master | Mils/Thous | Target Stack Up Thickness = 30.0000 | Stack Up Thickness = 29.6000 | Stack Up Thickness with Soldermask = 29.6000 | Beta V21.02.01

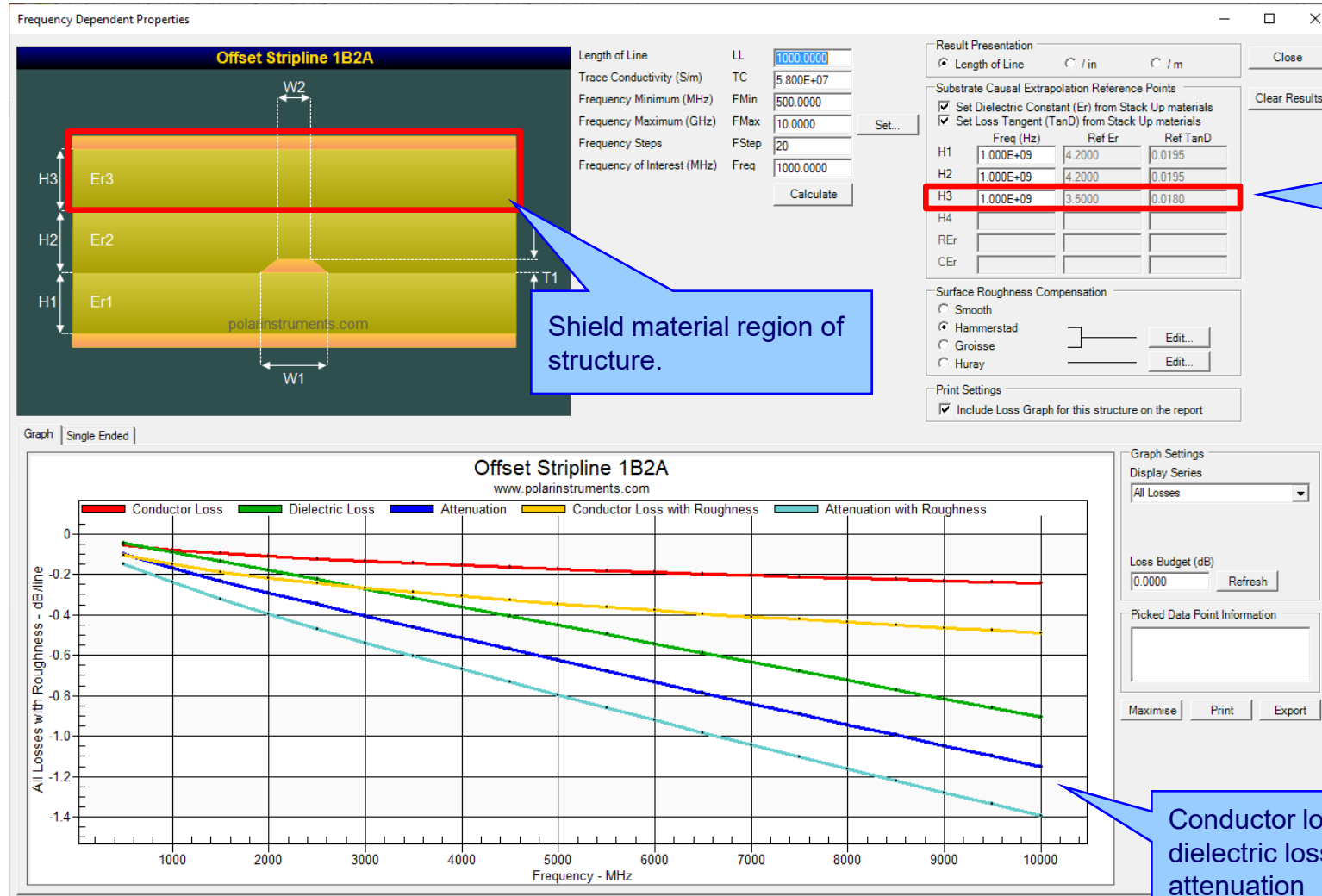
Shield material
in stack up

Impedance and insertion
calculations support the
new Shield material type.

Shield material region of
structure.

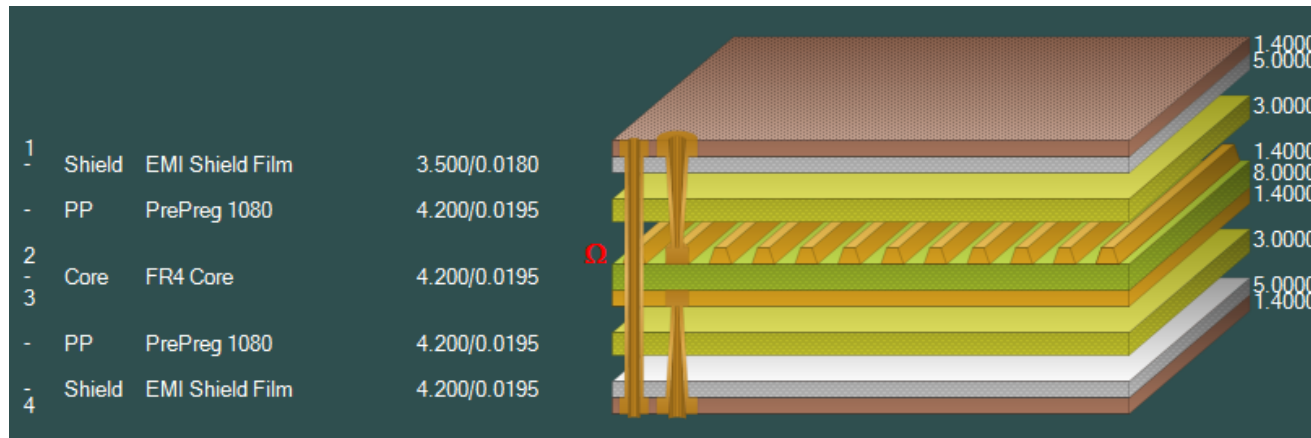
Shield adhesive height /
thickness dimension and
dielectric constant.

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'.

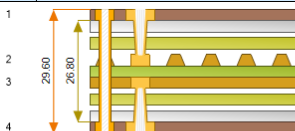


Technical report enhancements

Technical report showing shield materials

Speedstack Report Printer
File Options

C:\Apps\Samples\ShieldExample\5_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	5.000	4.200	0.0195	
					1.400			

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

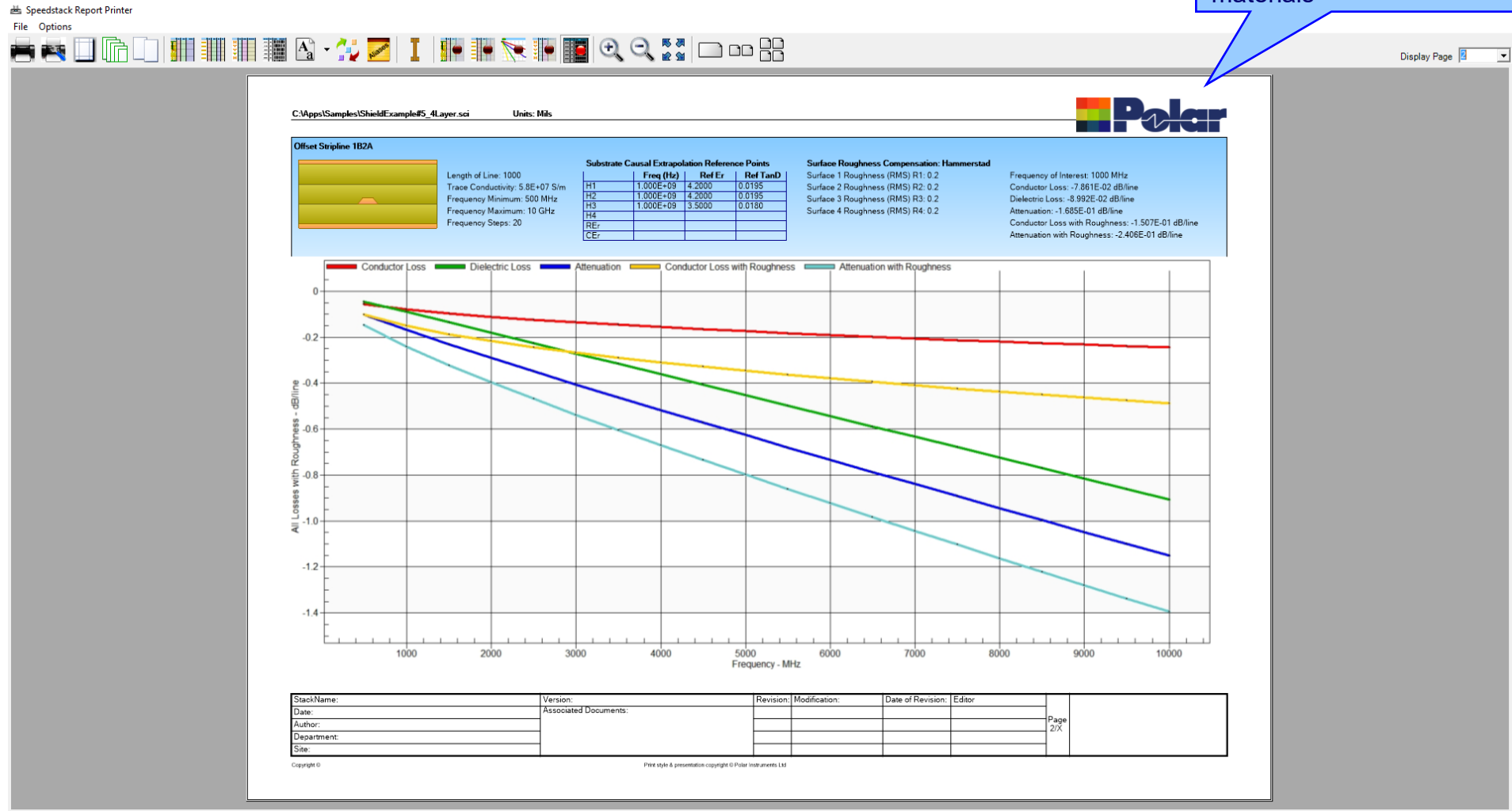
Drill Image	1st Layer	2nd Layer	Column Position	Drill Type
	1	2	2	Laser PTH
	1	4	1	Mechanical PTH
	4	3	2	Laser PTH

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

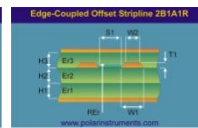
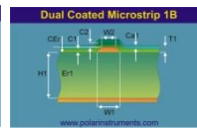
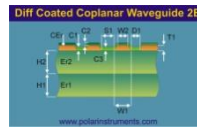
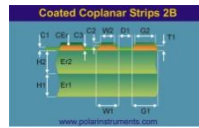
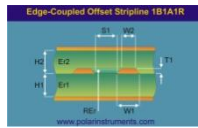
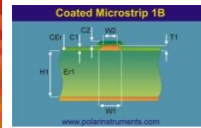
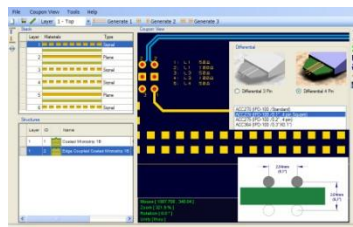
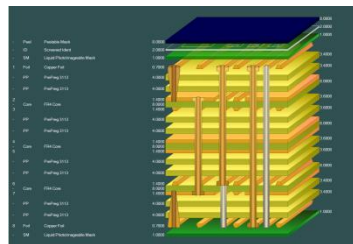
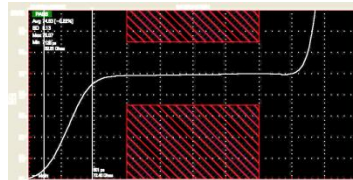
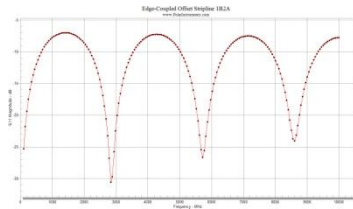
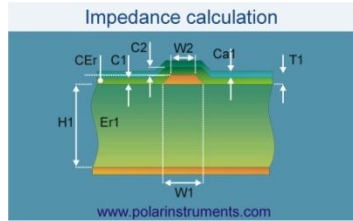
Insertion loss report
supporting shield
materials



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

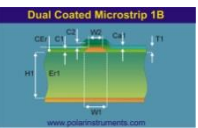
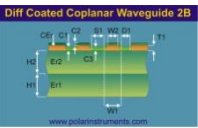
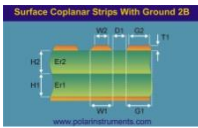
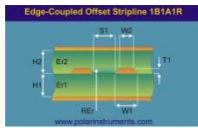
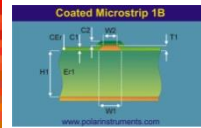
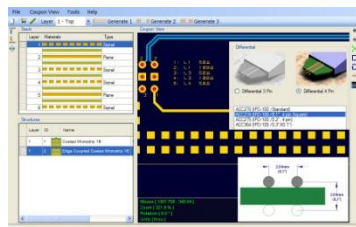
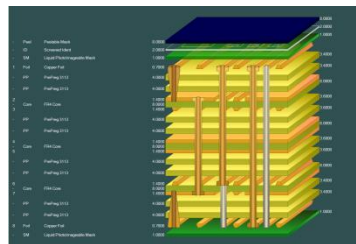
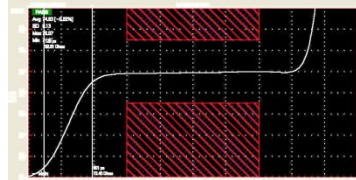
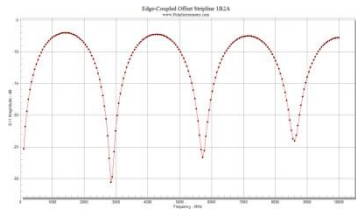
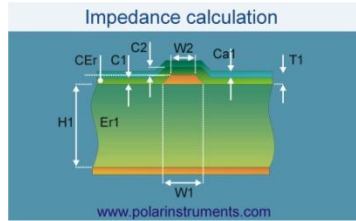


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slide*



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**For more information:
Contact Polar now:**

Phone

USA / Canada / Mexico
Erik Bateham

(503) 356 5270

Asia / Pacific
Terence Chew

+65 6873 7470

UK / Europe
Neil Chamberlain

+44 23 9226 9113

Germany / Austria / Switzerland
Hermann Reischer

+43 7666 20041-0

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