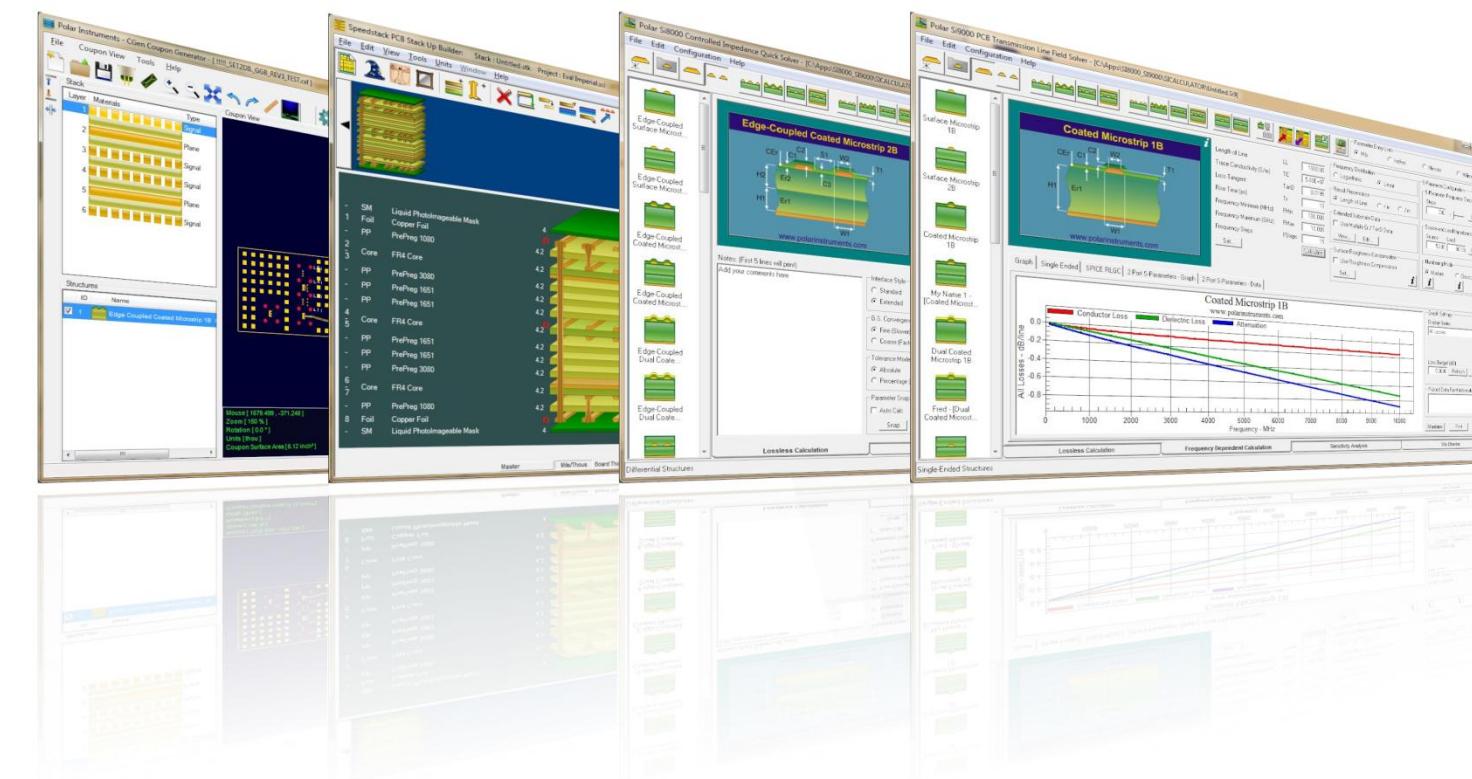


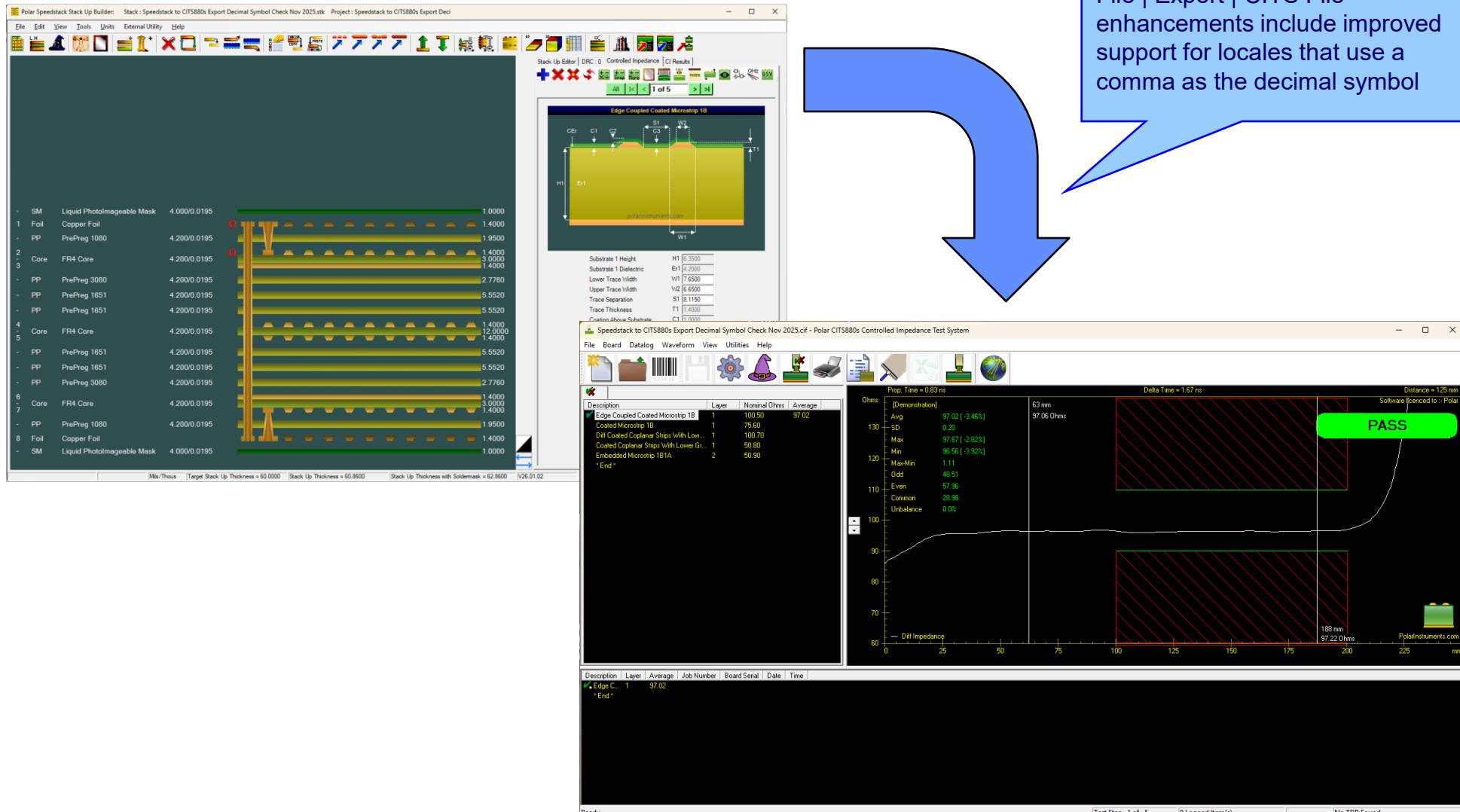
Speedstack 2021 – 2026 Updates

Richard Attrill – Nov 2025 (Rev 20)



Speedstack v26.01.02 (Jan 2026)

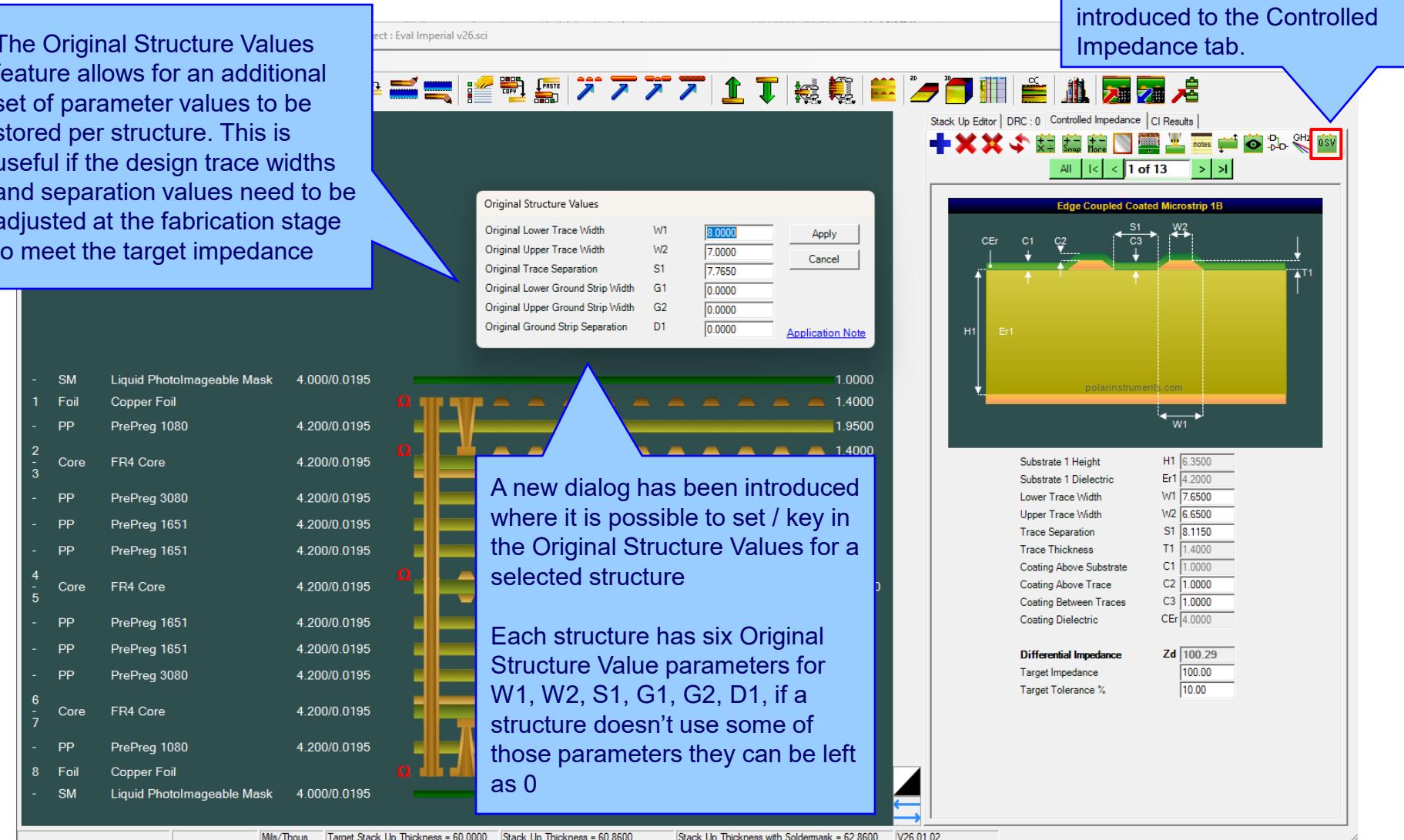
File | Export | CITS File enhancements



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



The screenshot shows the Polar Speedstack software interface. On the left, a stackup table lists various layers: SM (Liquid Photolimageable Mask), Foil (Copper Foil), PP (PrePreg 1080), Core (FR4 Core), PP (PrePreg 3080), PP (PrePreg 1651), PP (PrePreg 1651), Core (FR4 Core), PP (PrePreg 1651), PP (PrePreg 1651), PP (PrePreg 3080), Core (FR4 Core), PP (PrePreg 1080), and Foil (Copper Foil). The target stack up thickness is 60.0000, and the stack up thickness with soldermask is 62.8600. On the right, the 'Controlled Impedance' tab is active, showing the 'Original Structure Values' dialog and the 'Edge Coupled Coated Microstrip 1B' structure. The structure diagram shows various dimensions: H1, Er1, W1, W2, S1, C1, C2, C3, T1, and T2. The 'Original Structure Values' dialog lists parameters: 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 also displays a list of parameters and a 'Differential Impedance' section.

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

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

Parameter	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
Coating Above Trace	C2 1.0000
Coating Between Traces	C3 1.0000
Coating Dielectric	CEr 4.0000

Parameter	Value
Differential Impedance	Zd 100.29
Target Impedance	100.00
Target Tolerance %	10.00

New Original Structure Values feature

Mils

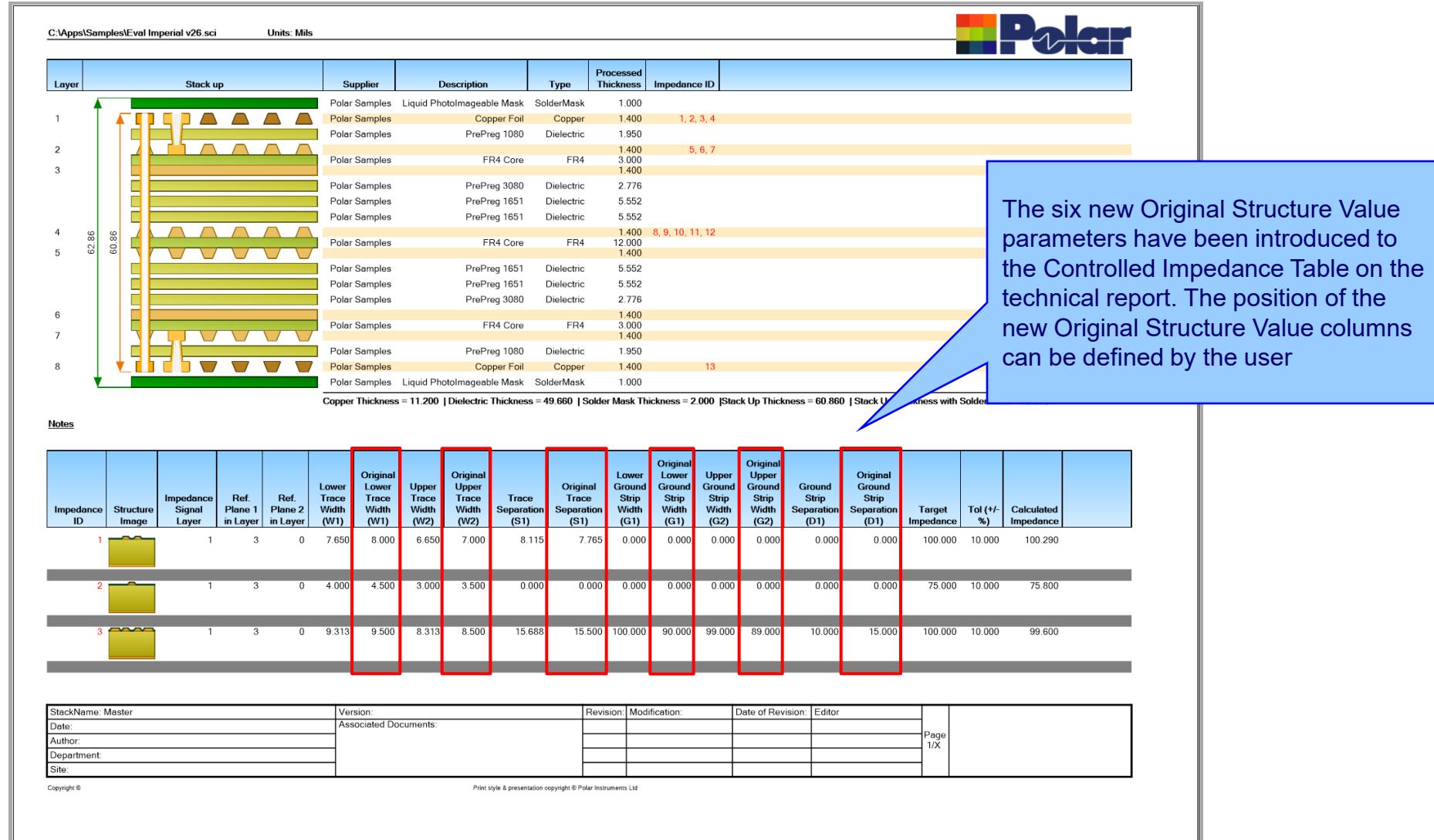
Original Structure Values					
Original Lower Trace Width	W1	8.0000	<input type="button" value="Apply"/>	<input type="button" value="Cancel"/>	Application Note
Original Upper Trace Width	W2	7.0000			
Original Trace Separation	S1	7.7650			
Original Lower Ground Strip Width	G1	0.0000			
Original Upper Ground Strip Width	G2	0.0000			
Original Ground Strip Separation	D1	0.0000			

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	<input type="button" value="Apply"/>	<input type="button" value="Cancel"/>	Application Note
Original Upper Trace Width	W2	177.80			
Original Trace Separation	S1	197.23			
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



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

Polar

Advanced Chip & Circuit Materials

AGC

File Type

Foils
RCCs
PrePreg
Cores
SolderMasks
Ident
Peelables
Coverlays
BondPly
Adhesives
FlexCores
Shields

Library Files Available : ACCM

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

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

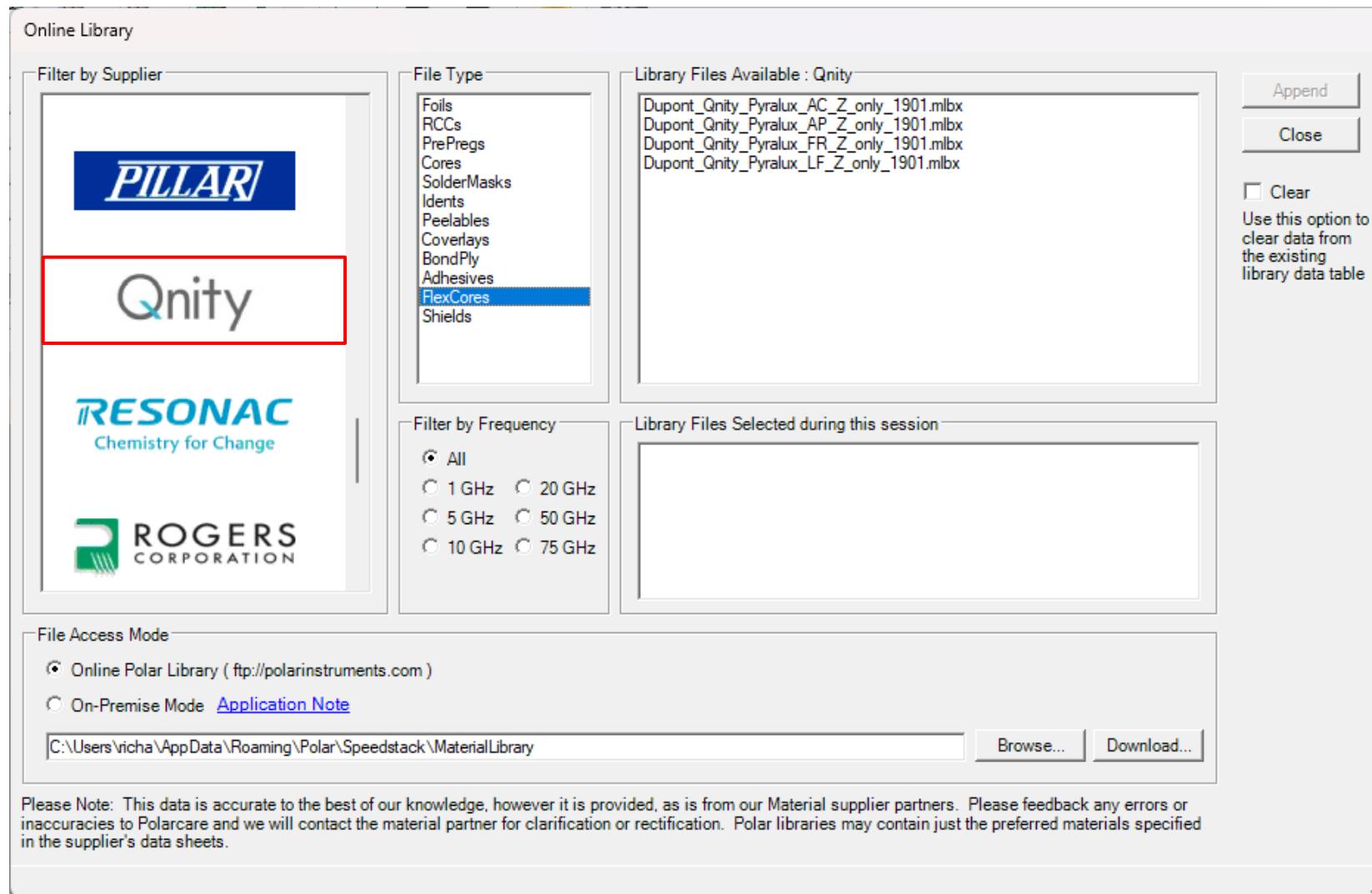
File Access Mode

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

C:\Users\richa\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. Polar libraries may contain just the preferred materials specified in the supplier's data sheets.

Qnity materials added to the Online Library

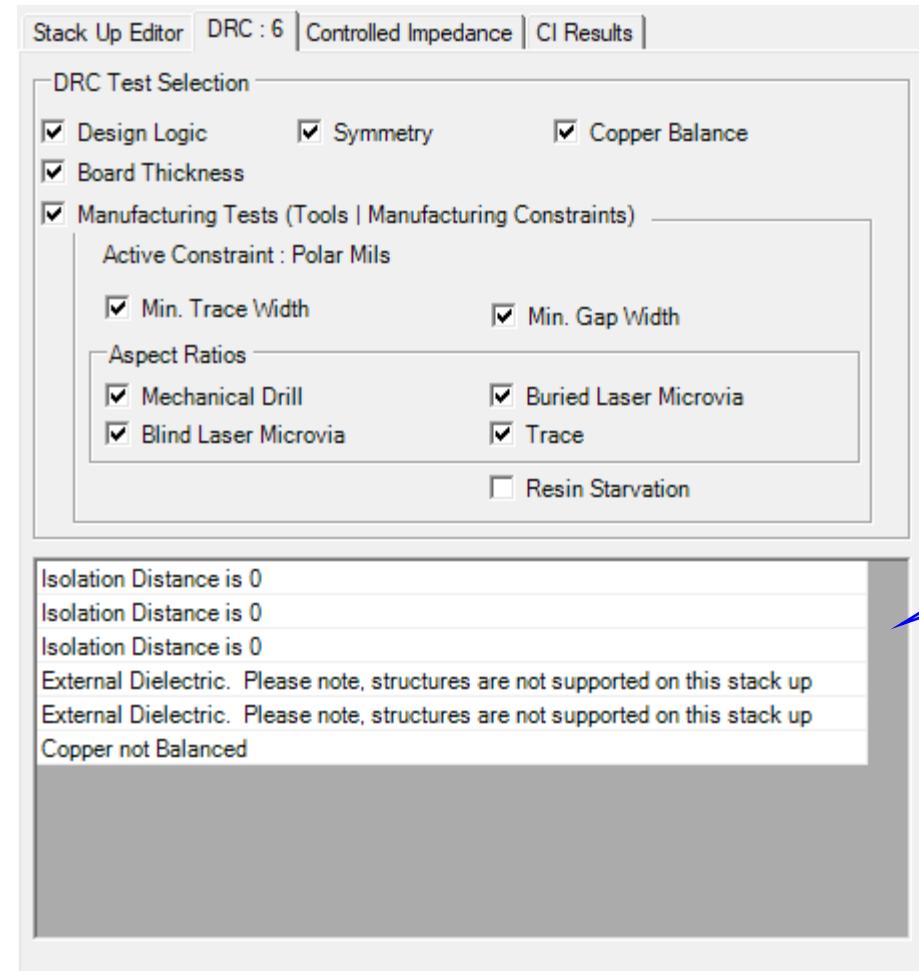


The screenshot shows the 'Online Library' interface with the following components:

- Filter by Supplier:** Displays logos for PILLAR, Qnity (highlighted with a red box), RESONAC, and ROGERS CORPORATION.
- File Type:** A list of material types including Foils, RCCs, PrePreg, Cores, SolderMasks, Idents, Peelables, Coverlays, BondPly, Adhesives, FlexCores (selected), and Shields.
- Library Files Available : Qnity:** A list of available library files:
 - Dupont_Qnity_Pyralux_AC_Z_only_1901.mlx
 - Dupont_Qnity_Pyralux_AP_Z_only_1901.mlx
 - Dupont_Qnity_Pyralux_FR_Z_only_1901.mlx
 - Dupont_Qnity_Pyralux_LF_Z_only_1901.mlx
- Append:** A button to add selected files to the library.
- Close:** A button to close the dialog.
- Clear:** A checkbox with a description: "Use this option to clear data from the existing library data table".
- Filter by Frequency:** Options to select frequency ranges: All, 1 GHz, 5 GHz, 10 GHz, 20 GHz, 50 GHz, and 75 GHz.
- Library Files Selected during this session:** A list box showing selected files.
- File Access Mode:** Options for Online Polar Library (selected) and On-Premise Mode (with a link to Application Note).
- File Path:** A text input field showing the path: C:\Users\richa\AppData\Roaming\Polar\Speedstack\MaterialLibrary, with Browse... and Download... buttons.
- Please Note:** A note stating: "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



The screenshot shows the DRC Test Selection pane with the following checked options:

- Design Logic
- Symmetry
- Copper Balance
- Board Thickness
- Manufacturing Tests (Tools | Manufacturing Constraints)
- Min. Trace Width
- Min. Gap Width
- Mechanical Drill
- Buried Laser Microvia
- Blind Laser Microvia
- Trace

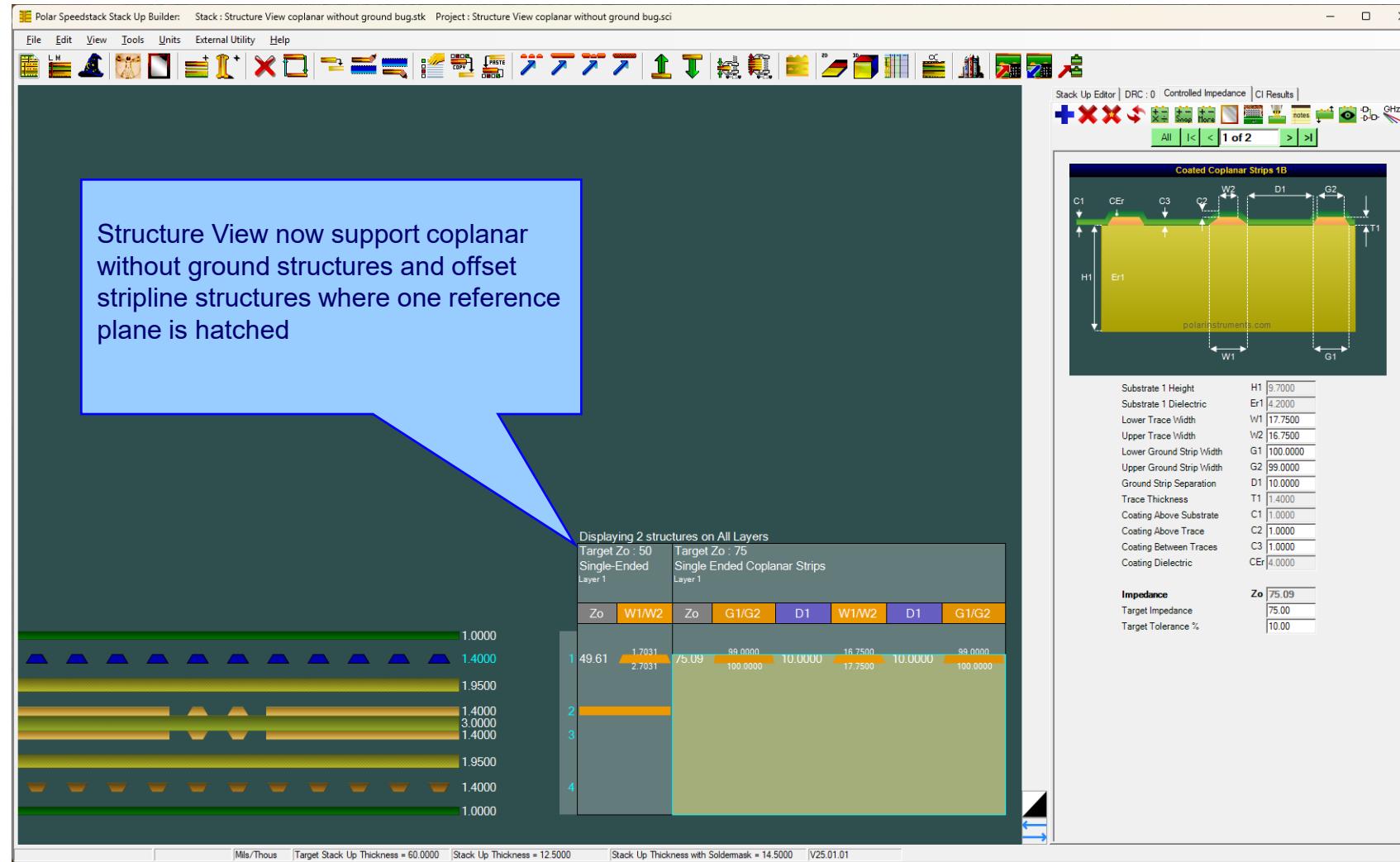
The Messages pane displays the following DRC results:

- 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

A blue callout box points from the text "The Design Rule Check messages have been enhanced. These new messages offer improved guidance to the user" to the list of messages in the pane.

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

Structure View enhancements



Full list of enhancements & fixes included with v25.01.01

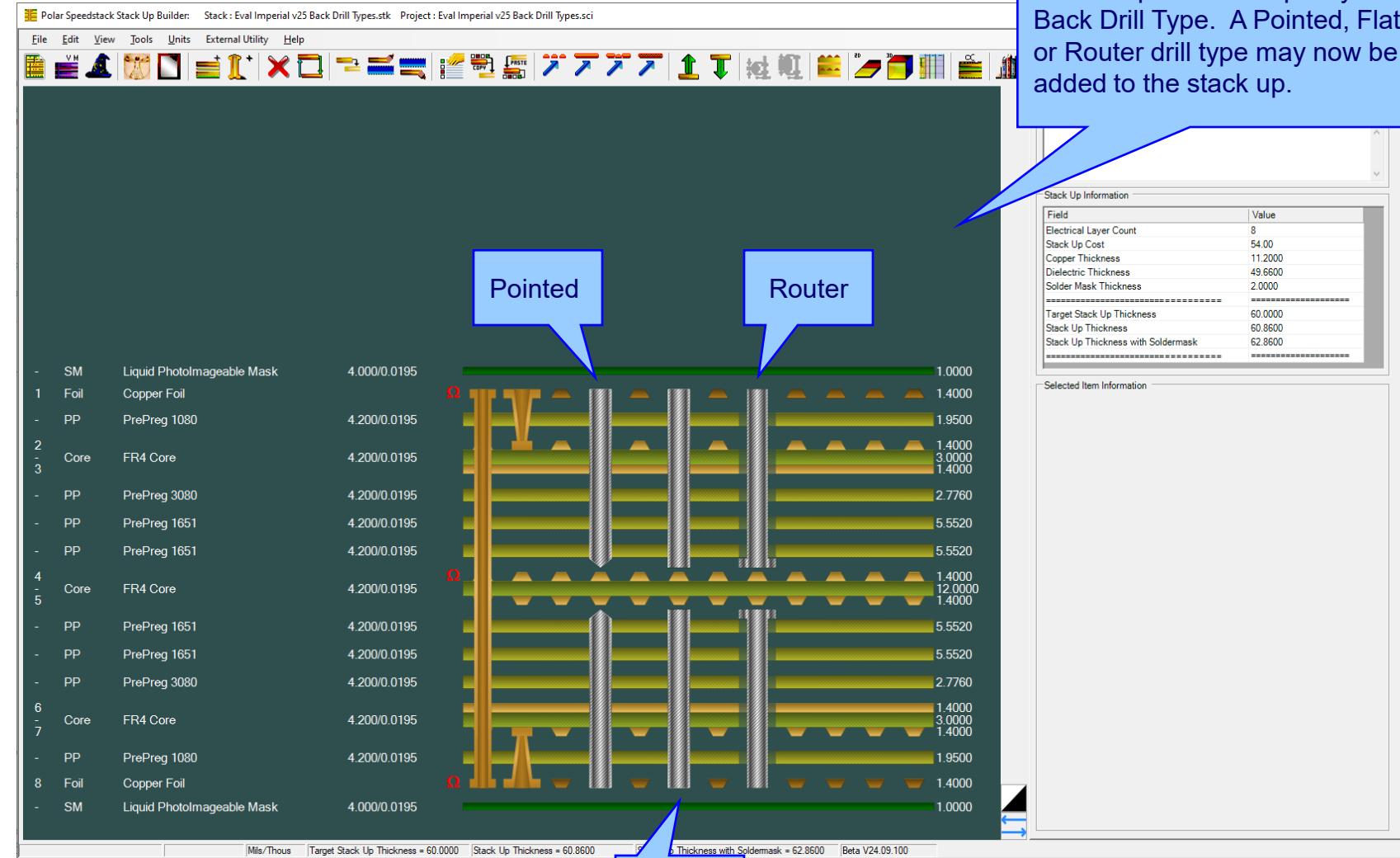
1. Printing: The Solder Mask to Solder Mask dimension arrow now detects when only a single Solder Mask exists and suppresses the dimension arrow when the stack up spans two or more pages
2. Drilling: When adding a drill to a stack that contains just prepregs and no copper layers an exception error was 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

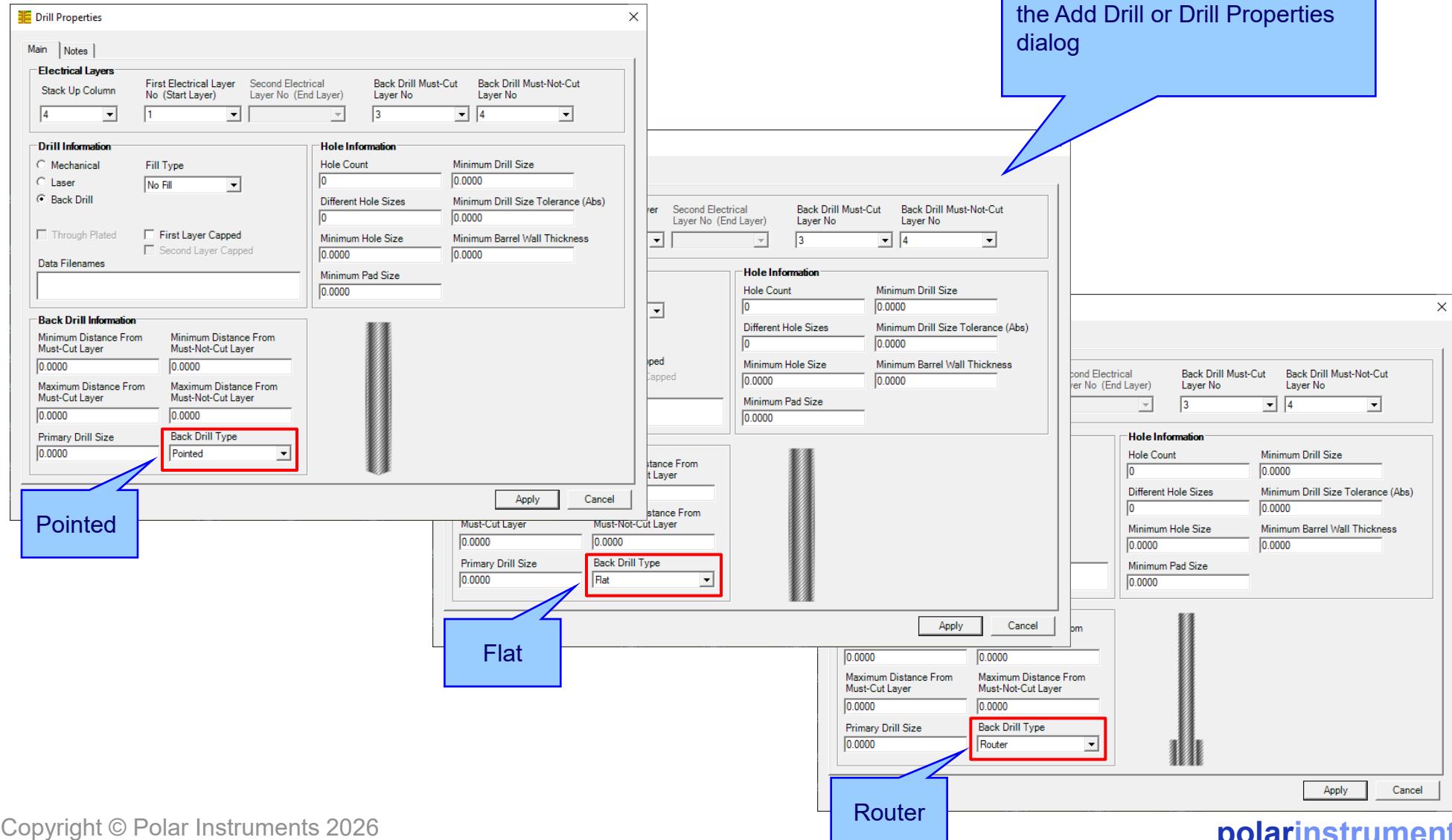
6. Messaging: When the stack up is modified after structures have been added a 'No Valid Mnemonic' message is sometimes displayed. A more detailed explanation of how to resolve the issue is now provided
7. Structure View Graphics: Fixed problem where inverted offset structures when using one hatched 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)

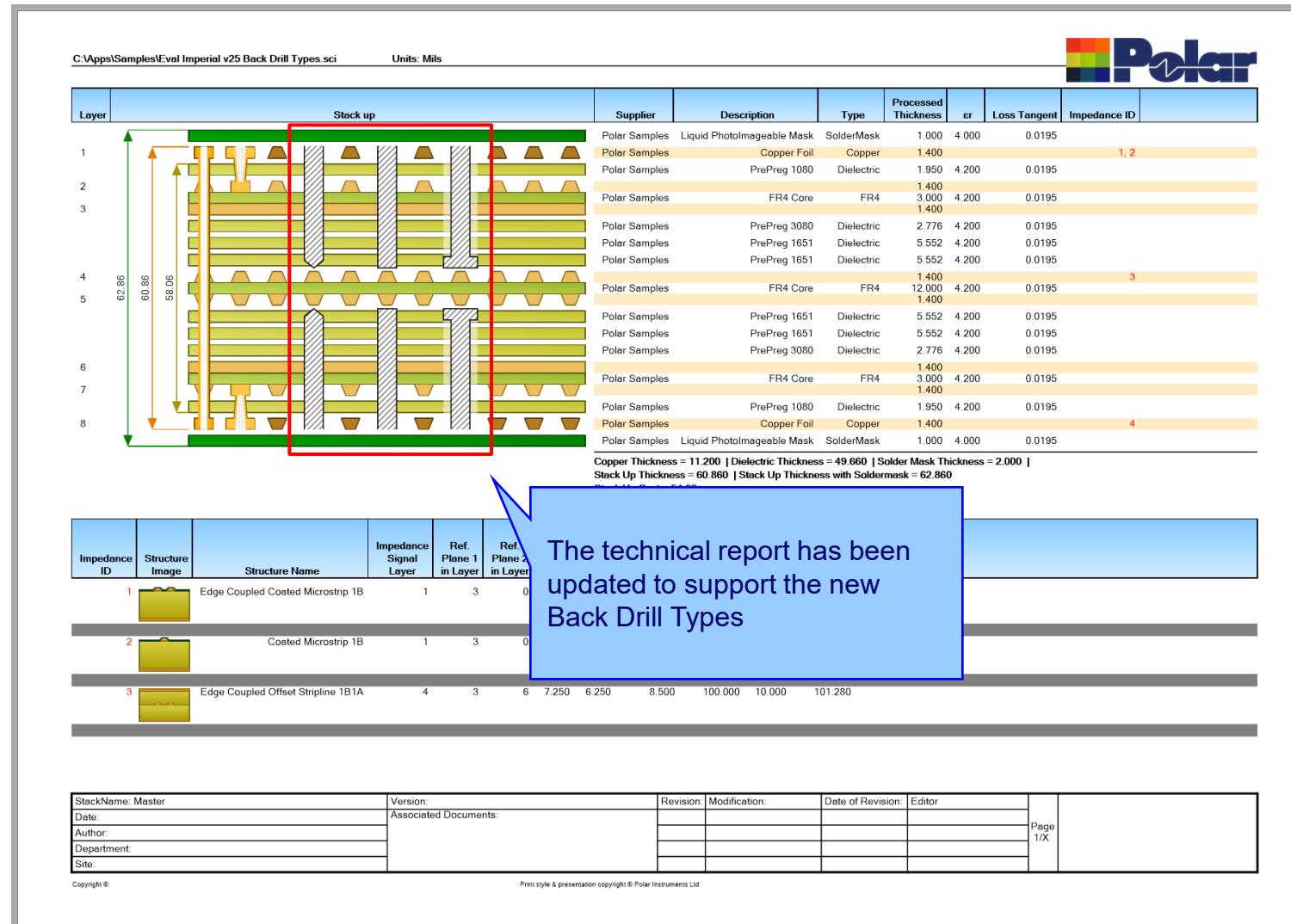
New Back Drill Types – Pointed, Flat and Router



New Back Drill Types – Pointed, Flat and Router



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

Polar

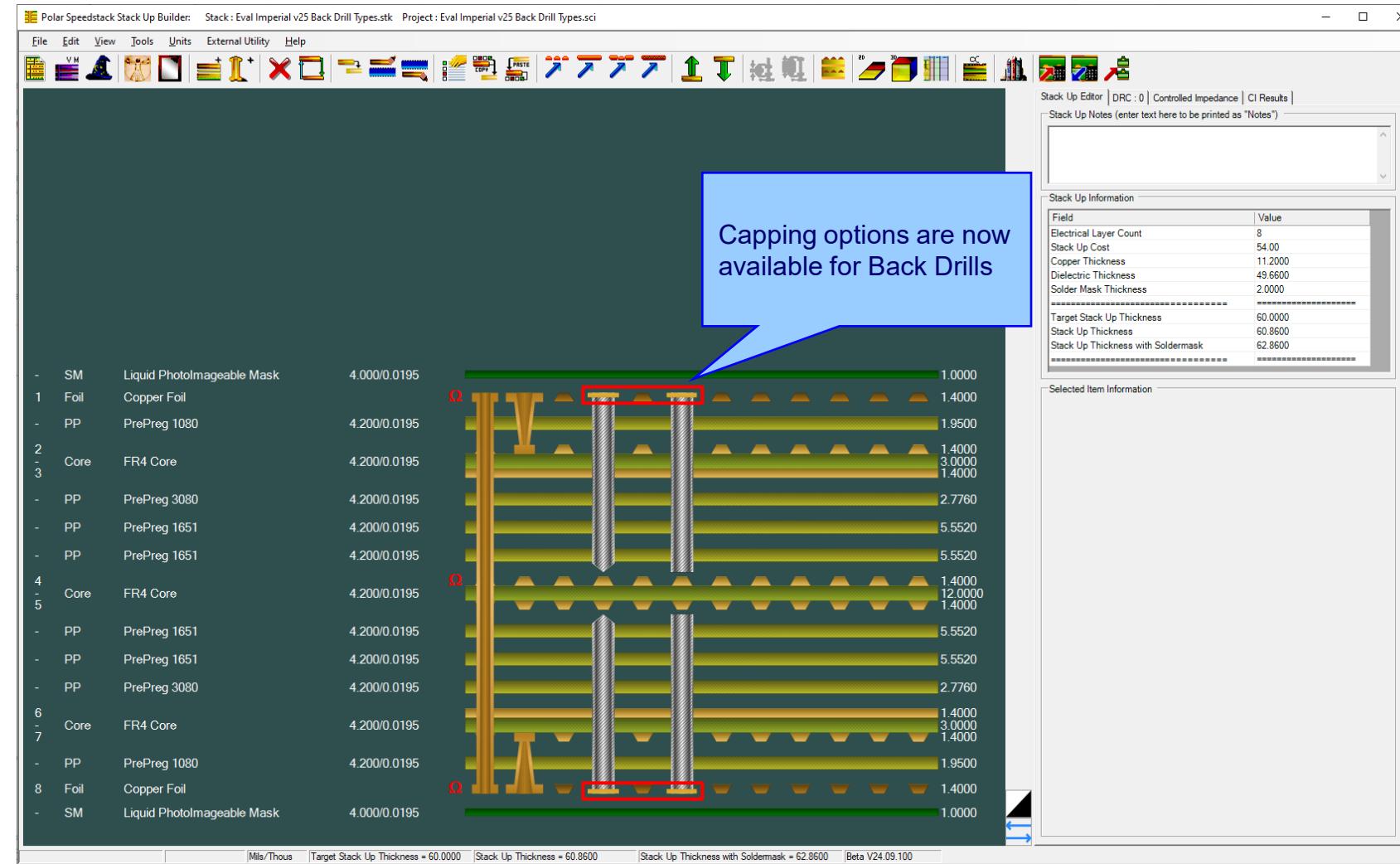
Impedance ID	Structure Image	Structure Name	Impedance Signal Layer	Ref. Plane 1 in Layer	Ref. Plane 2 in Layer	Lower Trace Width (W1)	Upper Trace Width (W2)	Trace Separation (S1)	Target Impedance	Tol (+/- %)	Calculated Impedance
4		Coated Microstrip 1B	8	6	0	4.000	3.000	0.000	75.000	10.000	75.800
2		Laser PTH	1	2	-	0.000	3.350	0.000	0.000	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

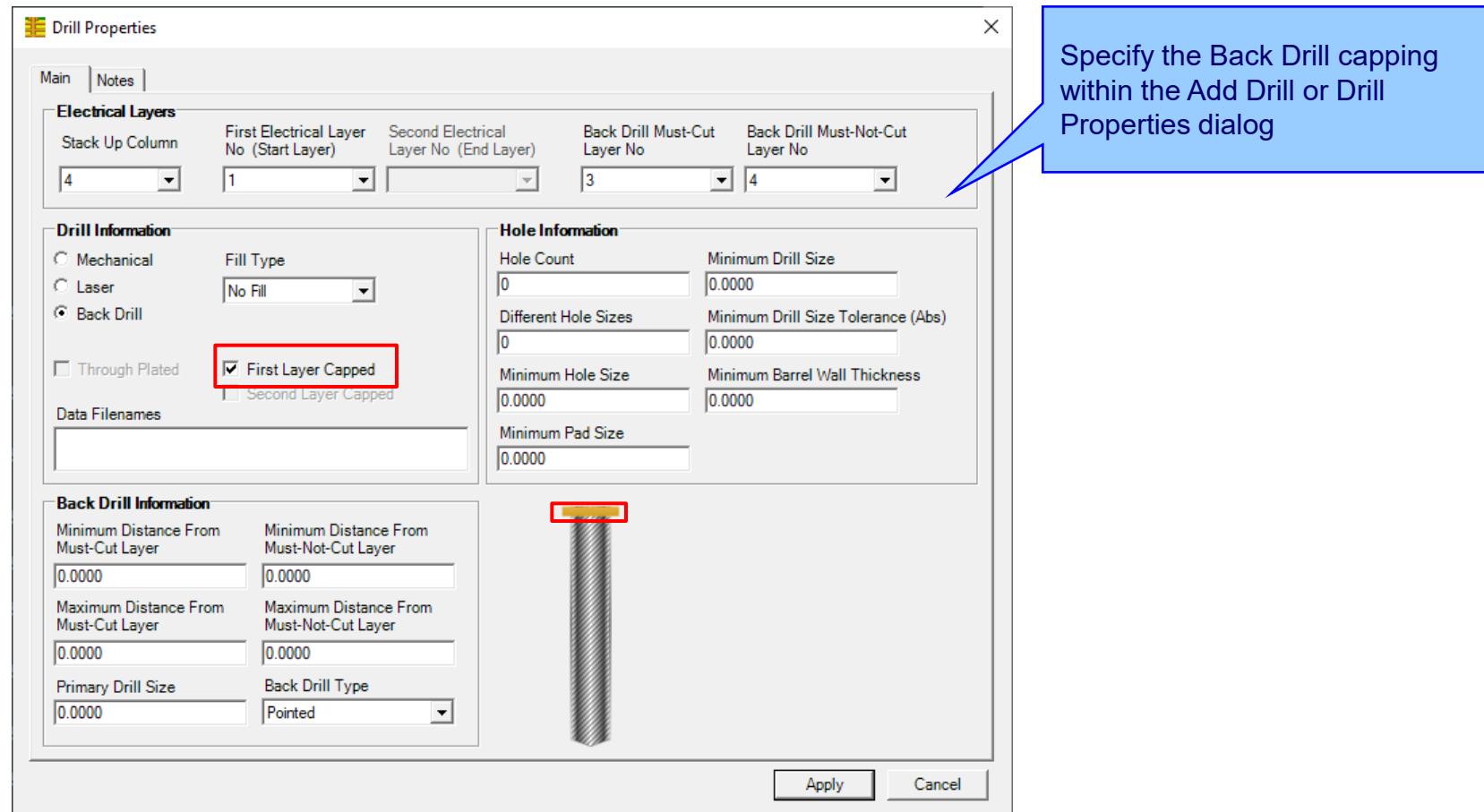
StackName: _____ Version: _____ Revision: _____ Modification: _____ Date of Revision: _____ Editor: _____
Date: _____ Associated Documents: _____
Author: _____
Department: _____
Site: _____
Page 2/X

Copyright © Polar Instruments 2026

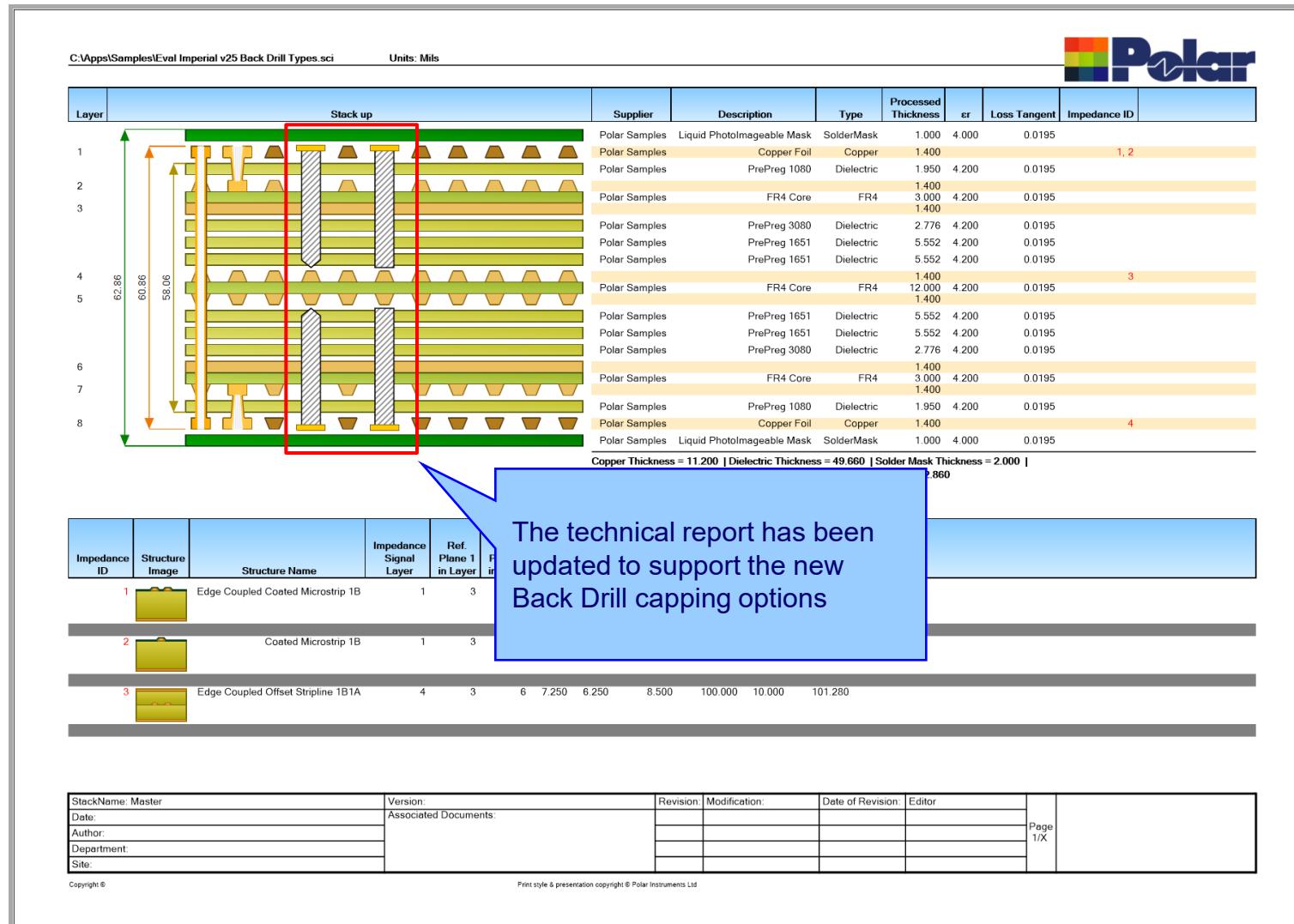
New capping options for Back Drills



New capping options for Back Drills



New capping options for Back Drills



Grid View now supports Copper Coverage Percentage

Grid View

Stack Up Collection Index	Material Class	Material	Electrical Layer	Material Layer Type ID	Layer Name	Description	Processed Thickness	Dielectric Constant	Loss Tangent	Copper Coverage %
0	CSTSolderMask	Mask		SM		Liquid Photomageable Mask	1.0000	4.0000	0.0195	
1	CSTFoil	Copper	1	Foil	Top	Copper Foil				10.00
2	CSTPrePreg	Dielectric		PP		PrePreg				15.00
3	CSTCore	UpperCopper	2		Inner 2					85.00
3	CSTCore	Dielectric		Core		FR4 Core				12.00
3	CSTCore	LowerCopper	3		Inner 3					90.00
4	CSTPrePreg	Dielectric		PP		PrePreg				18.00
5	CSTPrePreg	Dielectric		PP		PrePreg				8.00
6	CSTPrePreg	Dielectric		PP		PrePreg				
7	CSTCore	UpperCopper	4		Inner 4					
7	CSTCore	Dielectric		Core		FR4 Core				
7	CSTCore	LowerCopper	5		Inner 5					
8	CSTPrePreg	Dielectric		PP		PrePreg				
9	CSTPrePreg	Dielectric		PP		PrePreg				
10	CSTPrePreg	Dielectric		PP		PrePreg				
11	CSTCore	UpperCopper	6		Inner 6					
11	CSTCore	Dielectric		Core		FR4 Core	3.0000	4.2000	0.0195	
11	CSTCore	LowerCopper	7		Inner 7					
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 Photomageable Mask	1.0000	4.0000	0.0195	

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

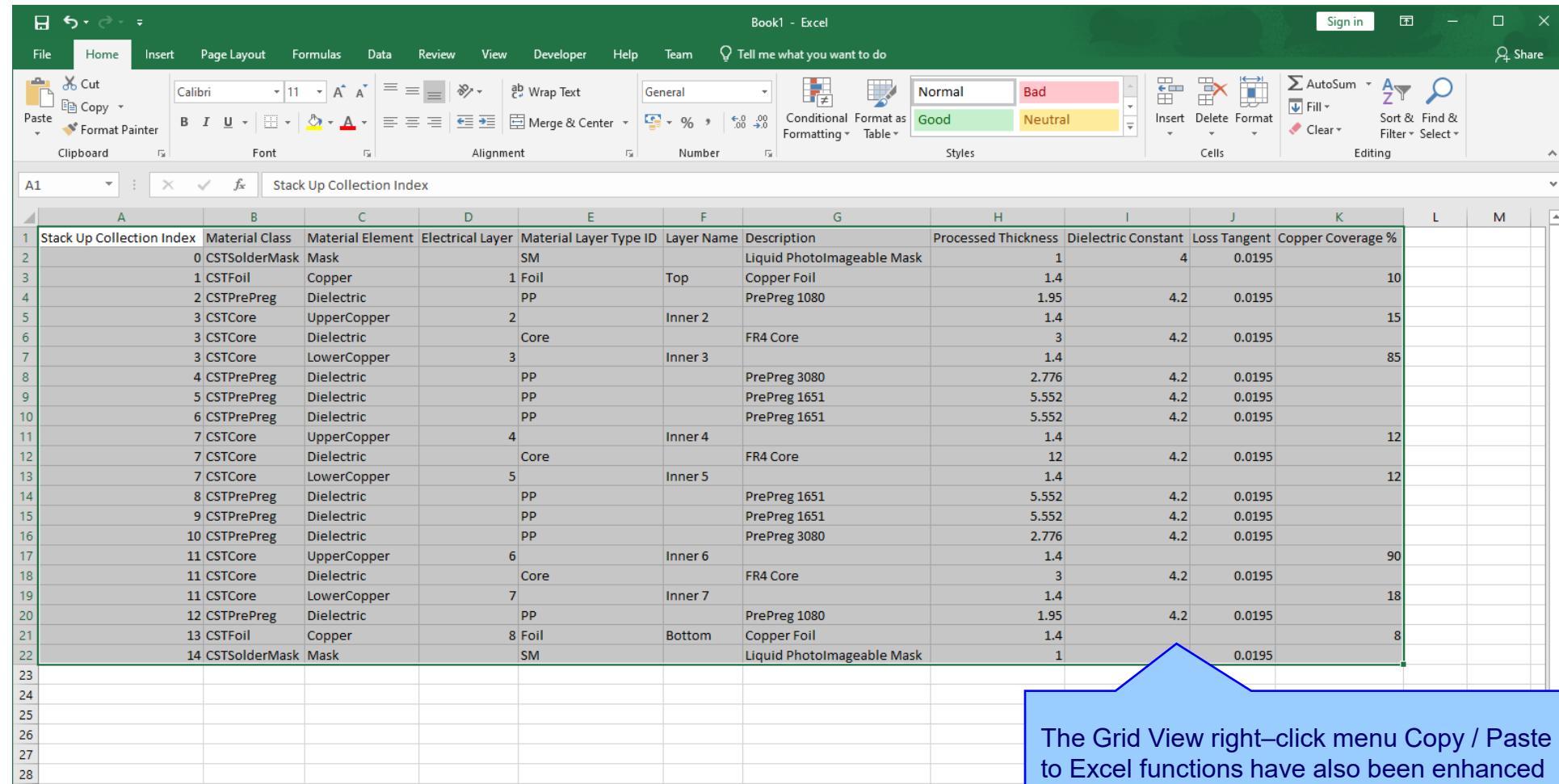
Use the right-click menu to copy / paste the Grid View to the clipboard - the data may then be edited with Microsoft Excel

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

Grid View now supports Copper Coverage Percentage



The screenshot shows a Microsoft Excel spreadsheet titled "Book1 - Excel". The table has the following data:

	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 %
1	0	CSTSolderMask	Mask		SM		Liquid Photolimageable Mask	1	4	0.0195	
2	1	CSTFoil	Copper		1	Foil	Copper Foil	1.4			10
3	2	CSTPrePreg	Dielectric		PP		PrePreg 1080	1.95	4.2	0.0195	
4	3	CSTCore	UpperCopper		2		Inner 2	1.4			15
5	3	CSTCore	Dielectric		Core		FR4 Core	3	4.2	0.0195	
6	3	CSTCore	LowerCopper		3		Inner 3	1.4			85
7	4	CSTPrePreg	Dielectric		PP		PrePreg 3080	2.776	4.2	0.0195	
8	5	CSTPrePreg	Dielectric		PP		PrePreg 1651	5.552	4.2	0.0195	
9	6	CSTPrePreg	Dielectric		PP		PrePreg 1651	5.552	4.2	0.0195	
10	7	CSTCore	UpperCopper		4		FR4 Core	1.4			12
11	7	CSTCore	Dielectric		Core		FR4 Core	12	4.2	0.0195	
12	7	CSTCore	LowerCopper		5		Inner 5	1.4			12
13	8	CSTPrePreg	Dielectric		PP		PrePreg 1651	5.552	4.2	0.0195	
14	9	CSTPrePreg	Dielectric		PP		PrePreg 1651	5.552	4.2	0.0195	
15	10	CSTPrePreg	Dielectric		PP		PrePreg 3080	2.776	4.2	0.0195	
16	11	CSTCore	UpperCopper		6		Inner 6	1.4			90
17	11	CSTCore	Dielectric		Core		FR4 Core	3	4.2	0.0195	
18	11	CSTCore	LowerCopper		7		Inner 7	1.4			18
19	12	CSTPrePreg	Dielectric		PP		PrePreg 1080	1.95	4.2	0.0195	
20	13	CSTFoil	Copper		8	Foil	Copper Foil	1.4			8
21	14	CSTSolderMask	Mask		SM		Liquid Photolimageable Mask	1		0.0195	
22											
23											
24											
25											
26											
27											
28											

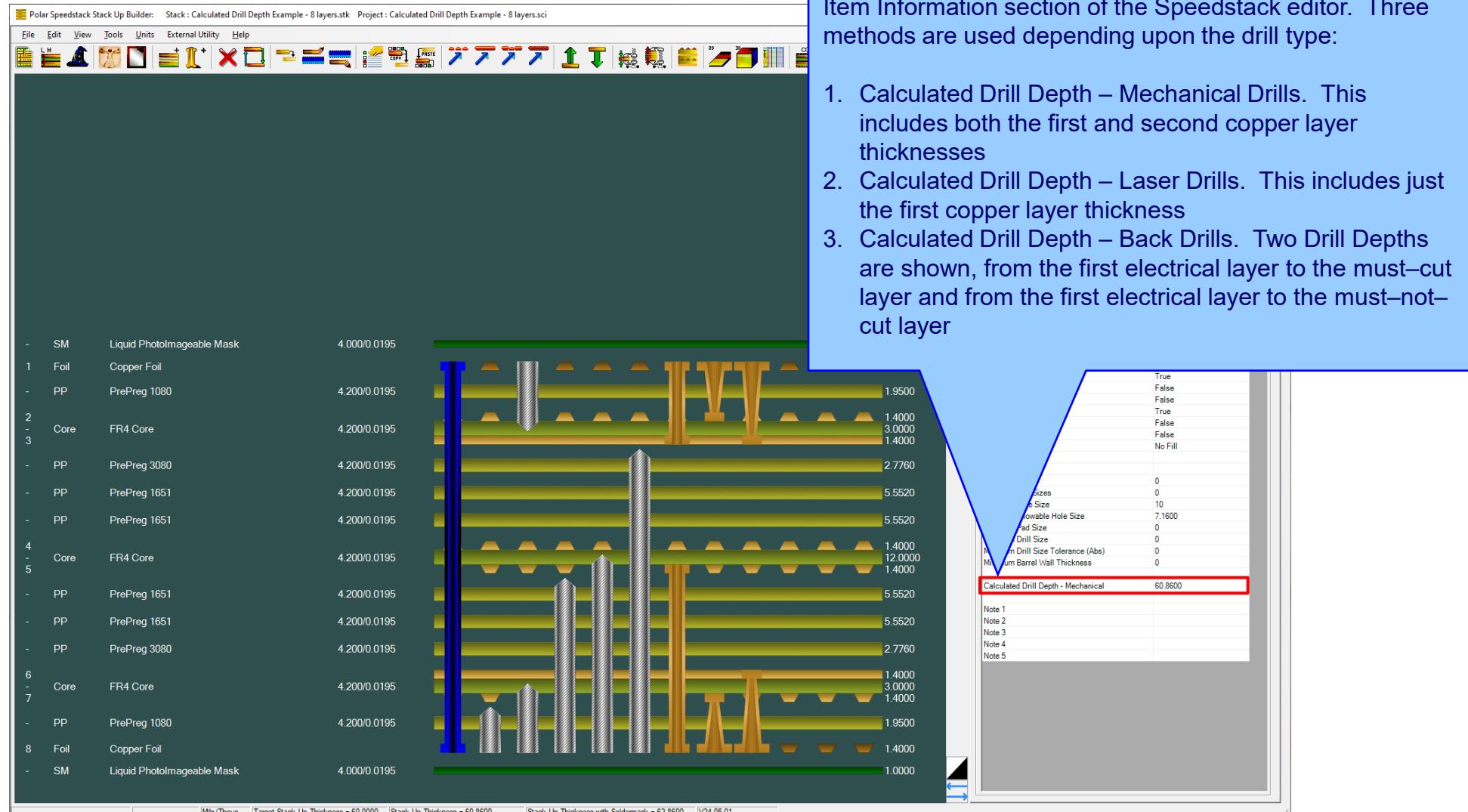
The Grid View right-click menu Copy / Paste to Excel functions have also been enhanced to support Copper Coverage Percentage

Other enhancements

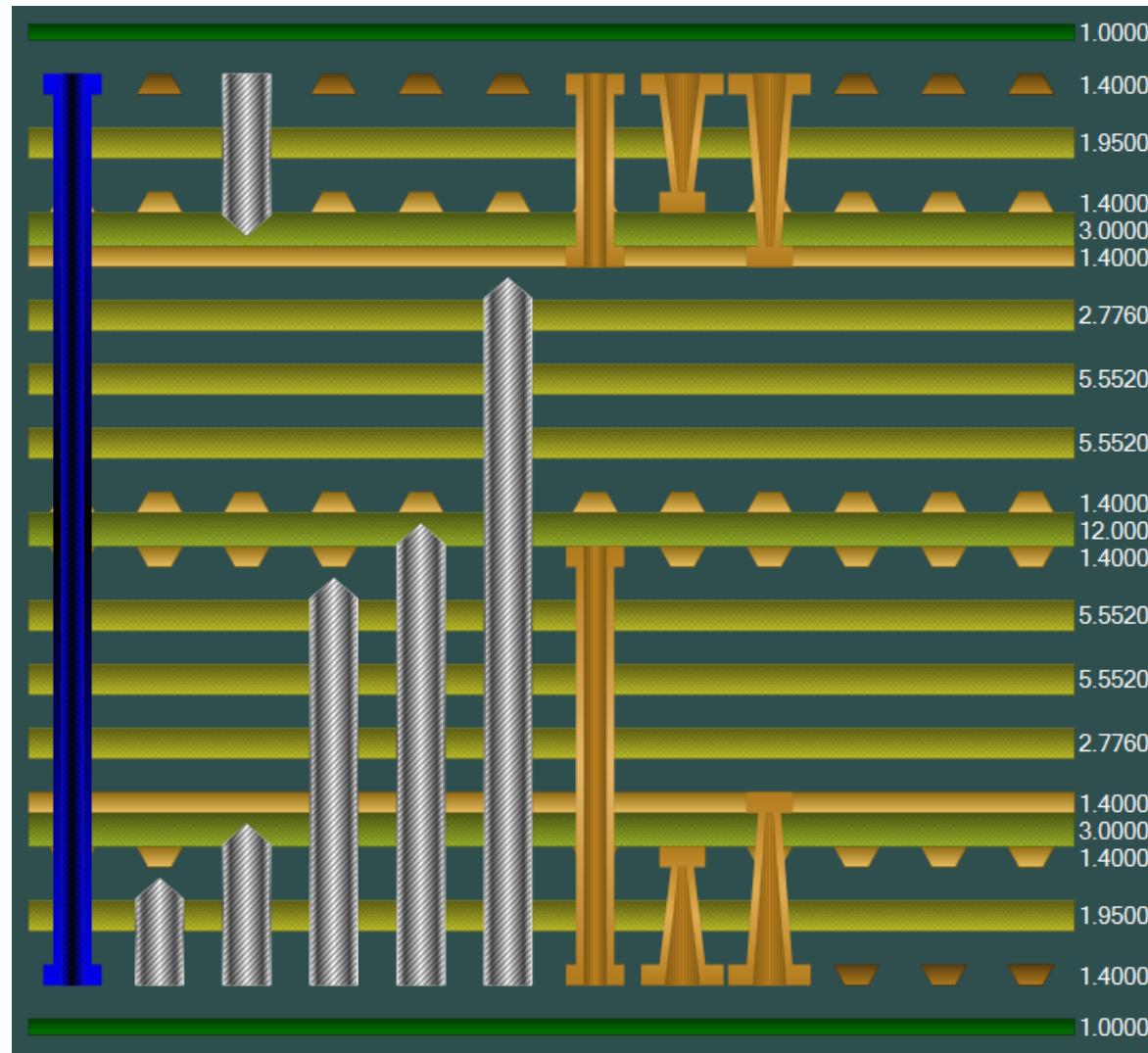
- New import / export XML STKX v25.00 and SSX v15.00 file formats to support the new Back Drill Type and Capped Drill options.
- Drilling: When the Add Drill and Drill Properties dialogs are dismissed the current pan position is now retained. Previously, on high layer stack ups, the graphical image panned 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



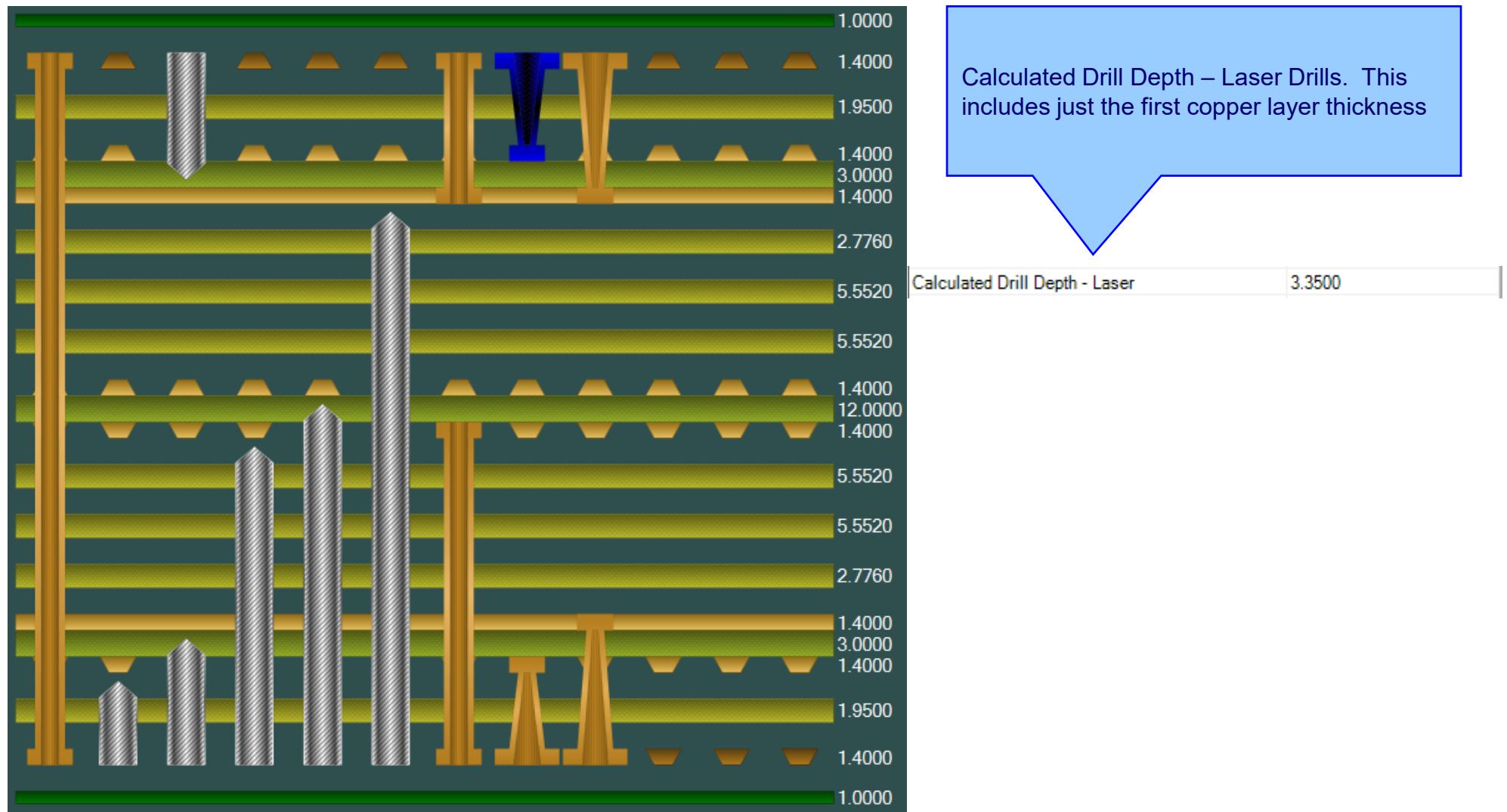
New Calculated Drill Depth – Mechanical Drills



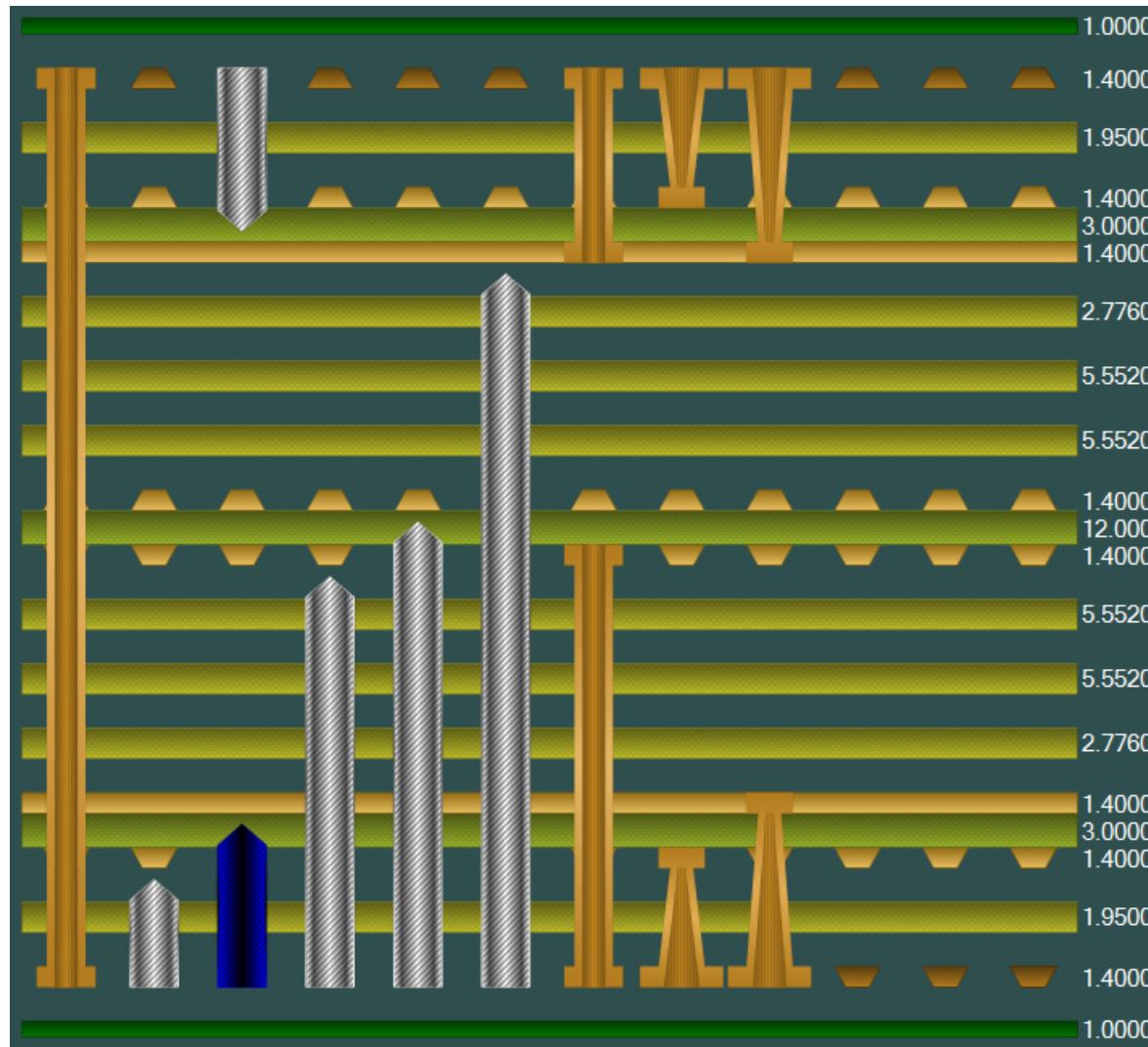
Calculated Drill Depth – Mechanical Drills.
This includes both the first and second
copper layer thicknesses

Calculated Drill Depth - Mechanical 60.8600

New Calculated Drill Depth – Laser Drills



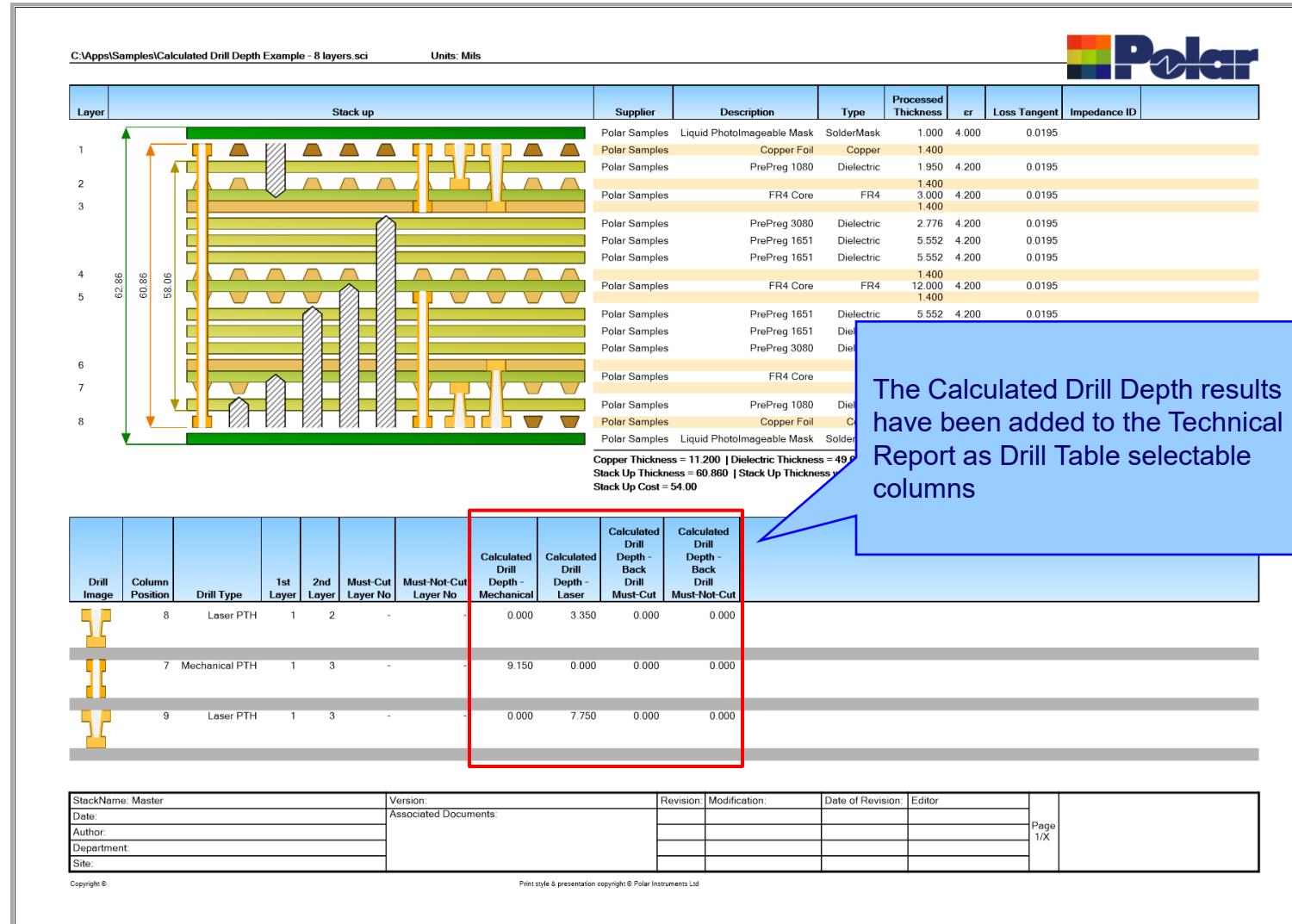
New Calculated Drill Depth – Back Drills



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

Polar

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	-	2	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

StackName: Version: Revision: Modification: Date of Revision: Editor: Page 2/X

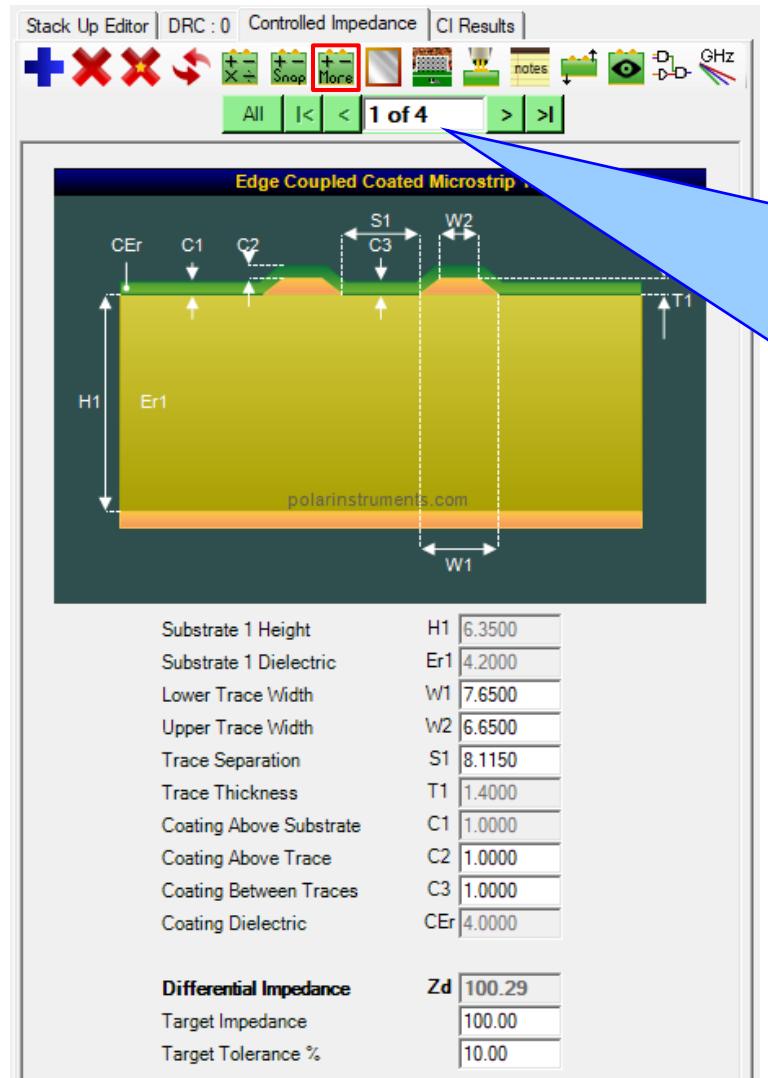
Date: Associated Documents: Author: Department: Site:

Copyright © Polar Instruments 2026 Print style & presentation copyright © Polar Instruments Ltd

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

Speedstack v24.04.08 (April 2024)

New Structure More Calculations option



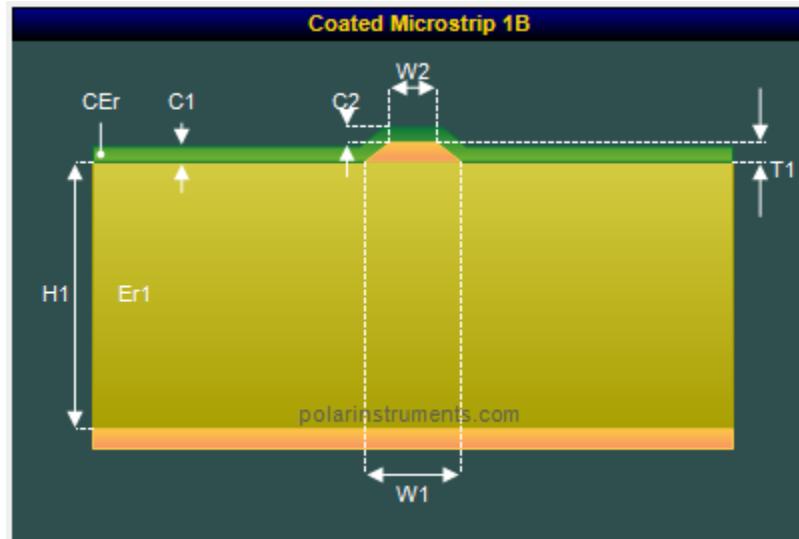
On the structure toolbar there is a new More Calculations button. On selecting this option the following field solver results will be calculated:

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

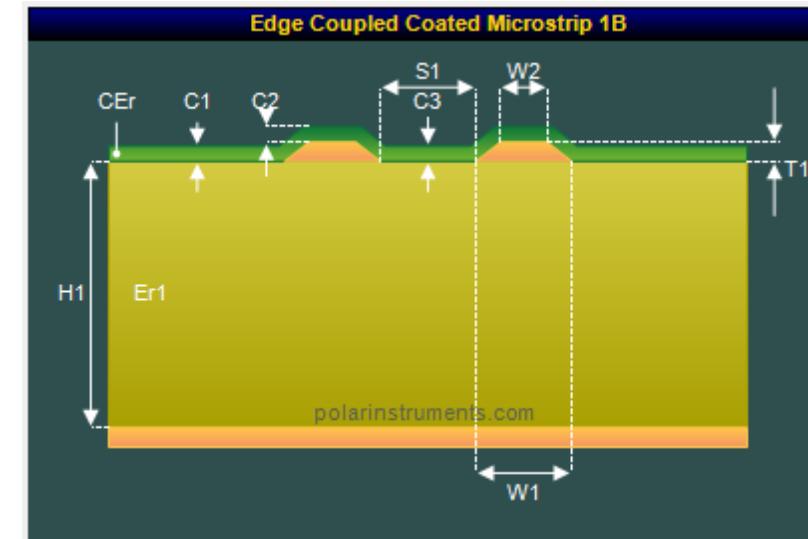
New Structure More Calculations option

Single-ended structure results



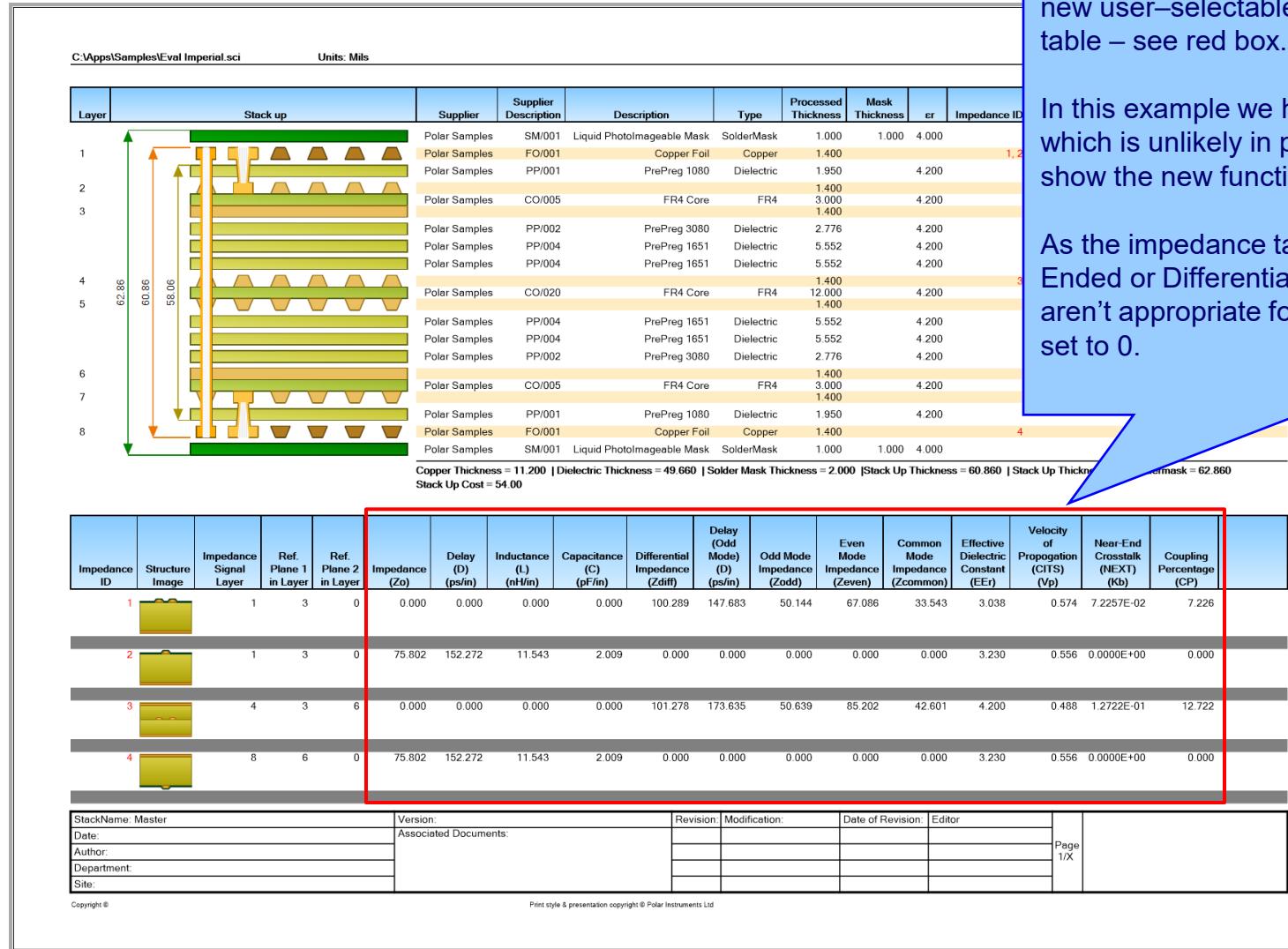
More Calculations	
Impedance	Z ₀ <input type="text" value="75.802"/>
Delay (ps/in)	D <input type="text" value="152.272"/>
Inductance (nH/in)	L <input type="text" value="11.543"/>
Capacitance (pF/in)	C <input type="text" value="2.009"/>
Effective Dielectric Constant	E _{Er} <input type="text" value="3.230"/>
Velocity of Propogation (CITS)	V _p <input type="text" value="0.556"/>

Differential structure results



More Calculations	
Differential Impedance	Z _{diff} <input type="text" value="100.289"/>
Delay (Odd Mode) (ps/in)	D <input type="text" value="147.683"/>
Odd Mode Impedance	Z _{odd} <input type="text" value="50.144"/>
Even Mode Impedance	Z _{even} <input type="text" value="67.086"/>
Common Mode Impedance	Z _{common} <input type="text" value="33.543"/>
Effective Dielectric Constant	E _{Er} <input type="text" value="3.038"/>
Velocity of Propogation (CITS)	V _p <input type="text" value="0.574"/>
Near-End Crosstalk (NEXT)	K _b <input type="text" value="7.2257E-02"/>
Coupling Percentage	C _P <input type="text" value="7.226"/>

New Structure More Calculations option

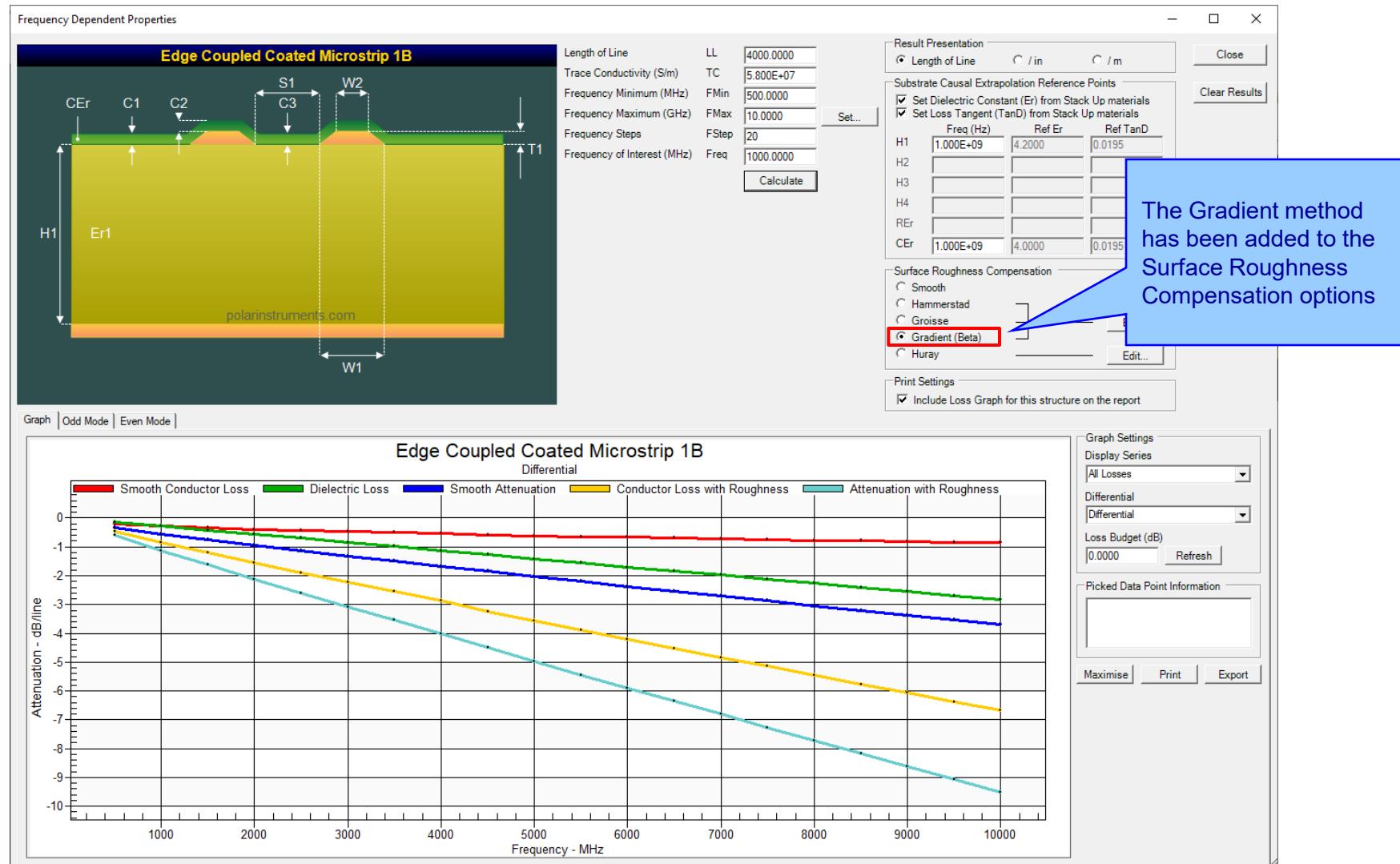


The technical report has been enhanced with 13 new user-selectable columns on the impedance table – see red box.

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

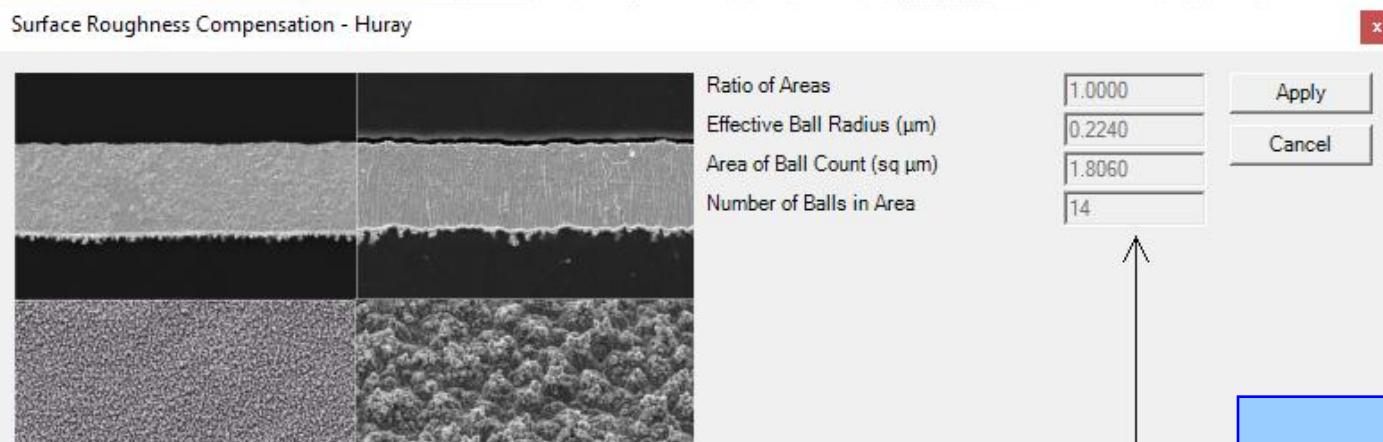
As the impedance table contains both Single-Ended or Differential structures the columns that aren't appropriate for a given structure type are set to 0.

Gradient Roughness Method



Update Cannonball–Huray Method to Simonovich–Cannonball Method

Surface Roughness Compensation - Huray



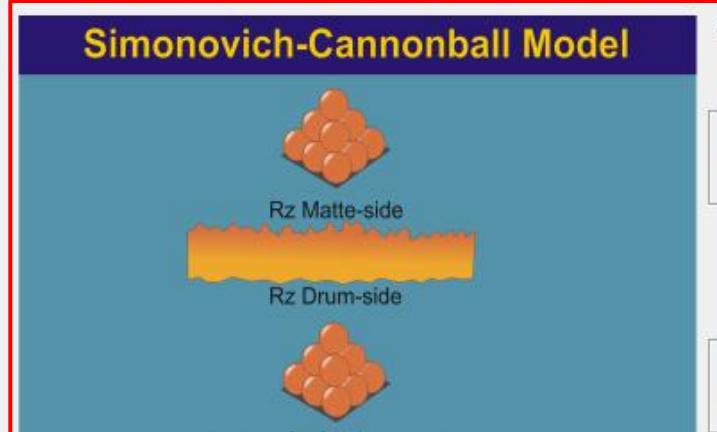
Ratio of Areas
Effective Ball Radius (μm)
Area of Ball Count (sq μm)
Number of Balls in Area

1.0000
0.2240
1.8060
14

Apply
Cancel

Images by courtesy of Circuit Foil Luxembourg

Simonovich-Cannonball Model



Enable Simonovich-Cannonball

Matte-Side Roughness
Rz Matte (μm)

Drum-Side Roughness
Rz Drum (μm)

Calculate

www.polarinstruments.com

Courtesy of Bert Simonovich, Lamsim Enterprises Inc [Application Note](#)

Update / rebrand of the Cannonball–Huray Method to Simonovich–Cannonball Method.

Application Note now links to two papers

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 correctly when materials spanned multiple print pages

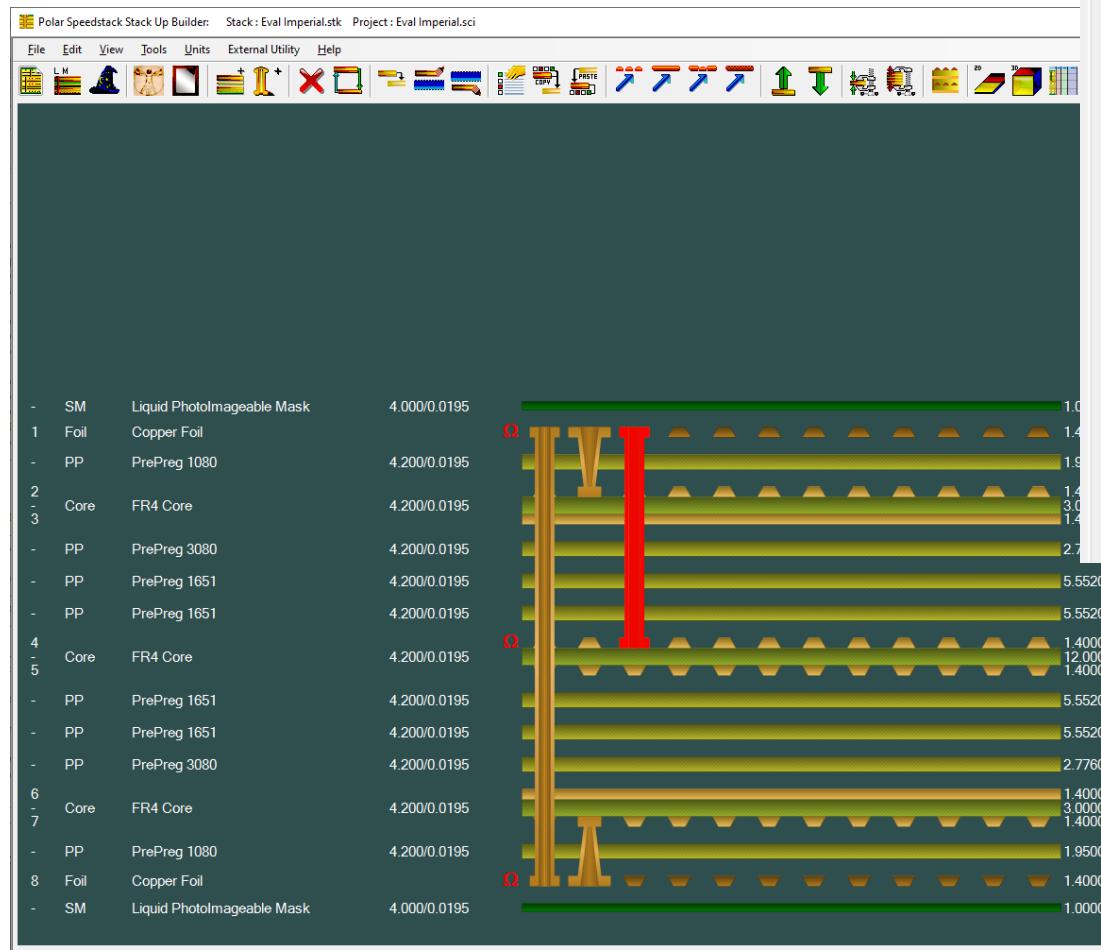
Speedstack v24.01.01 (Jan 2024)

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



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 : 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

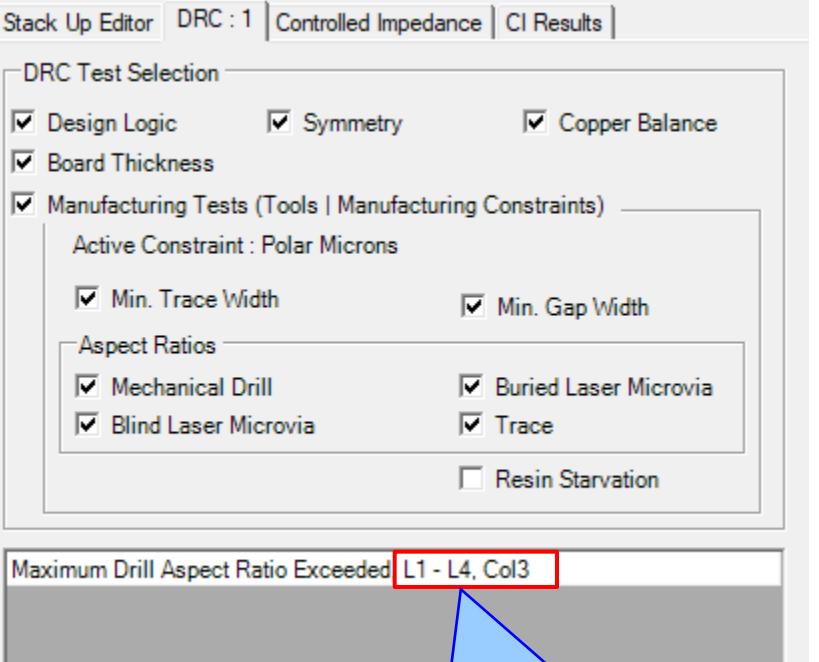
Blind Laser Microvia Trace

Resin Starvation

Maximum Drill Aspect Ratio Exceeded L1 - L4, Col3

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

Mil/Thous Target Stack Up Thickness = 60.0000 Stack Up Thickness = 60.0600 Stack Up Thickness with Soldermask = 62.8600 V24.01.01



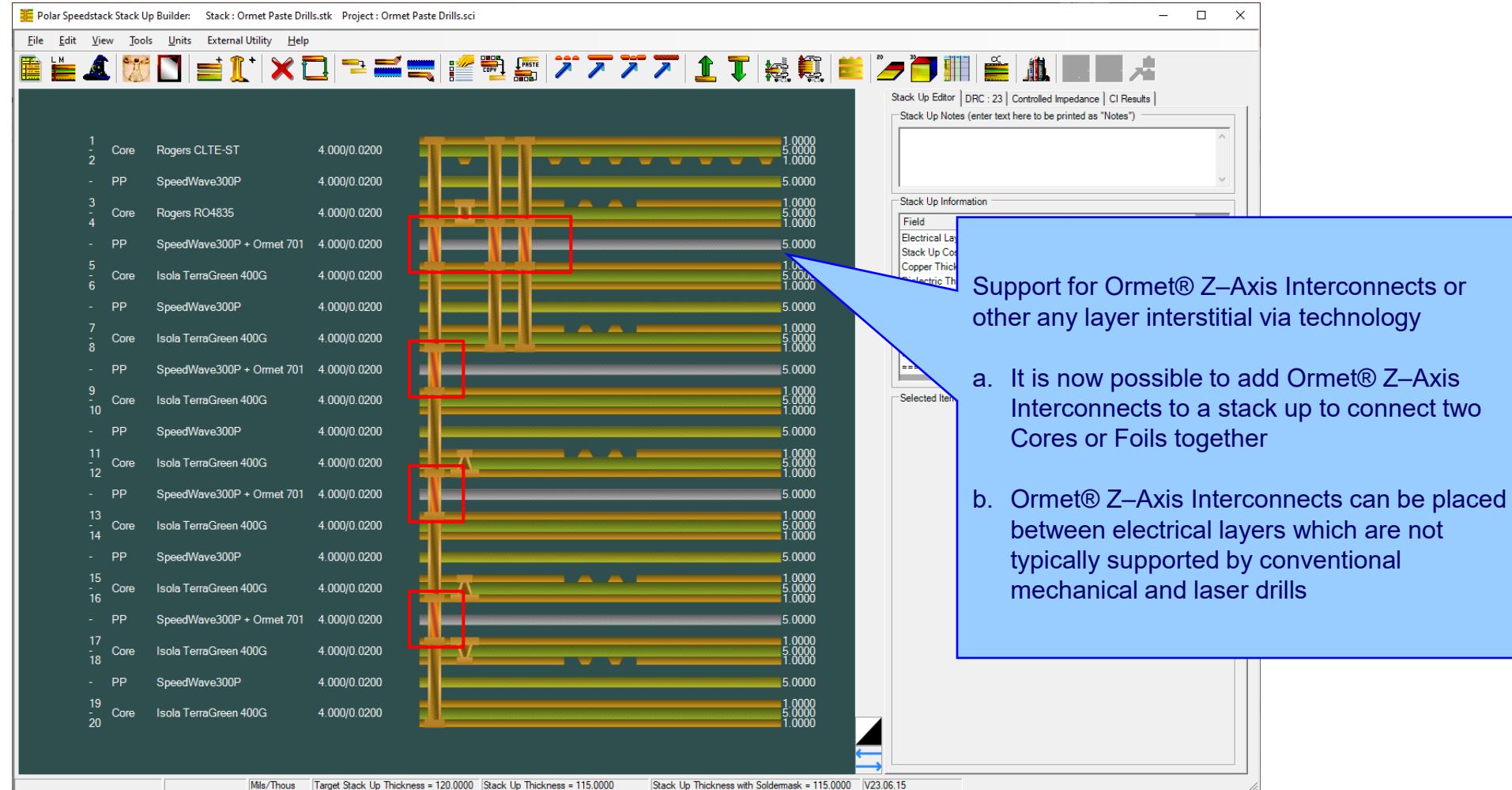
Design Rule Check information for Drills has been enhanced to provide more information, including start / end electrical layers and the column where the errant drill is located

Other enhancements

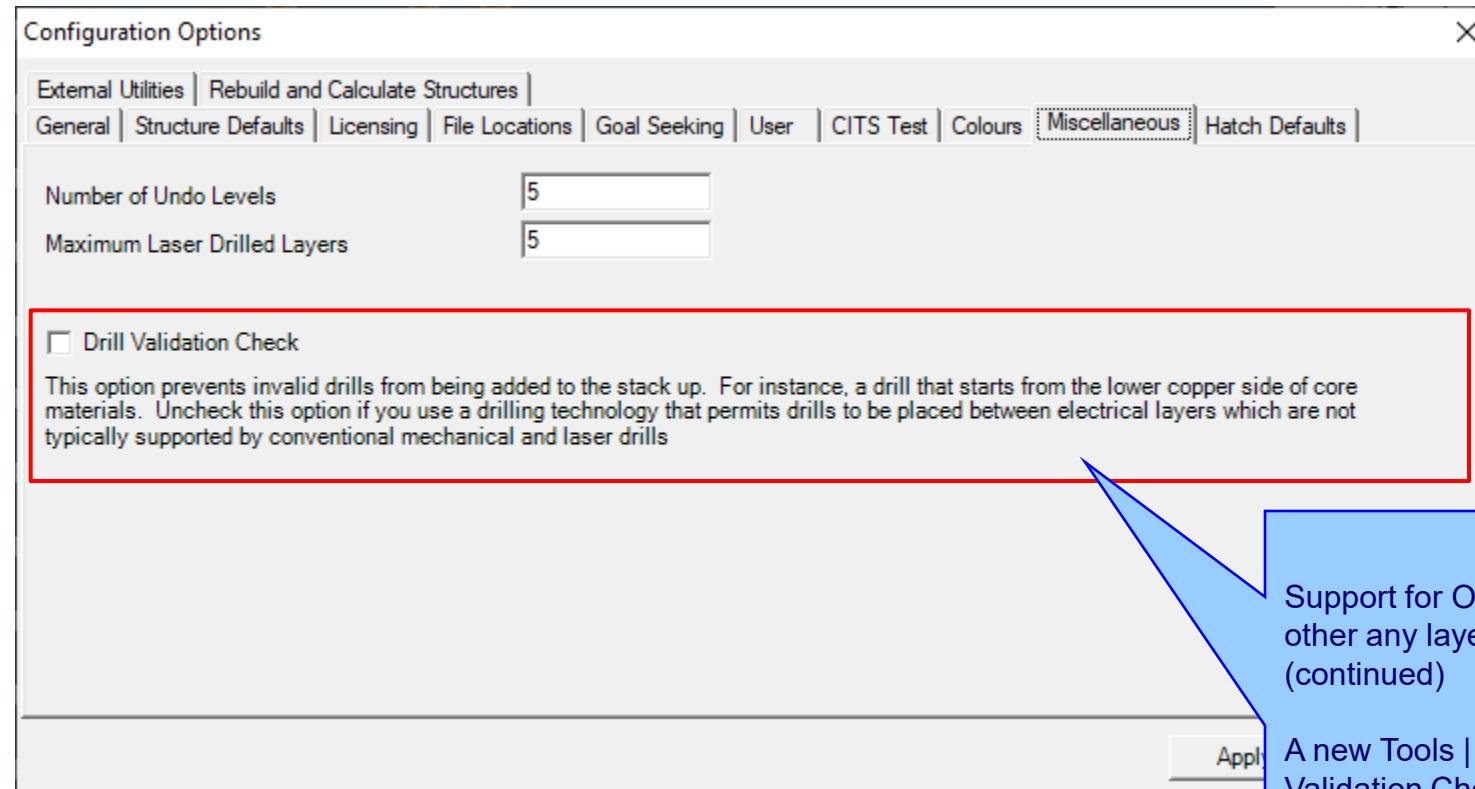
- Printing: Improvements to the Solder Mask to Solder Mask thickness line, particularly when an ident / coverlay / peelable material is above or below the Solder Mask
- Printing: Bill of Materials (BOM) table enhancements including options to enable / disable Number of Panels, Circuits Per Panel, Cost 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



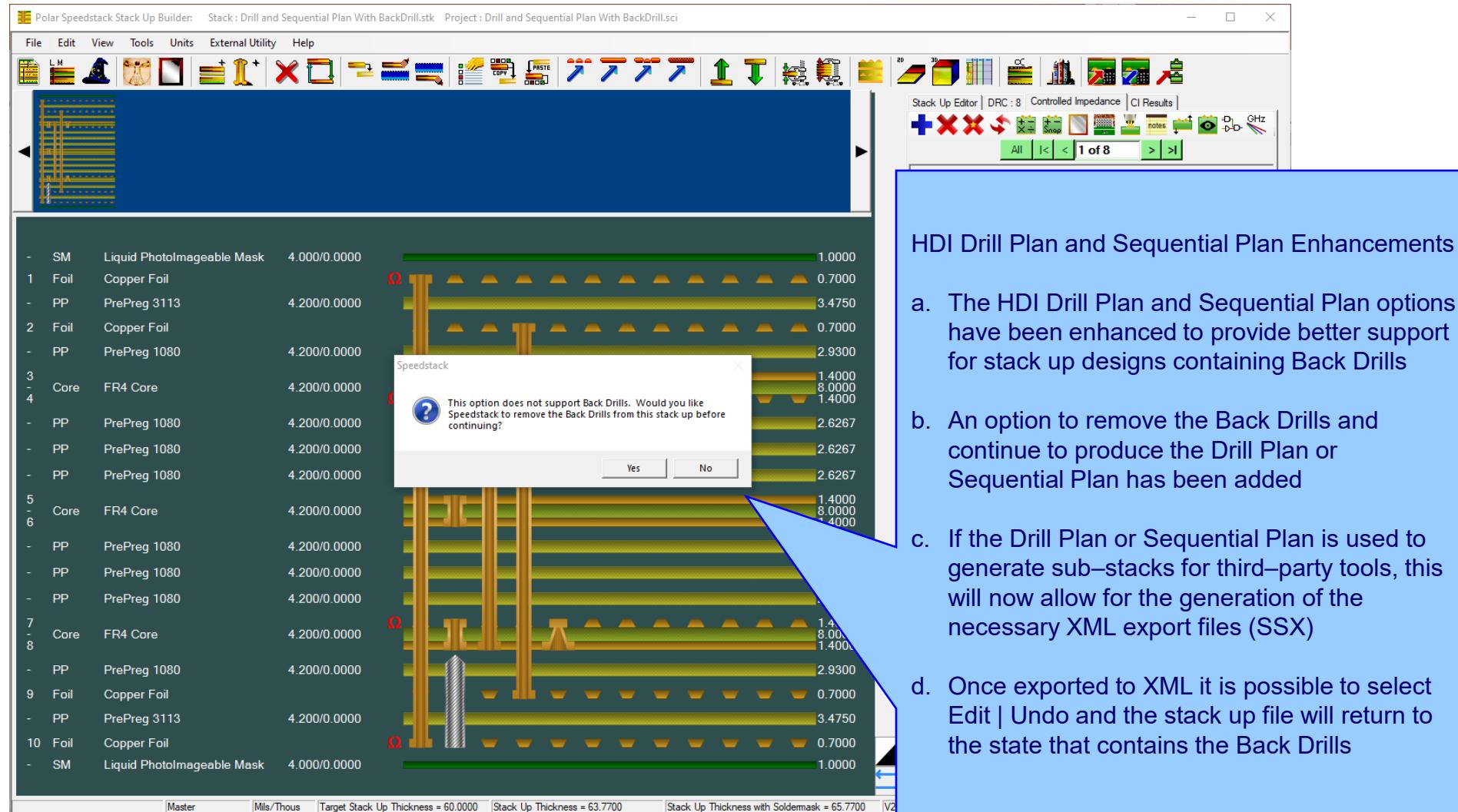
Enhancements including support for Ormet® Z–Axis Interconnects or other any layer interstitial via technology



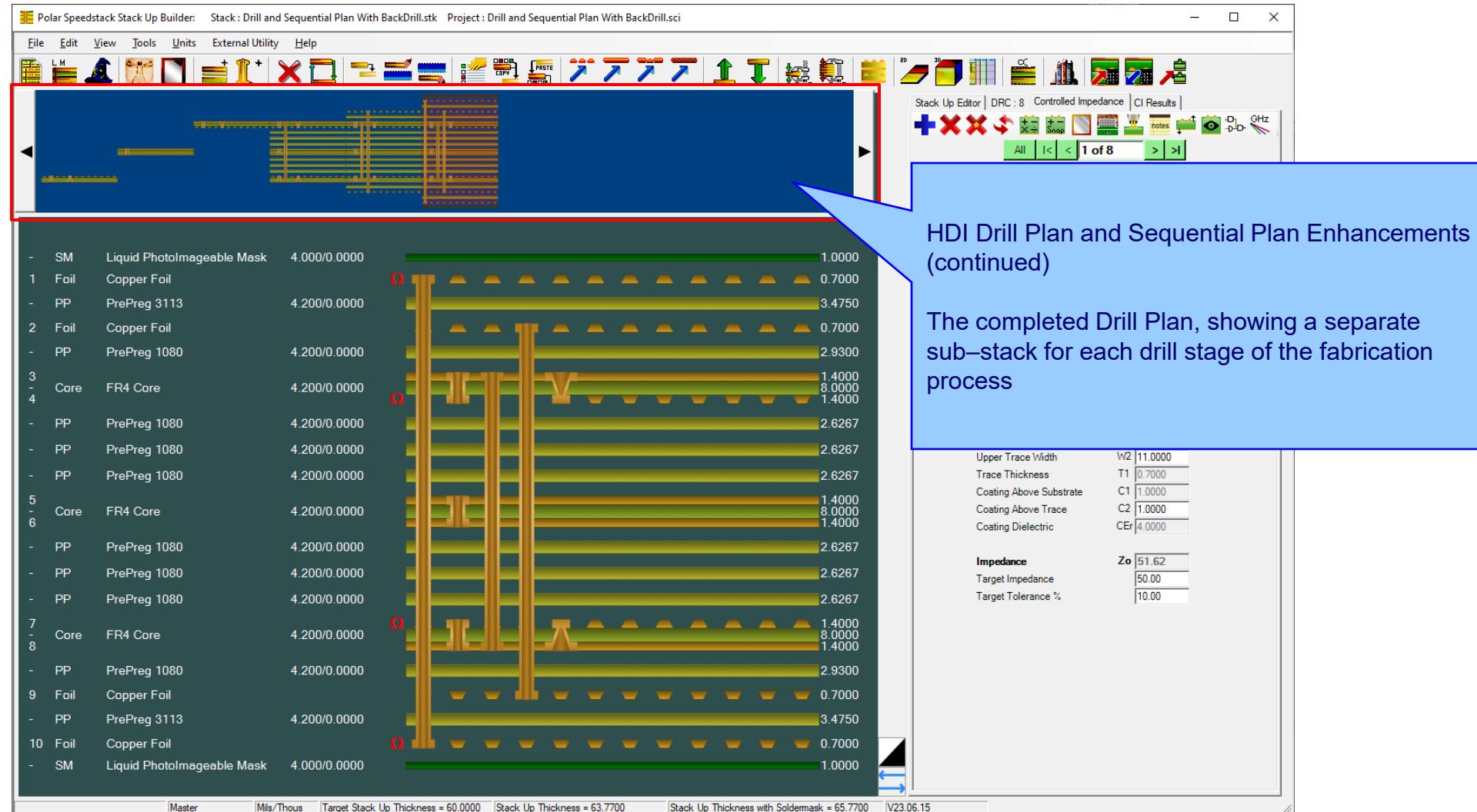
Support for Ormet® Z–Axis Interconnects or other any layer interstitial via technology (continued)

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

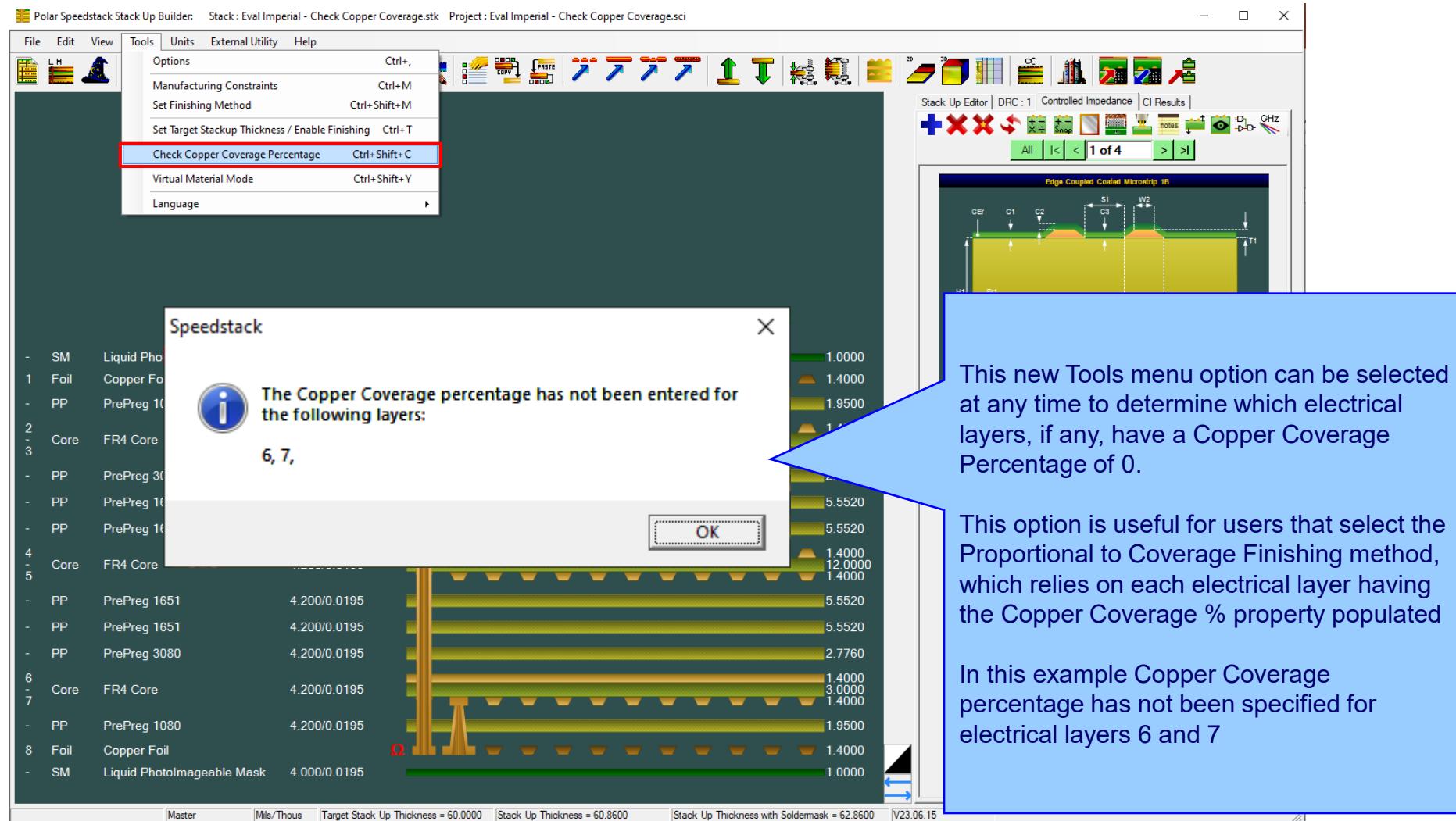


HDI Drill Plan and Sequential Plan Enhancements



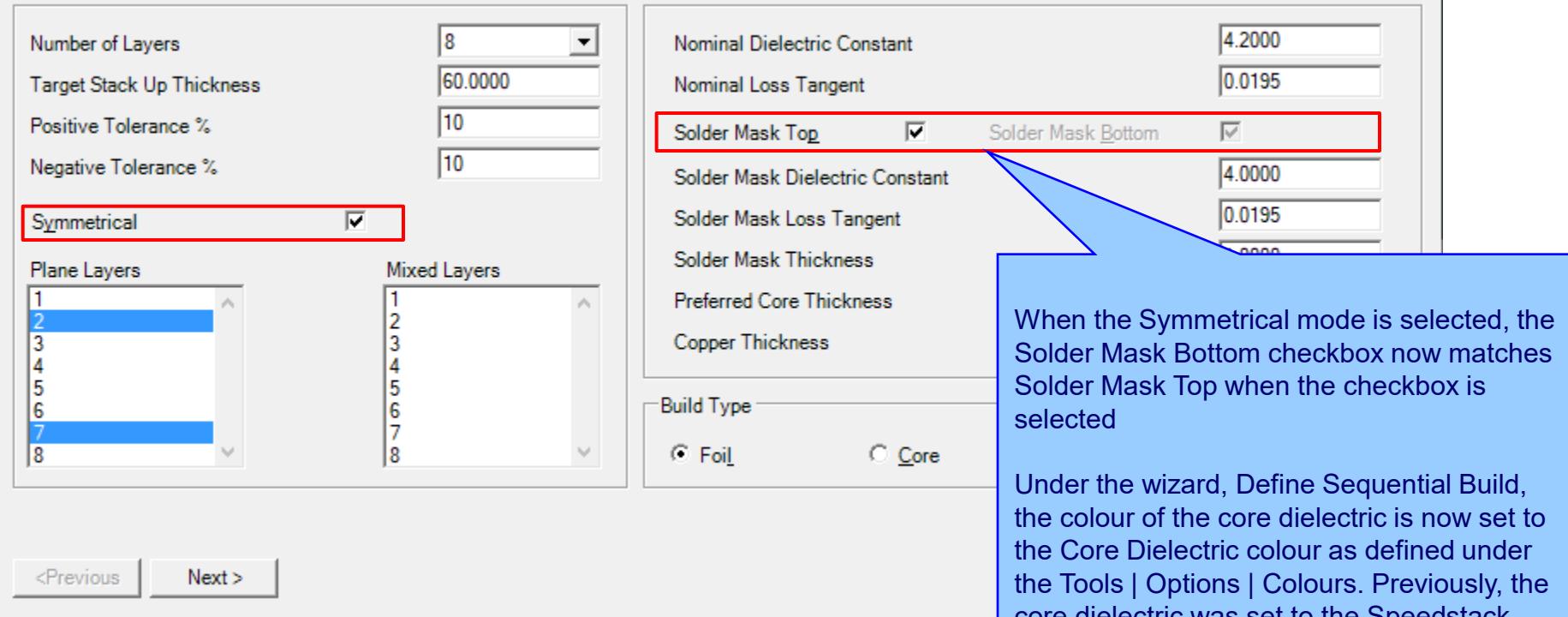
Speedstack v23.05.01 (May 2023)

New Check Copper Coverage Percentage option



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 (highlighted with a red box)
Plane Layers: 1, 2, 3, 4, 5, 6, 7, 8 (highlighted with a blue box)
Mixed Layers: 1, 2, 3, 4, 5, 6, 7, 8
Nominal Dielectric Constant: 4.2000
Nominal Loss Tangent: 0.0195
Solder Mask Top (highlighted with a red box)
Solder Mask Bottom (highlighted with a red box)
Solder Mask Dielectric Constant: 4.0000
Solder Mask Loss Tangent: 0.0195
Solder Mask Thickness: 0.0000
Preferred Core Thickness: 0.0000
Copper Thickness: 0.0000
Build Type: Foil Core

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

- PILLAR
- RESONAC**
Chemistry for Change
- ROGERS CORPORATION
- SYTECH 生益科技

File Type

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

Library Files Available : Resonac

- Resonac_GEA_679_1GHz_1901.mlx
- Resonac_GEA_67BE_1GHz_1901.mlx
- Resonac_GEA_67N_1GHz_1901.mlx
- Resonac_GEA_705G(L)_1GHz_2201.mlx
- Resonac_GEA_705G_1GHz_2201.mlx
- Resonac_GFA_2_1GHz_1901.mlx
- Resonac_GHA_679G(S)_1GHz_1901.mlx
- Resonac_GHA_679G_1GHz_1901.mlx
- Resonac_GWA_900G_1GHz_1901.mlx
- Resonac_GWA_910G_1GHz_1901.mlx

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

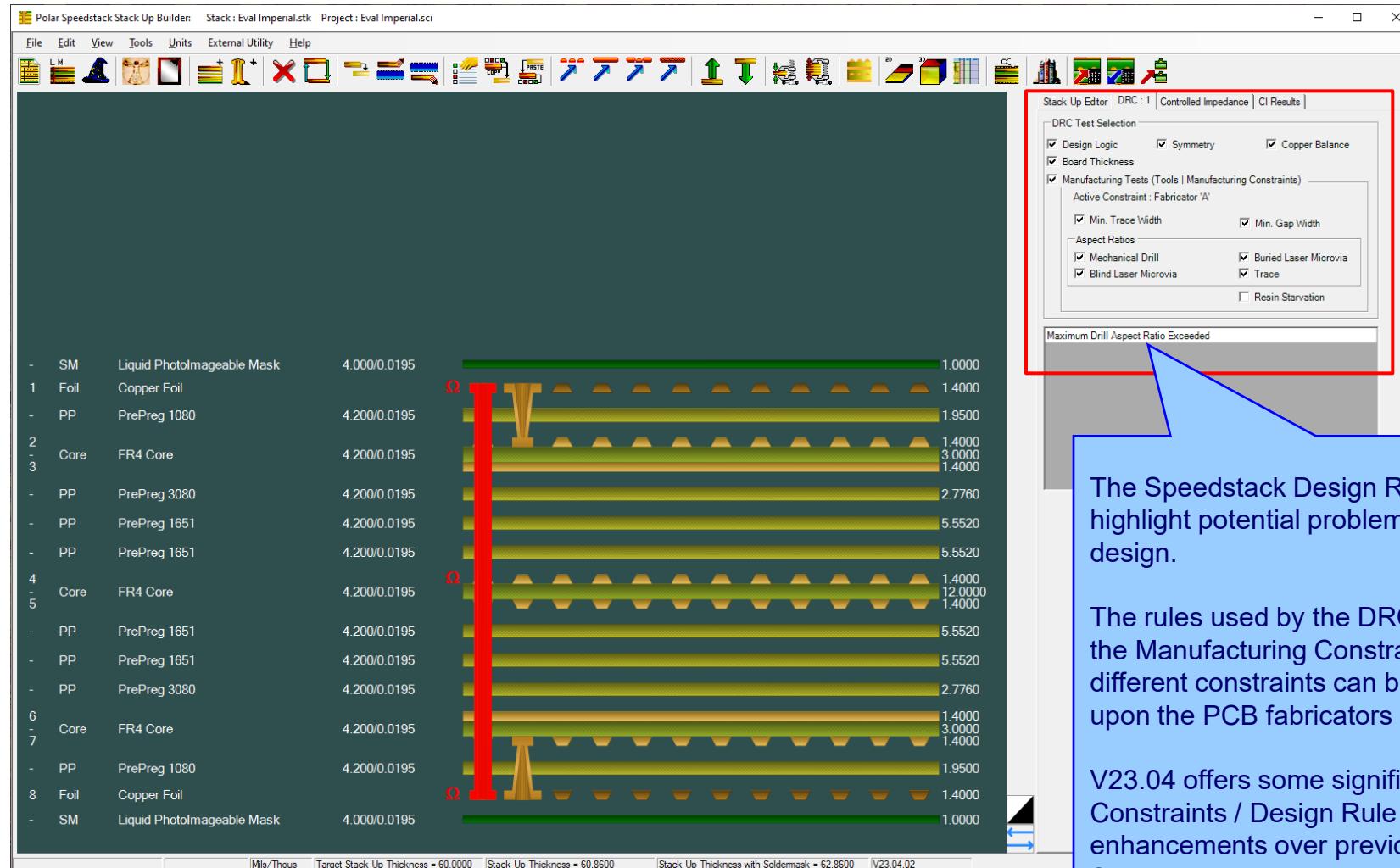
- Online Polar Library (<ftp://polarinstruments.com>)
- On-Premise Mode [Application Note](#)

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.

Speedstack v23.04.02 (April 2023)

Manufacturing Constraints / Design Rule Check Enhancements

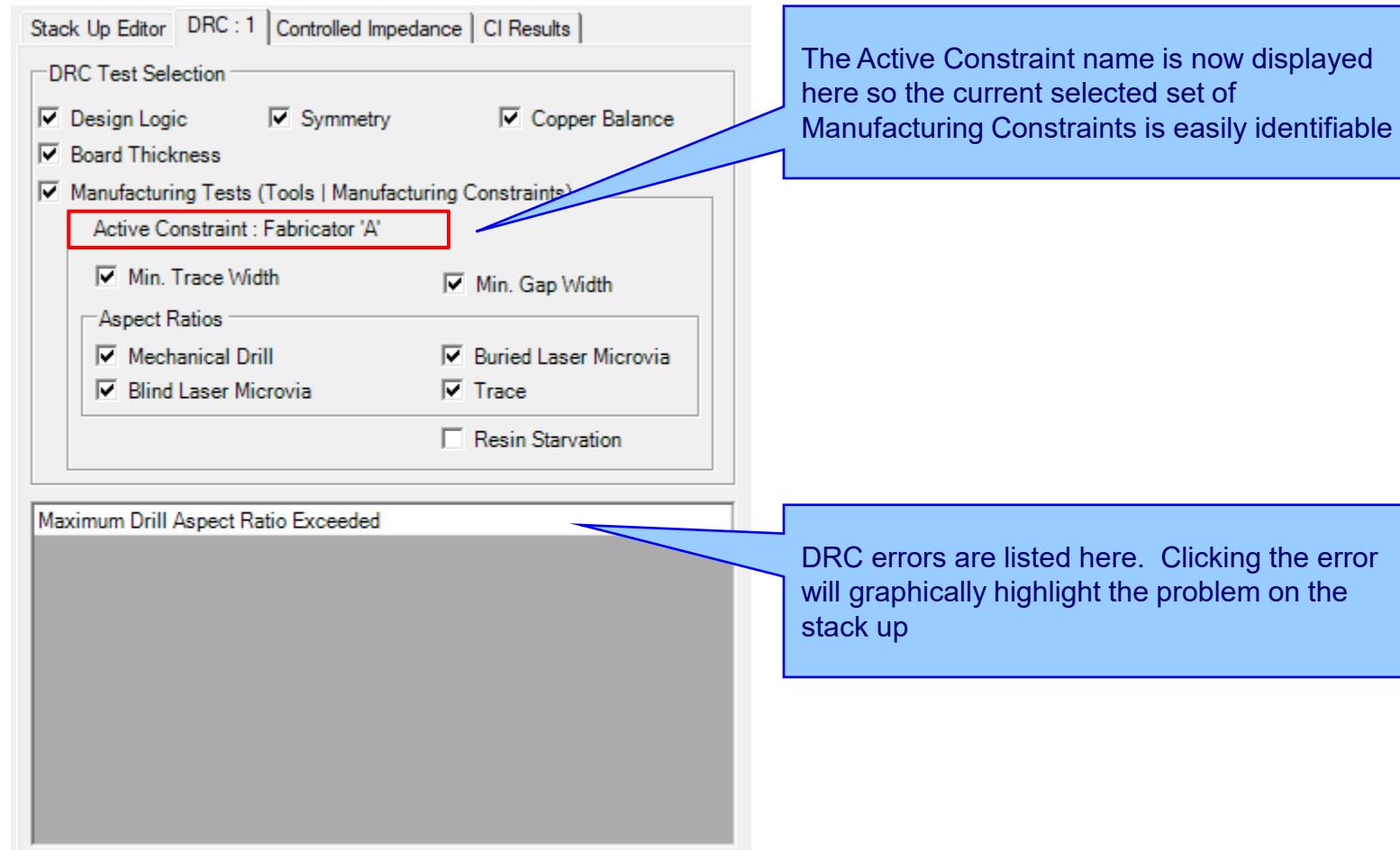


The Speedstack Design Rule Checks (DRC) highlight potential problems with the stack up design.

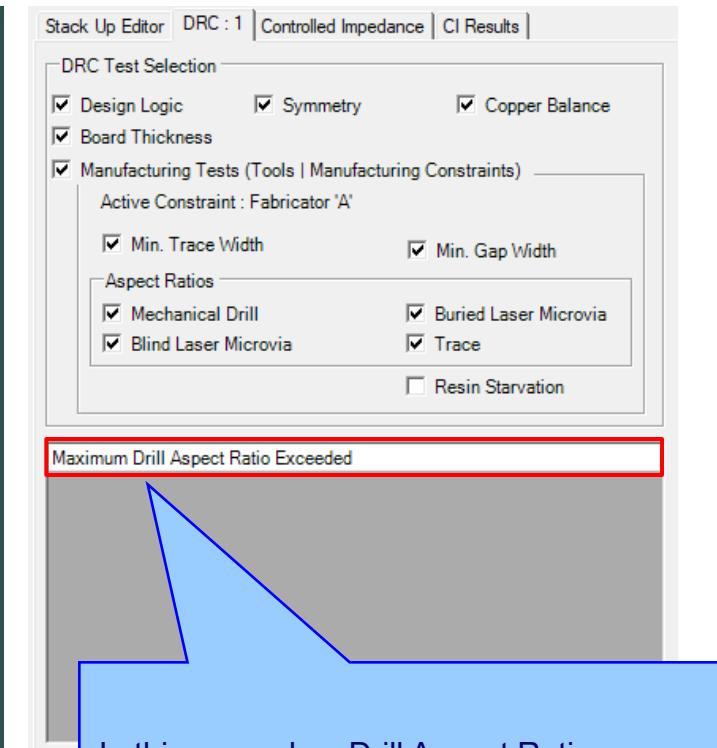
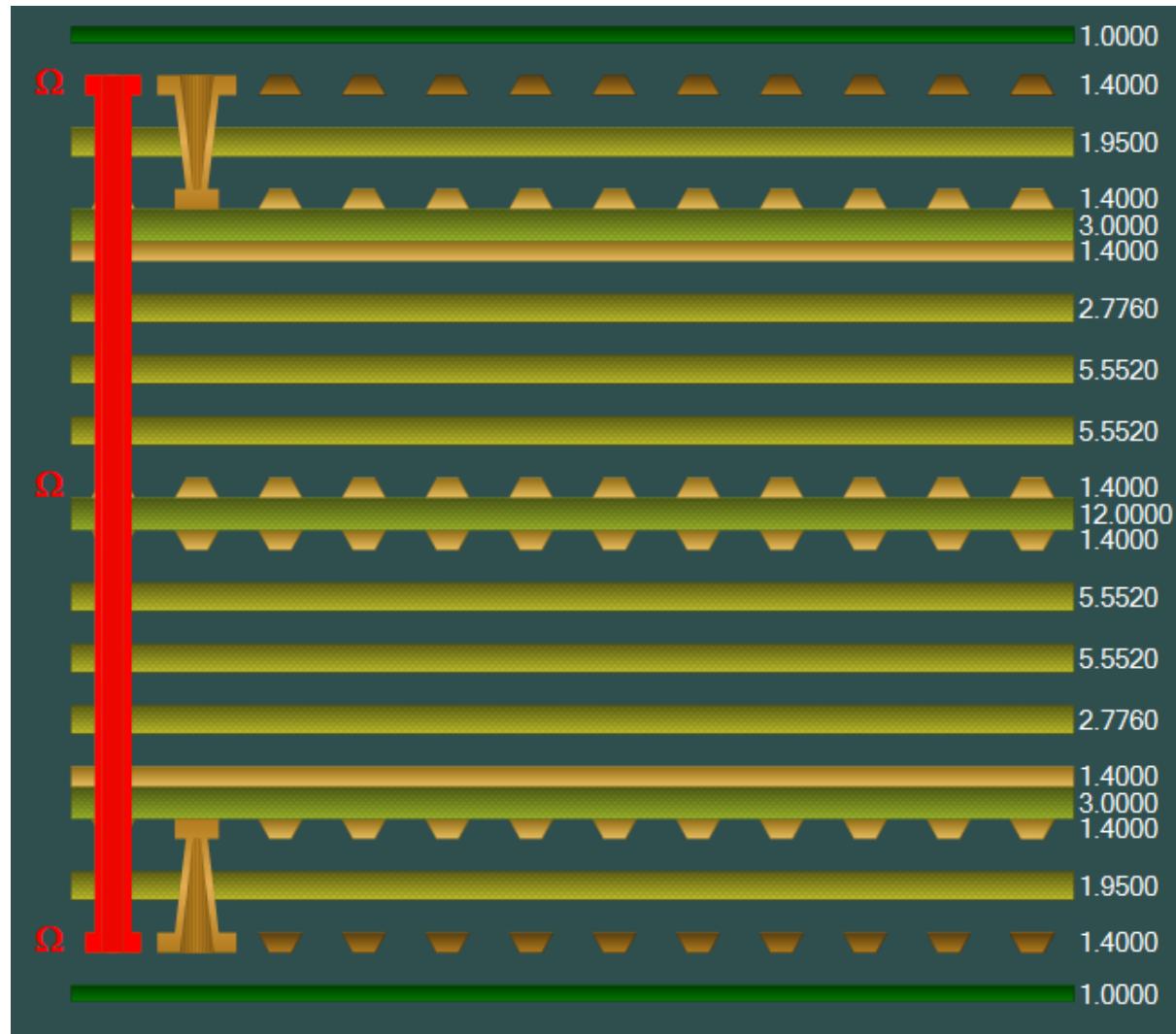
The rules used by the DRC are held within the Manufacturing Constraints, where different constraints can be configured based upon the PCB fabricators capabilities.

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

Manufacturing Constraints / Design Rule Check Enhancements



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

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

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

Minimum Gap

Minimum Trace Width

Mechanical Drill A.R.

Blind Via A.R.

Buried Via A.R.

Trace A.R.

Instructions

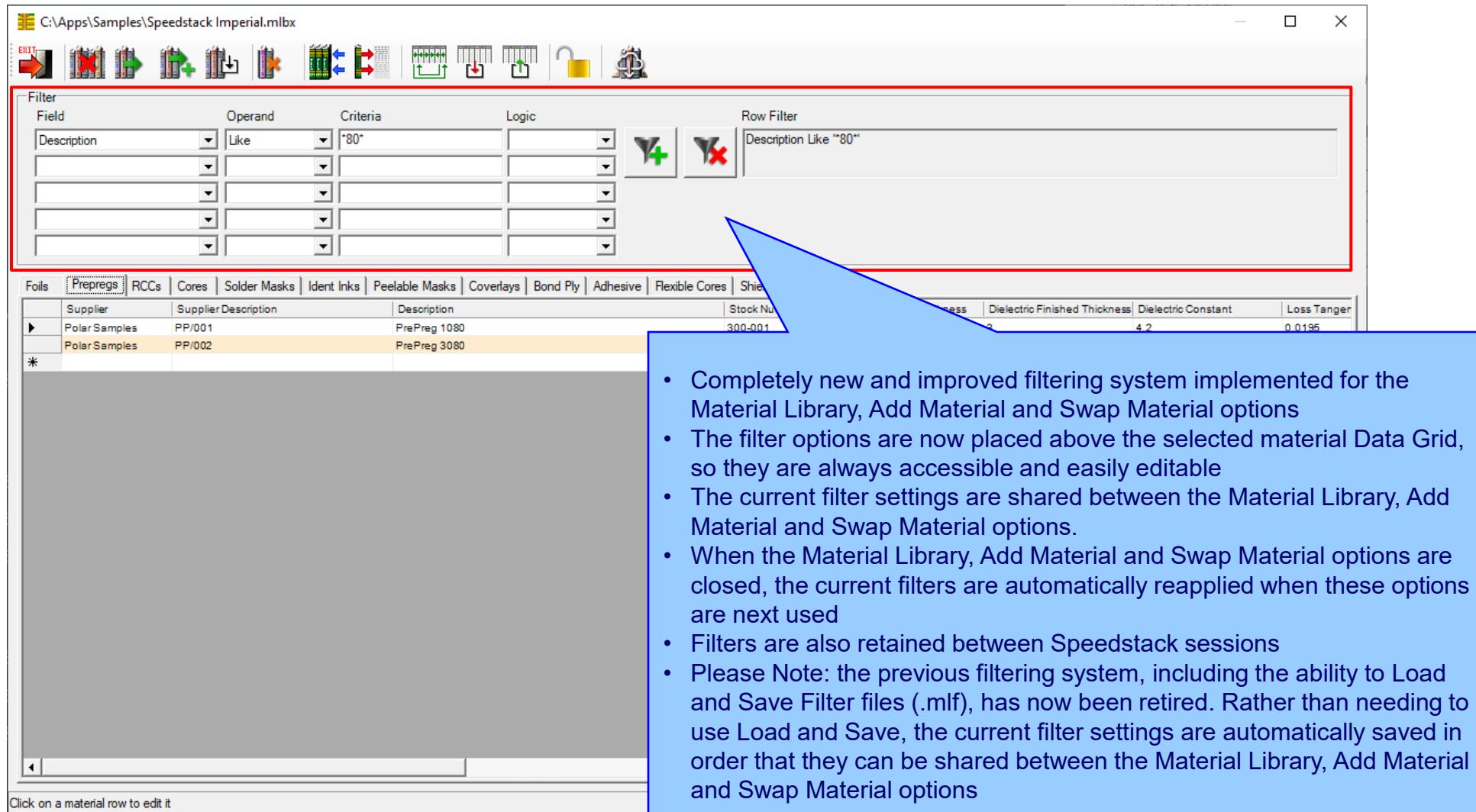
Add: Press Add, which will add a new blank constraint. Notice the 'n of n' record number will increase. Now key in the constraint details and select Done.

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.

Speedstack v23.03.01 (March 2023)

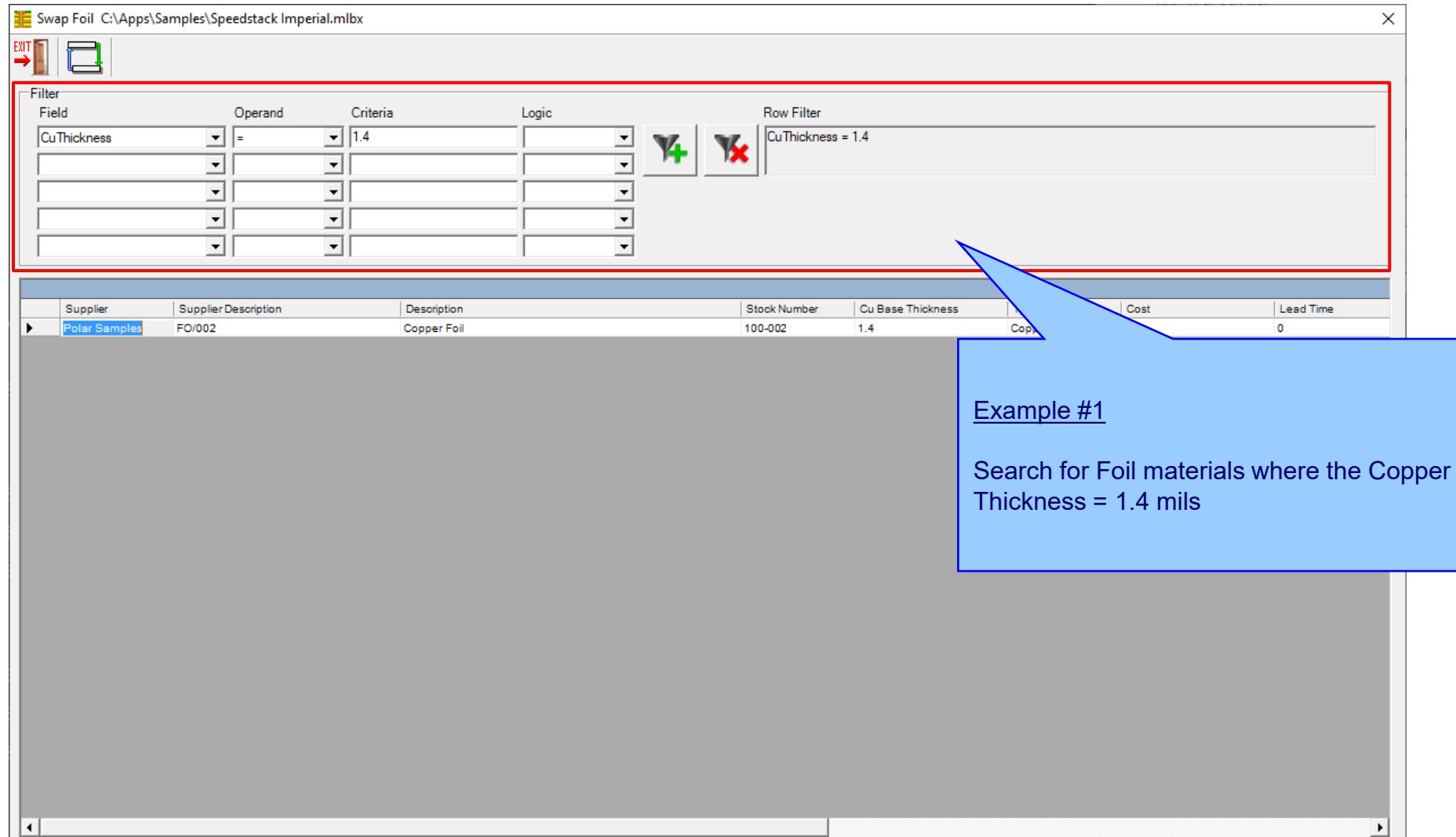
Material Library Filter / Search Enhancements



The screenshot shows the Speedstack Material Library interface. At the top, there is a toolbar with various icons. Below the toolbar, a red box highlights the 'Filter' section. This section contains a table with columns for 'Field', 'Operand', 'Criteria', and 'Logic'. A 'Row Filter' section is also present. A blue callout points from the 'Row Filter' section to a list of features. Below the filter is a data grid showing material samples. The data grid has columns for Supplier, Supplier Description, Description, Stock Number, and other technical parameters. The first two rows are for 'Polar Samples' with descriptions 'PrePreg 1080' and 'PrePreg 3080' respectively. The bottom of the interface has a note: '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.mlx

EXIT

Filter

Field	Operand	Criteria	Logic
CuThickness	=	1.4	

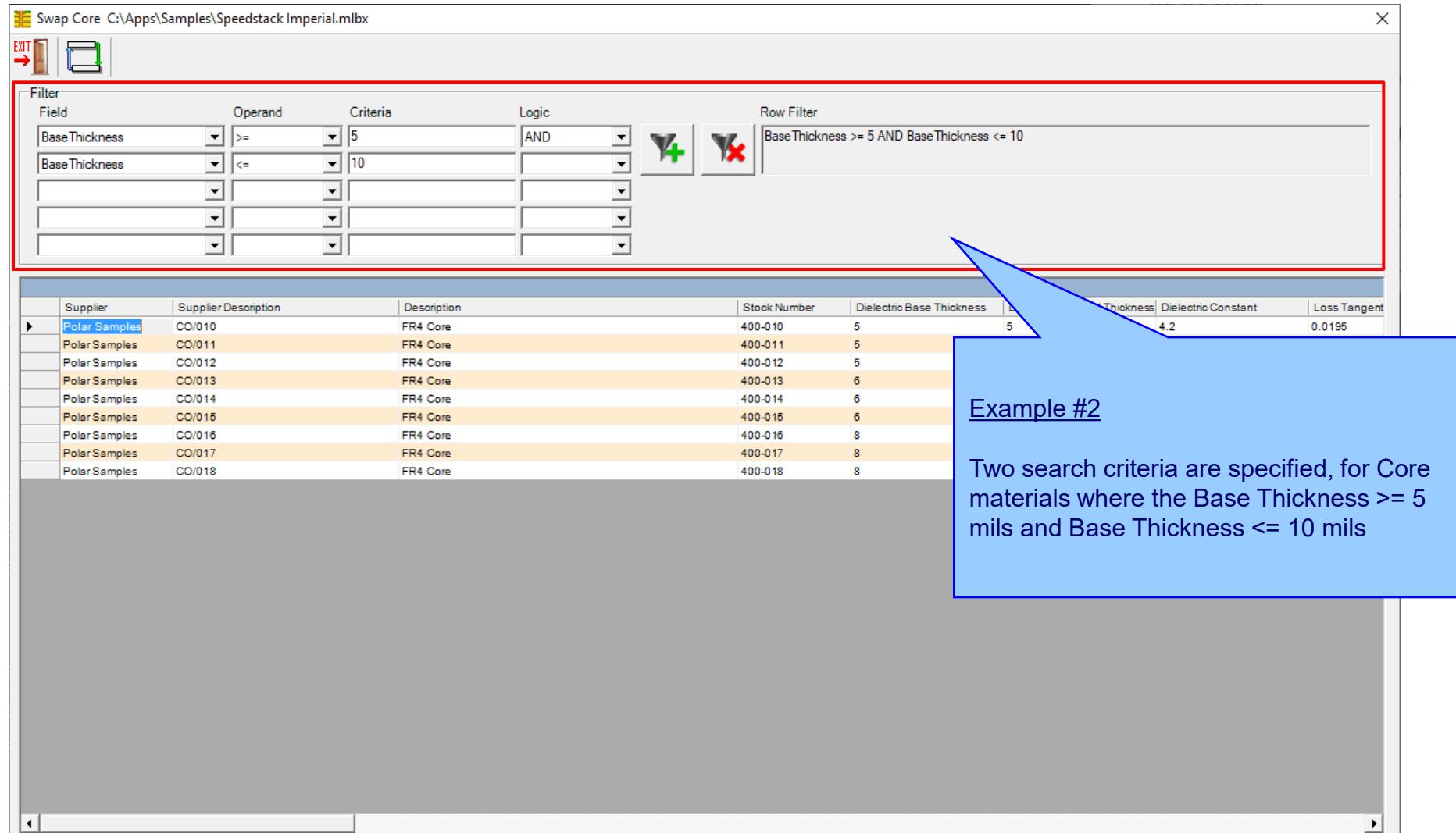
Row Filter: CuThickness = 1.4

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

Example #1

Search for Foil materials where the Copper Thickness = 1.4 mils

Material Library Filter / Search Enhancements



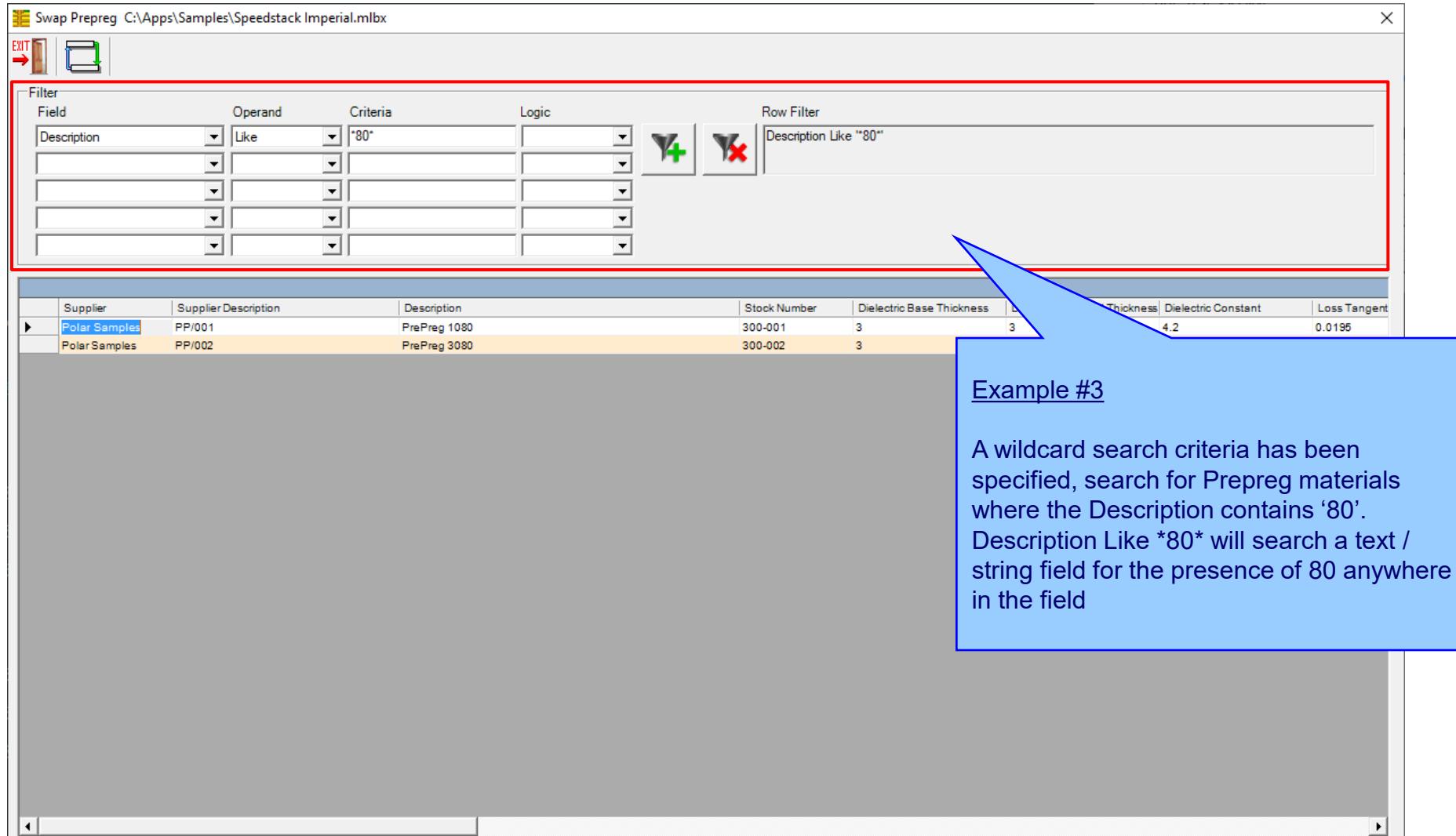
The screenshot shows the 'Swap Core' dialog for 'Speedstack Imperial.mlx' with a red box highlighting the filter interface. The filter criteria are:

Field	Operand	Criteria	Logic
BaseThickness	\geq	5	AND
BaseThickness	\leq	10	

The 'Row Filter' shows the combined condition: `BaseThickness >= 5 AND BaseThickness <= 10`. The results table lists 18 rows of material samples, all from 'Polar Samples' with 'CO' codes. A blue callout box labeled 'Example #2' points to the results table, with the text: 'Two search criteria are specified, for Core materials where the Base Thickness \geq 5 mils and Base Thickness \leq 10 mils'.

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			

Material Library Filter / Search Enhancements



The screenshot shows the 'Swap Prepreg' dialog for 'Speedstack Imperial.mlbx'. The 'Filter' section is highlighted with a red box. It contains a table with columns: Field, Operand, Criteria, and Logic. The first row has 'Description' in the Field column, 'Like' in the Operand column, and '*80*' in the Criteria column. To the right of the table are two filter icons: a green one with a plus sign and a red one with a minus sign. Below these icons is a 'Row Filter' input field containing 'Description Like *80*'. A blue callout box points from the text 'Description Like *80*' to the text 'Example #3' in the adjacent text block.

Field	Operand	Criteria	Logic
Description	Like	*80*	

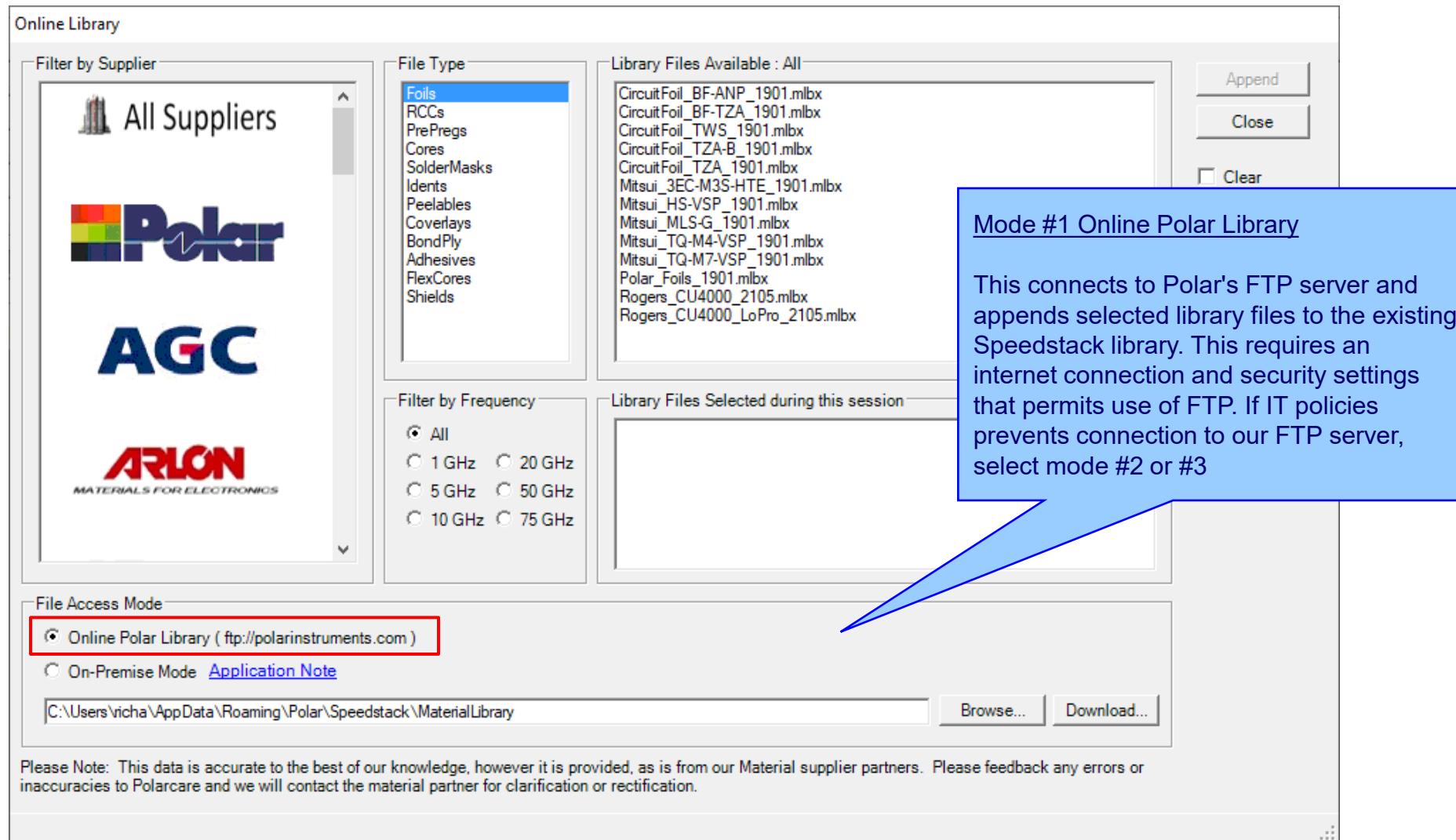
Row Filter: Description Like *80*

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



The screenshot shows the Speedstack Online Library interface with three modes of operation:

- Mode #1 Online Polar Library** (highlighted in blue): This mode connects to Polar's FTP server and appends selected library files to the existing Speedstack library. It requires an internet connection and security settings that permit use of FTP. If IT policies prevent connection to the FTP server, select mode #2 or #3.
- On-Premise Mode**: Application Note
- File Access Mode**: Online Polar Library (ftp://polarinstruments.com) (selected)

File Type: Foils, RCCs, PrePreg, Cores, SolderMasks, Idents, Peelables, Coverlays, BondPly, Adhesives, FlexCores, Shields

Library Files Available : All

- CircuitFoil_BF-ANP_1901.mlx
- CircuitFoil_BF-TZA_1901.mlx
- CircuitFoil_TWS_1901.mlx
- CircuitFoil_TZA-B_1901.mlx
- CircuitFoil_TZA_1901.mlx
- Mitsui_3EC-M3S-HTE_1901.mlx
- Mitsui_HS-VSP_1901.mlx
- Mitsui MLS-G_1901.mlx
- Mitsui_TQ-M4-VSP_1901.mlx
- Mitsui_TQ-M7-VSP_1901.mlx
- Polar_Foils_1901.mlx
- Rogers CU4000_2105.mlx
- Rogers CU4000_LoPro_2105.mlx

File Access Mode: Online Polar Library (ftp://polarinstruments.com)

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.

Online Library – Now supports three modes

Online Library

Filter by Supplier

All Suppliers

Polar

AGC

ARLON MATERIALS FOR ELECTRONICS

File Type

Library Files Available : All

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

CircuitFoil_BF-ANP_1901.mlx
CircuitFoil_BF-TZA_1901.mlx
CircuitFoil_TWS_1901.mlx
CircuitFoil_TZA-B_1901.mlx
CircuitFoil_TZA_1901.mlx
Mitsui_3EC-M3S-HTE_1901.mlx
Mitsui_HS-VSP_1901.mlx
Mitsui_MLS-G_1901.mlx
Mitsui_TQ-M4-VSP_1901.mlx
Mitsui_TQ-M7-VSP_1901.mlx
Polar_Foils_1901.mlx
Rogers CU4000_2105.mlx
Rogers CU4000_LoPro_2105.mlx

Append
Close
Clear

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.

File Access Mode

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

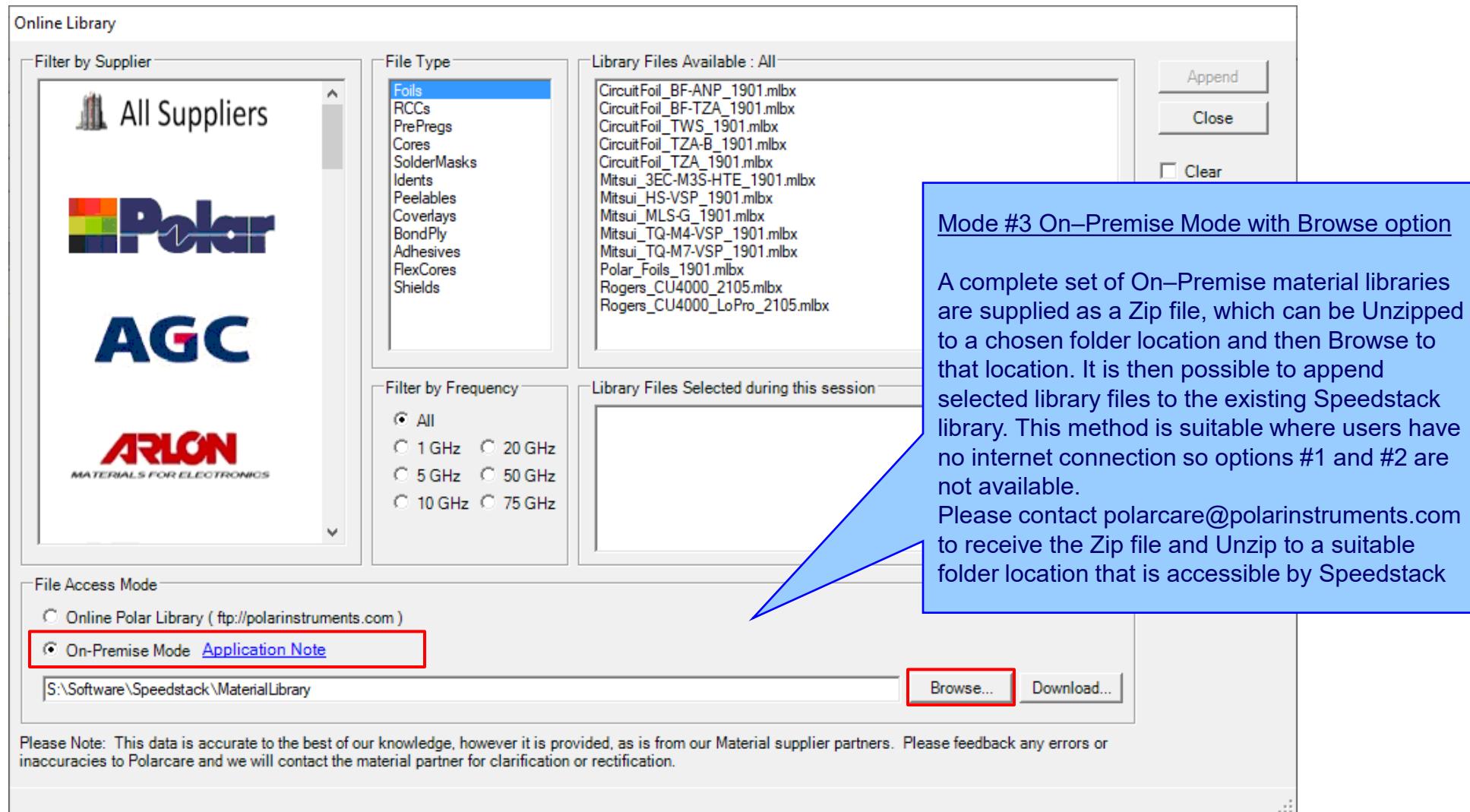
On-Premise Mode [Application Note](#)

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

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.

Online Library – Now supports three modes



Mode #3 On-Premise Mode with Browse option

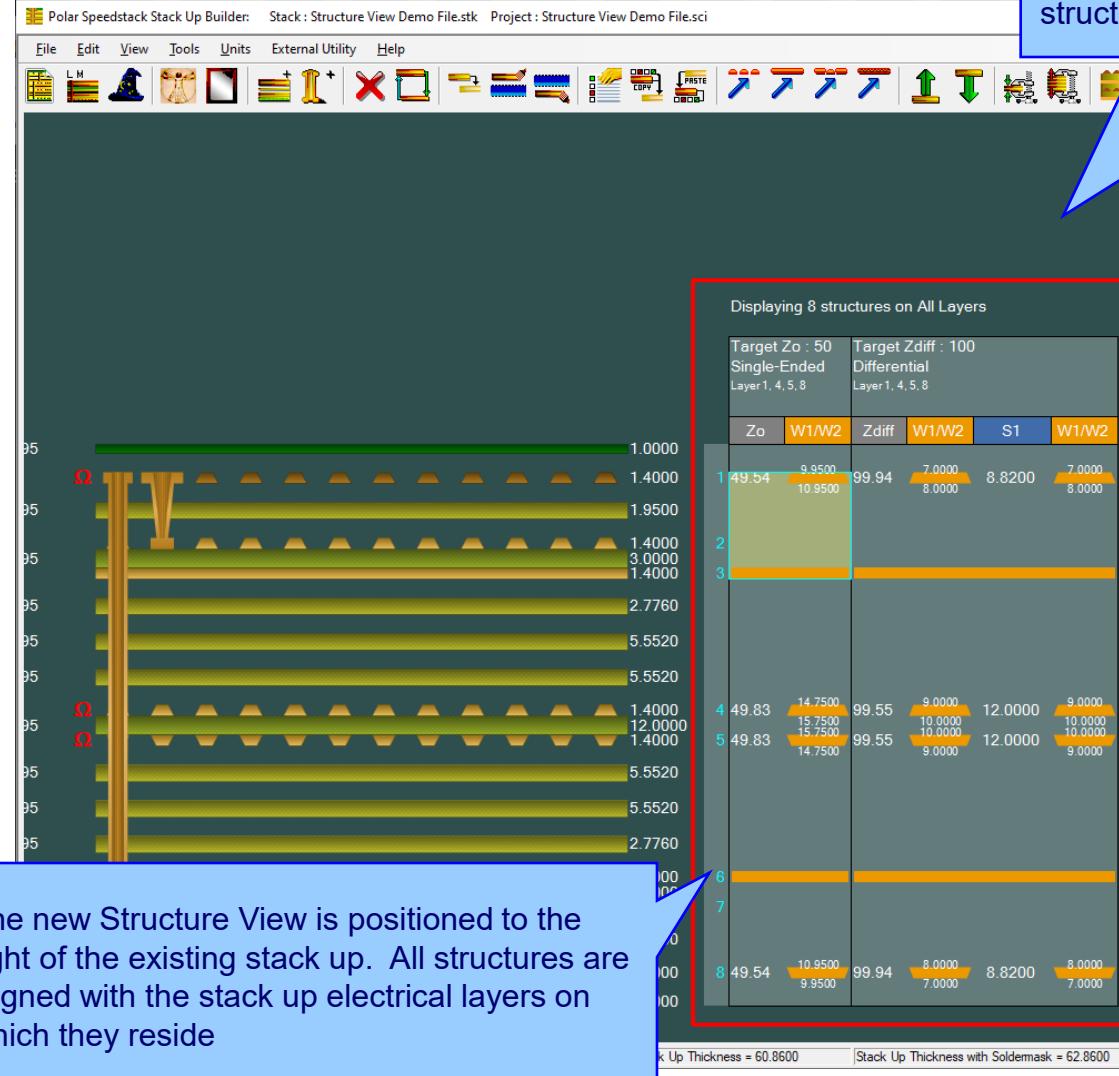
A complete set of On-Premise material libraries are supplied as a Zip file, which can be Unzipped to a chosen folder location and then Browse to that location. It is then possible to append selected library files to the existing Speedstack library. This method is suitable where users have no internet 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.

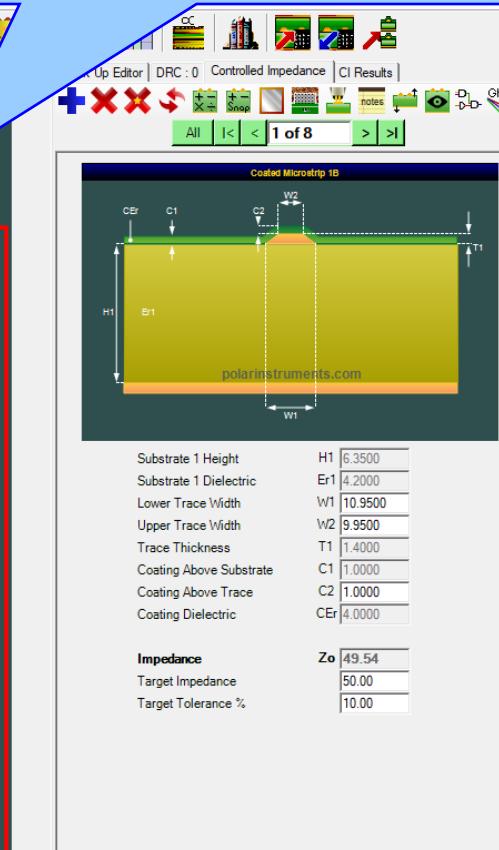
Speedstack v22.11.01 (November 2022)

Introducing Structure View



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.

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



Substrate 1 Height	H1	6.3500
Substrate 1 Dielectric	Er1	4.2000
Lower Trace Width	W1	10.9500
Upper Trace Width	W2	9.9500
Trace Thickness	T1	1.4000
Coating Above Substrate	C1	1.0000
Coating Above Trace	C2	1.0000
Coating Dielectric	CEr	4.0000

Impedance	Zo	49.54
Target Impedance		50.00
Target Tolerance %		10.00

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

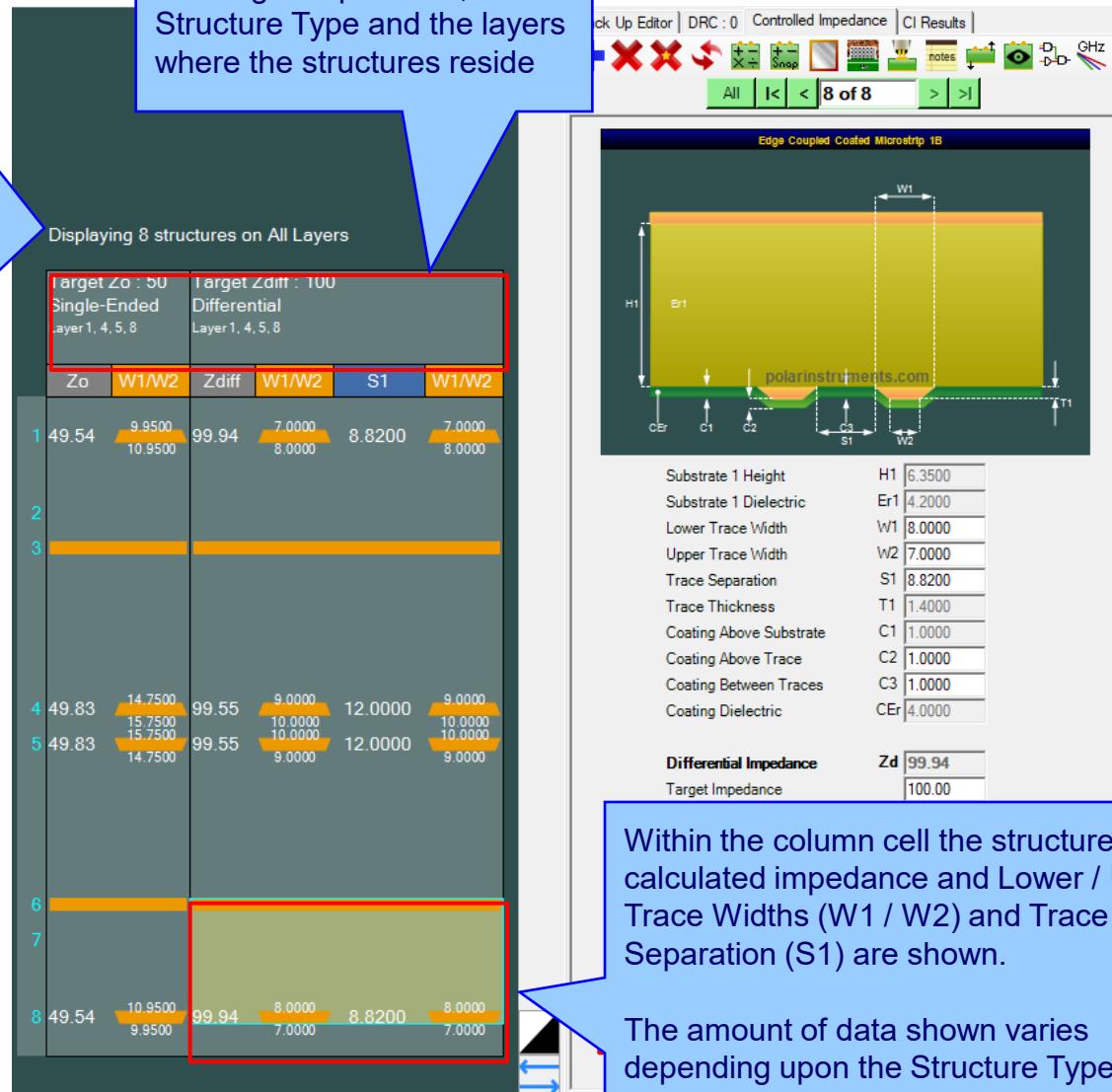
Structures are arranged by Target Impedance, low to high, then by Structure Type.

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:

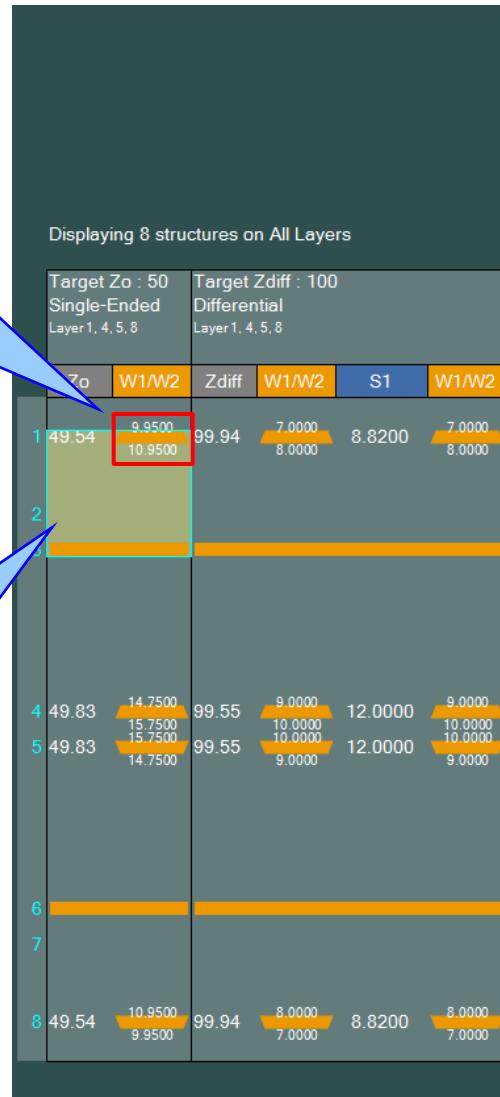
4 x 50 ohm singled-ended (column 1)
4 x 100 ohm differential (column 2)

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

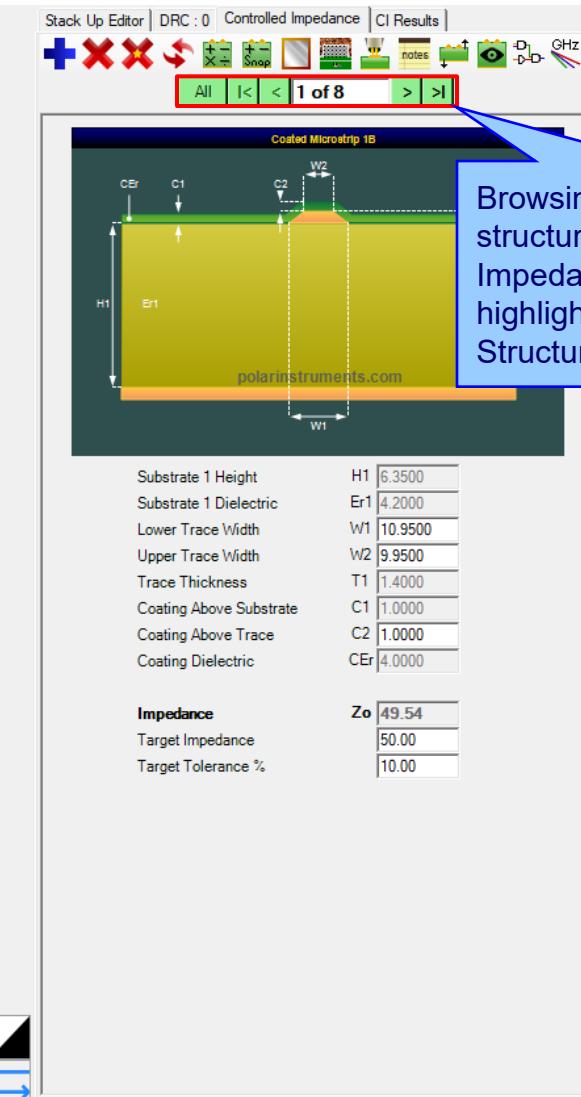


Introducing Structure View

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

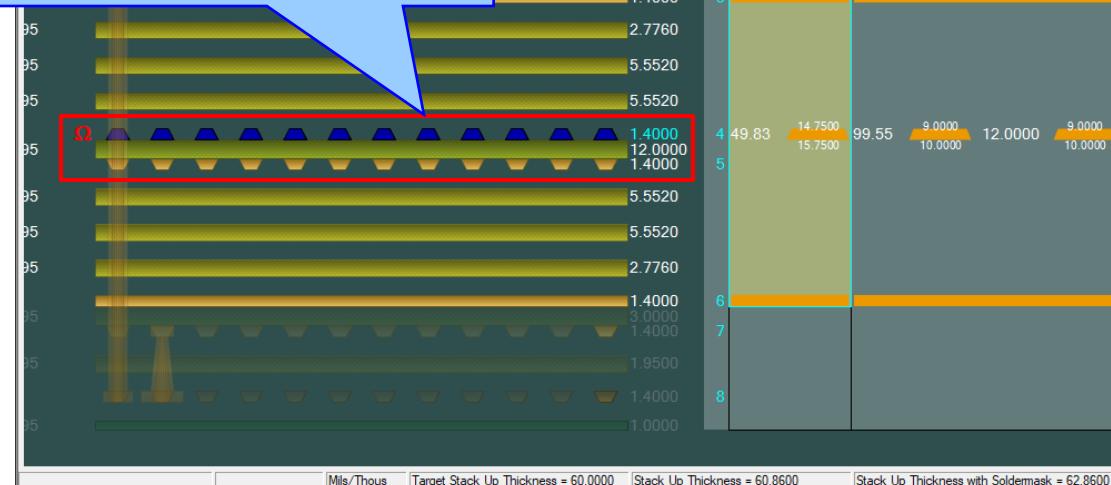


Browsing through the structures on the Controlled Impedance tab will auto highlight the structure on Structure View

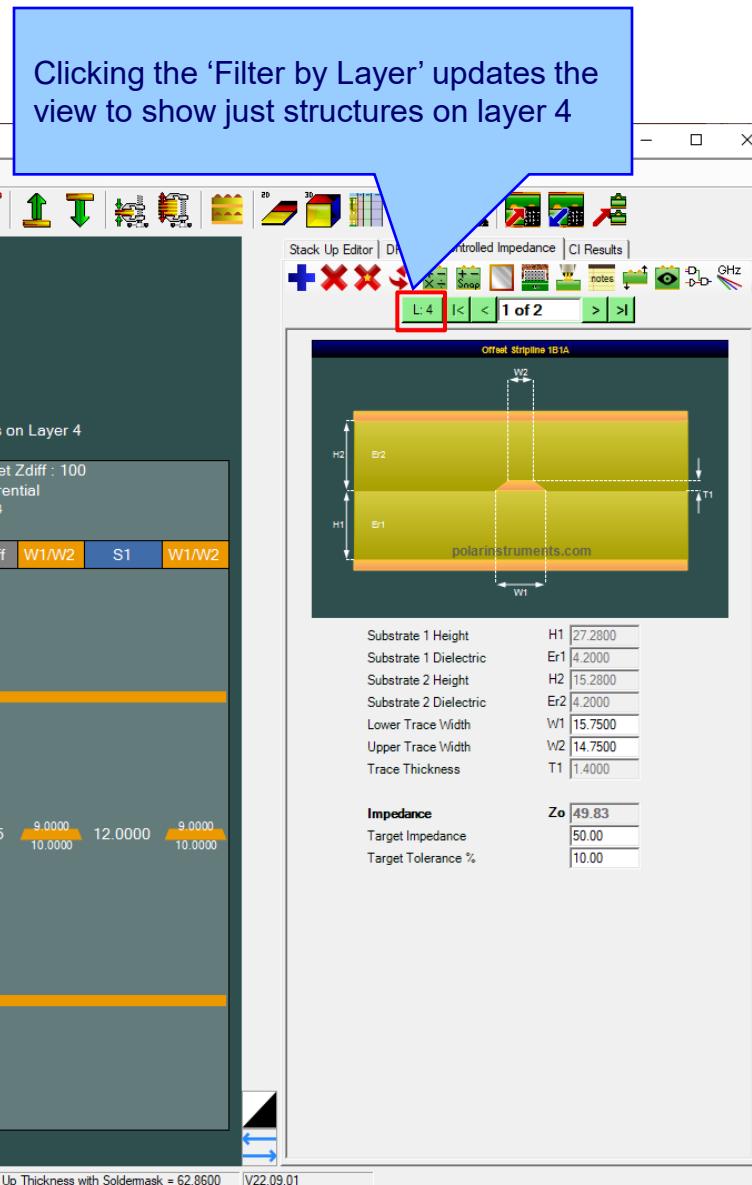
Introducing Structure View

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

In this example layer 4 has been selected



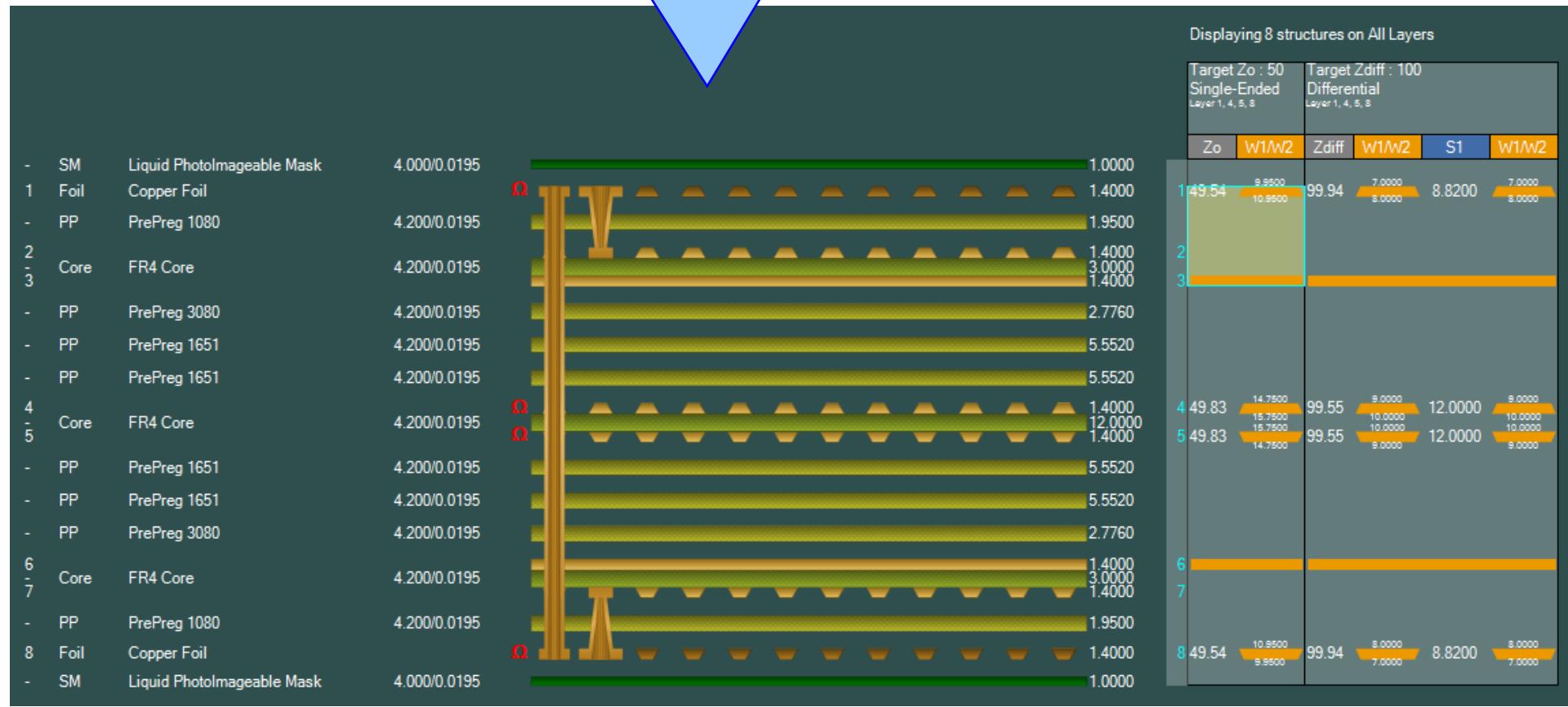
Clicking the 'Filter by Layer' updates the view to show just structures on layer 4



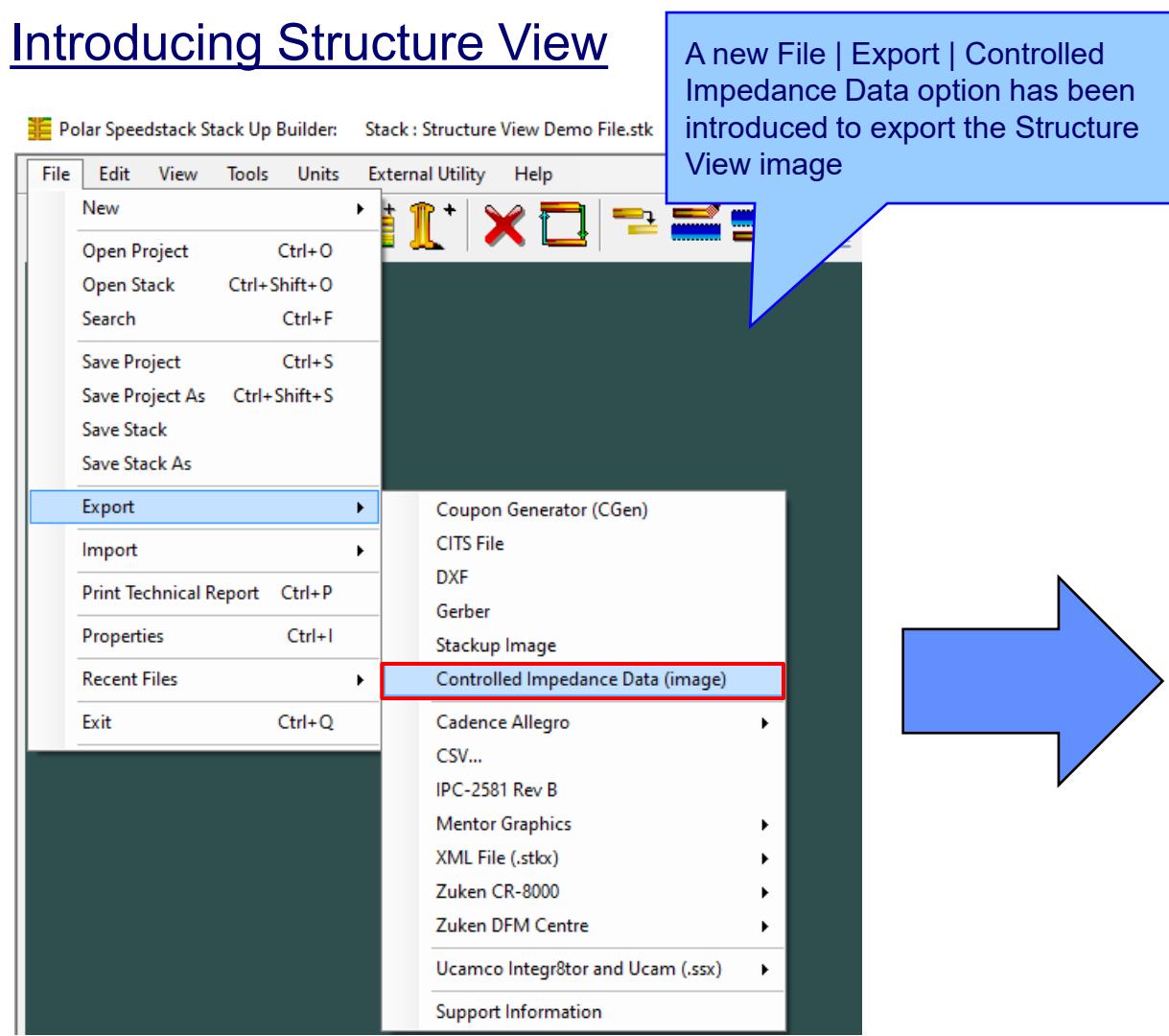
Introducing Structure View

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



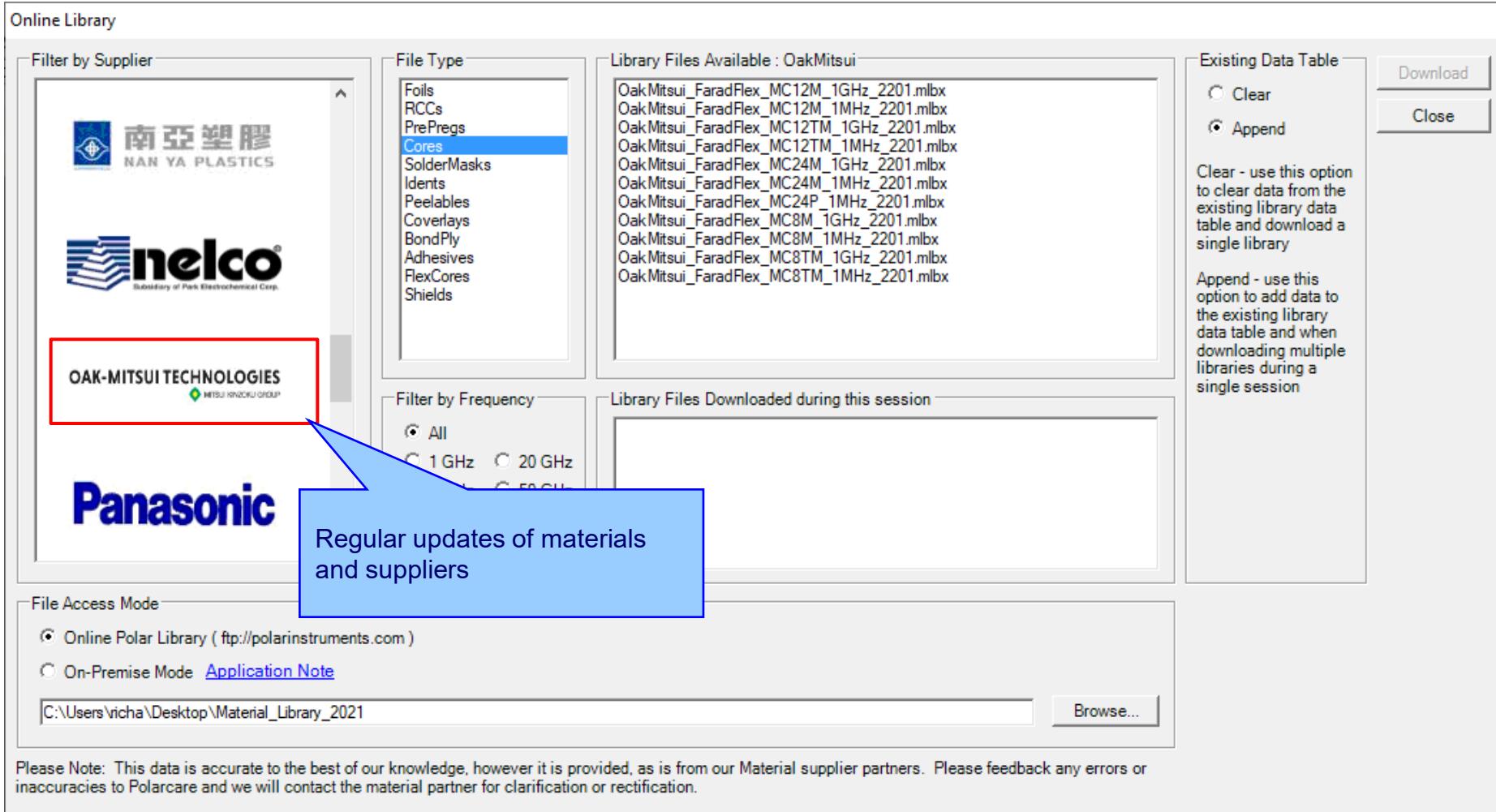
Introducing Structure View



Displaying 8 structures on All Layers

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

Online Library enhancements



The screenshot shows the 'Online Library' interface with the following components:

- Filter by Supplier:** Displays logos for NAN YA PLASTICS, nelco, OAK-MITSUI TECHNOLOGIES (highlighted with a red box), and Panasonic.
- File Type:** A list of file types including Foils, RCCs, PrePregs, Cores (selected), SolderMasks, Idents, Peelables, Coverlays, BondPly, Adhesives, FlexCores, and Shields.
- Library Files Available : OakMitsui:** A list of library files: OakMitsui_FaradFlex_MC12M_1GHz_2201.mlx, OakMitsui_FaradFlex_MC12M_1MHz_2201.mlx, OakMitsui_FaradFlex_MC12TM_1GHz_2201.mlx, OakMitsui_FaradFlex_MC12TM_1MHz_2201.mlx, OakMitsui_FaradFlex_MC24M_1GHz_2201.mlx, OakMitsui_FaradFlex_MC24M_1MHz_2201.mlx, OakMitsui_FaradFlex_MC24P_1MHz_2201.mlx, OakMitsui_FaradFlex_MC8M_1GHz_2201.mlx, OakMitsui_FaradFlex_MC8M_1MHz_2201.mlx, OakMitsui_FaradFlex_MC8TM_1GHz_2201.mlx, OakMitsui_FaradFlex_MC8TM_1MHz_2201.mlx.
- Existing Data Table:** Options for 'Clear' (radio button) and 'Append' (selected radio button). Descriptions: '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'.
- Filter by Frequency:** Options for 'All' (selected), 1 GHz, 20 GHz, and 50 GHz.
- Library Files Downloaded during this session:** A list box currently empty.
- File Access Mode:** Options for 'Online Polar Library (ftp://polarinstruments.com)' (selected) and 'On-Premise Mode' with a link to an 'Application Note'.
- File Path:** A text input field containing 'C:\Users\vicha\Desktop\Material_Library_2021' with a 'Browse...' button.
- 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.'

A blue callout box points to the 'OAK-MITSUI TECHNOLOGIES' section with the text: '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 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

Grid View can then be edited with Excel. Only columns are editable, other columns are read only. `CSTSolderMask.MaskThickness, Coverlay`

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

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			Inner 6	PrePreg 3080	2.7760	4.2000	0.0195
11	CSTCore	UpperCopper				FR4 Core	1.4000		
					Inner 7		3.0000	4.2000	0.0195
						PrePreg 1080	1.4000		
					Bottom	Copper Foil	1.9500	4.2000	0.0195
						Liquid PhotoImageable Mask	1.0000	4.0000	0.0195

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		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				
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	Copper Foil	1.4000		
14	CSTSolderMask	Mask		SM		Liquid PhotoImageable Mask	1.0000	4.0000	0.0195

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

Apply Cancel

Introducing Grid View

Grid View

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		4.0000	4.0000	0.0195
1	CSTFoil	Copper	1	Foil	Top	4.2000	4.2000	0.0195
2	CSTPrePreg	Dielectric		PP		4.2000	4.2000	0.0195
3	CSTCore	UpperCopper	2		Inner 1	4.2000	4.2000	0.0195
3	CSTCore	Dielectric		Core		4.2000	4.2000	0.0195
3	CSTCore	LowerCopper	3		Inner 2	4.2000	4.2000	0.0195
4	CSTPrePreg	Dielectric		PP		4.2000	4.2000	0.0195
5	CSTPrePreg	Dielectric		PP		4.2000	4.2000	0.0195
6	CSTPrePreg	Dielectric		PP		5.5520	4.2000	0.0195
7	CSTCore	UpperCopper	4		Inner 4	1.4000	1.4000	
7	CSTCore	Dielectric		Core		12.0000	4.2000	0.0195
7	CSTCore	LowerCopper	5		Inner 5	1.4000	1.4000	
8	CSTPrePreg	Dielectric		PP		5.5520	4.2000	0.0195
9	CSTPrePreg	Dielectric		PP		5.5520	4.2000	0.0195
10	CSTPrePreg	Dielectric		PP		2.7760	4.2000	0.0195
11	CSTCore	UpperCopper	6		Inner 6	1.4000	1.4000	
11	CSTCore	Dielectric		Core		3.0000	4.2000	0.0195
11	CSTCore	LowerCopper	7		Inner 7	1.4000	1.4000	
12	CSTPrePreg	Dielectric		PP		1.9500	4.2000	0.0195
13	CSTFoil	Copper	8	Foil	Bottom	1.4000	1.4000	
14	CSTSolderMask	Mask		SM		1.0000	4.0000	0.0195

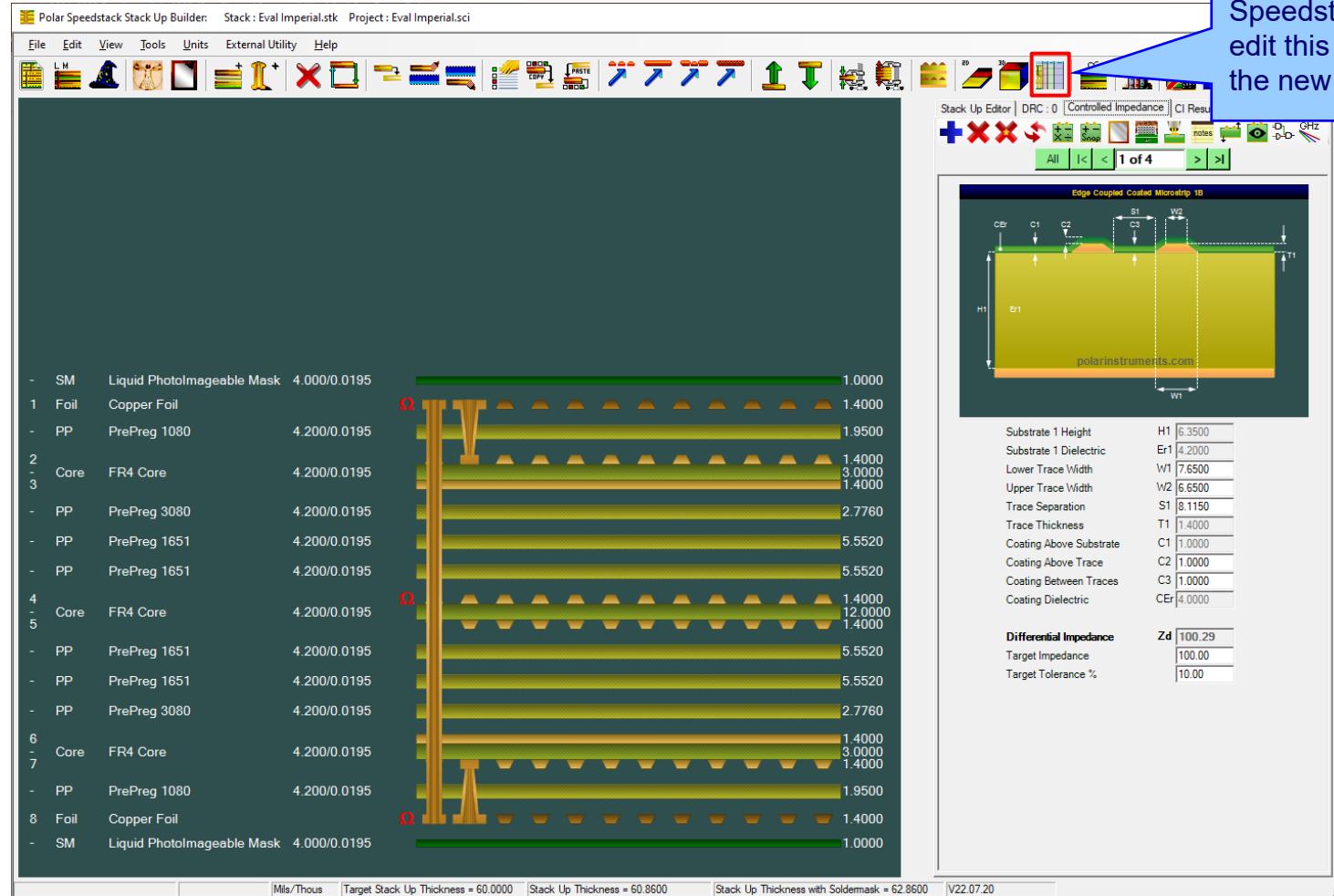
Grid View has many uses, some are highlighted here:

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

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, Overlay.FinishedThickness

Apply Cancel

Grid View – Walkthrough Step #1



Step #1

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

Grid View – Walkthrough Step #2

Grid View

Stack Up Collection Index	Material Class	Material Element	Electrical Layer	Material Layer Type ID	Layer Name	Description	1.0000	4.0000	0.0195
0	CSTSolderMask	Mask		SM		Liquid Photomask	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 Photomask	1.0000	4.0000	0.0195

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

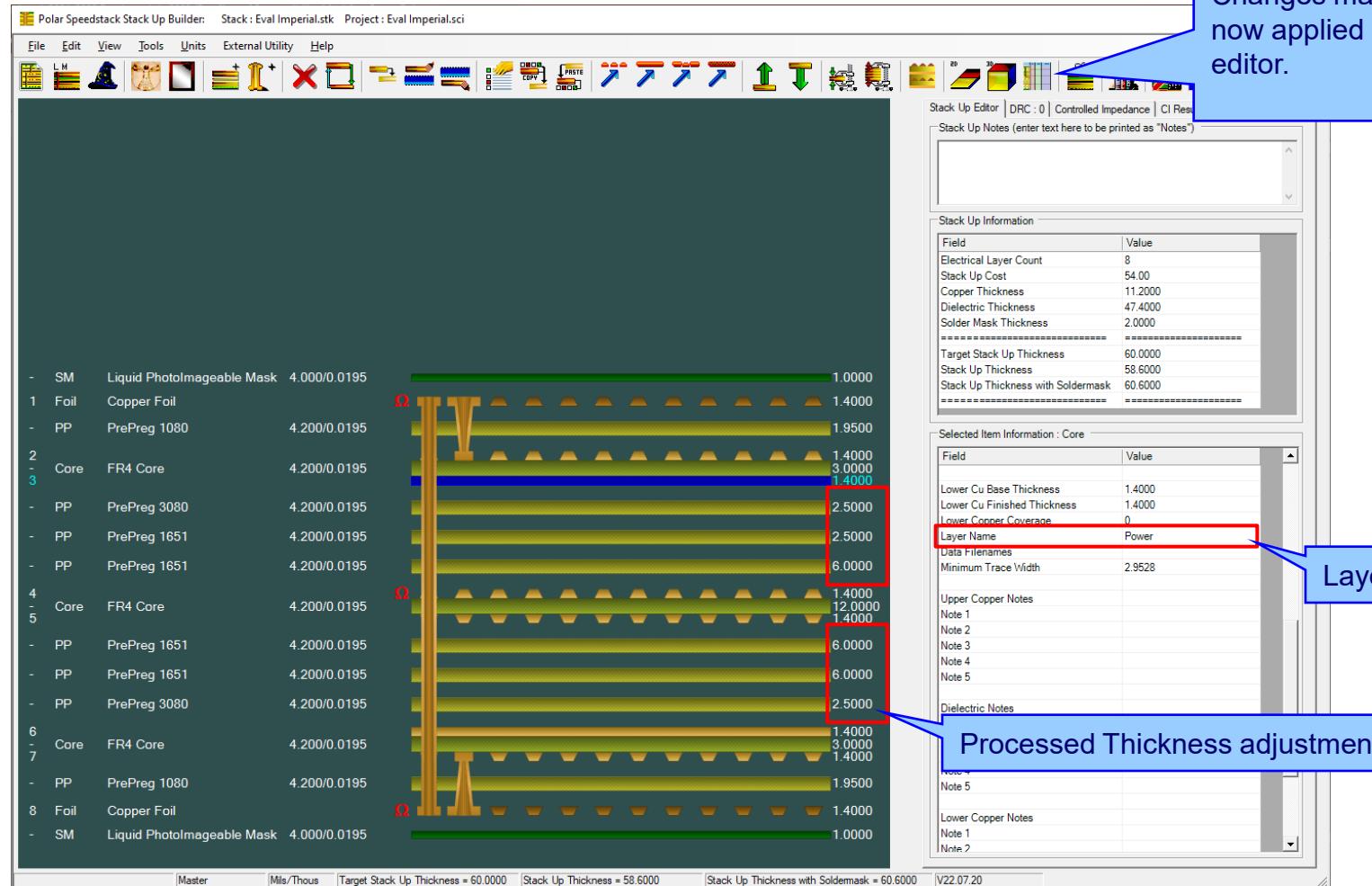
Apply Cancel

Step #2

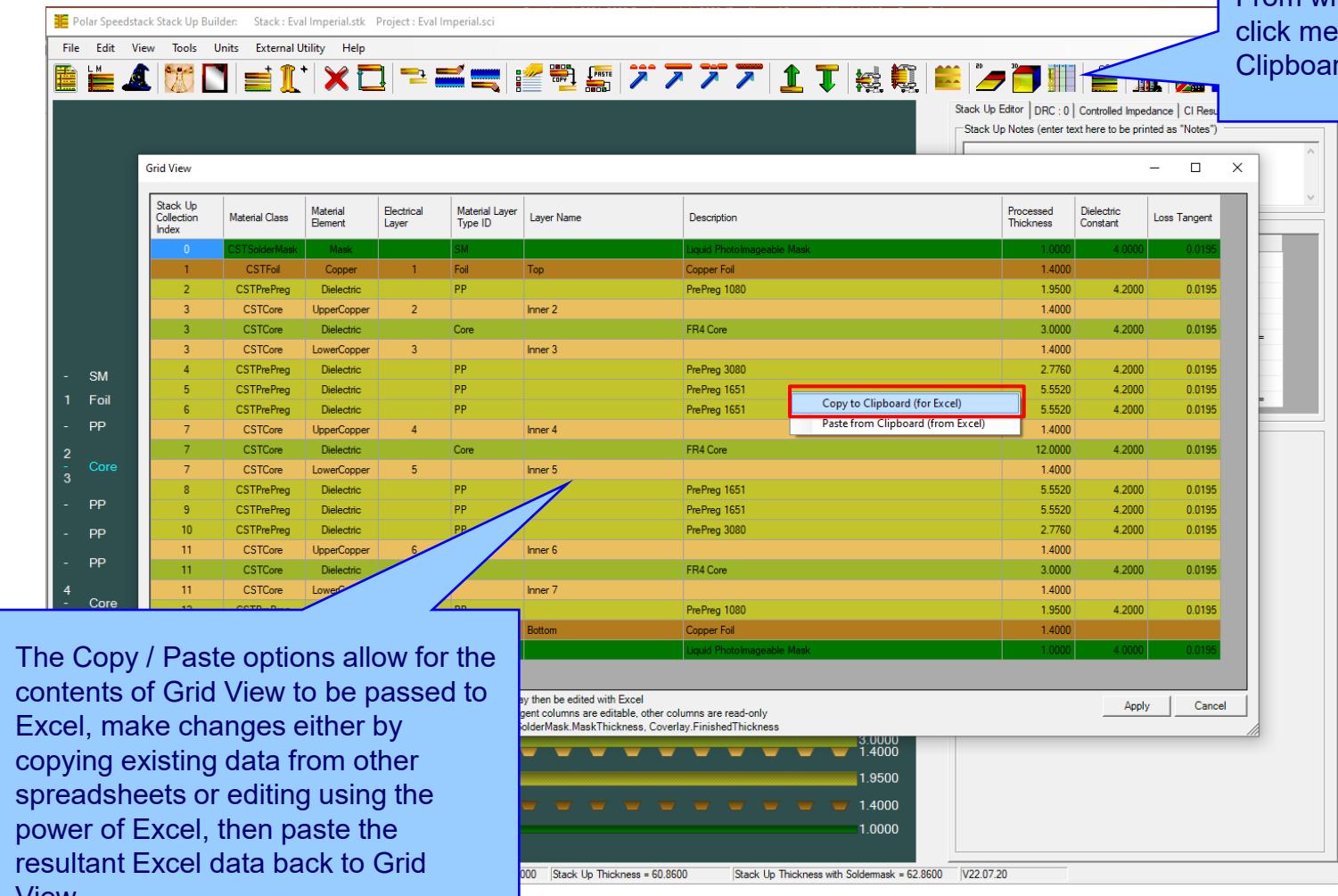
Using the Grid View editor the following cells are amended. Layer Names have been changed and Processed Thickness adjusted

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

Grid View – Walkthrough Step #3



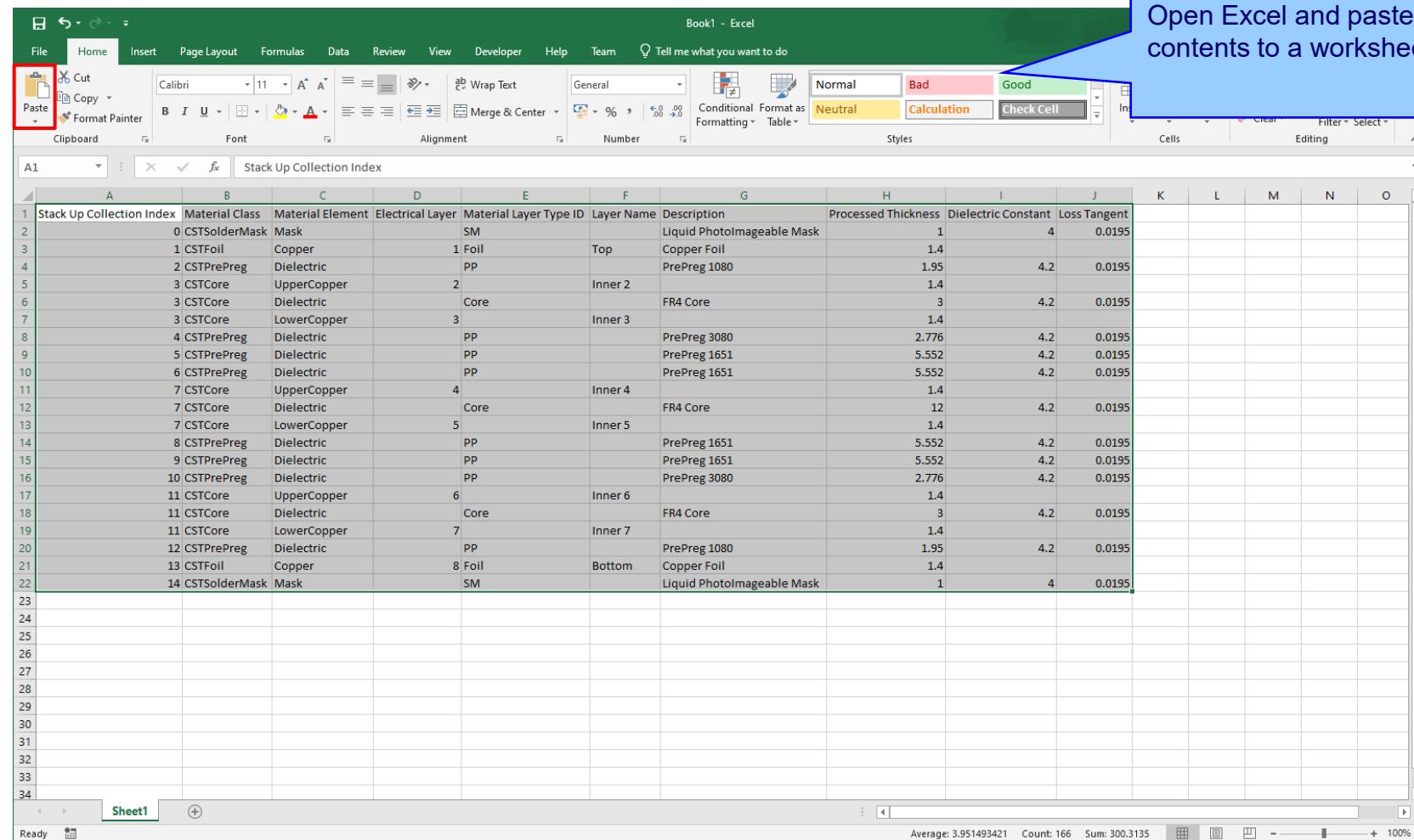
Using Grid View with Microsoft Excel – Step #1



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.

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

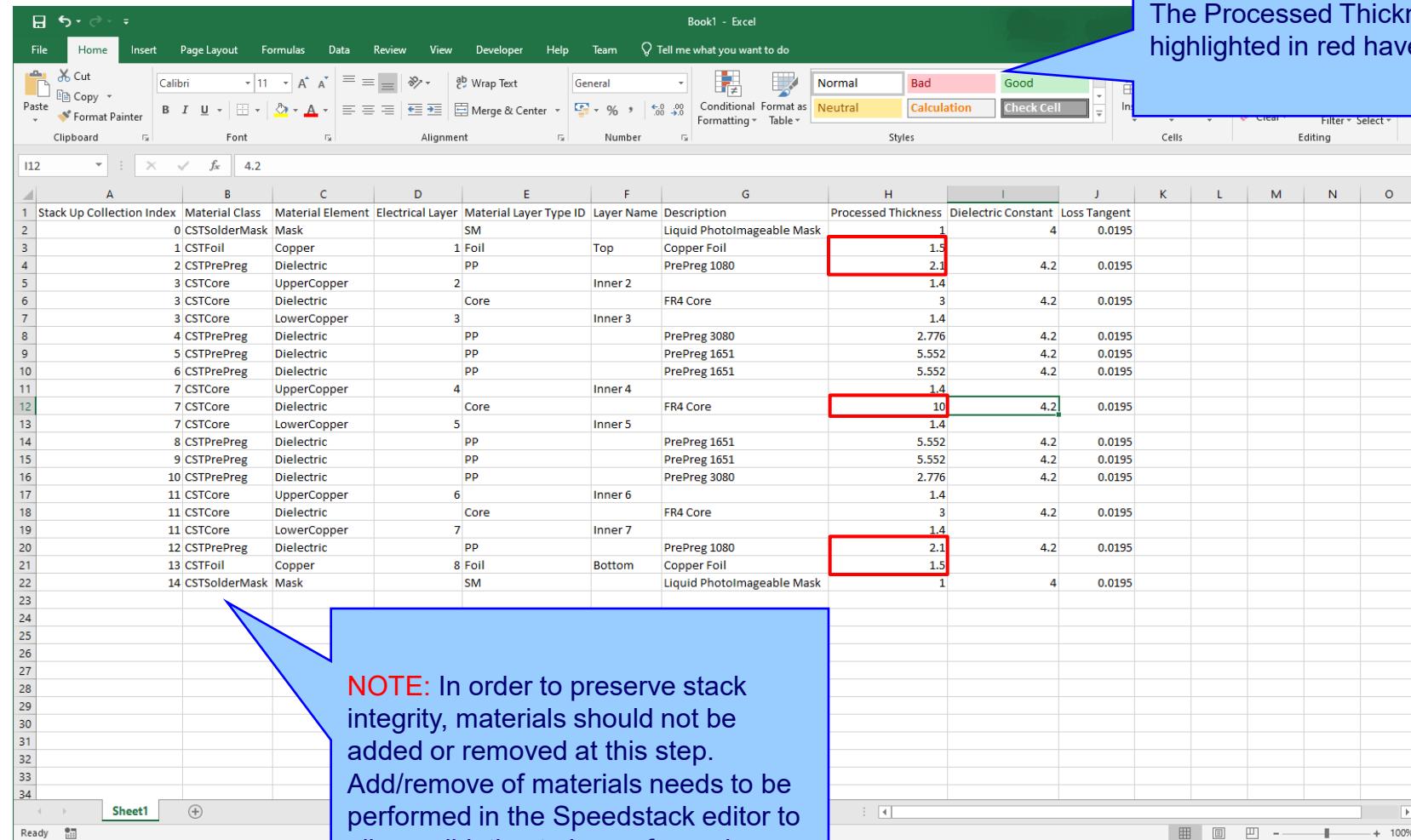
Using Grid View with Microsoft Excel – Step #2



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 Photolimageable Mask	1	4	0.0195
1	CSTFoil	Copper		1	Foil	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	Copper Foil	1.4		
14	CSTSolderMask	Mask		SM		Liquid Photolimageable Mask	1	4	0.0195

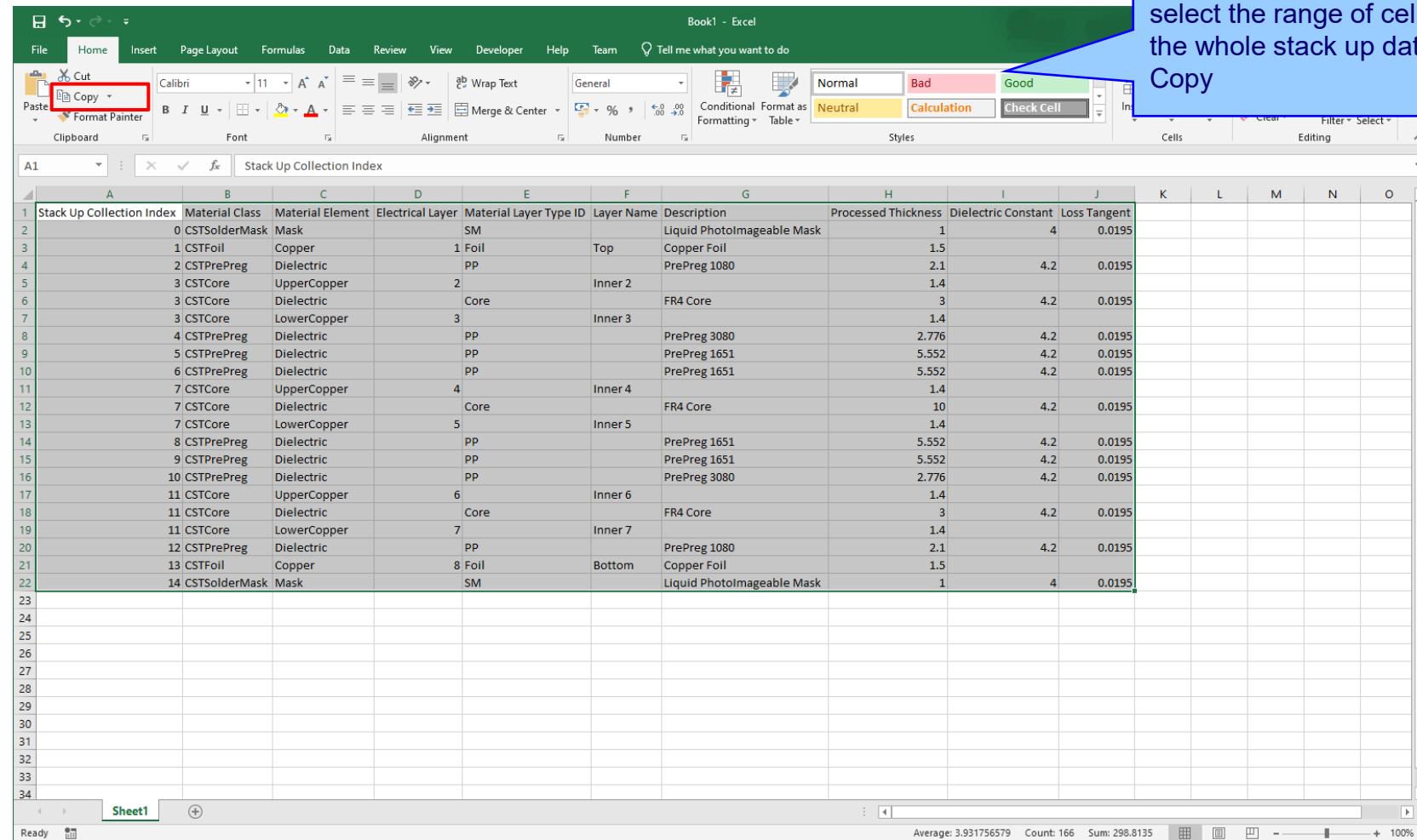
Using Grid View with Microsoft Excel – Step #3



The screenshot shows a Microsoft Excel spreadsheet titled "Book1 - Excel" with a table of stackup data. The table has columns for Stack Up Collection Index, Material Class, Material Element, Electrical Layer, Material Layer Type ID, Layer Name, Description, Processed Thickness, Dielectric Constant, and Loss Tangent. Several cells in the "Processed Thickness" column (H) are highlighted in red, specifically rows 1, 12, 13, 17, and 21. A callout box on the right says "Step #3 The Processed Thickness cells highlighted in red have been changed". A callout box at the bottom left says "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."

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

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
1	0	CSTsolderMask	Mask		SM	Liquid Photolimageable Mask	1	4	0.0195
2	1	CSTFoil	Copper		1	Foil	Copper Foil	1.5	
3	2	CSTPrePreg	Dielectric		PP	PrePreg 1080	2.1	4.2	0.0195
4	3	CSTCore	UpperCopper		2	Inner 2		1.4	
5	3	CSTCore	Dielectric		Core	FR4 Core	3	4.2	0.0195
6	3	CSTCore	LowerCopper		3	Inner 3		1.4	
7	4	CSTPrePreg	Dielectric		PP	PrePreg 3080	2.776	4.2	0.0195
8	5	CSTPrePreg	Dielectric		PP	PrePreg 1651	5.552	4.2	0.0195
9	6	CSTPrePreg	Dielectric		PP	PrePreg 1651	5.552	4.2	0.0195
10	7	CSTCore	UpperCopper		4	Inner 4		1.4	
11	7	CSTCore	Dielectric		Core	FR4 Core	10	4.2	0.0195
12	7	CSTCore	LowerCopper		5	Inner 5		1.4	
13	8	CSTPrePreg	Dielectric		PP	PrePreg 1651	5.552	4.2	0.0195
14	9	CSTPrePreg	Dielectric		PP	PrePreg 1651	5.552	4.2	0.0195
15	10	CSTPrePreg	Dielectric		PP	PrePreg 3080	2.776	4.2	0.0195
16	11	CSTCore	UpperCopper		6	Inner 6		1.4	
17	11	CSTCore	Dielectric		Core	FR4 Core	3	4.2	0.0195
18	11	CSTCore	LowerCopper		7	Inner 7		1.4	
19	12	CSTPrePreg	Dielectric		PP	PrePreg 1080	2.1	4.2	0.0195
20	13	CSTFoil	Copper		Foil	Copper Foil	1.5		
21	14	CSTsolderMask	Mask		SM	Liquid Photolimageable Mask	1	4	0.0195
22									
23									
24									
25									
26									
27									
28									
29									
30									
31									
32									
33									
34									

Using Grid View with Microsoft Excel – Step #5

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 Photomageable 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			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 Photomageable Mask	1.0000	4.0000	0.0195

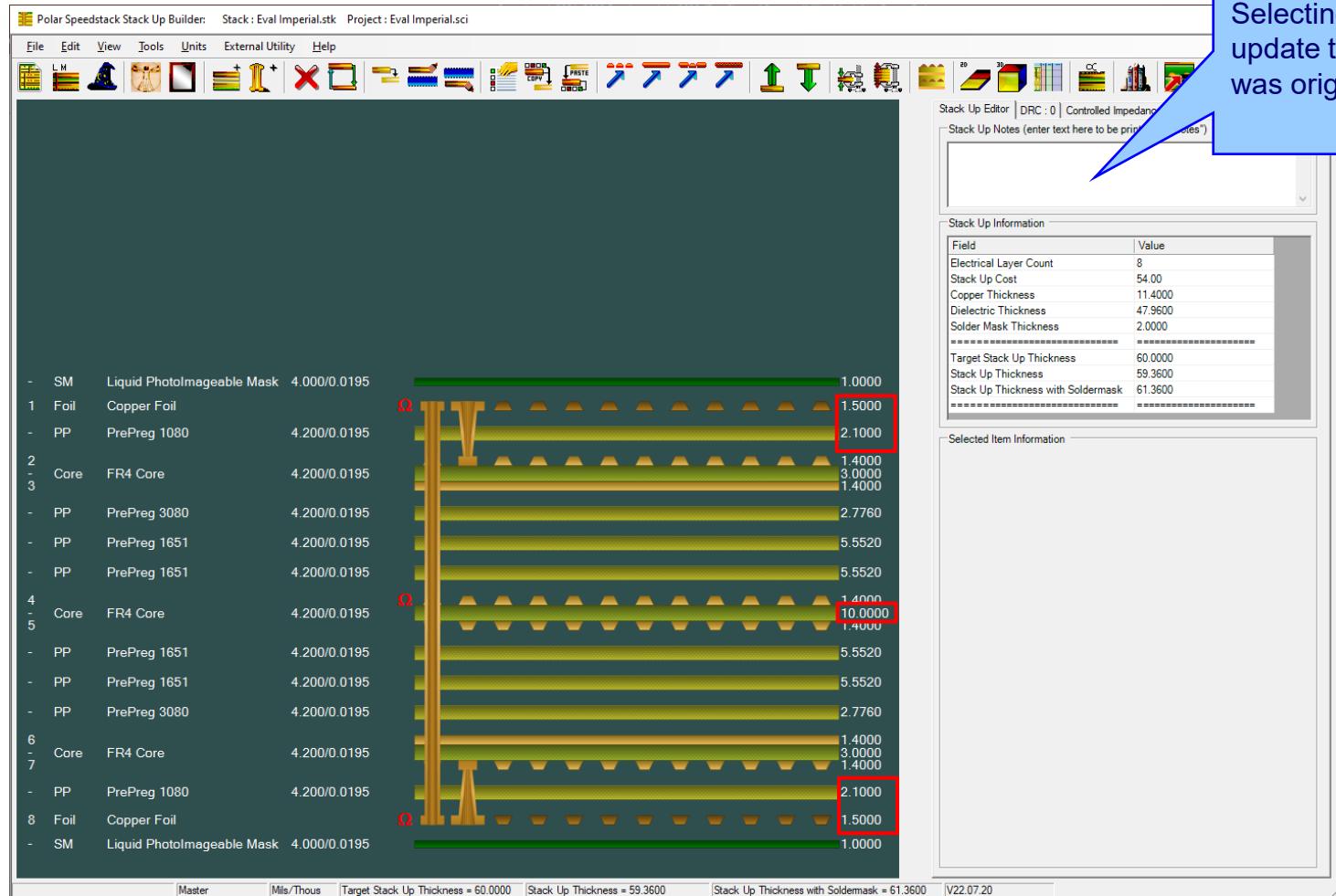
Use the right-click menu to copy / paste the Grid View to the clipboard - the data may then be edited with Excel
Layer Name, Description, Processed Thickness, Dielectric Constant and Loss Tangent columns are editable, other columns are read-only
Processed Thickness = Copper.FinishedThickness, Dielectric.IsolationDistance,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

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

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

Apply Cancel

Using Grid View with Microsoft Excel – Step #6



Step #6

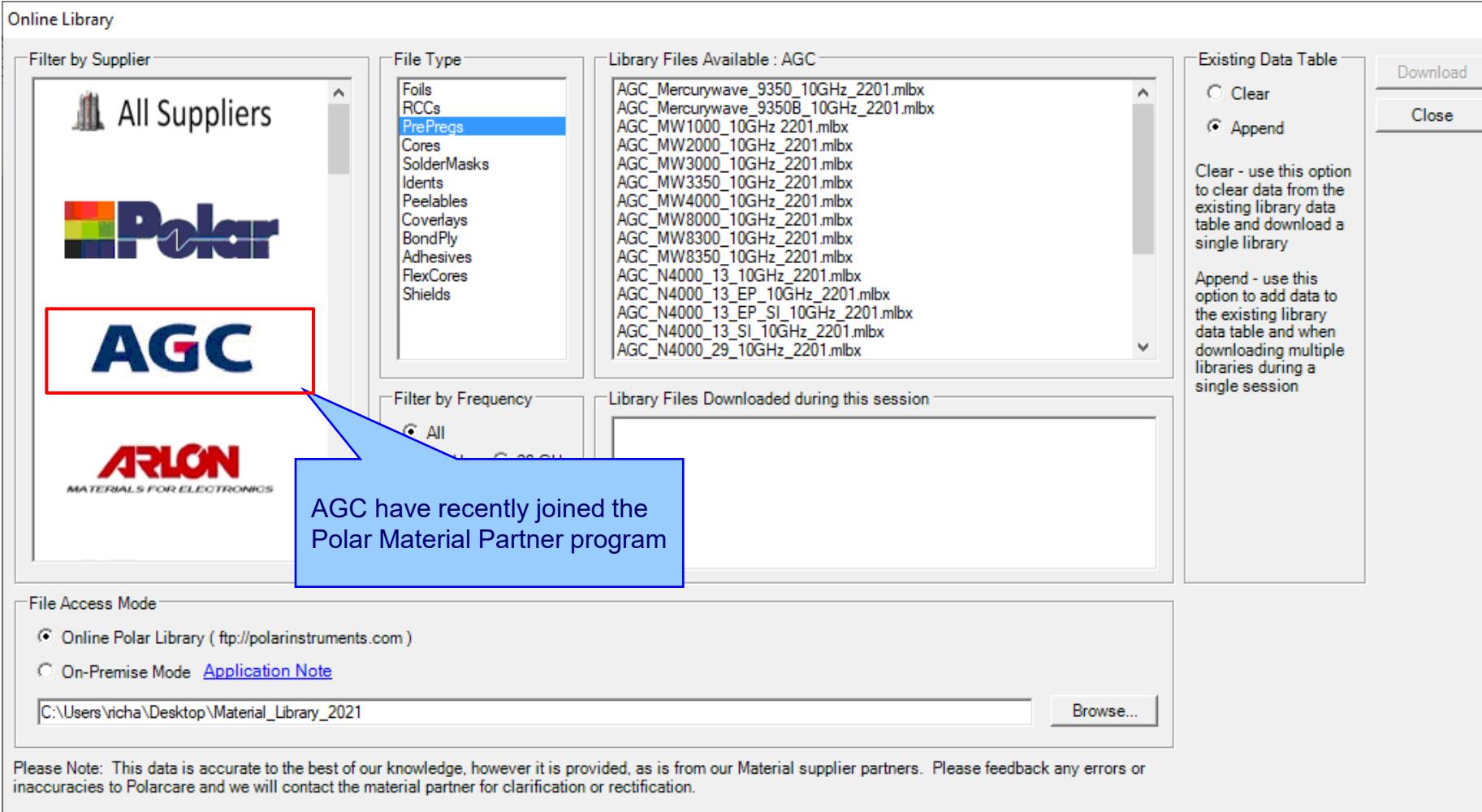
Selecting Apply in Grid View will update the stack up with the data that was originally changed in Excel

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

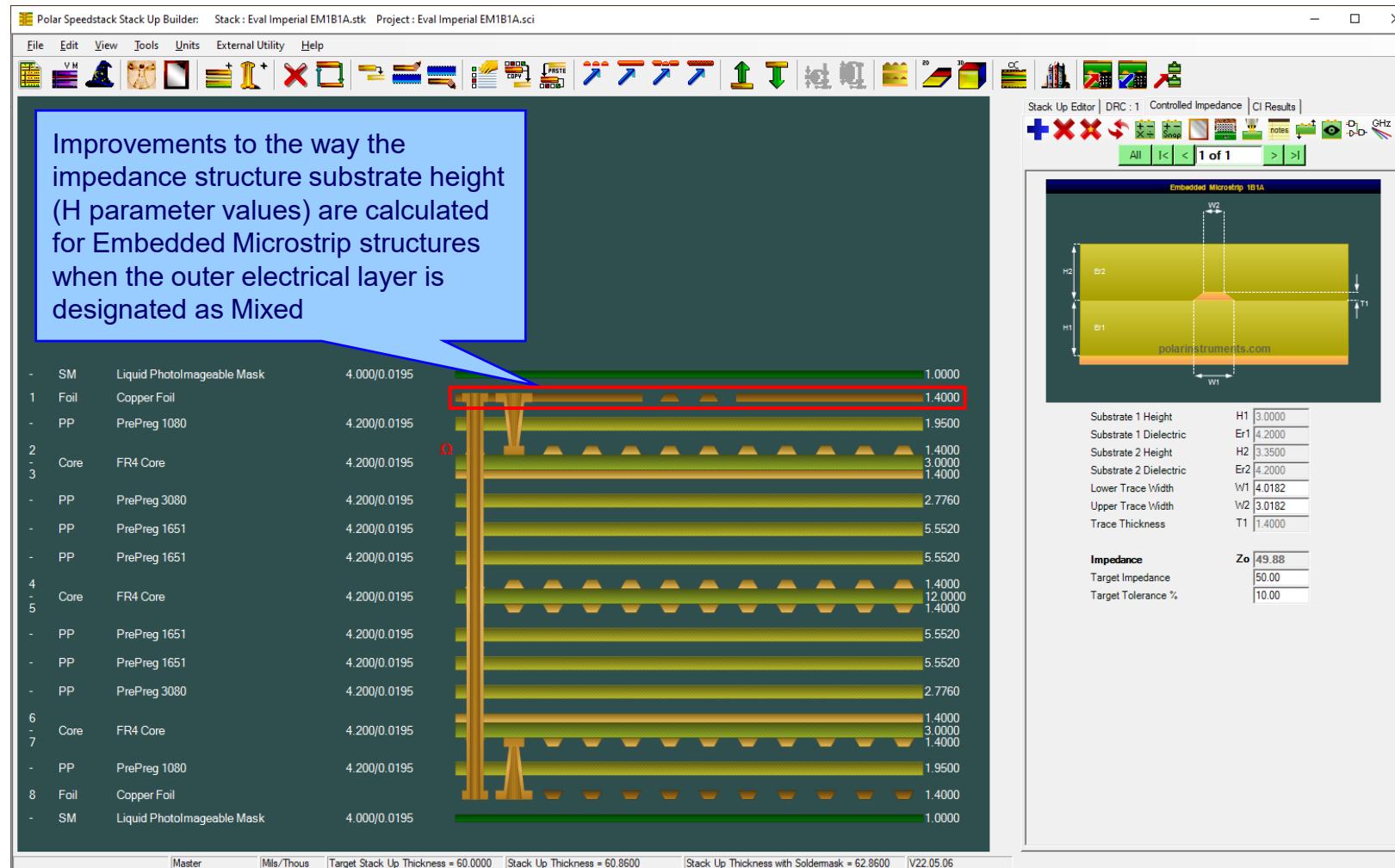
Speedstack v22.05.06 (May 2022)

Online Library enhancements

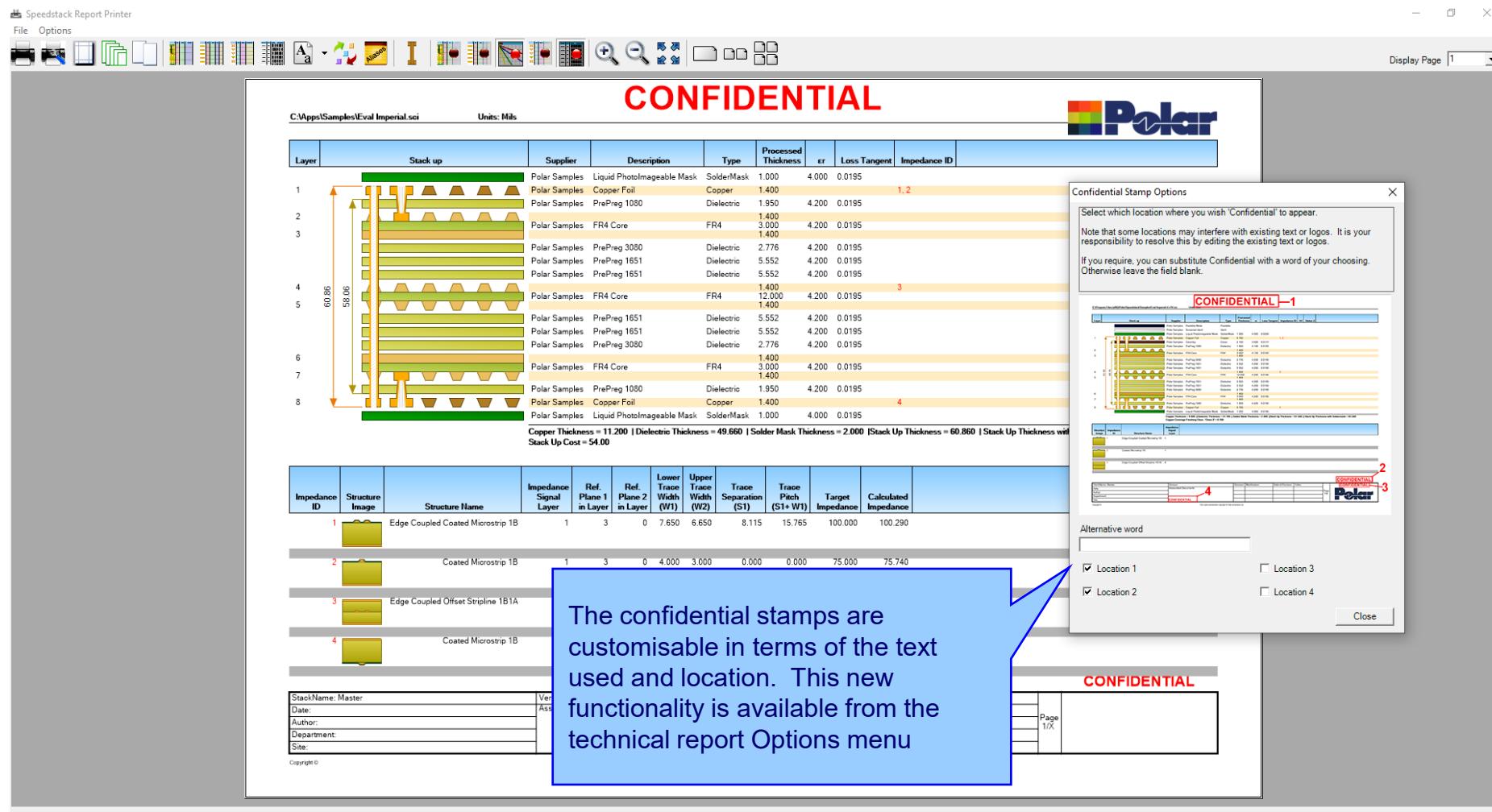


The screenshot shows the 'Online Library' interface. On the left, there's a 'Filter by Supplier' section with 'All Suppliers' and 'Polar' logos, and a red box highlighting the 'AGC' logo. Below these are 'ARLON' and 'MATERIALS FOR ELECTRONICS' logos. A blue callout box points to the AGC logo with the text: 'AGC have recently joined the Polar Material Partner program'. In the center, there's a 'File Type' dropdown menu with 'PrePreg' selected, and a list of 'Library Files Available : AGC' including various AGC_MW and AGC_N4000 files. On the right, there's an 'Existing Data Table' section with 'Clear' and 'Append' radio buttons, and descriptions for each. At the bottom, there's a 'File Access Mode' section with 'Online Polar Library' selected, a file path input field containing 'C:\Users\vicha\Desktop\Material_Library_2021', and a 'Browse...' button. A note at the bottom states: 'Please Note: This data is accurate to the best of our knowledge, however it is provided, as is from our Material supplier partners. Please feedback any errors or inaccuracies to Polarcare and we will contact the material partner for clarification or rectification.'

Embedded Microstrip structure enhancements

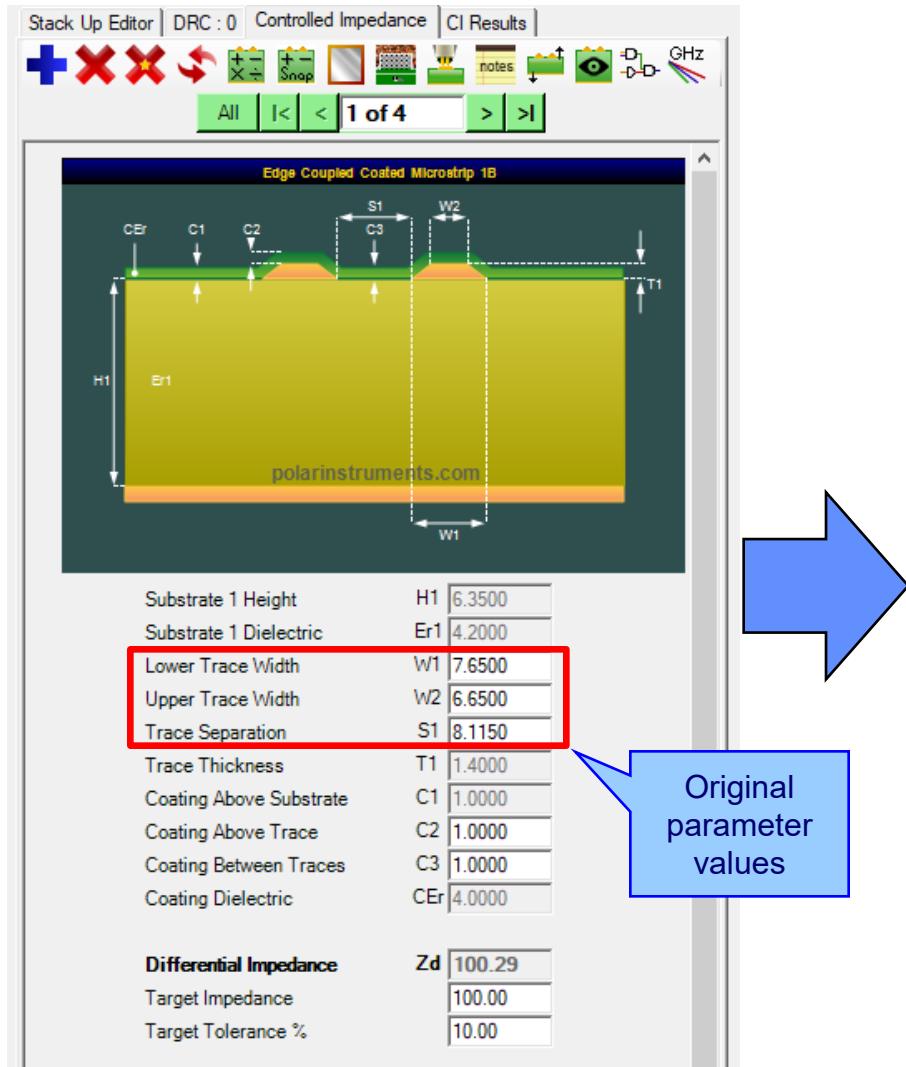


New Confidential Stamp options added to the technical report

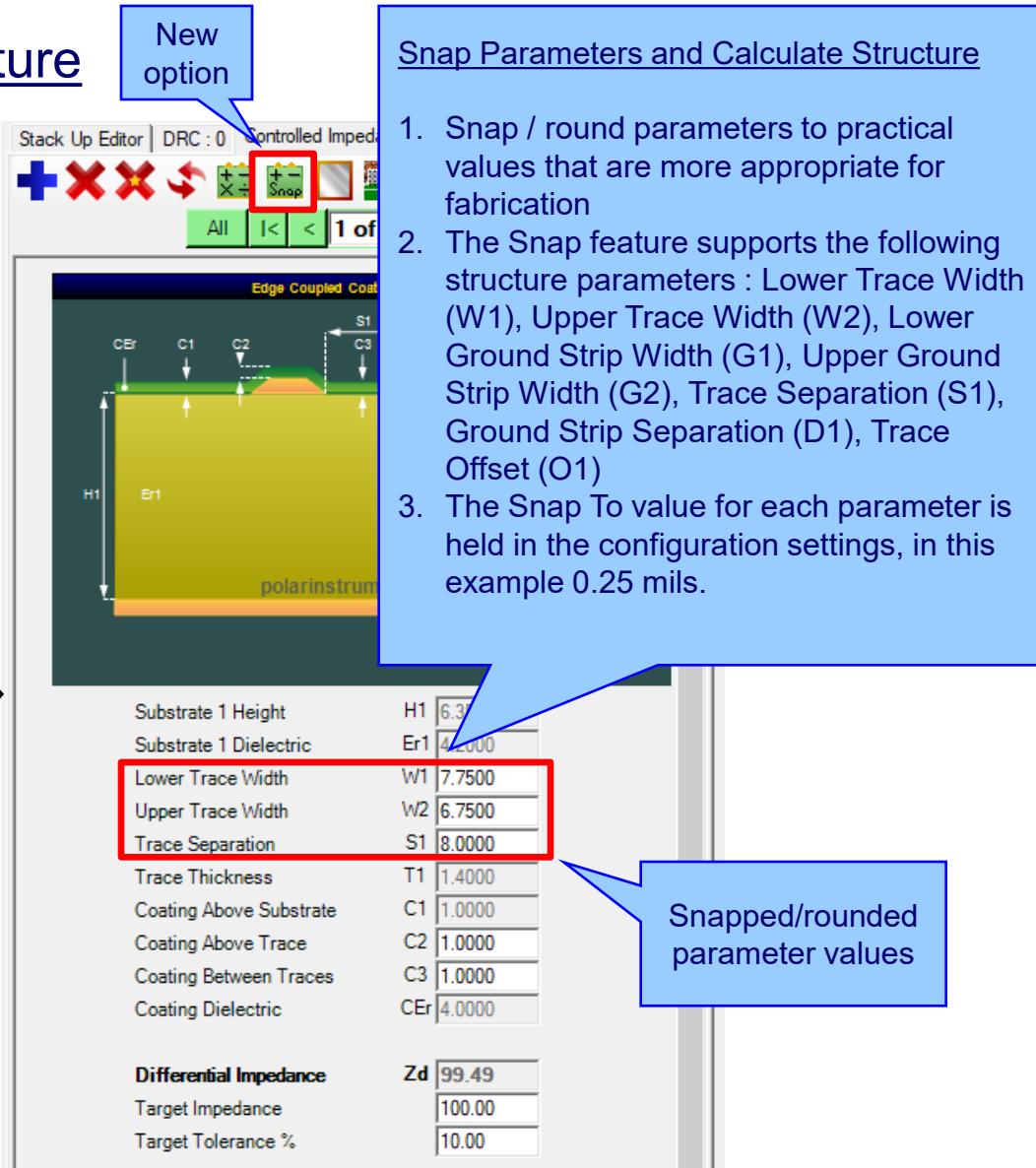


Speedstack v22.01.01 (January 2022)

Snap Parameters and Calculate Structure



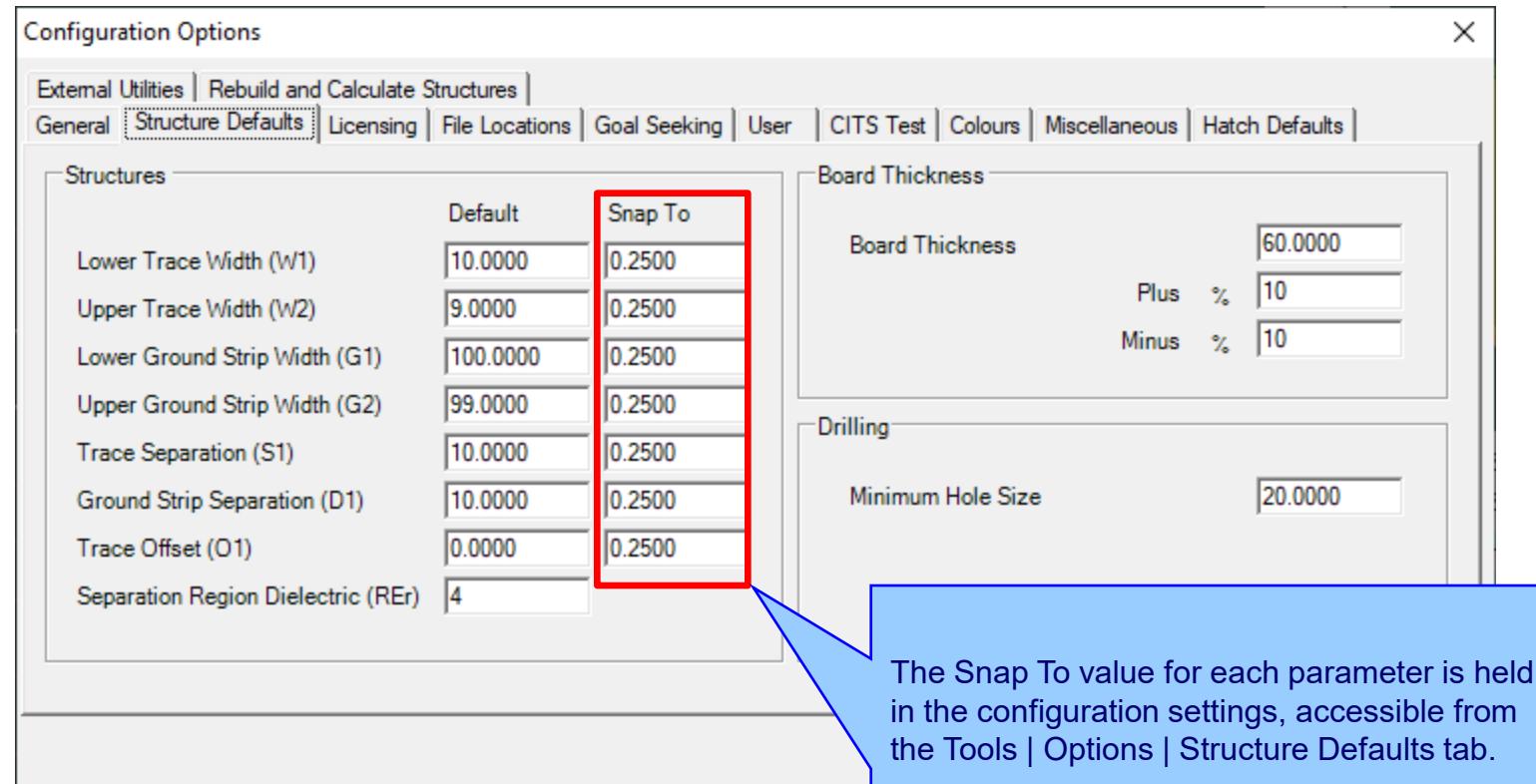
Original parameter values



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.

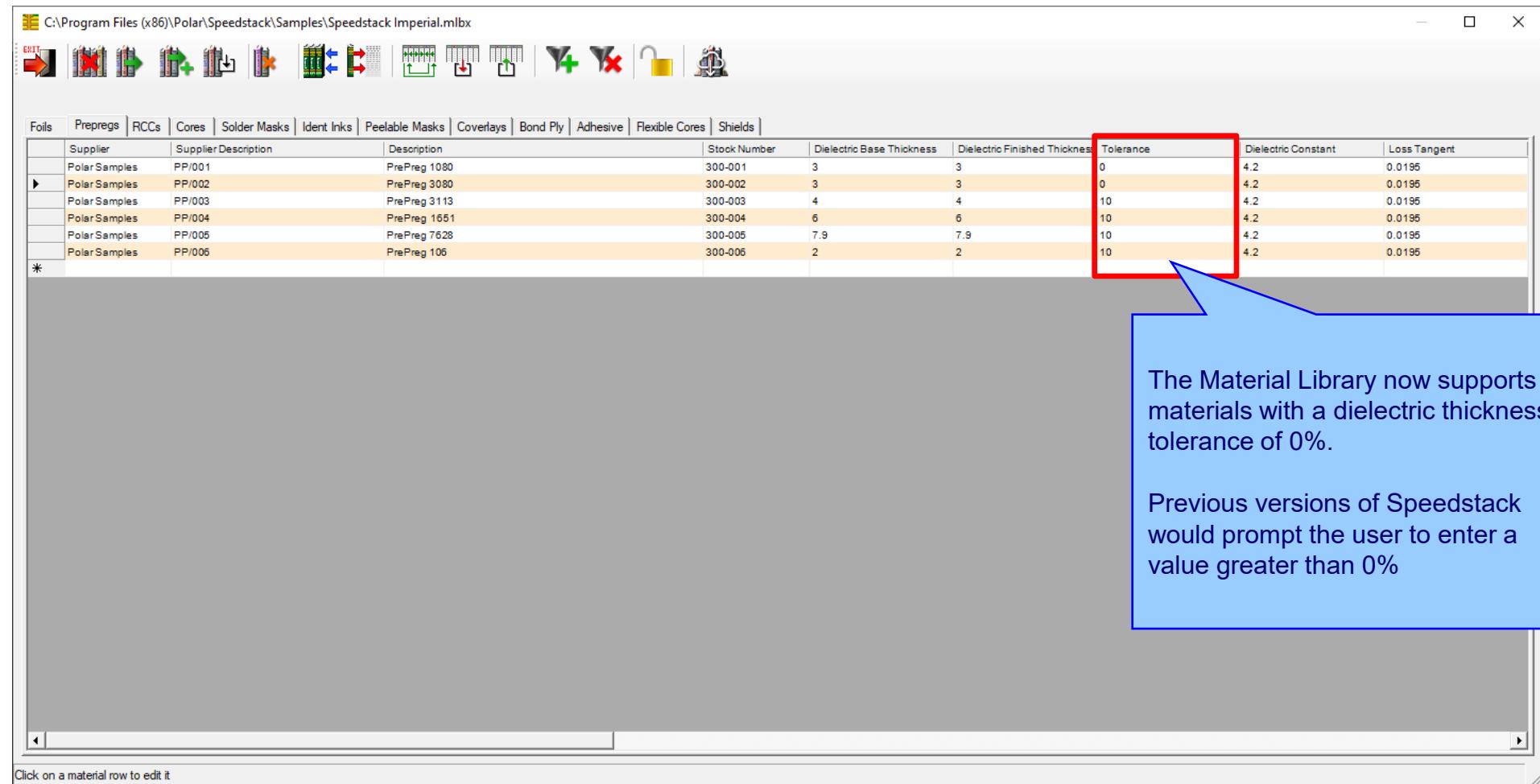
Snap Parameters and Calculate Structure



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

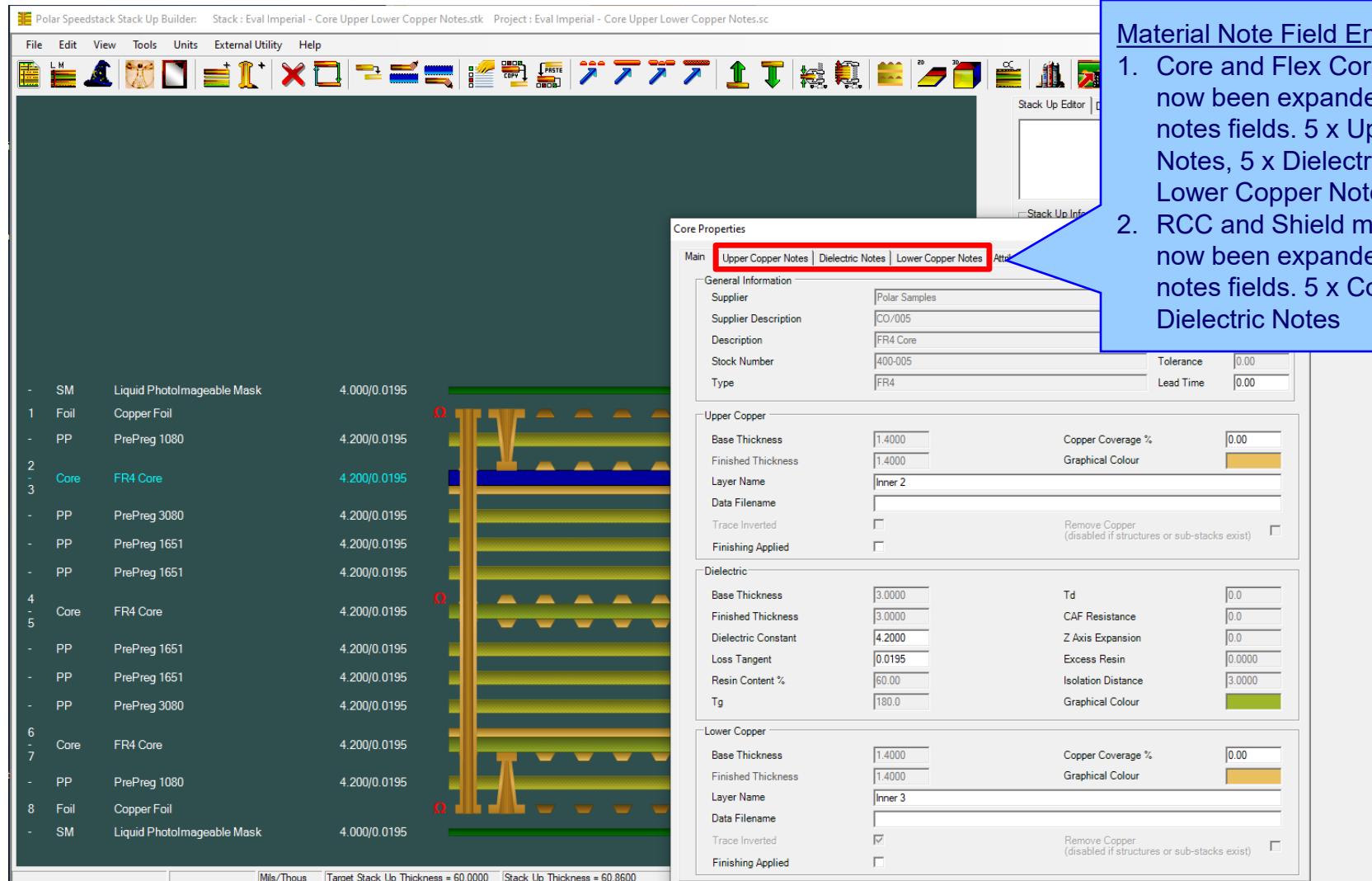
Although all Snap To values shown here are set to 0.25 mils, each parameter can support a different value

Material Library Enhancements



Speedstack v21.11.01 (November 2021)

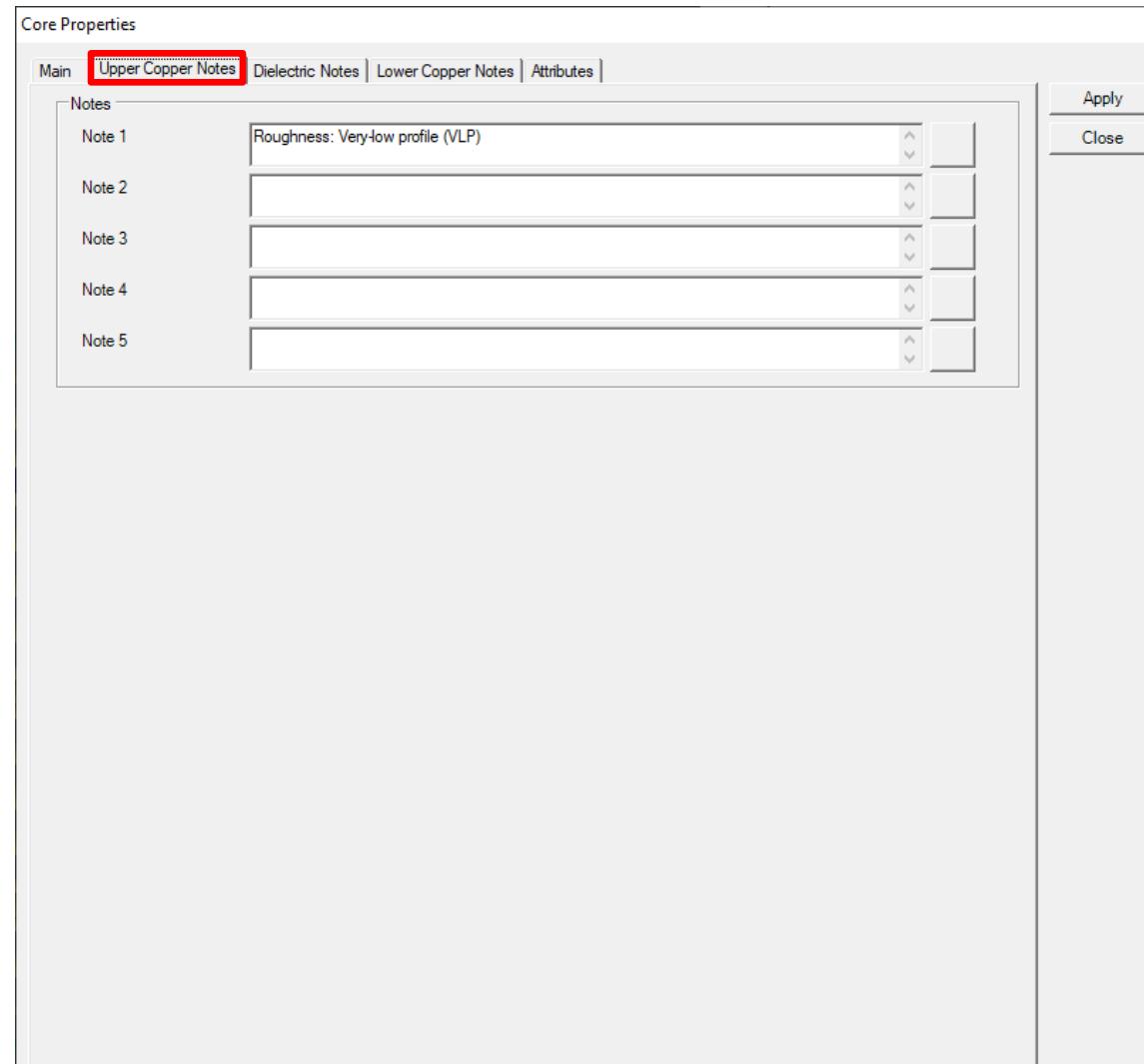
Material Note Field Enhancements – improvements to stack up documentation



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

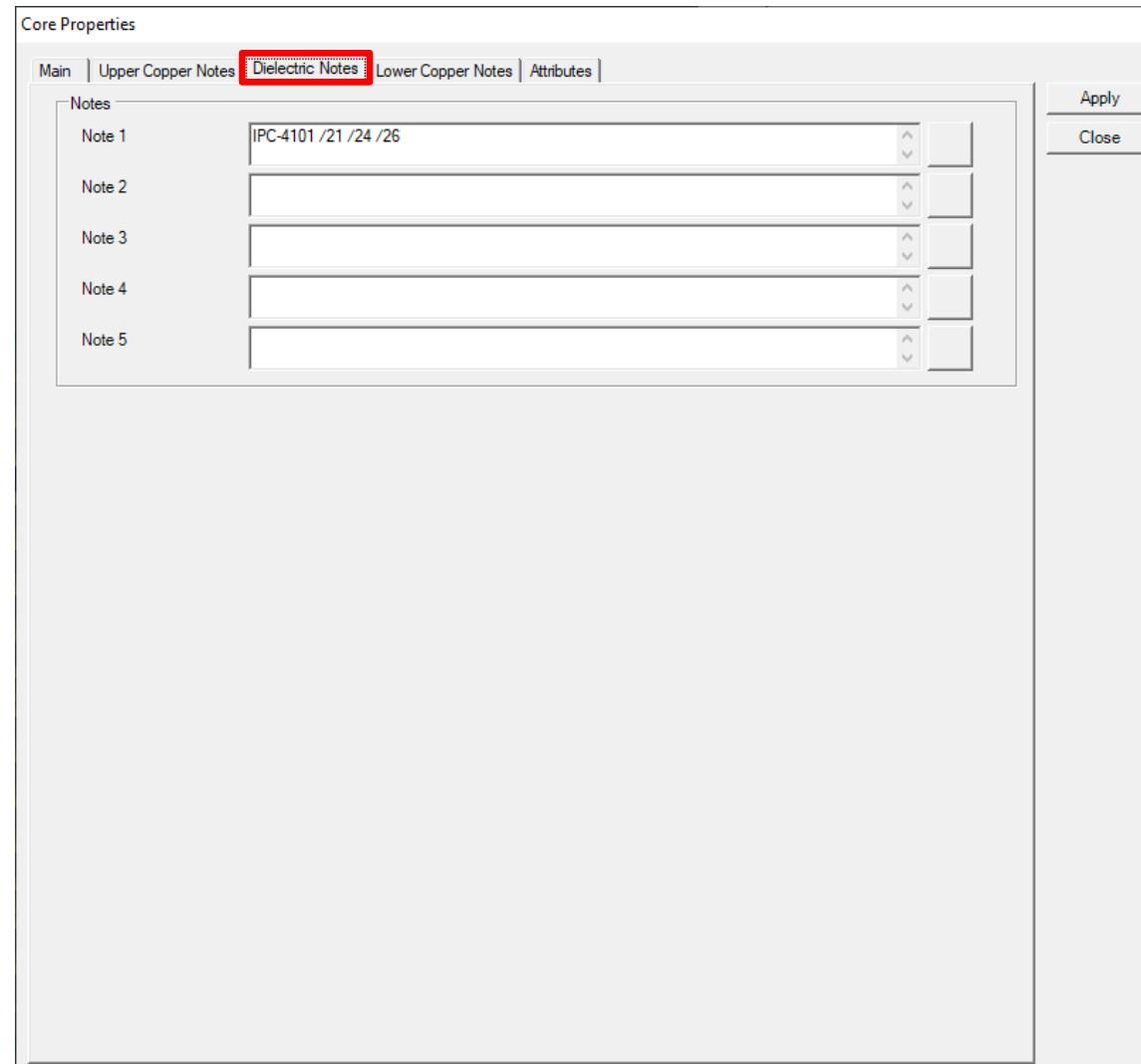
Material Note Field Enhancements – improvements to stack up documentation



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

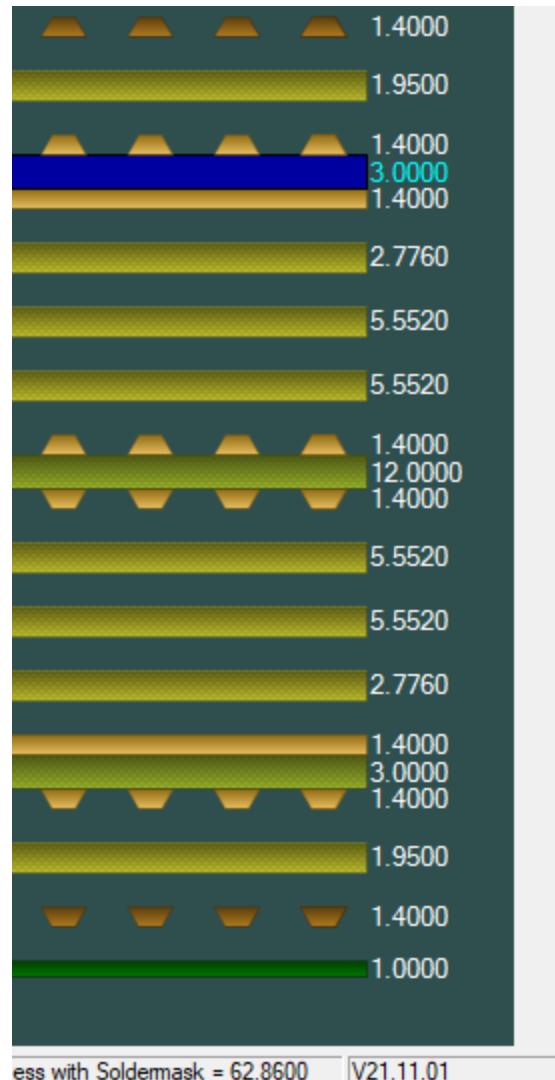
Material Note Field Enhancements – improvements to stack up documentation



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

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

Material Note Field Enhancements – improvements to stack up documentation



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

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

Material Note Field Enhancements – library enhancements

Review/Edit Cores

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

Upper Copper Notes

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

Dielectric Notes

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

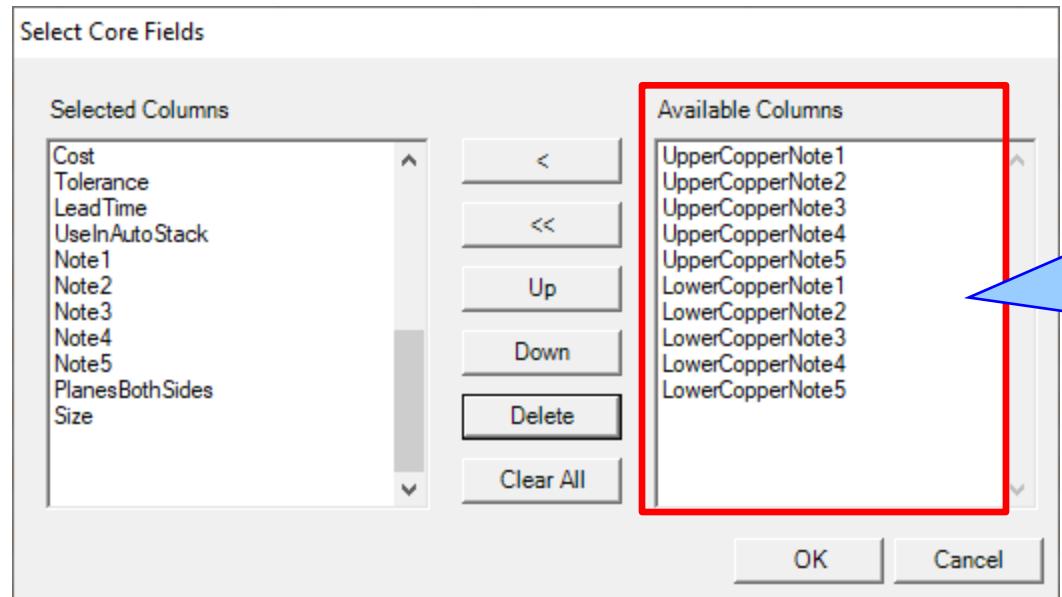
Lower Copper Notes

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

Notes

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

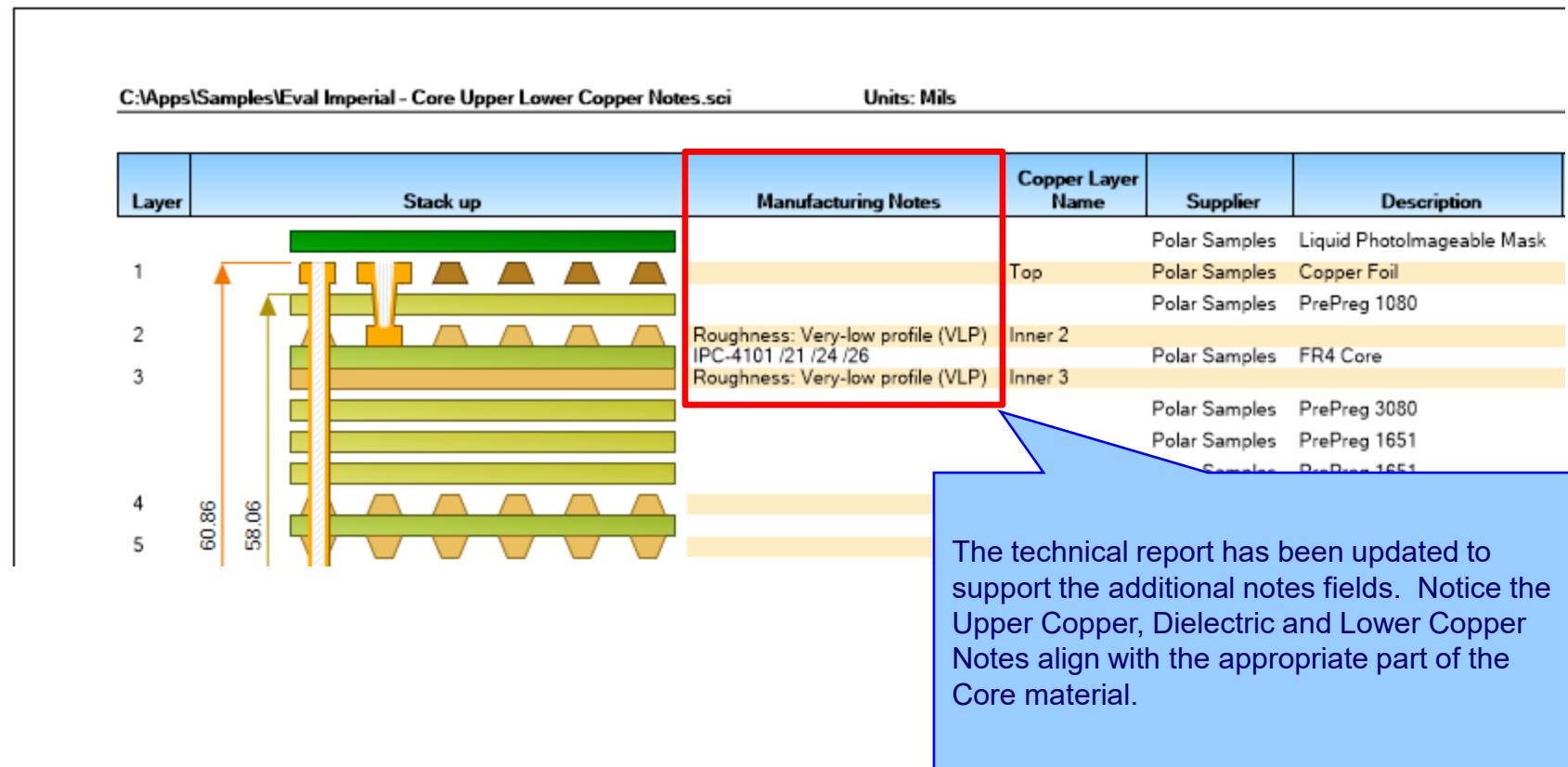


Material Library Import / Export

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



Material Note Field Enhancements – technical report enhancements



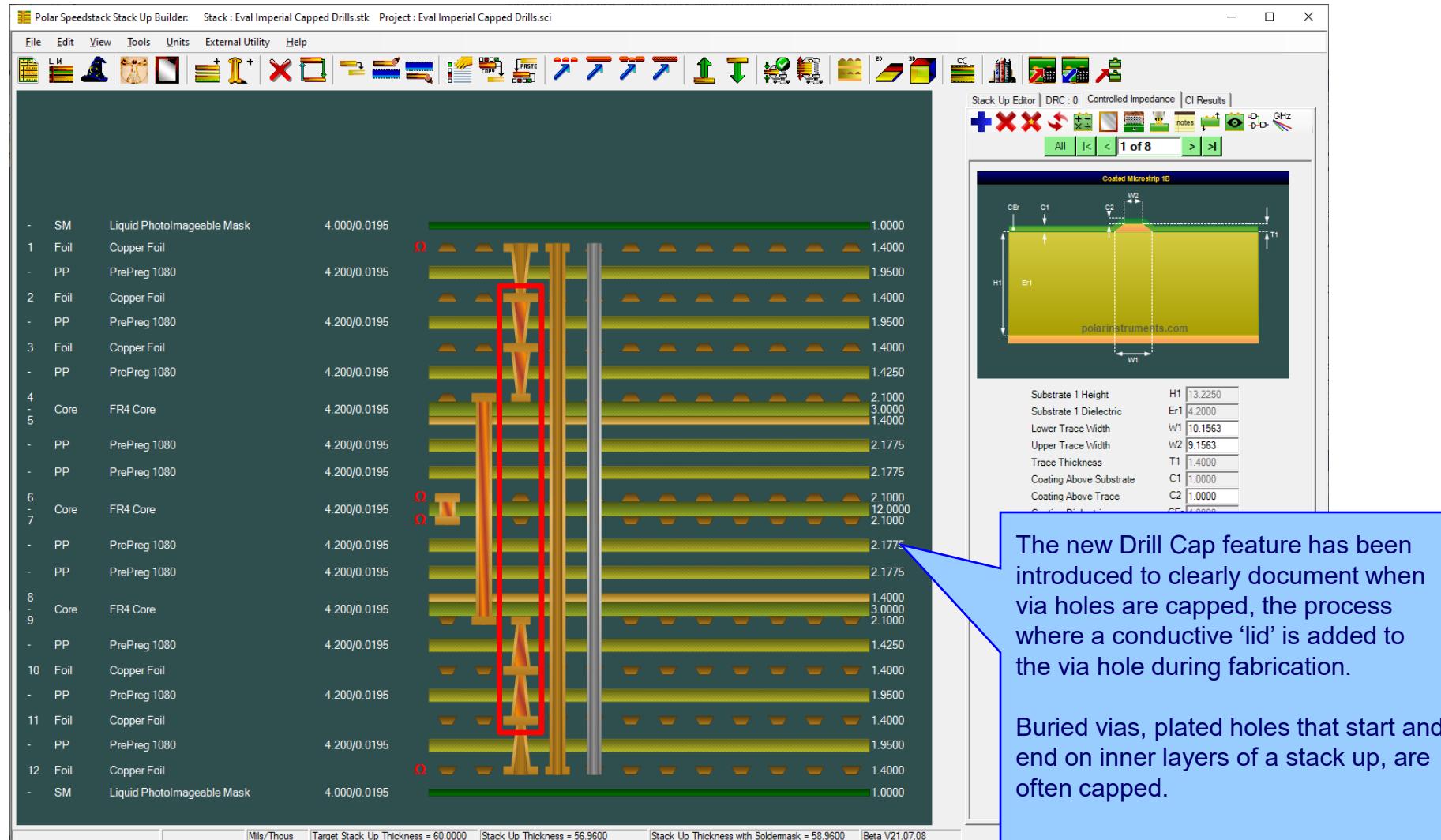
Import / Export enhancements

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

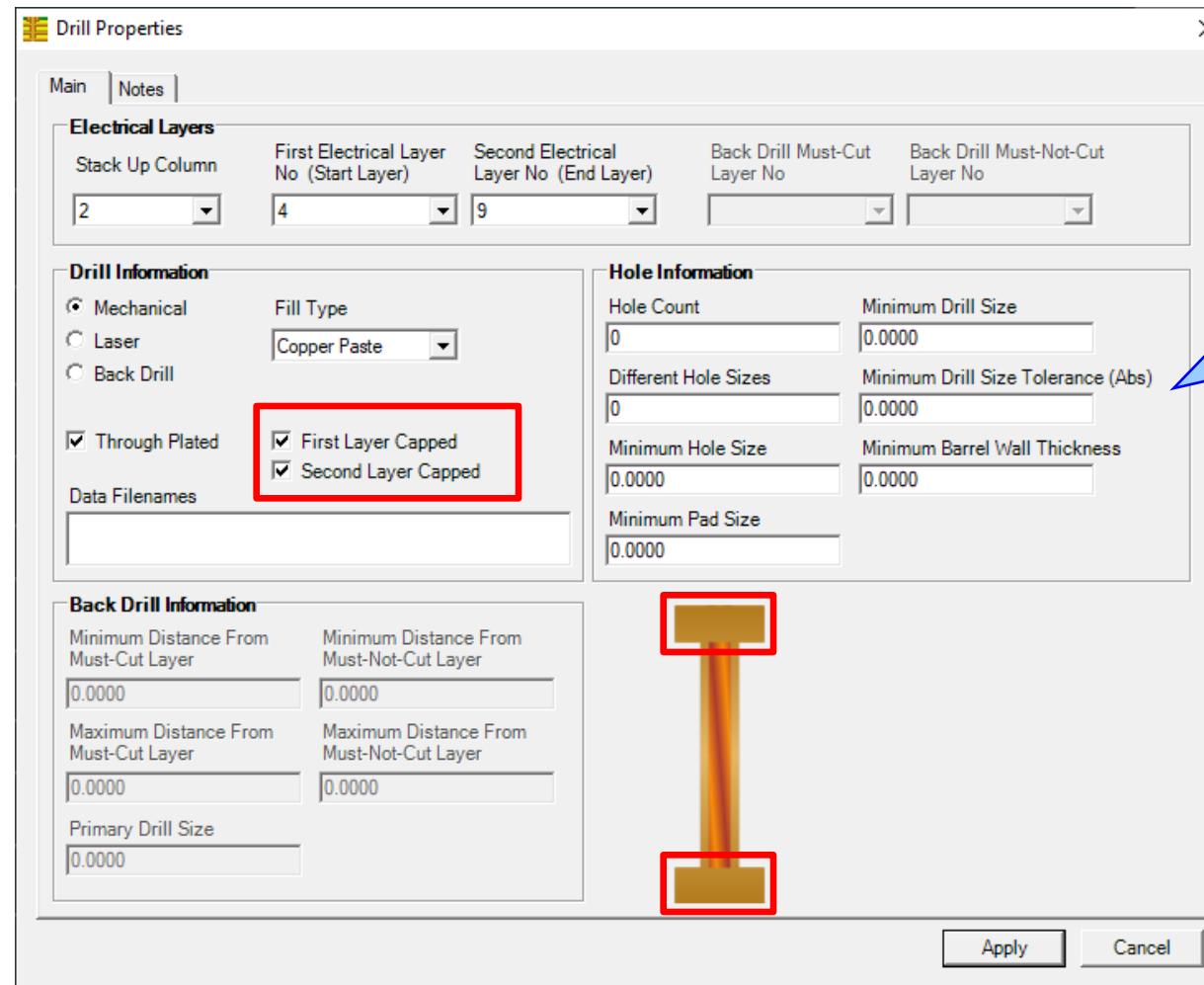
- XML STKX v23.00 and SSX v13.00 import / export options
- CSV export option

Speedstack v21.07.08 (July 2021)

New Drill Cap feature



Drill Cap option – mechanical through plated drills

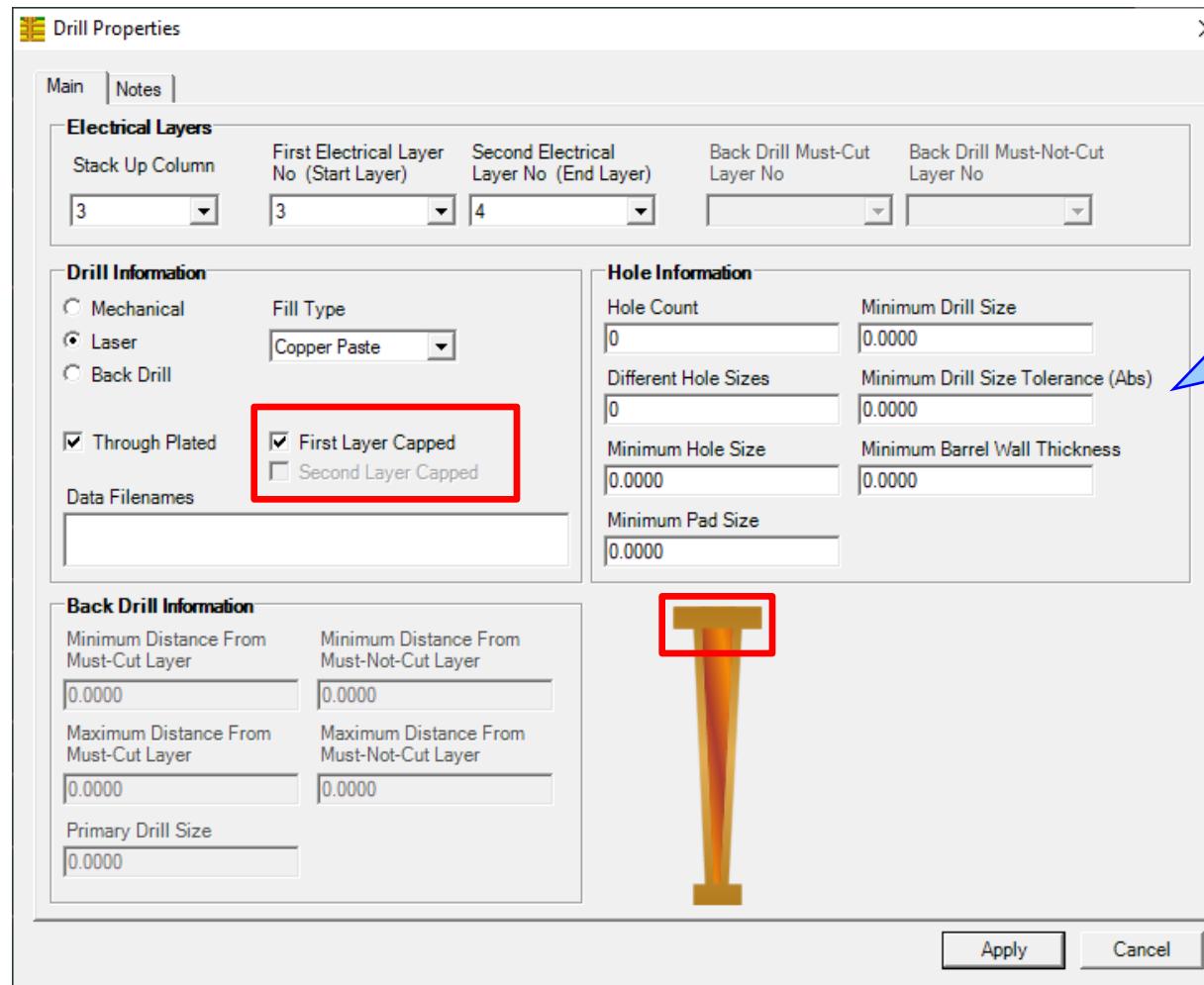


Mechanical

For mechanical drills it is possible to have four states:

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

Drill Cap option – laser drills

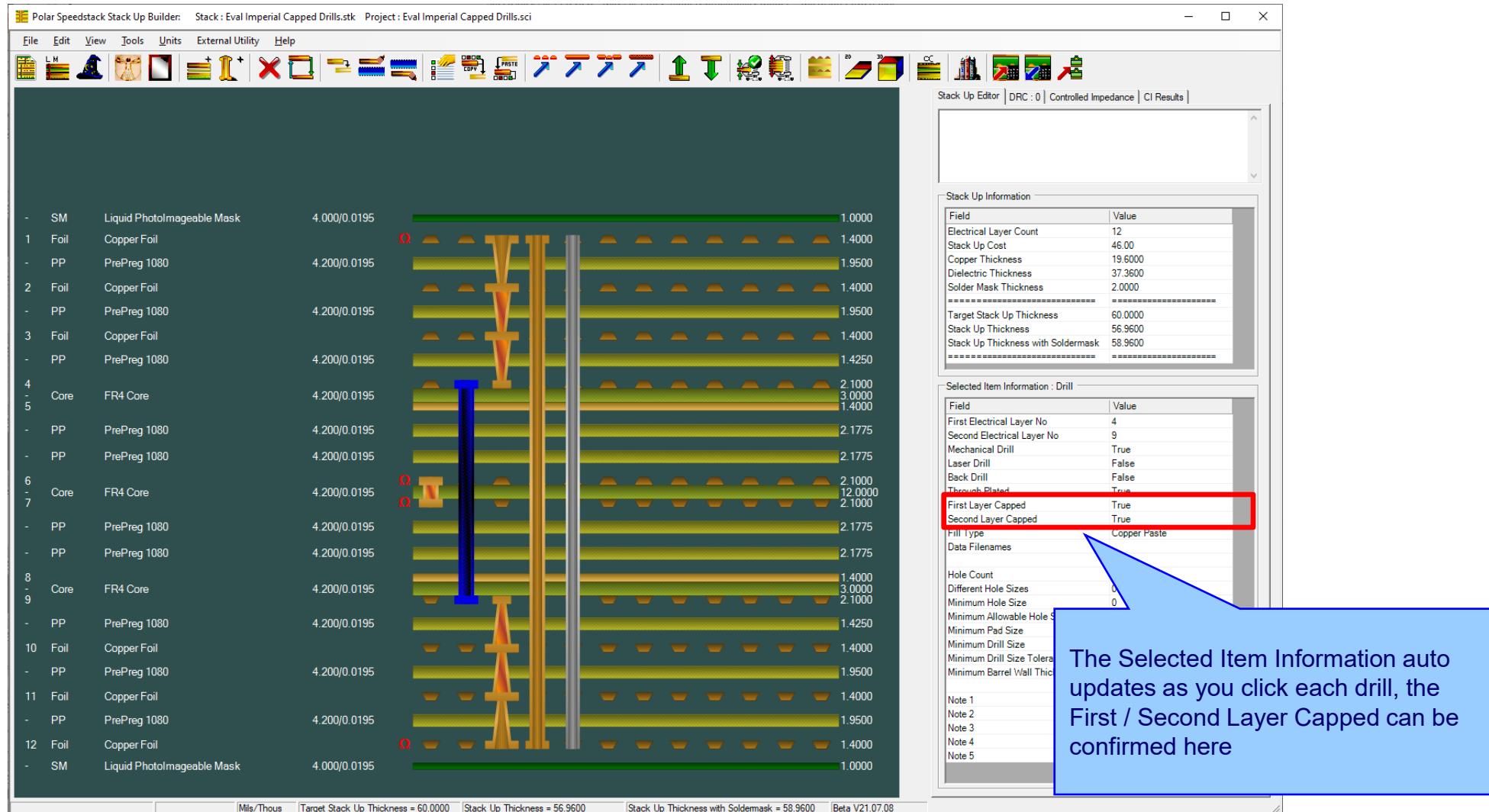


Laser

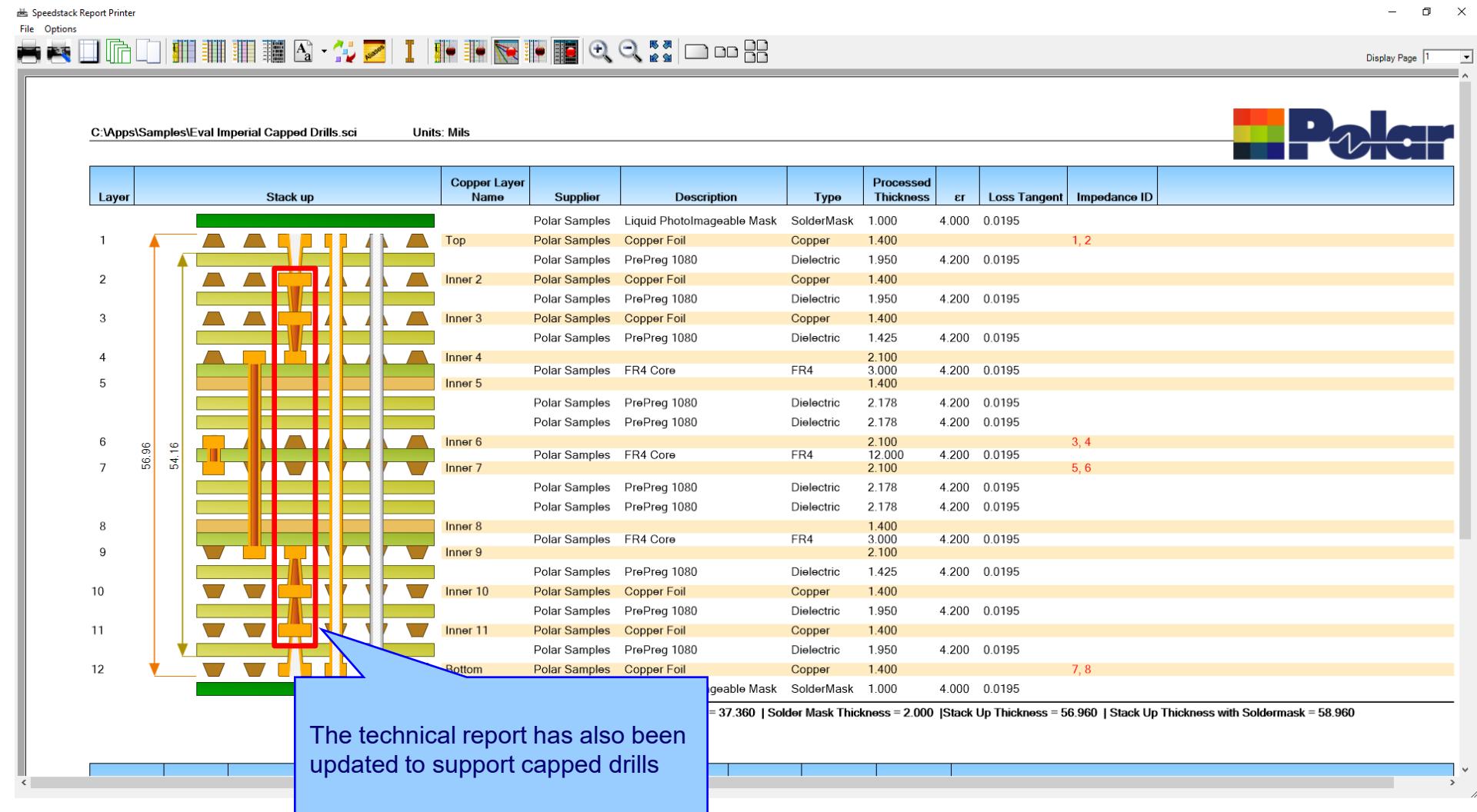
For laser drills it is possible to have two states as the Second Layer Capped checkbox is disabled:

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

New Drill Cap feature



New Drill Cap feature – technical report enhancements



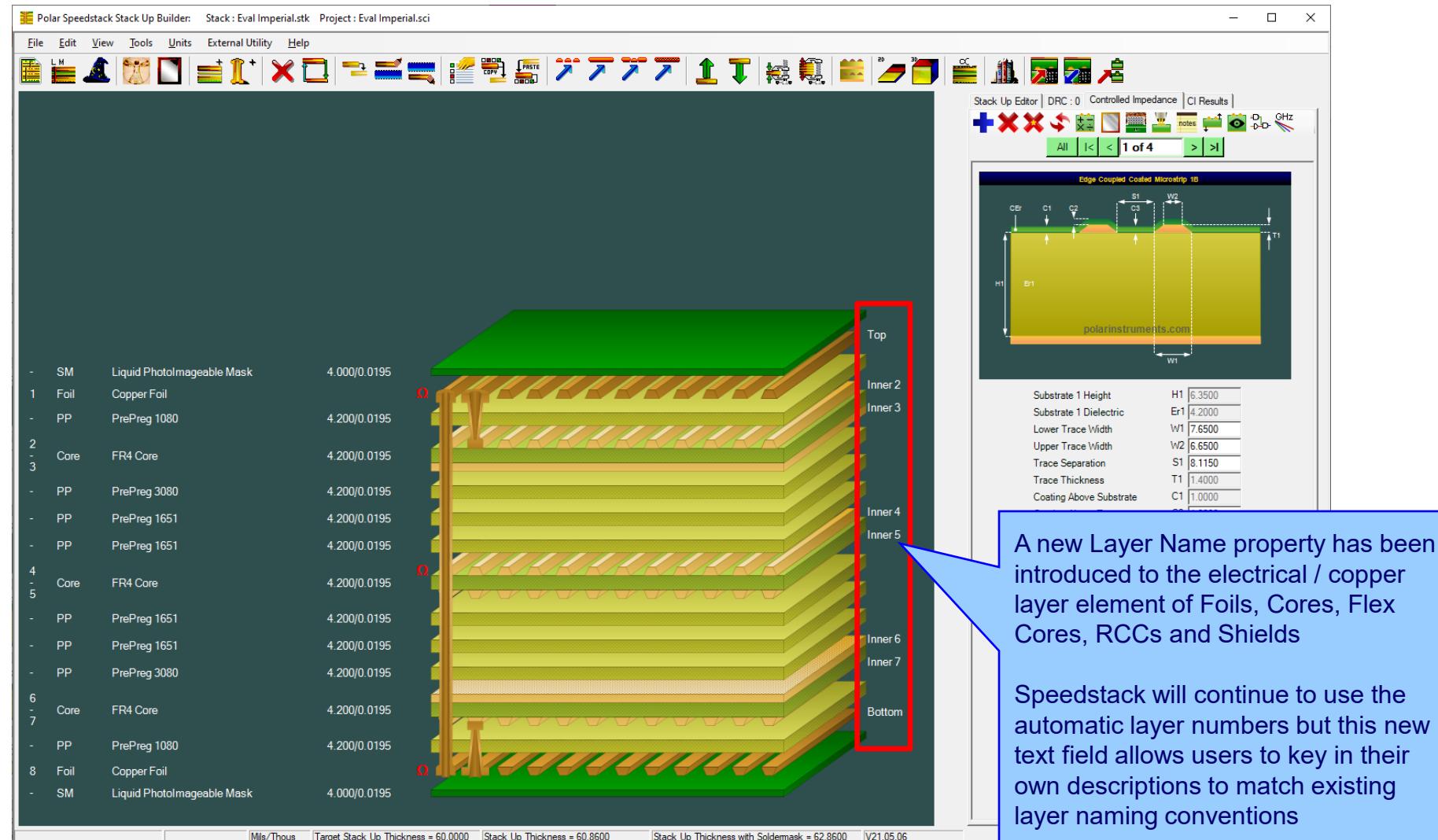
Import / Export enhancements

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

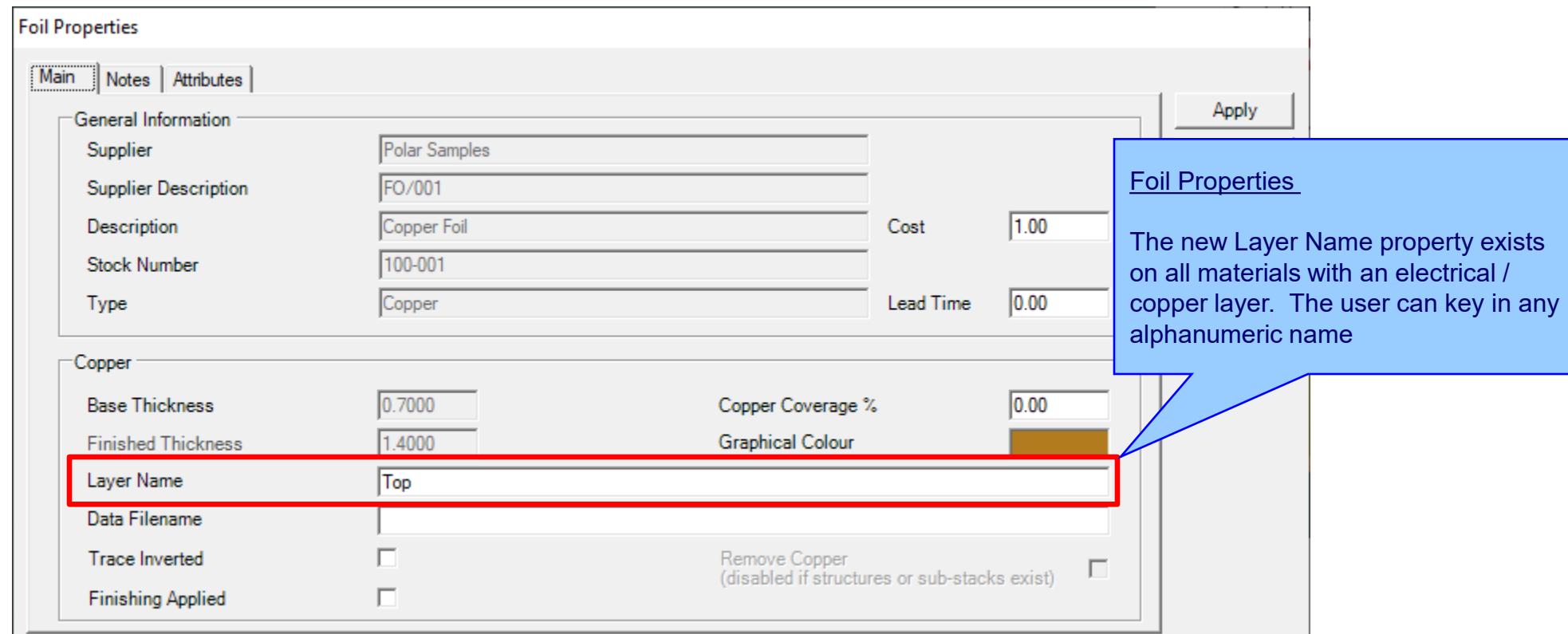
- XML STKX v22.00 and SSX v12.00 import / export options
- CSV export option

Speedstack v21.05.06 (May 2021)

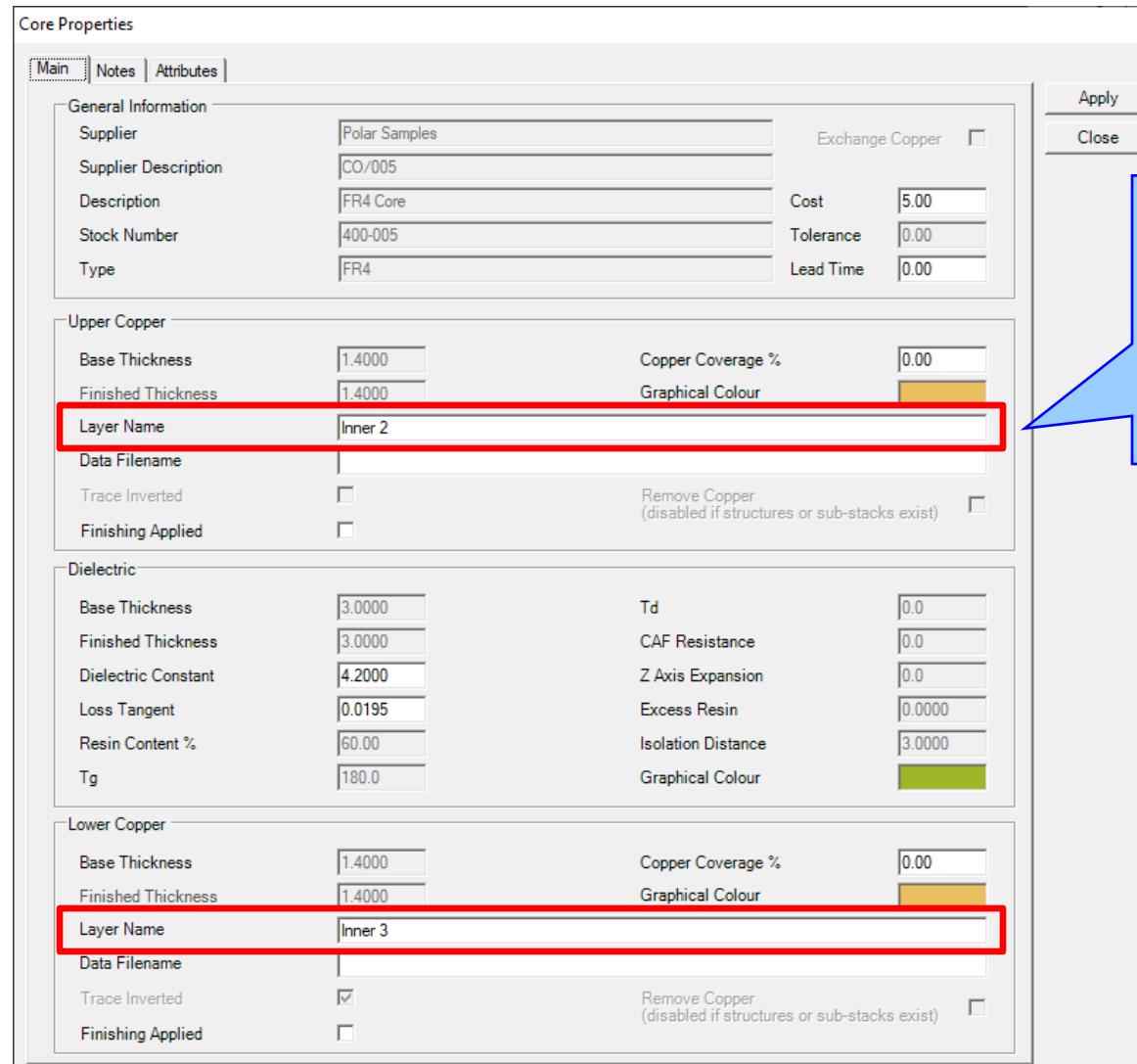
New Layer Name property for electrical / copper layers



New Layer Name property for electrical / copper layers



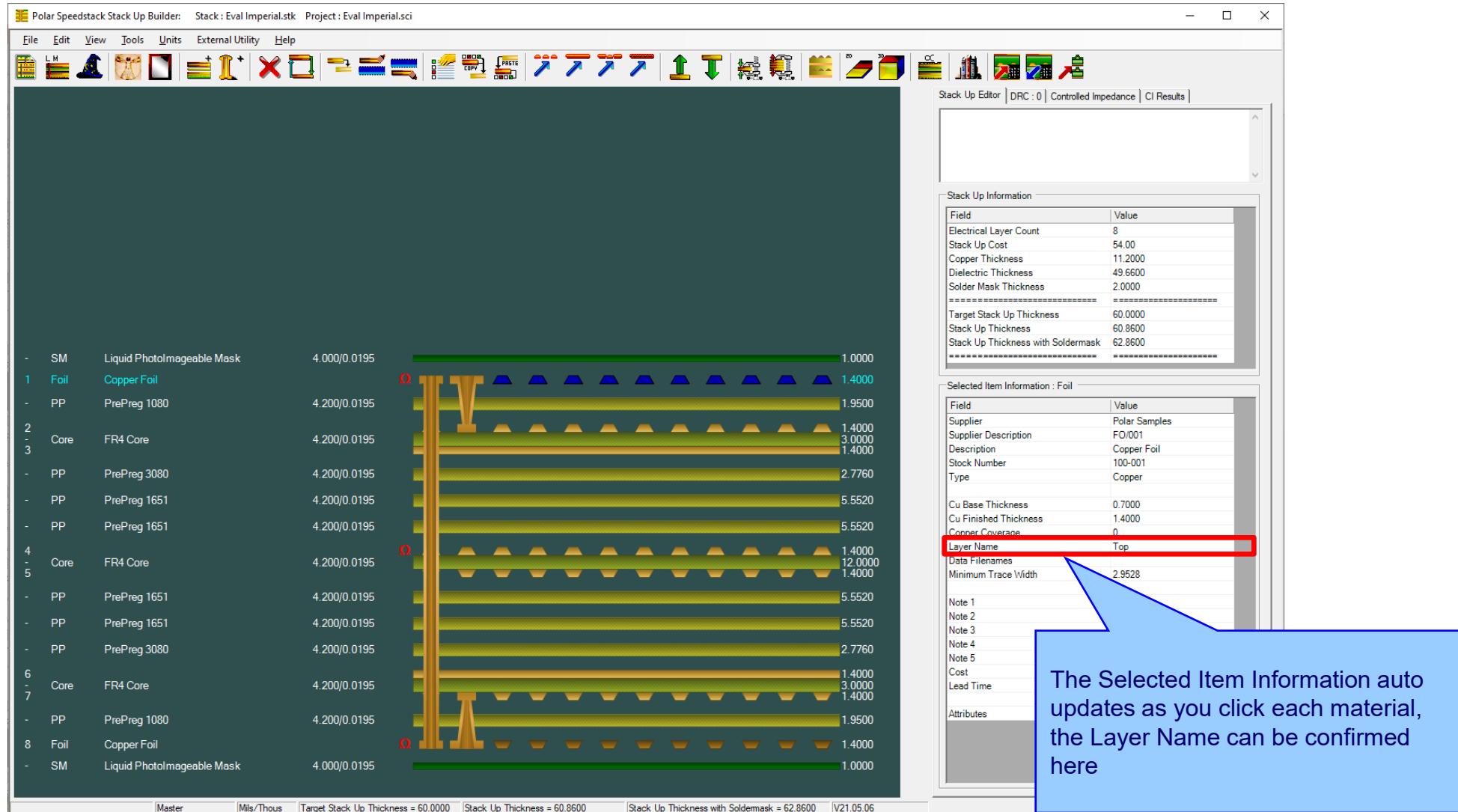
New Layer Name property for electrical / copper layers



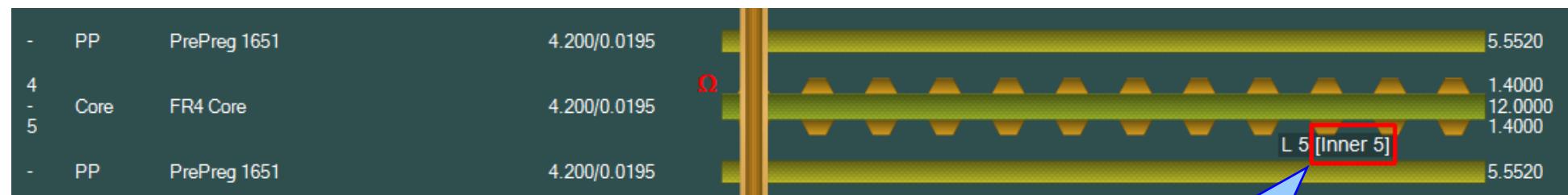
Core Properties

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

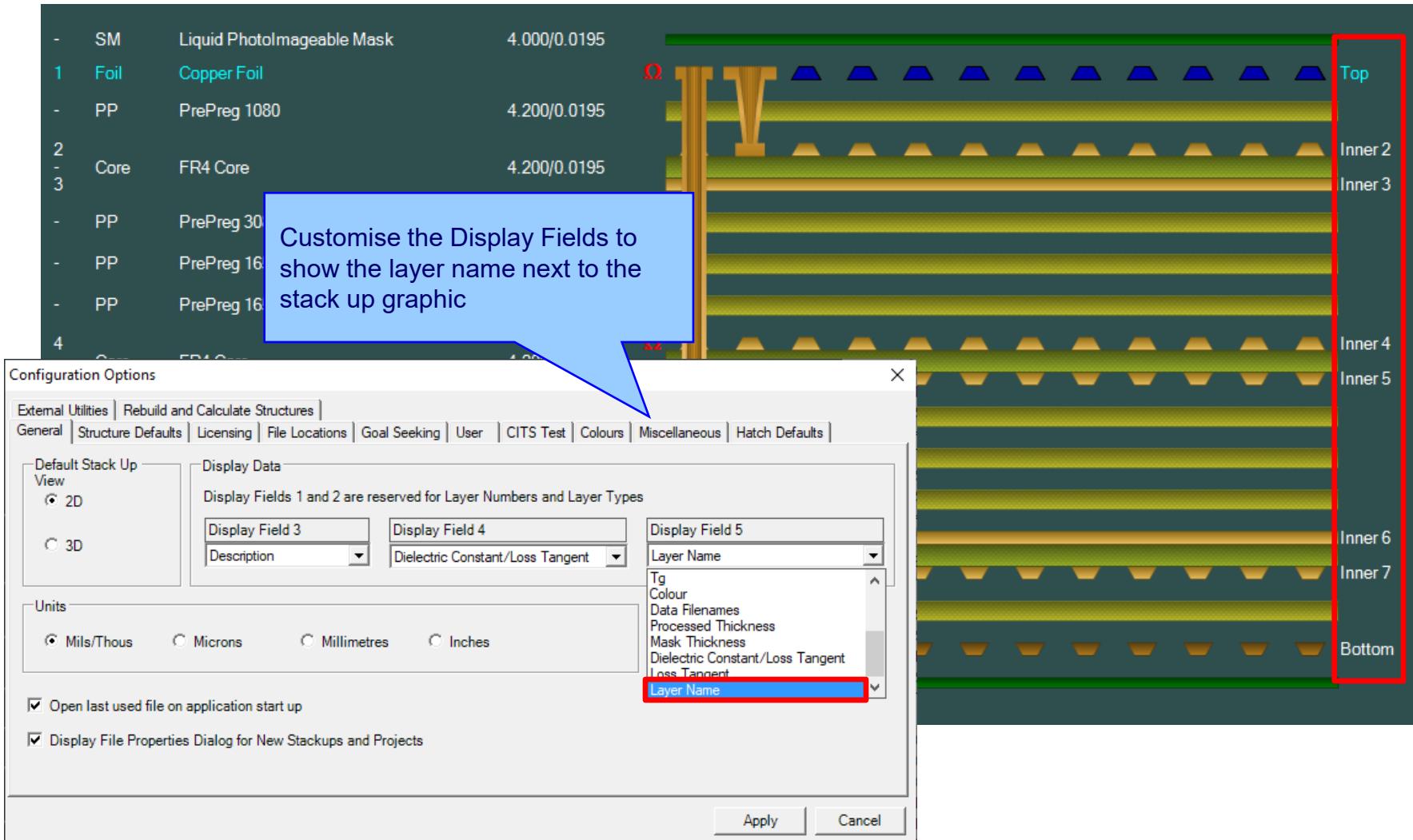


New Layer Name property for electrical / copper layers

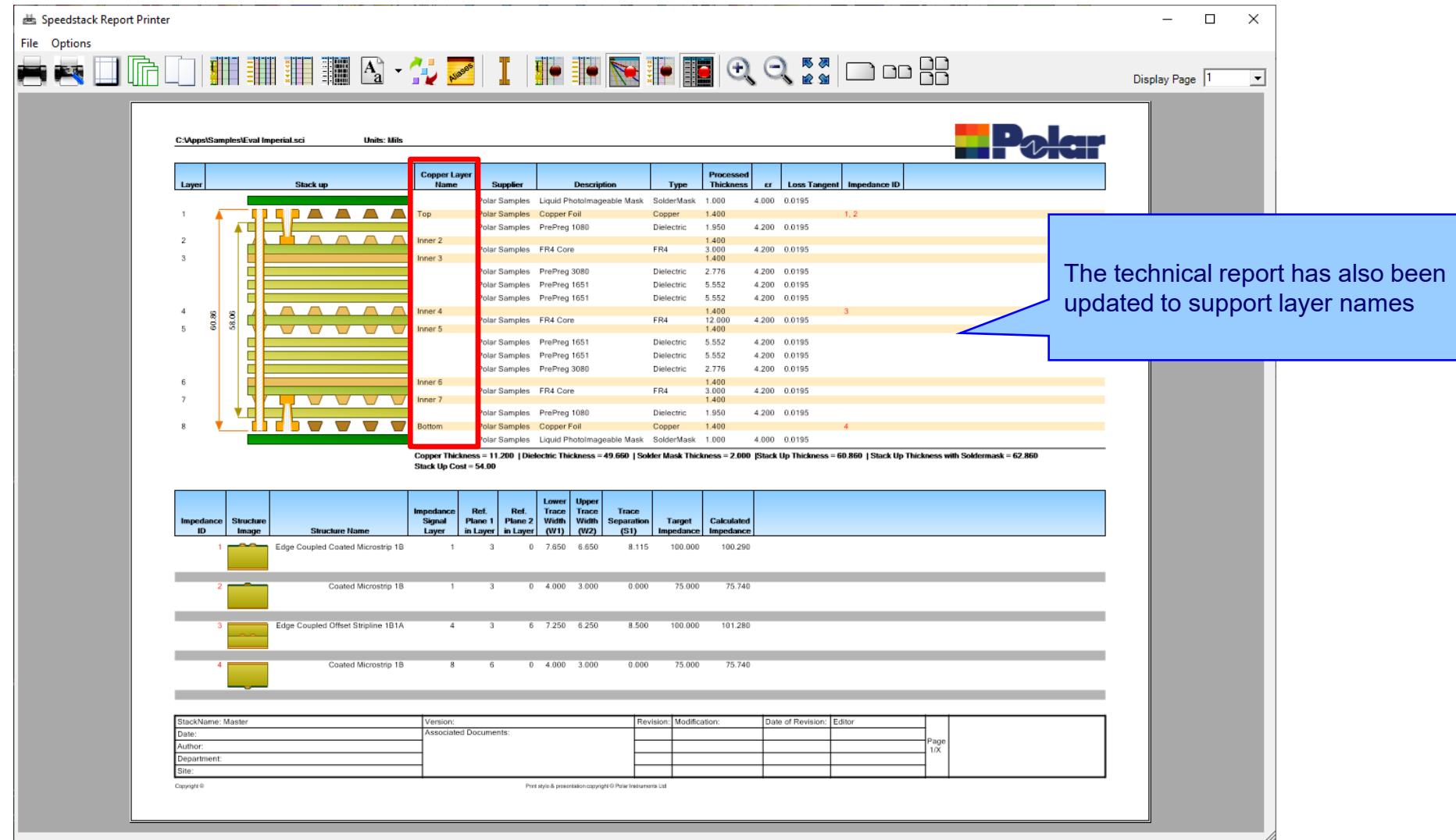


Mouse over the electrical layer and the Layer Name will display alongside the layer number and the amount of structures. Very quickly confirm the Layer Name without needing to open the Properties dialog

New Layer Name property for electrical / copper layers



New Layer Name property for electrical / copper layers



Copper Finishing classes increased

Copper Coverage Based Prepreg Corrections

Percentage Copper To Be Embedded in Prepreg

Set by Layer type

Signal Layer	% 75
Mixed Layer	% 15
Plane Layer	% 5

Proportional to Coverage

Copper Finishing

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

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

Excess Resin Test

Minimum Excess Resin % 15

Apply Cancel

Speedstack v21.04 and earlier supported 4 classes



Copper Coverage Based Prepreg Corrections

Percentage Copper To Be Embedded in Prepreg

Set by Layer type

Signal Layer	% 75
Mixed Layer	% 15
Plane Layer	% 5

Proportional to Coverage

Copper Finishing

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

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

Excess Resin Test

Minimum Excess Resin % 15

Apply Cancel

Speedstack v21.05 now supports 20 classes

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

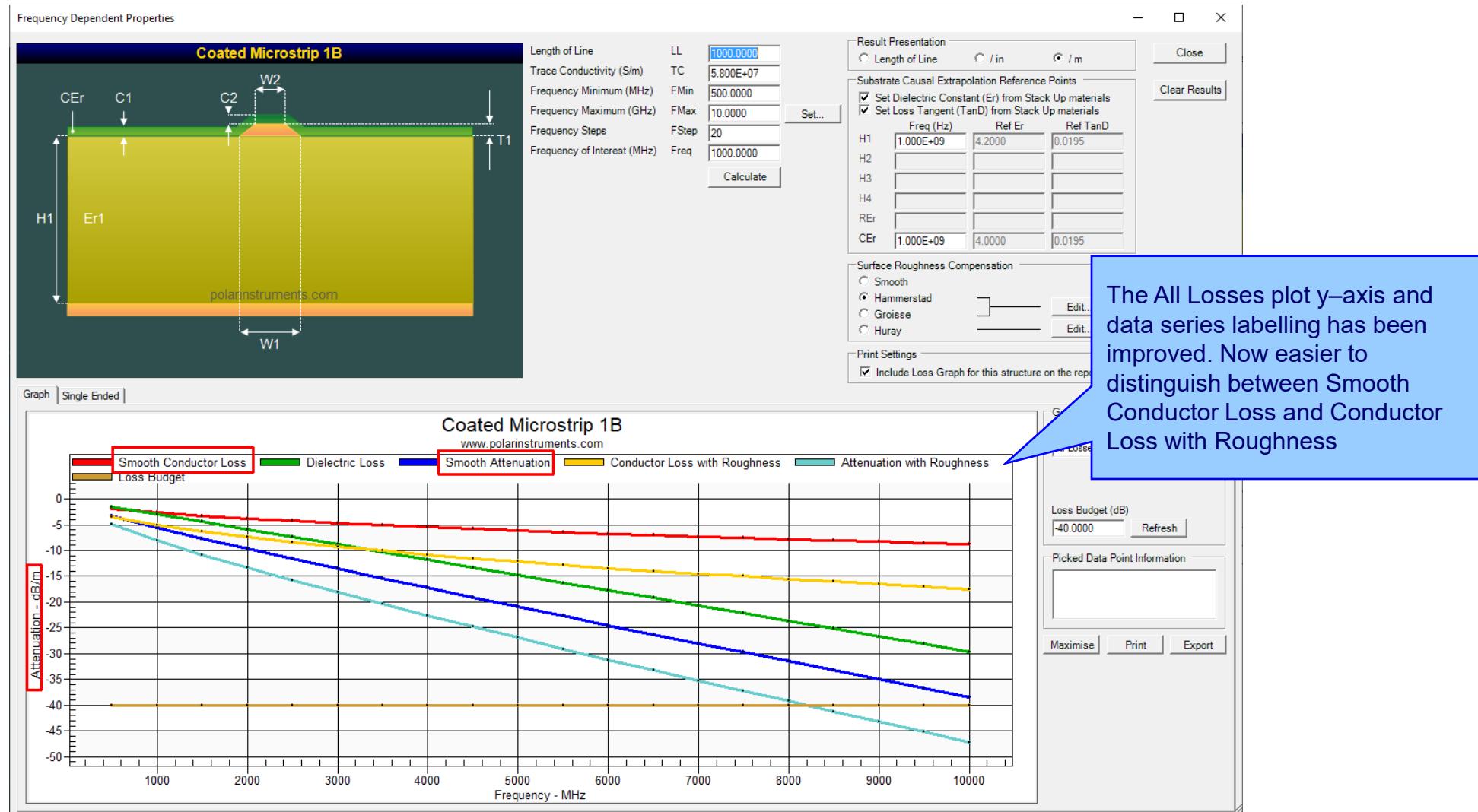
Import / Export enhancements

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

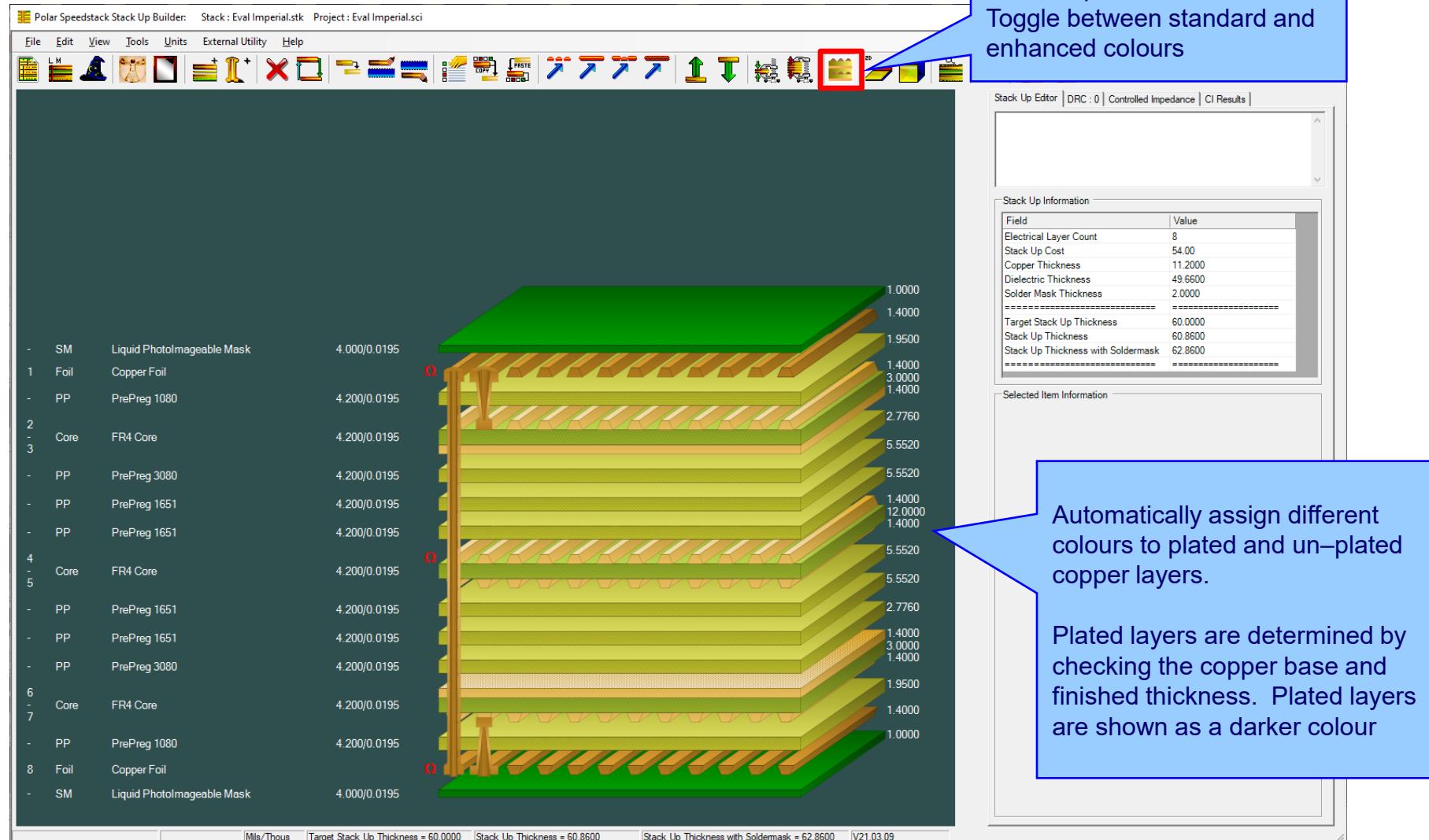


Other enhancements

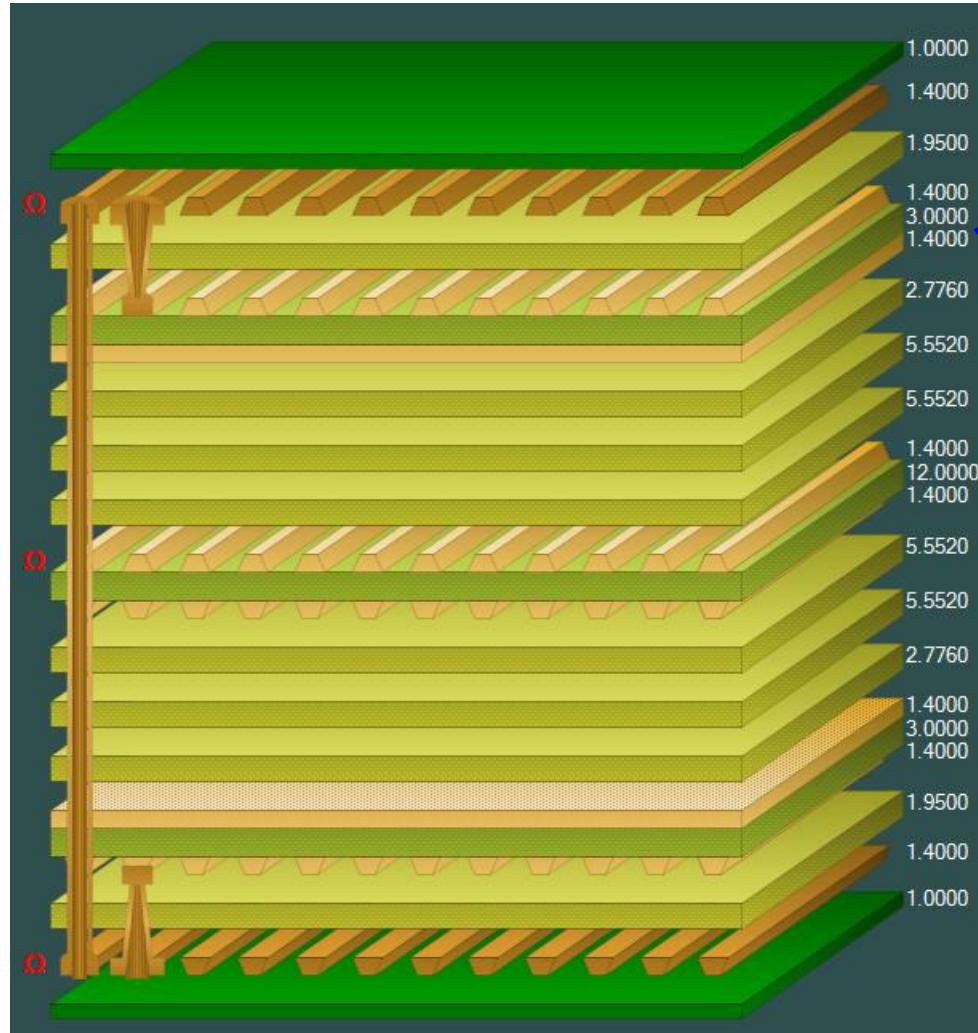
- The controlled impedance and insertion loss Calculation Engine updated to the latest edition
- Frequency Dependent Calculations graphing library enhancements

Speedstack v21.03.09 (March 2021)

New Apply Plating Colours toolbar option



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.

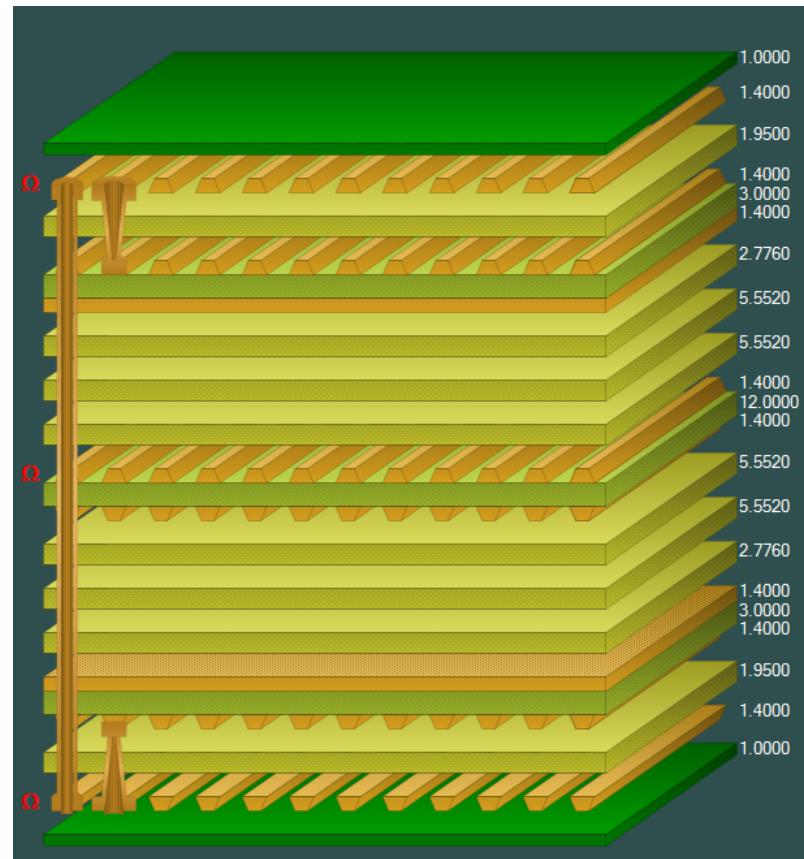
It is important to account for this additional plated copper thickness when calculating the overall stack up thickness and controlled impedance / insertion loss structures.

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 un-plated layers

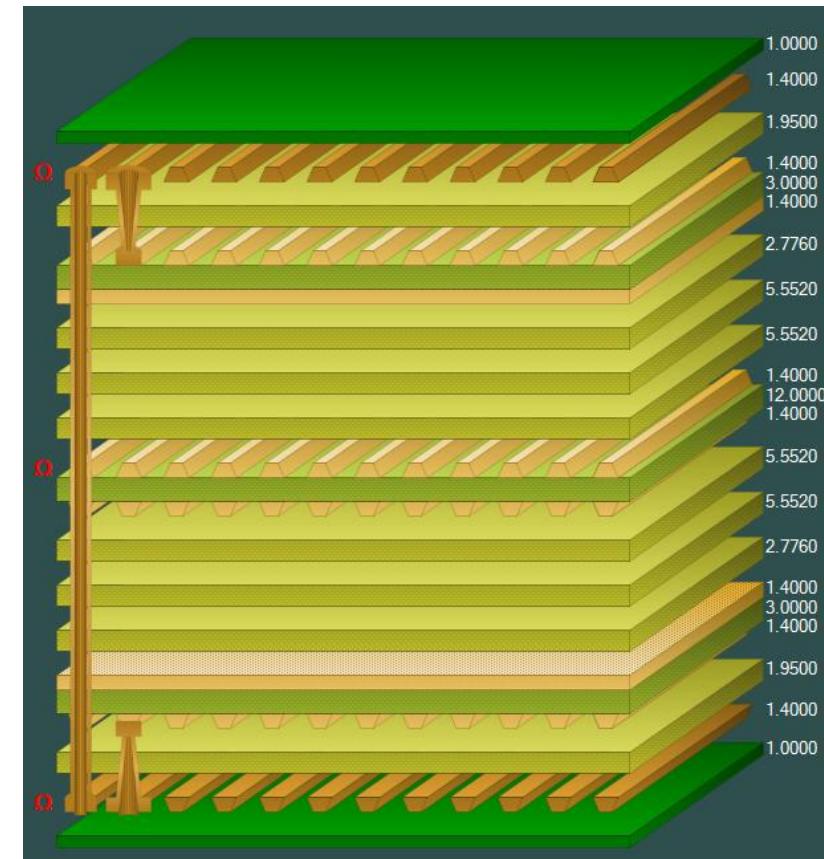
New Apply Plating Colours toolbar option



Standard Colours

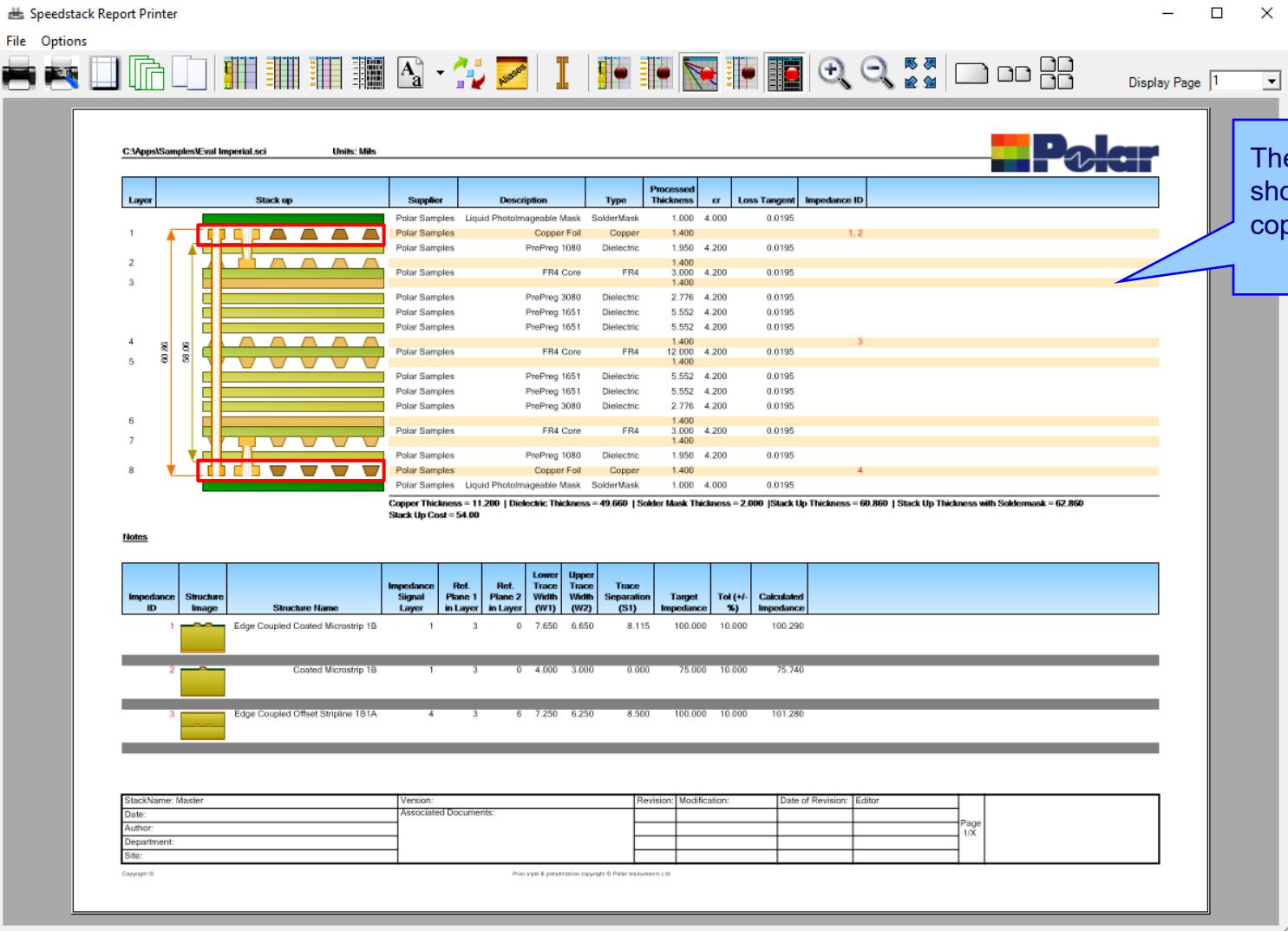


Apply Plating Colours



New Apply Plating Colours toolbar option

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



Stackup Diagram:

The stackup diagram shows a cross-section of the PCB with 8 layers. The top and bottom layers are green (Liquid Photomageable Mask, SolderMask). The middle layers are orange (FR4 Core). The top and bottom orange layers have red boxes around them, indicating the plated and un-plated copper layers. A vertical dimension line on the left indicates a total thickness of 60.860 mm, with 0.860 mm attributed to the top and bottom soldermask layers.

Table of Materials:

Layer	Stack up	Supplier	Description	Type	Processed Thickness	er	Loss Tangent	Impedance ID
1	Polar Samples Liquid Photomageable 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			
			1.400					
3	Polar Samples FR4 Core	FR4	3.000	4.200	0.0195			
			1.400					
4	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			
5	Polar Samples FR4 Core	FR4	12.000	4.200	0.0195			
			1.400			3		
6	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			
7	Polar Samples FR4 Core	FR4	3.000	4.200	0.0195			
			1.400					
8	Polar Samples PrePreg 1080	Dielectric	1.950	4.200	0.0195			
	Polar Samples Copper Foil	Copper	1.400			4		
	Polar Samples Liquid Photomageable Mask	SolderMask	1.000	4.000	0.0195			

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

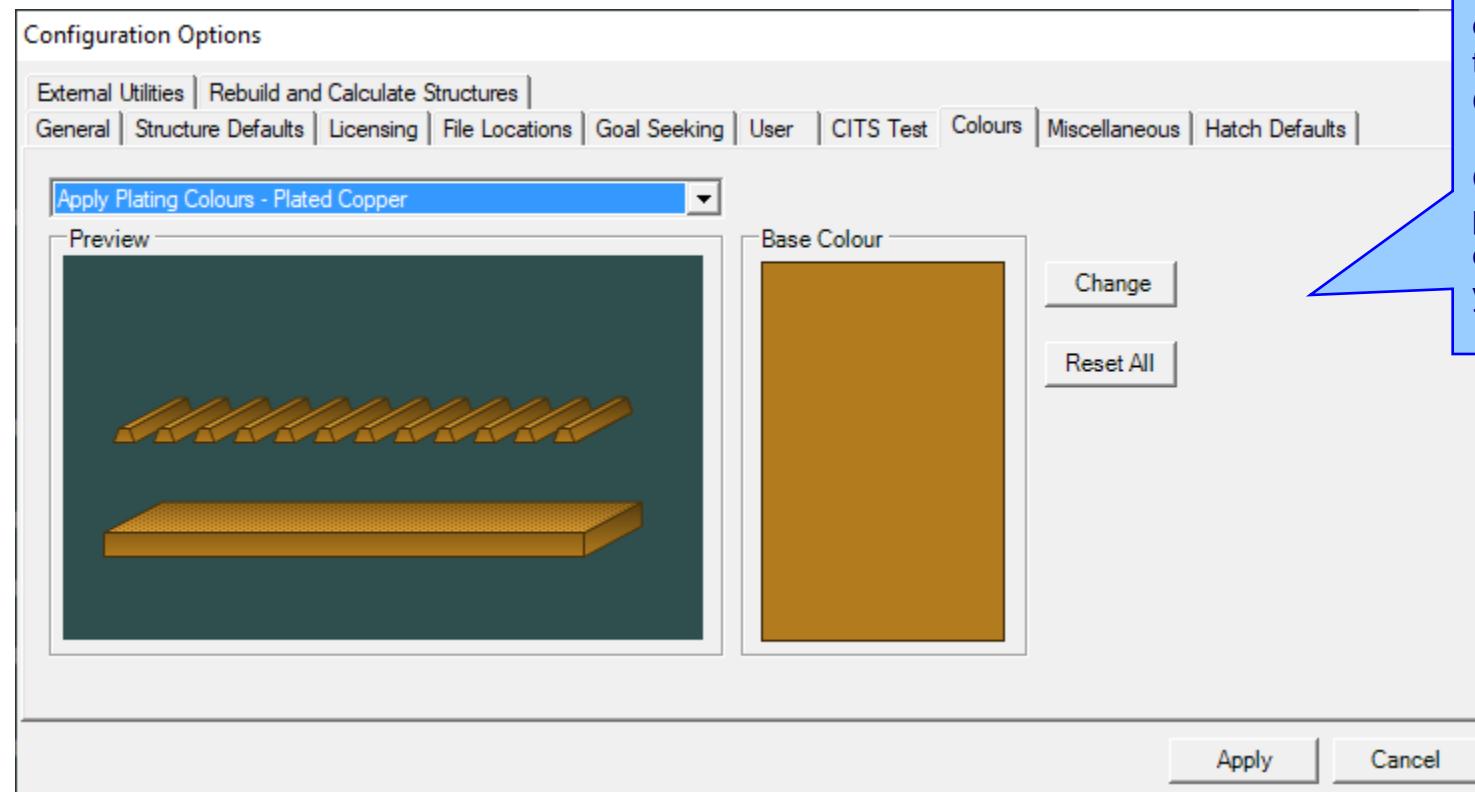
Stackup Summary:

- Copper Thickness = 11.200
- Dielectric Thickness = 49.660
- Solder Mask Thickness = 2.000
- Stack Up Thickness = 60.860
- Stack Up Cost = \$4.00

Stackup Configuration Table:

StackName: Master	Version:	Revision:	Modification:	Date of Revision:	Editor:	Page 1/2
Date:	Associated Documents:					
Author:						
Department:						
Site:						

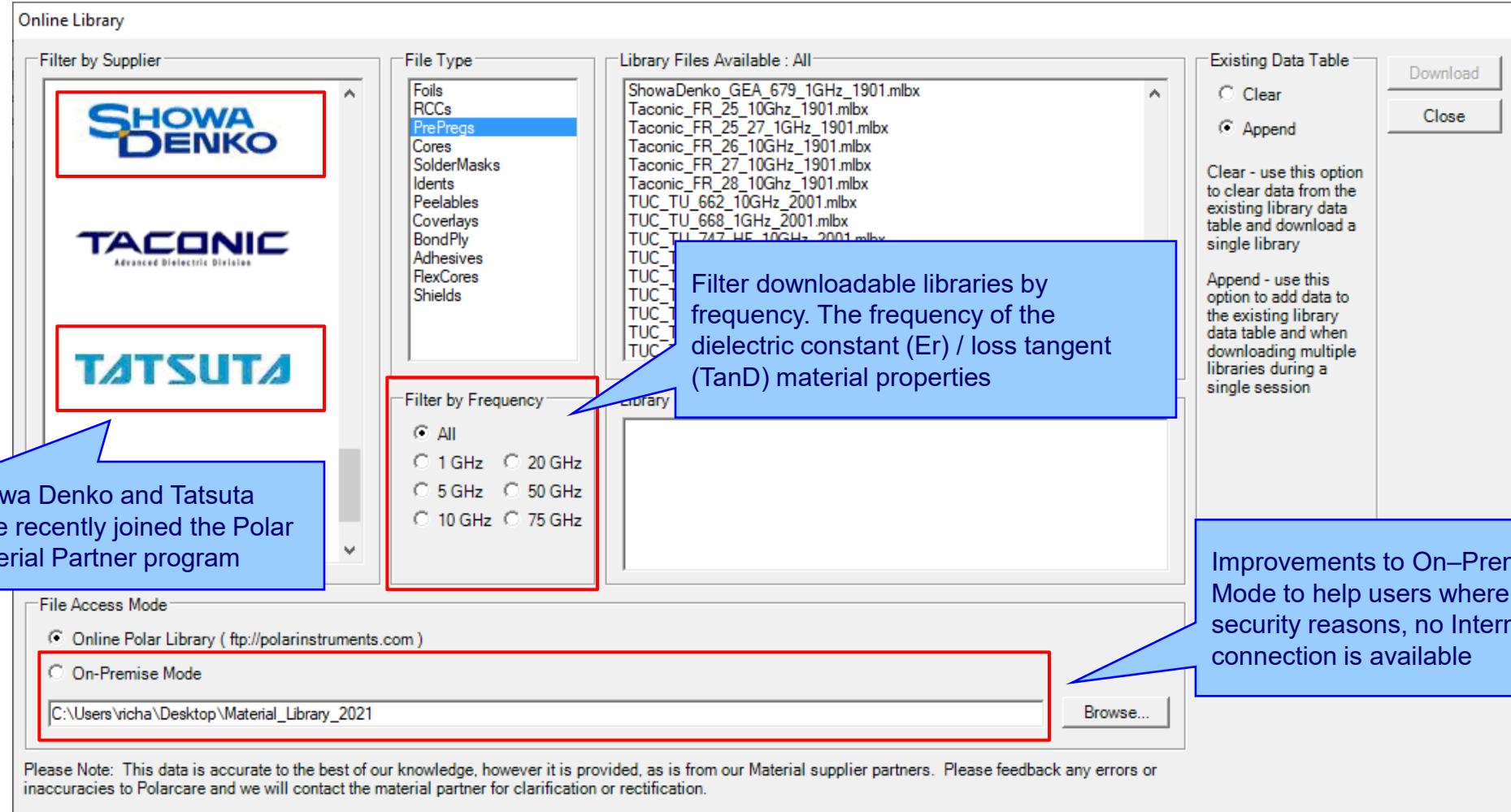
New Apply Plating Colours toolbar option



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

Customise the Plated and Unplated colours to suit existing colour schemes adopted by your organisation

Online Library enhancements



Online Library

Filter by Supplier

SHOWA DENKO

TACONIC Advanced Dielectric Division

TATSUTA

File Type

Library Files Available : All

Existing Data Table

Download

Close

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

Filter downloadable libraries by frequency. The frequency of the dielectric constant (Er) / loss tangent (TanD) material properties

Filter by Frequency

All

1 GHz 20 GHz

5 GHz 50 GHz

10 GHz 75 GHz

File Access Mode

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

On-Premise Mode

C:\Users\vicha\Desktop\Material_Library_2021

Browse...

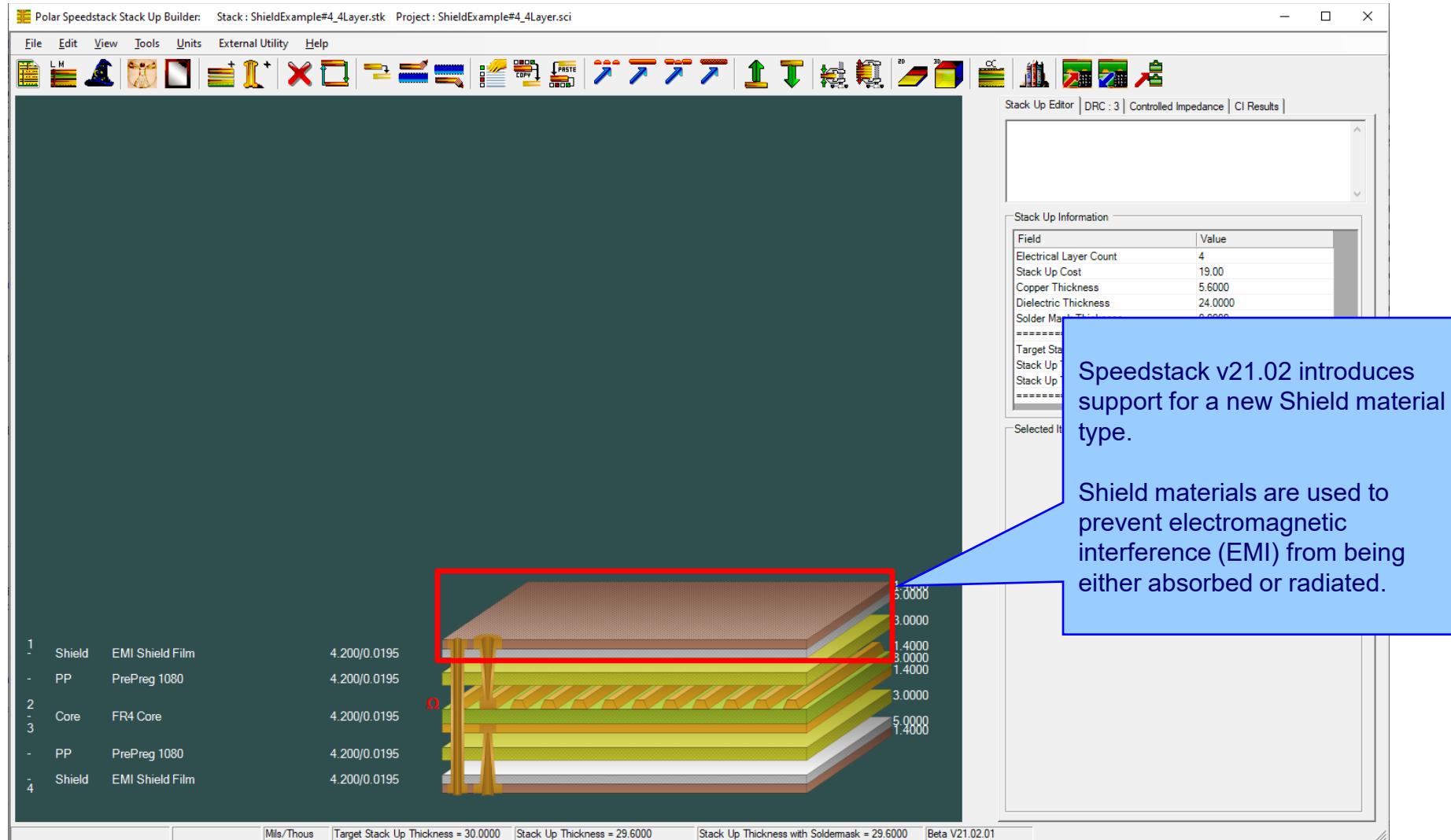
Please Note: This data is accurate to the best of our knowledge, however it is provided, as is from our Material supplier partners. Please feedback any errors or inaccuracies to Polarcare and we will contact the material partner for clarification or rectification.

Showa Denko and Tatsuta have recently joined the Polar Material Partner program

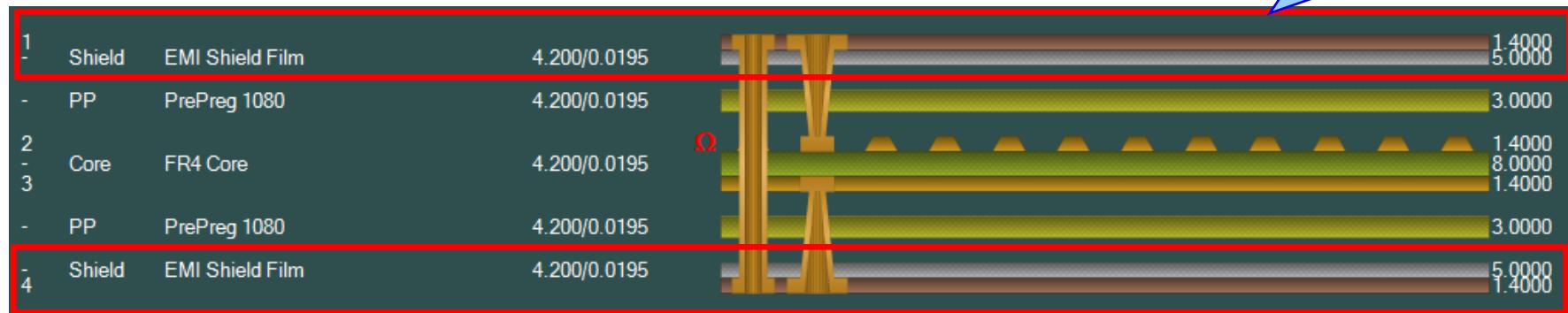
Improvements to On-Premise Mode to help users where, for security reasons, no Internet connection is available

Speedstack v21.02.01 (February 2021)

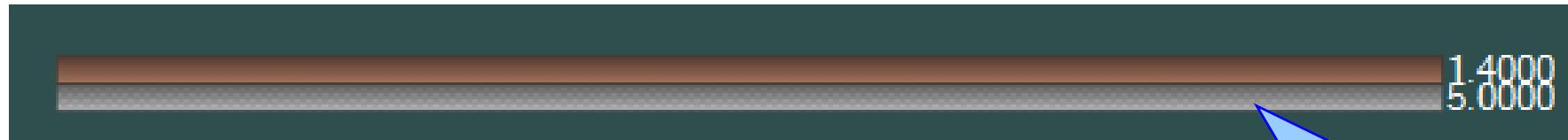
New Shield material



New Shield material

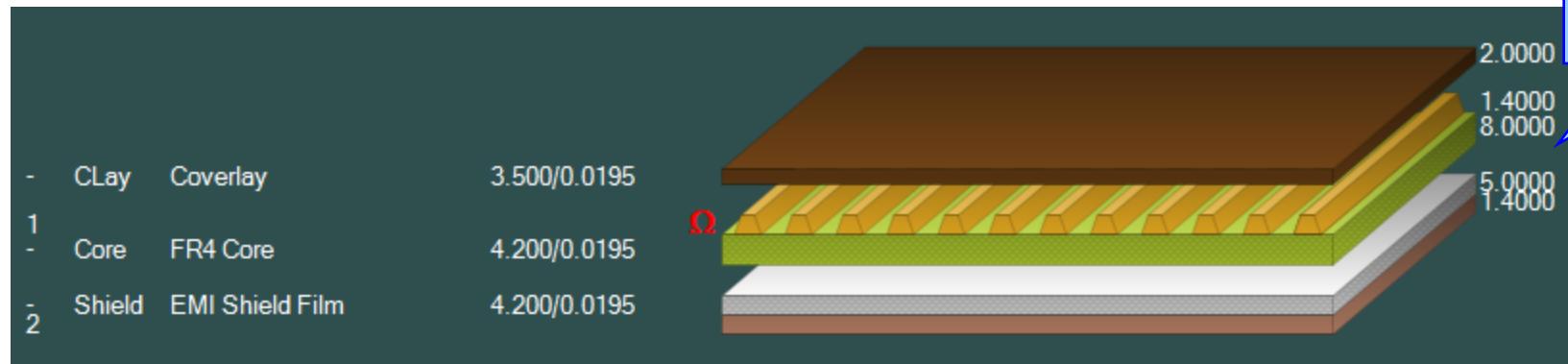


Shields are typically applied to the outer layer(s) of the stack up

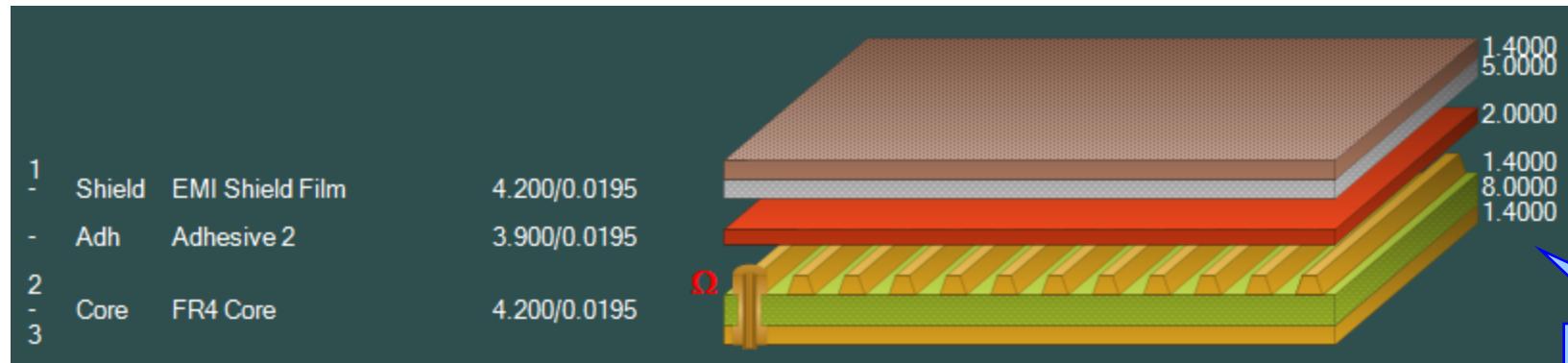


They consist of a shield layer (brown) and dielectric adhesive (silver)

Shield material examples

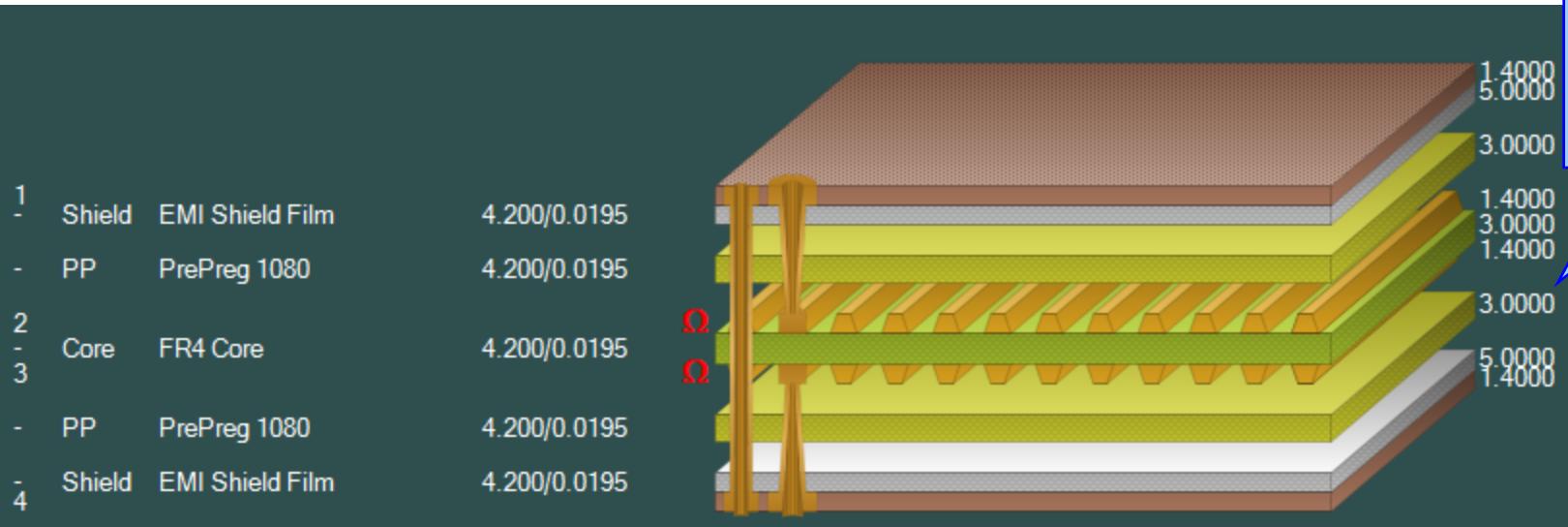


Example #1
Single-sided core,
coverlay above trace,
shield below

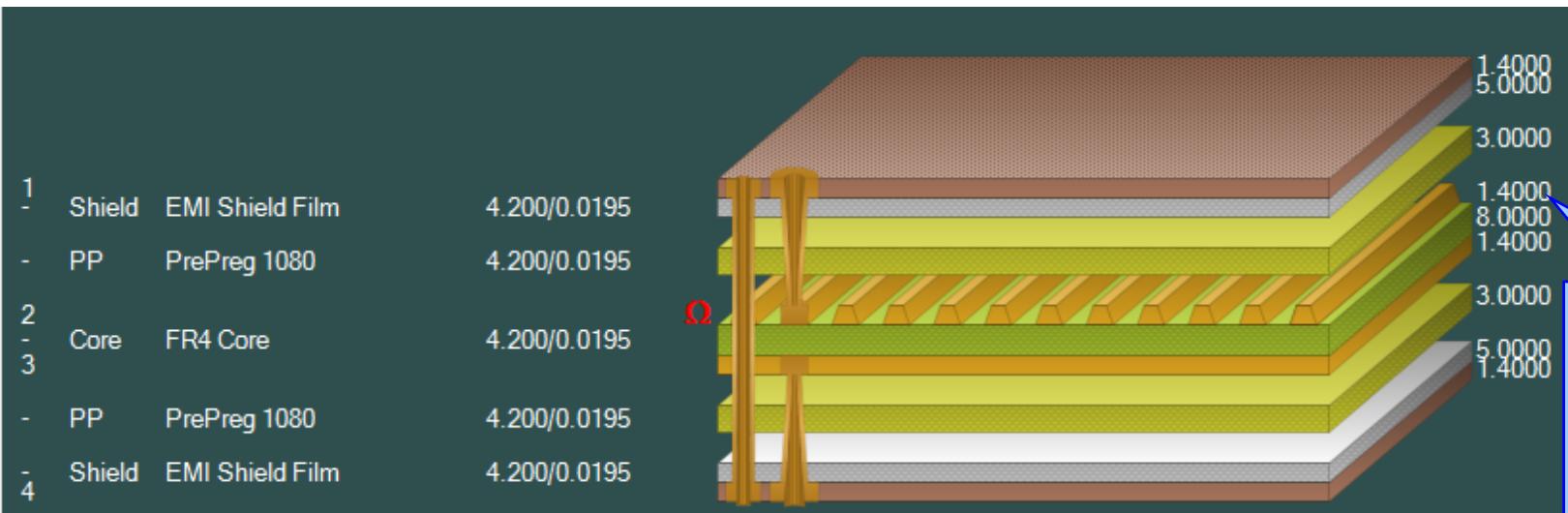


Example #2
Double-sided core,
adhesive and shield
above

Shield material examples

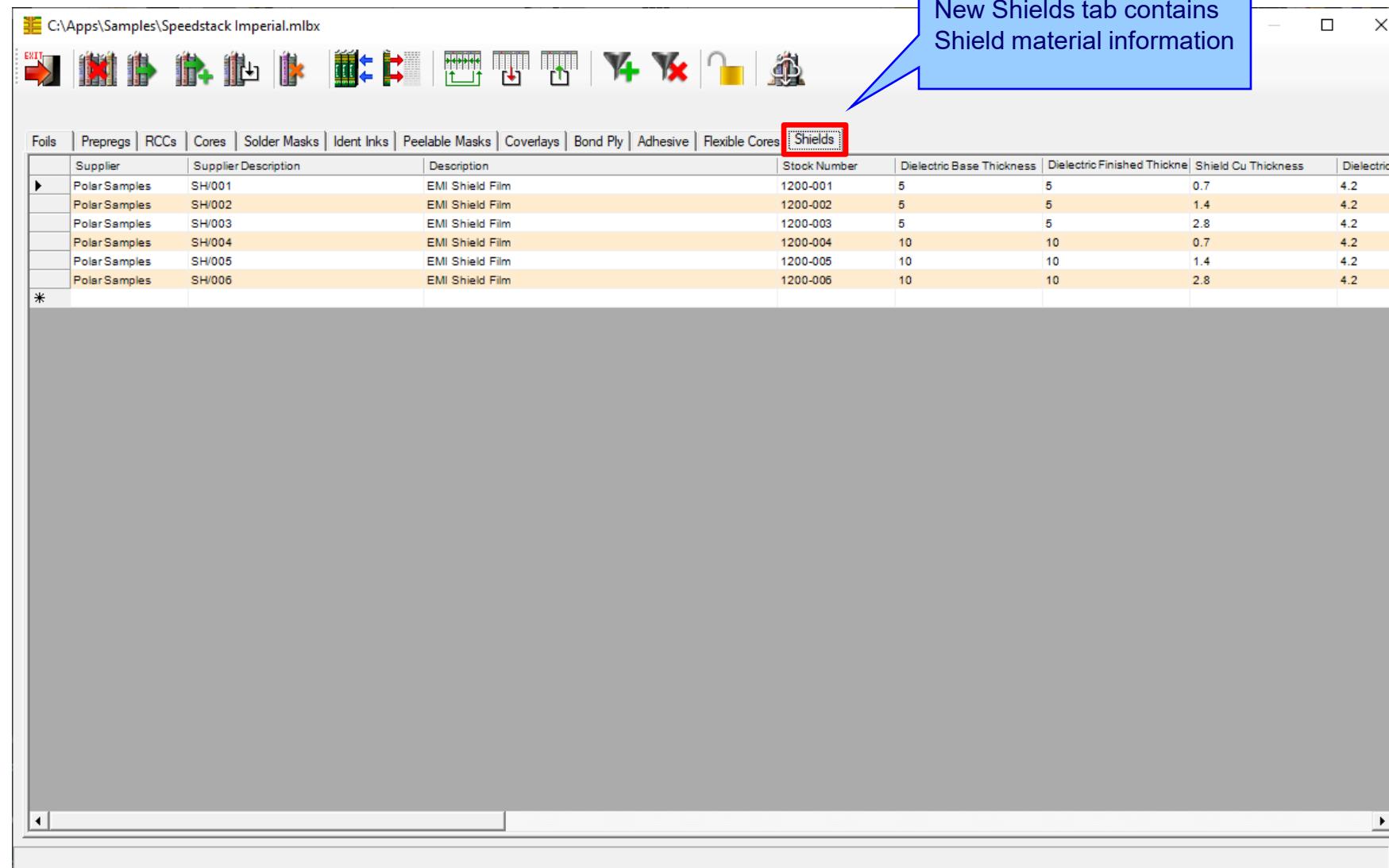


Example #3
Double-sided core
with two signal trace
layers with shield
above and below
trace layers



Example #4
Double-sided core
with one signal trace
layer with shield
above and below
trace layers

Material library enhancements



Material library enhancements

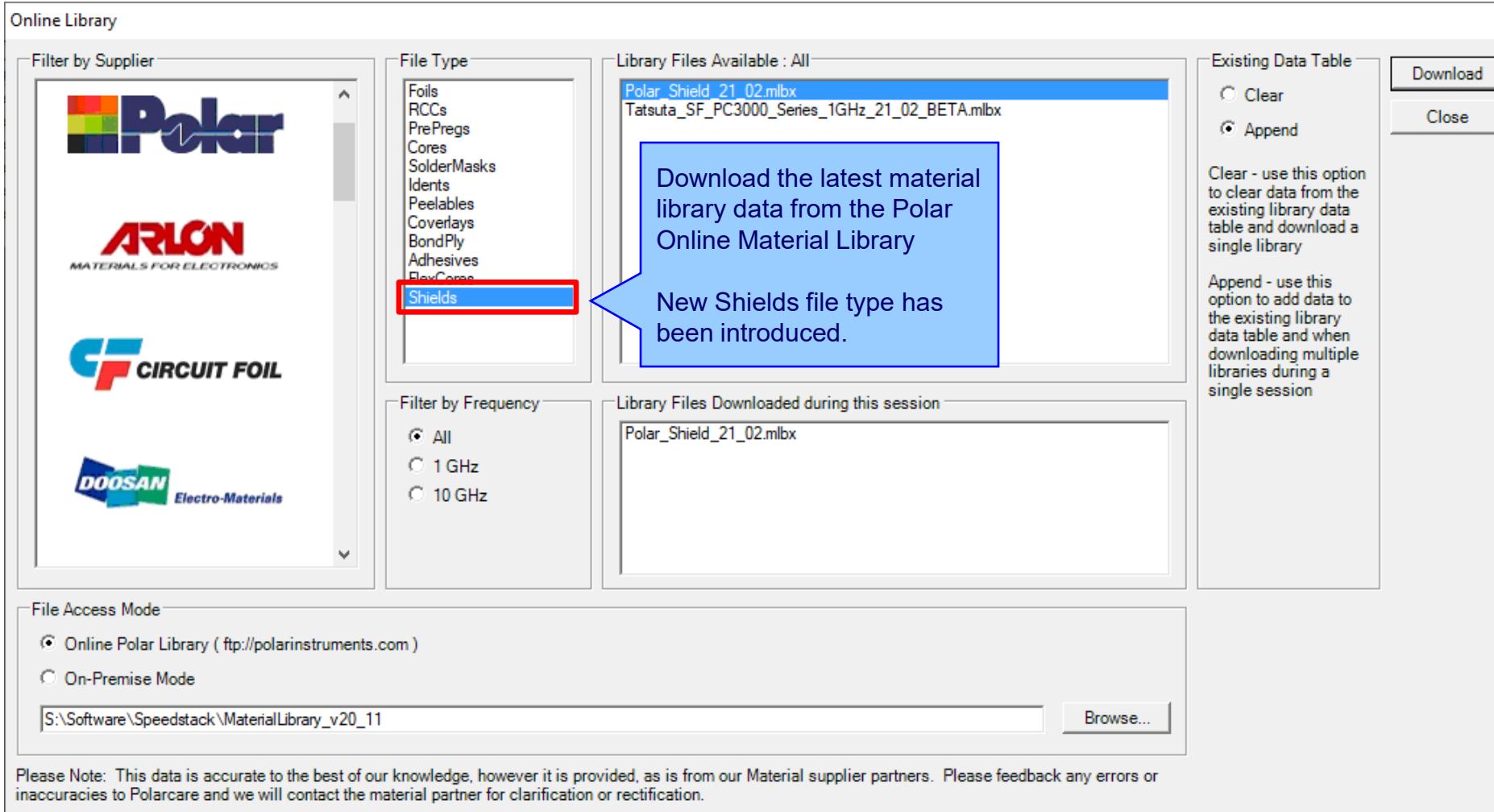
Review/Edit Shield

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	<input type="checkbox"/>		

Add **Delete** **<<** **<** **1 of 6** **>** **>>** **OK**

Material library Edit Shield dialog

Online Library enhanced to support Shield materials

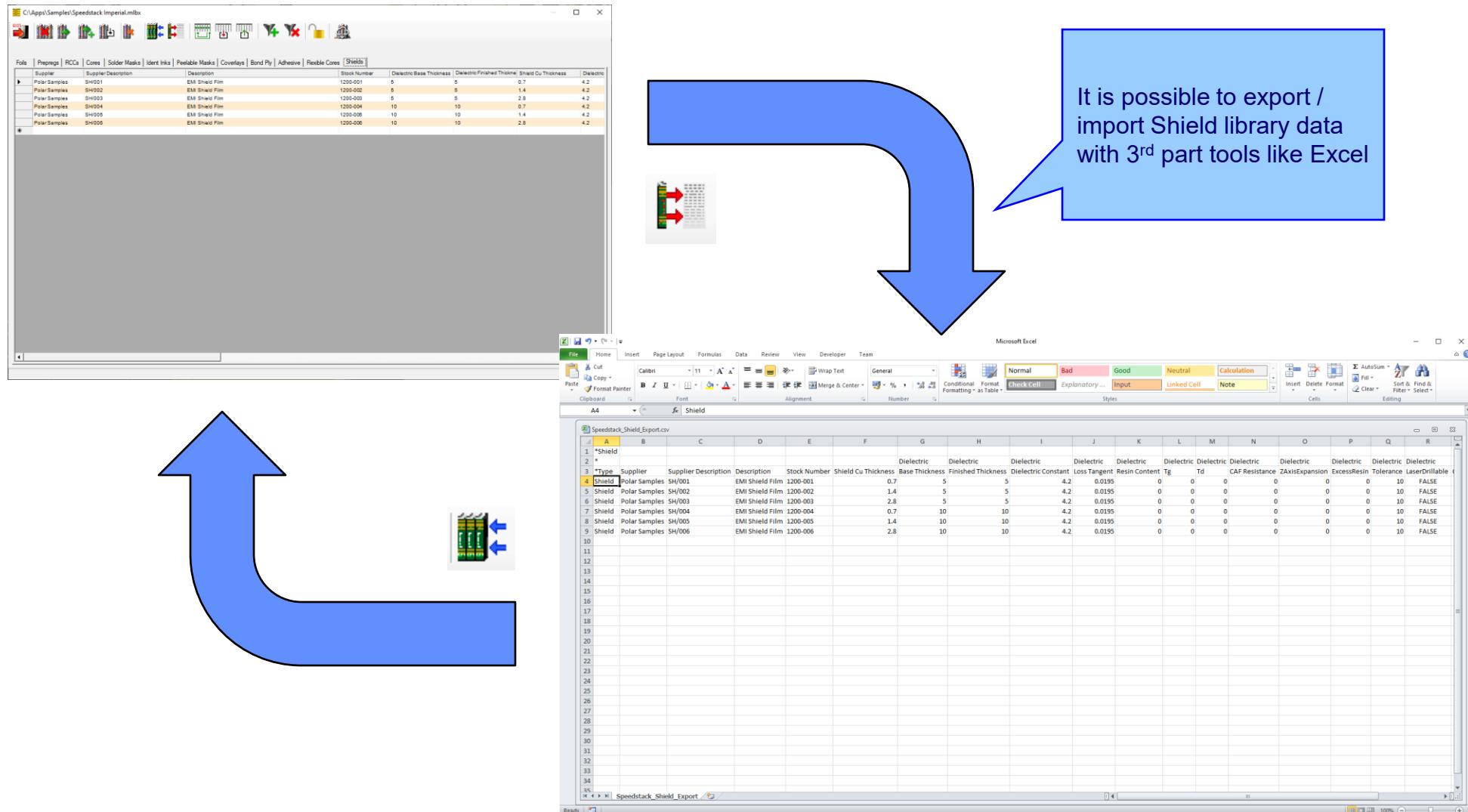


The screenshot shows the 'Online Library' interface with several sections:

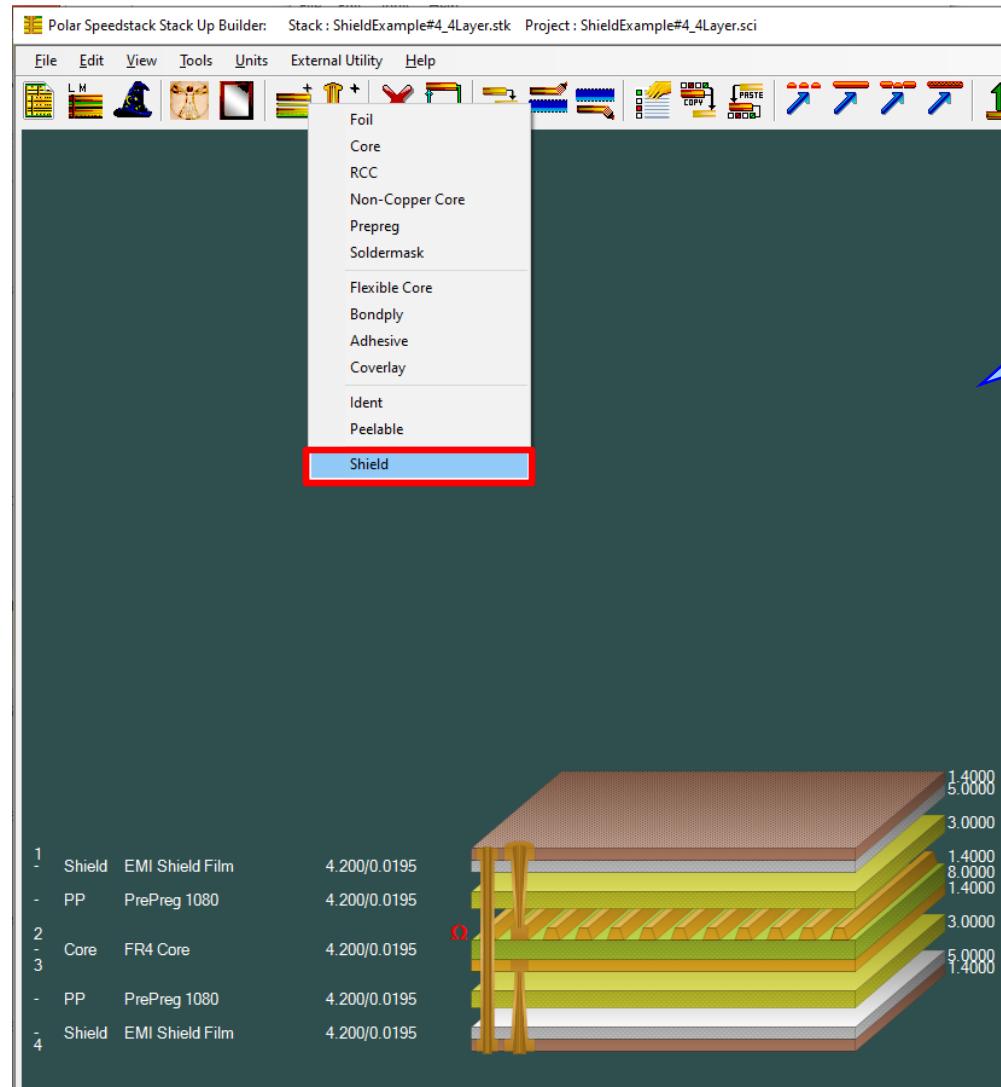
- Filter by Supplier:** Displays logos for Polar, Arlon, Circuit Foil, and Doosan.
- File Type:** A list including Foils, RCCs, PrePreg, Cores, SolderMasks, Idents, Peelables, Coverlays, BondPly, Adhesives, FlexCores, and **Shields** (highlighted with a red box).
- Library Files Available : All:** Lists 'Polar_Shield_21_02.mlx' and 'Tatsuta_SF_PC3000_Series_1GHz_21_02_BETA.mlx'.
- Existing Data Table:** Options for 'Clear' (radio button) and 'Append' (selected radio button). A note explains the difference: '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'.
- Download:** A button to download the selected library files.
- Close:** A button to close the dialog.
- File Access Mode:** Radio buttons for 'Online Polar Library (<ftp://polarinstruments.com>)' (selected) and 'On-Premise Mode'. A text input field shows 'S:\Software\Speedstack\MaterialLibrary_v20_11' with a 'Browse...' button.
- Please Note:** A note at the bottom states: 'Please Note: This data is accurate to the best of our knowledge, however it is provided, as is from our Material supplier partners. Please feedback any errors or inaccuracies to Polarcare and we will contact the material partner for clarification or rectification.'

A callout box highlights the 'Shields' file type and the note: 'Download the latest material library data from the Polar Online Material Library' and 'New Shields file type has been introduced.'

Export / Import Shield library to Excel



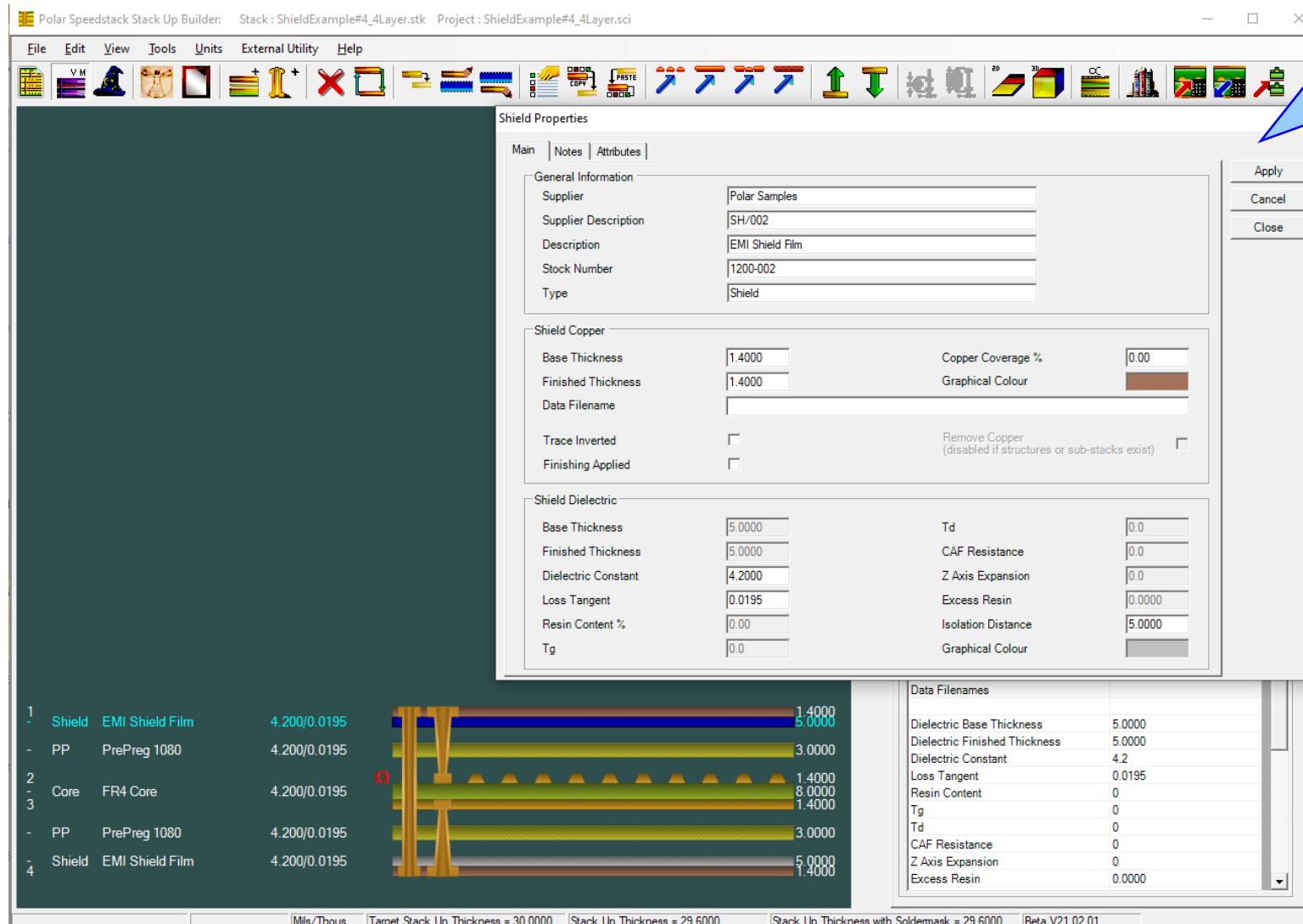
Stack up editor enhancements



Stack Up editor enhancements:

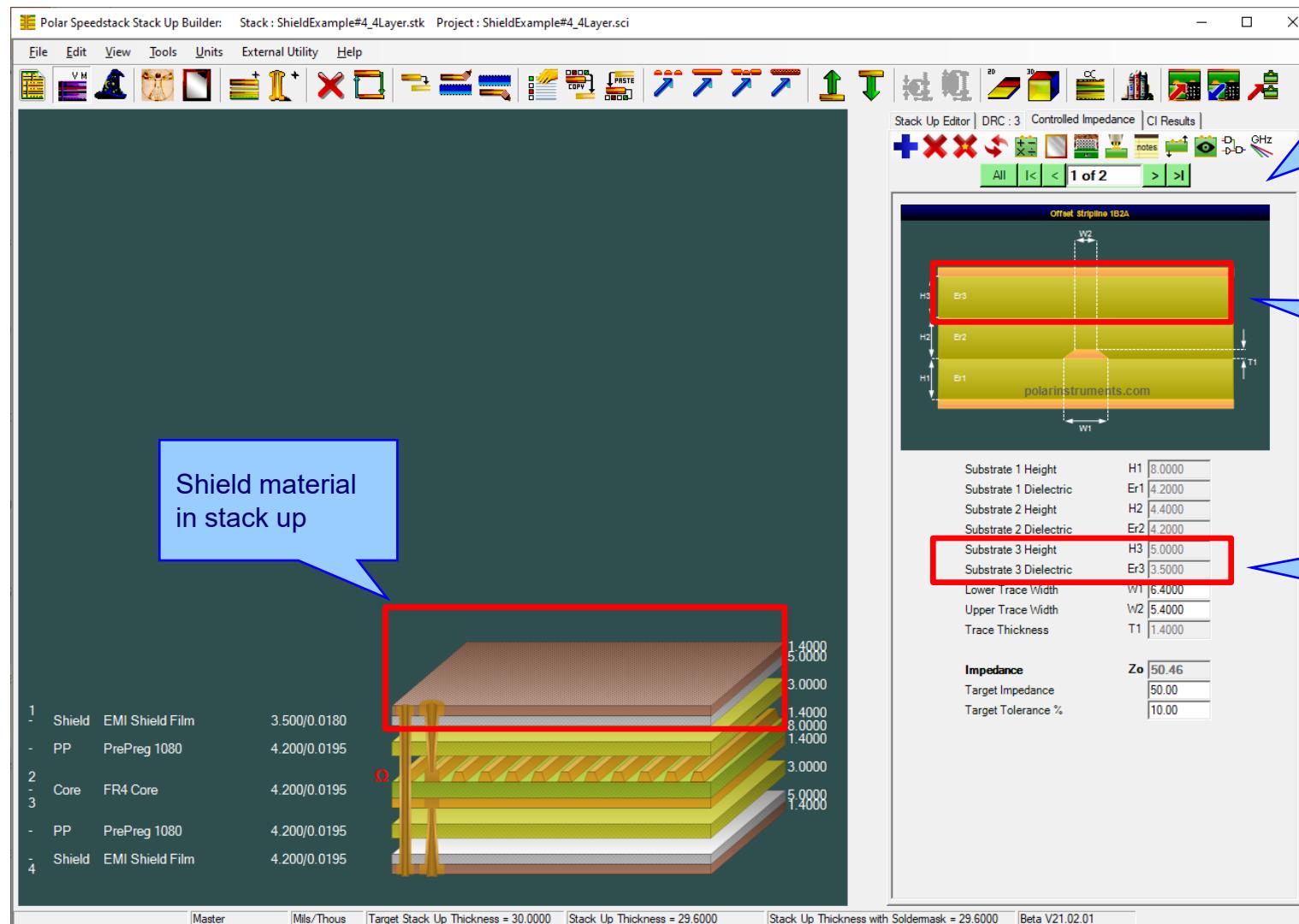
Shield material options to add, delete, swap, move up, move down, symmetry and set properties

Shield properties



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

Controlled impedance and insertion loss calculations

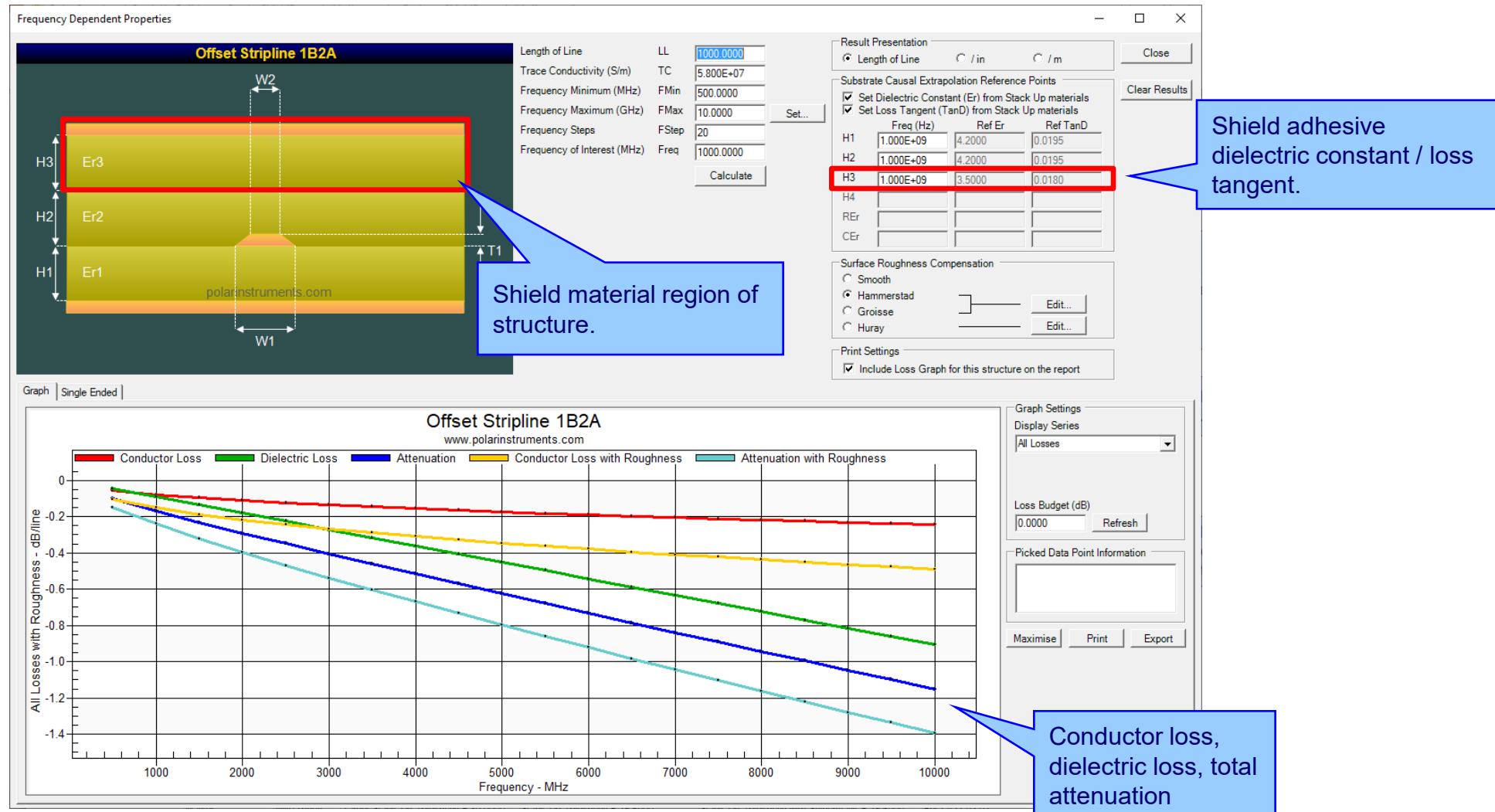


Impedance and insertion calculations support the new Shield material type.

Shield material region of structure.

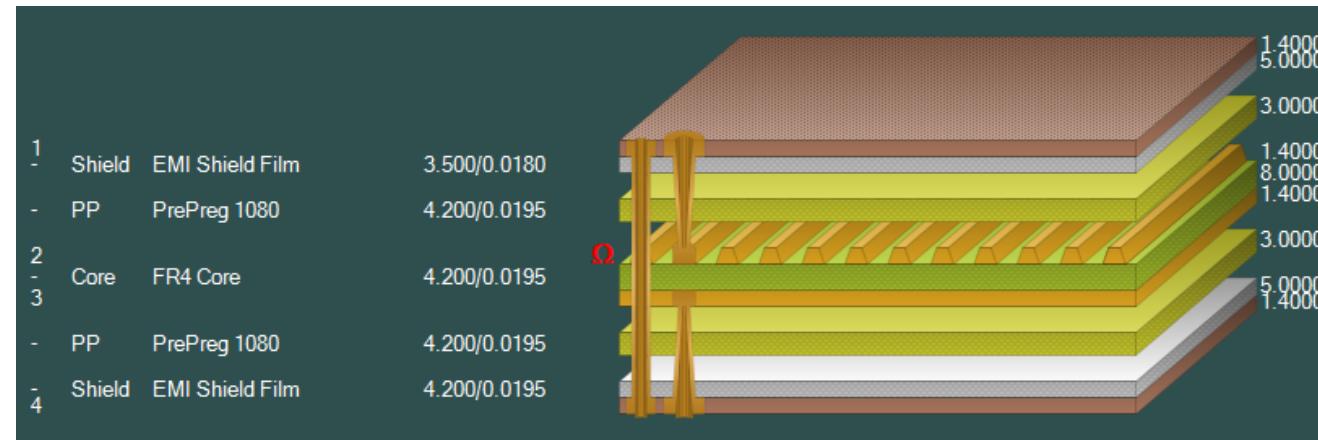
Shield adhesive height / thickness dimension and dielectric constant.

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

Speedstack Report Printer

File Options

Technical report showing shield materials

C:\App\Samples\ShieldExample#5_4Layer.sci Units: Mils

Stack up

Layer	Supplier	Description	Type	Processed Thickness	er	Loss Tangent	Impedance ID
1	Polar Samples	EMI Shield Film	Shield	5.000	3.500	0.0180	
2	Polar Samples	PrePreg 1080	Dielectric	3.000	4.200	0.0195	
3	Polar Samples	FR4 Core	FR4	1.400	8.00	4.200	1.2
4	Polar Samples	PrePreg 1080	Dielectric	3.000	4.200	0.0195	
	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	8.600	100.000	10.000	100.010

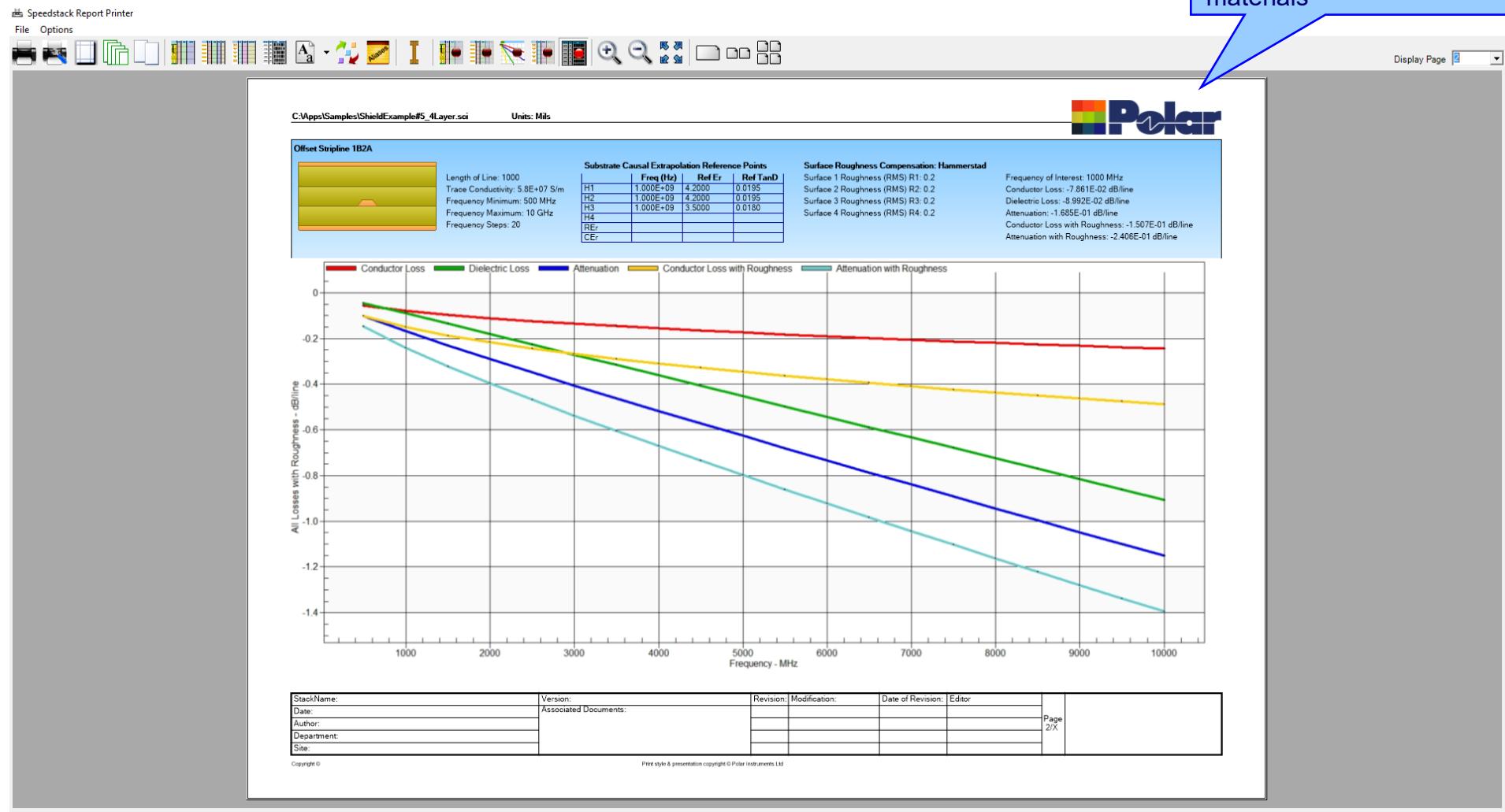
Drill Image

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 1/1

Copyright © Polar Instruments 2026

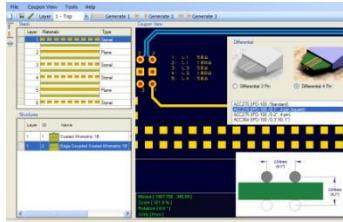
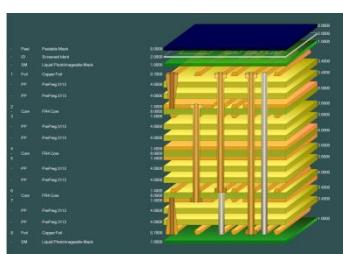
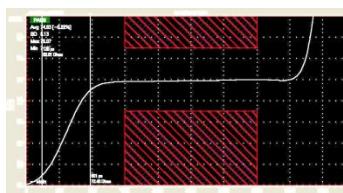
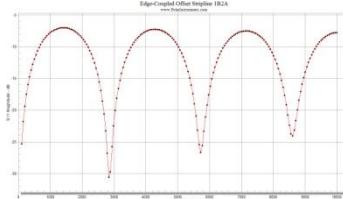
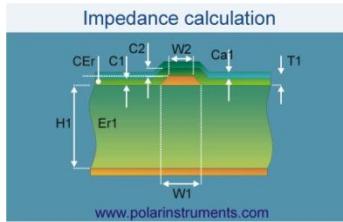
Technical report enhancements



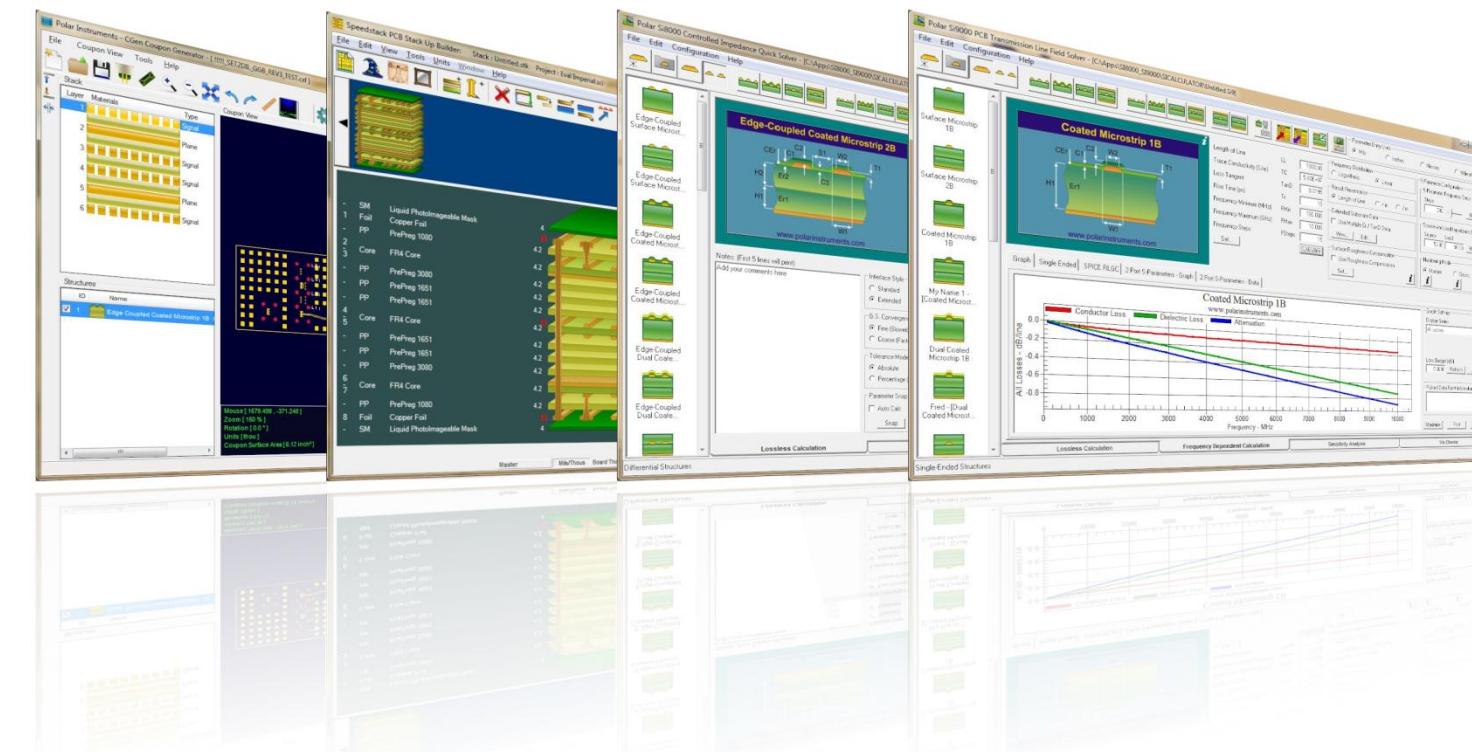
Import / Export enhancements

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

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



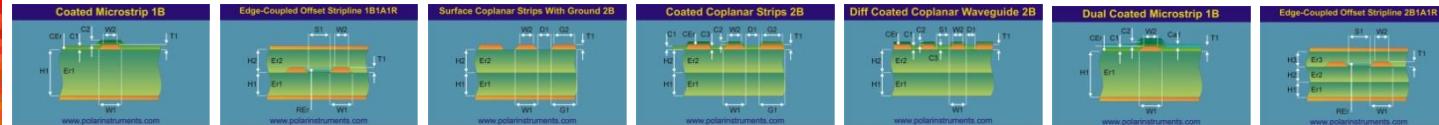
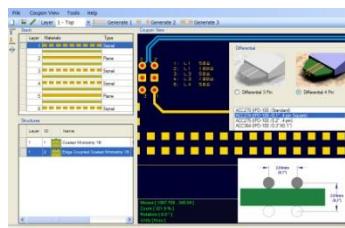
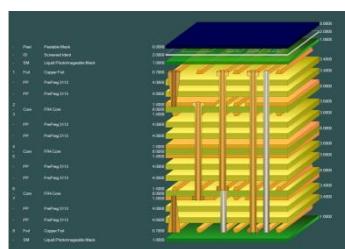
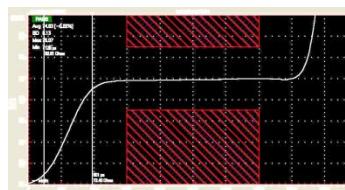
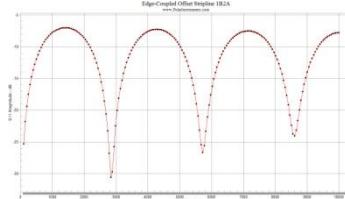
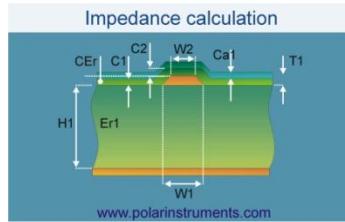
Thank you for viewing this Speedstack 2021 – 2026 preview. If you have questions we would be delighted to help you. Your local contact information is contained on the following slide



Polar Logo & graphic devices are registered trade marks of Polar Instruments Ltd.

Copyright Polar Instruments Ltd (c) 2026

polarinstruments.com



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

www.polarinstruments.com

Polar Logo & graphic devices are registered trade marks of Polar Instruments Ltd.

Copyright Polar Instruments Ltd (c) 2026

polarinstruments.com