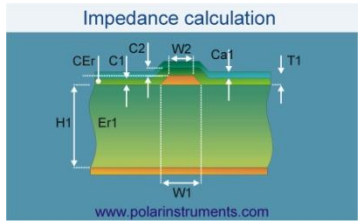

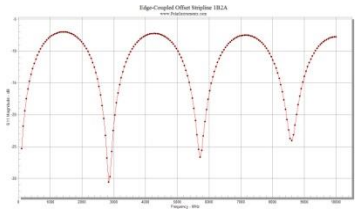

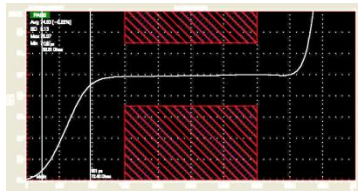

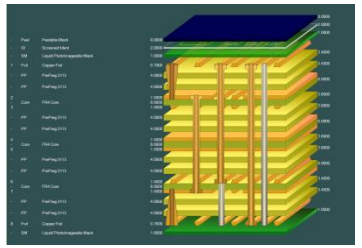

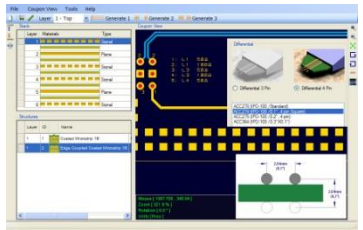

Speedstack 2021 - 2024 Updates

Richard Attrill – January 2024 (Rev 13)

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Speedstack v24.01.01 (Jan 2024)

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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

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Speedstack v23.09.01 (Sept 2023)

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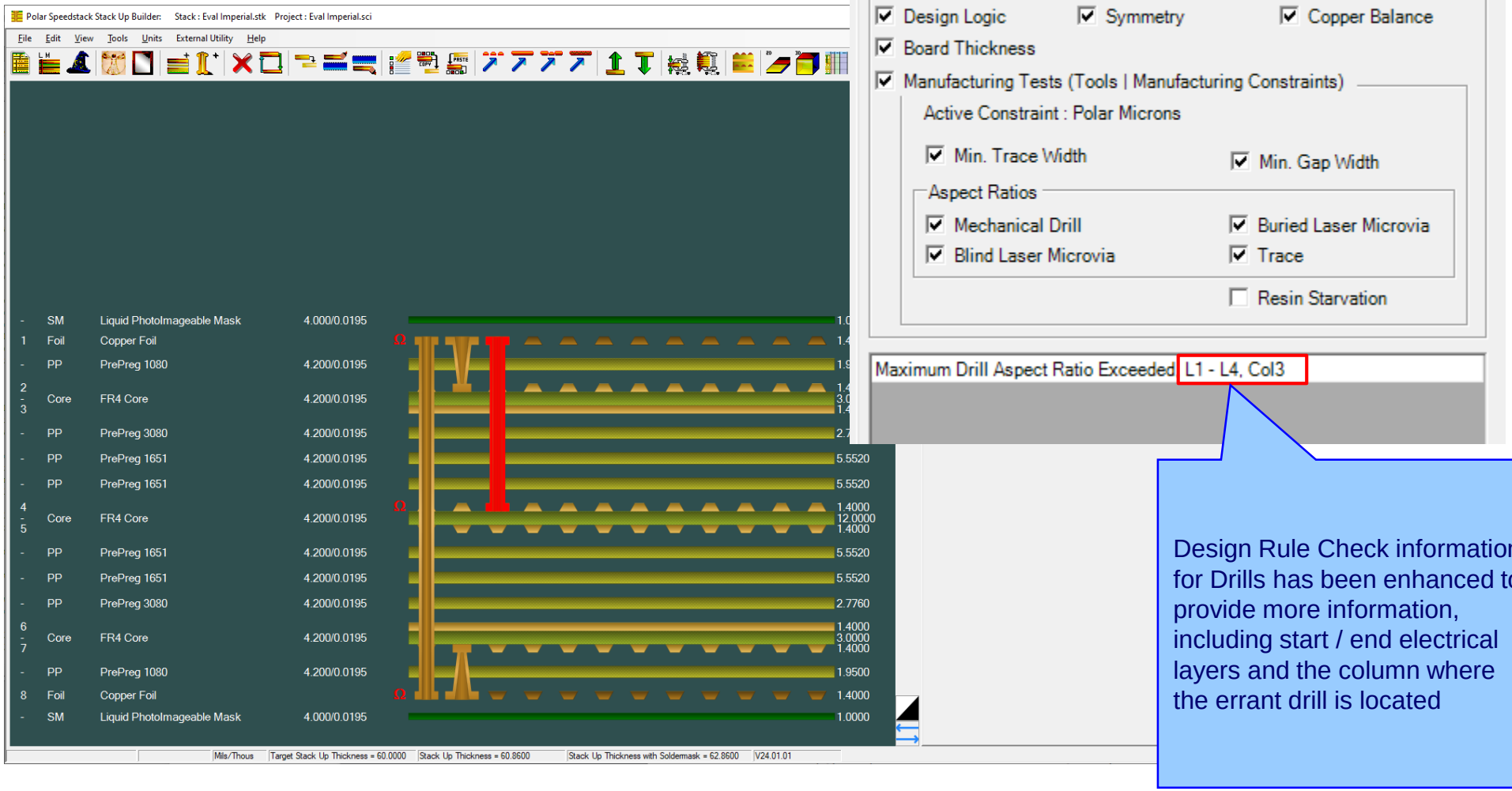
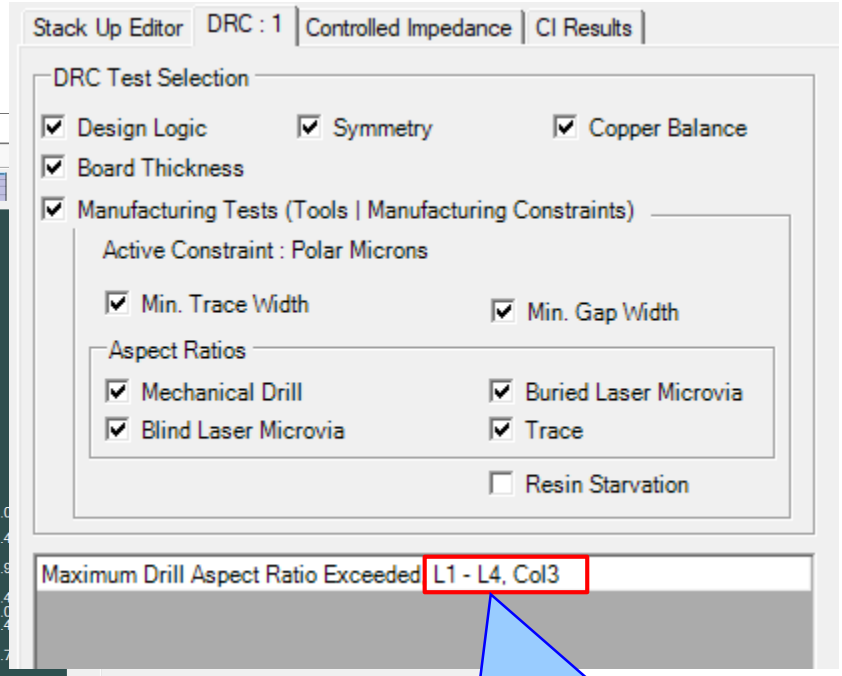
Design Rule Check (DRC) Enhancements





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

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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

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Speedstack v23.06.15 (June 2023)

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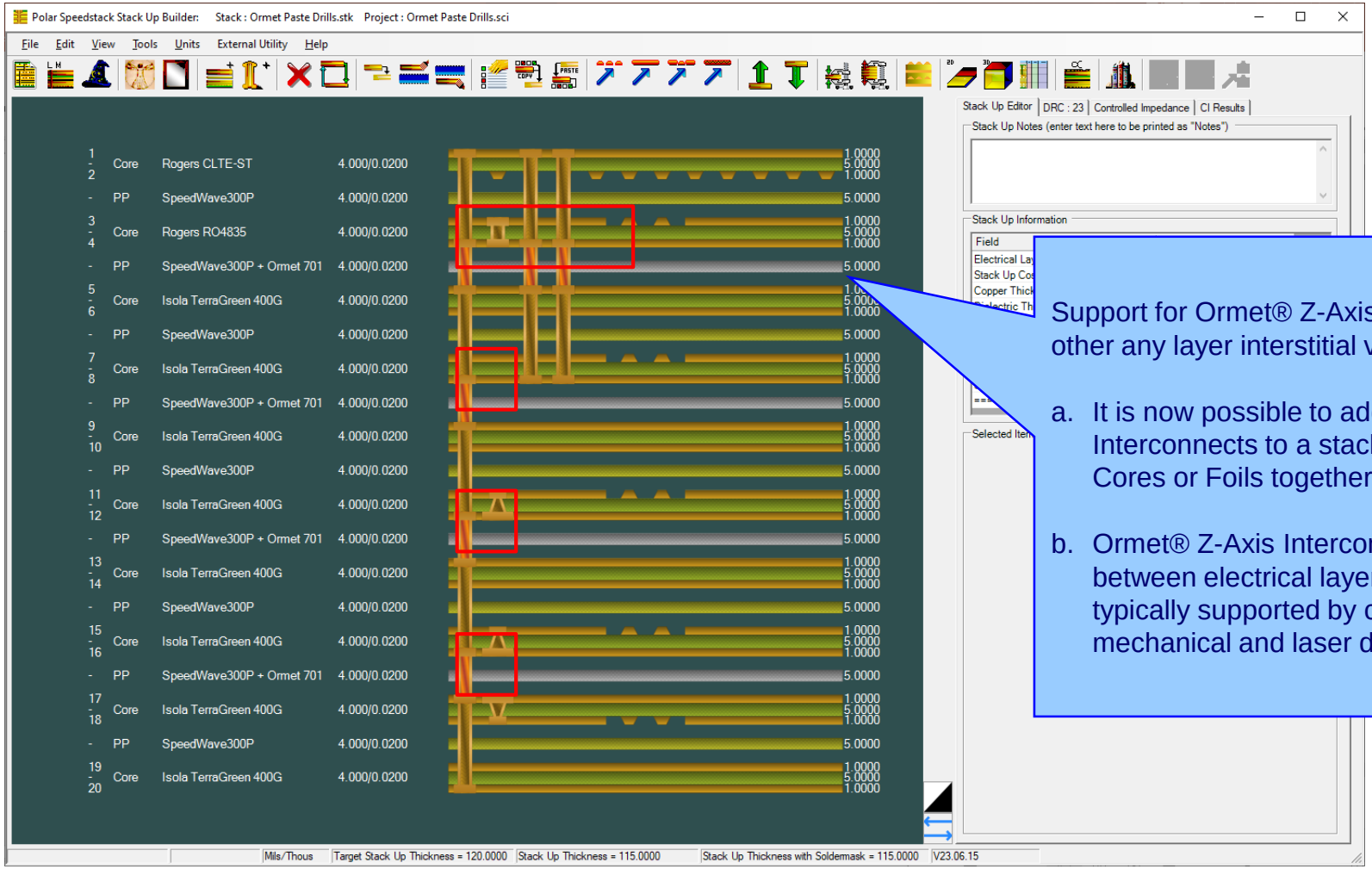
Drill Enhancements including support for Ormet® Z-Axis Interconnects or other any layer interstitial via technology



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

a. It is now possible to add Ormet® Z-Axis Interconnects to a stack up to connect two Cores or Foils together

b. Ormet® Z-Axis Interconnects can be placed between electrical layers which are not typically supported by conventional mechanical and laser drills

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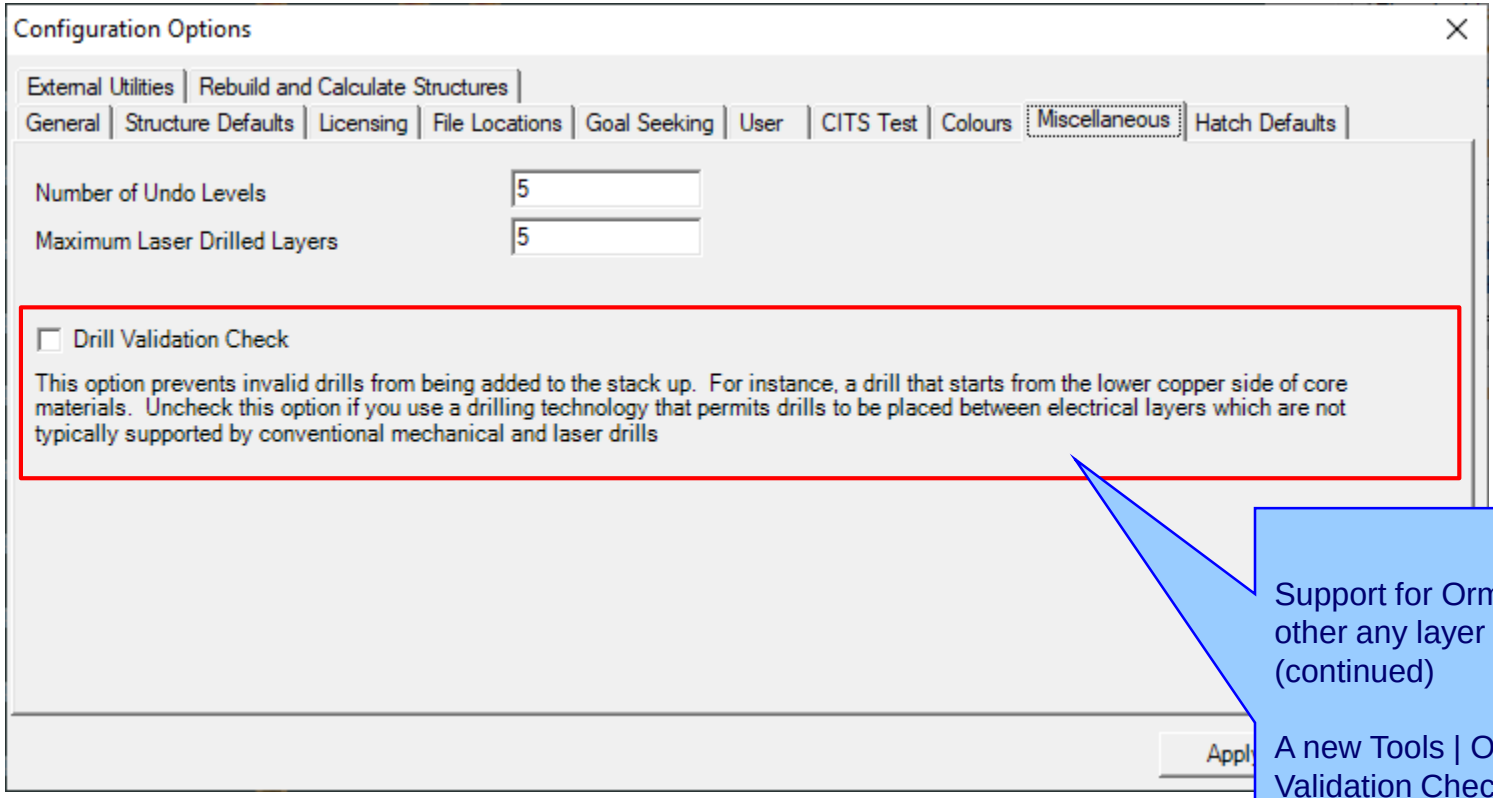
Enhancements including support for Ormet® Z-Axis Interconnects or other any layer interstitial via technology



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

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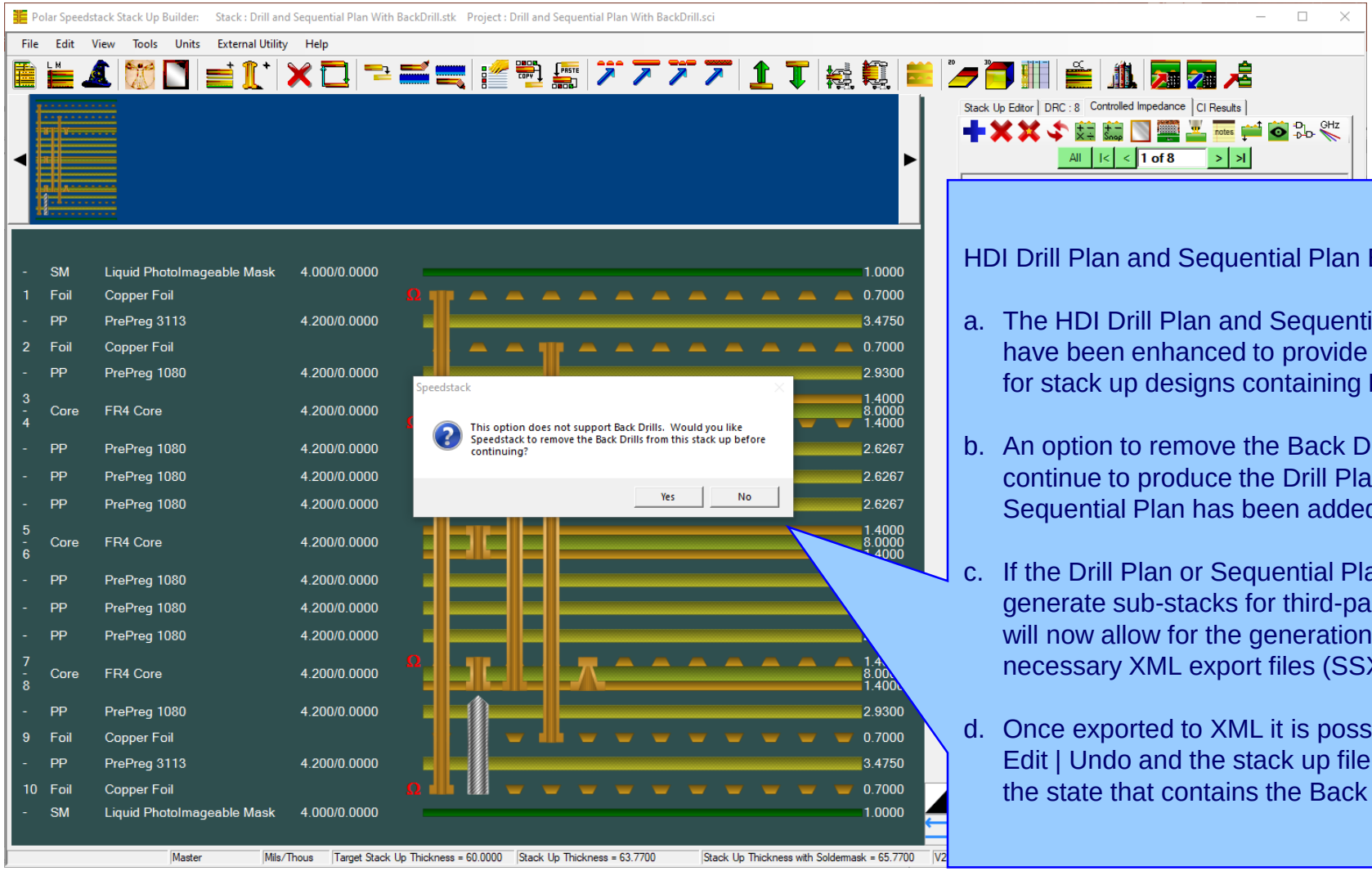
HDI Drill Plan and Sequential Plan Enhancements



HDI Drill Plan and Sequential Plan Enhancements

a. The HDI Drill Plan and Sequential Plan options have been enhanced to provide better support for stack up designs containing Back Drills

b. An option to remove the Back Drills and continue to produce the Drill Plan or Sequential Plan has been added

c. If the Drill Plan or Sequential Plan is used to generate sub-stacks for third-party tools, this will now allow for the generation of the necessary XML export files (SSX)

d. Once exported to XML it is possible to select Edit | Undo and the stack up file will return to the state that contains the Back Drills

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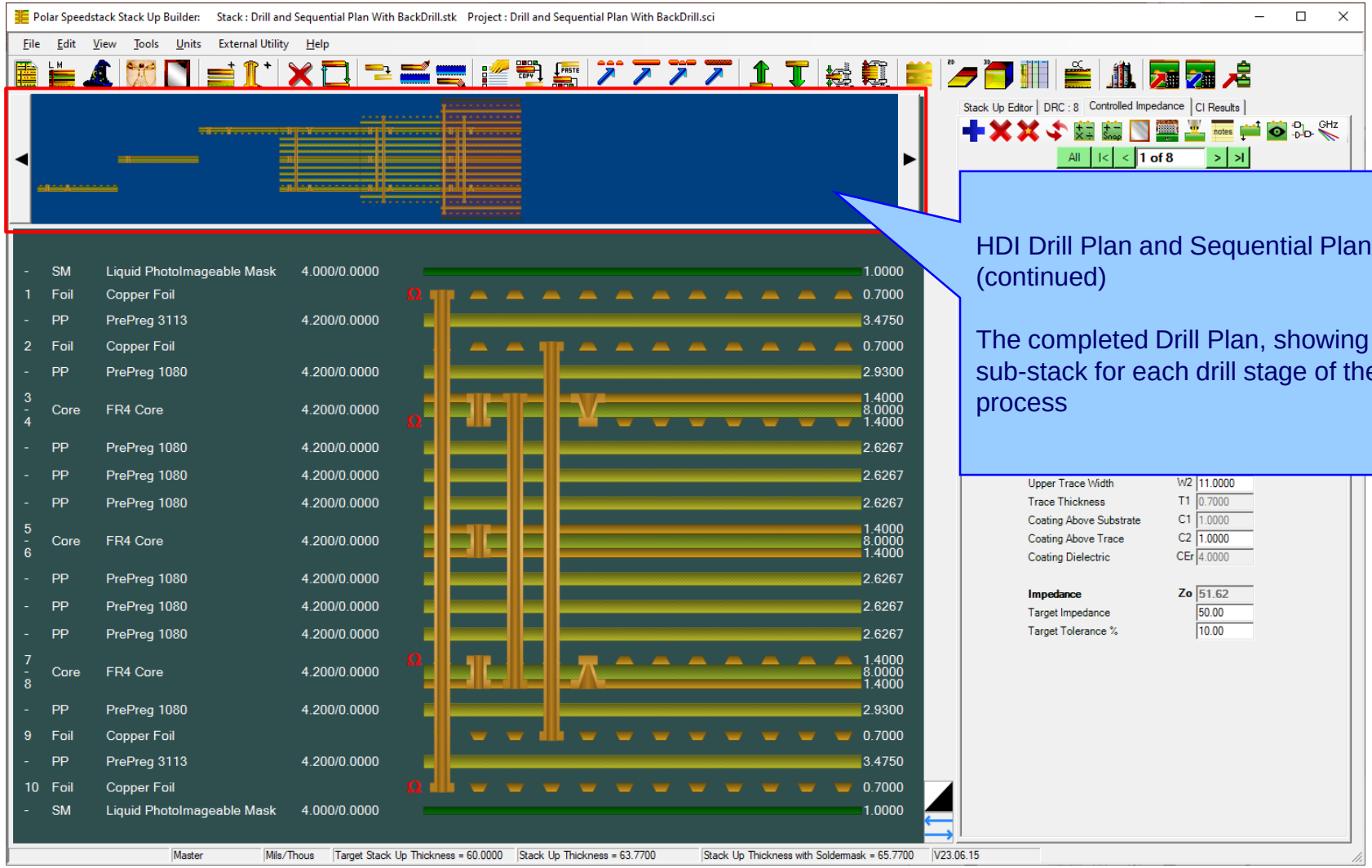
HDI Drill Plan and Sequential Plan Enhancements



HDI Drill Plan and Sequential Plan Enhancements (continued)

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

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Speedstack v23.05.01 (May 2023)

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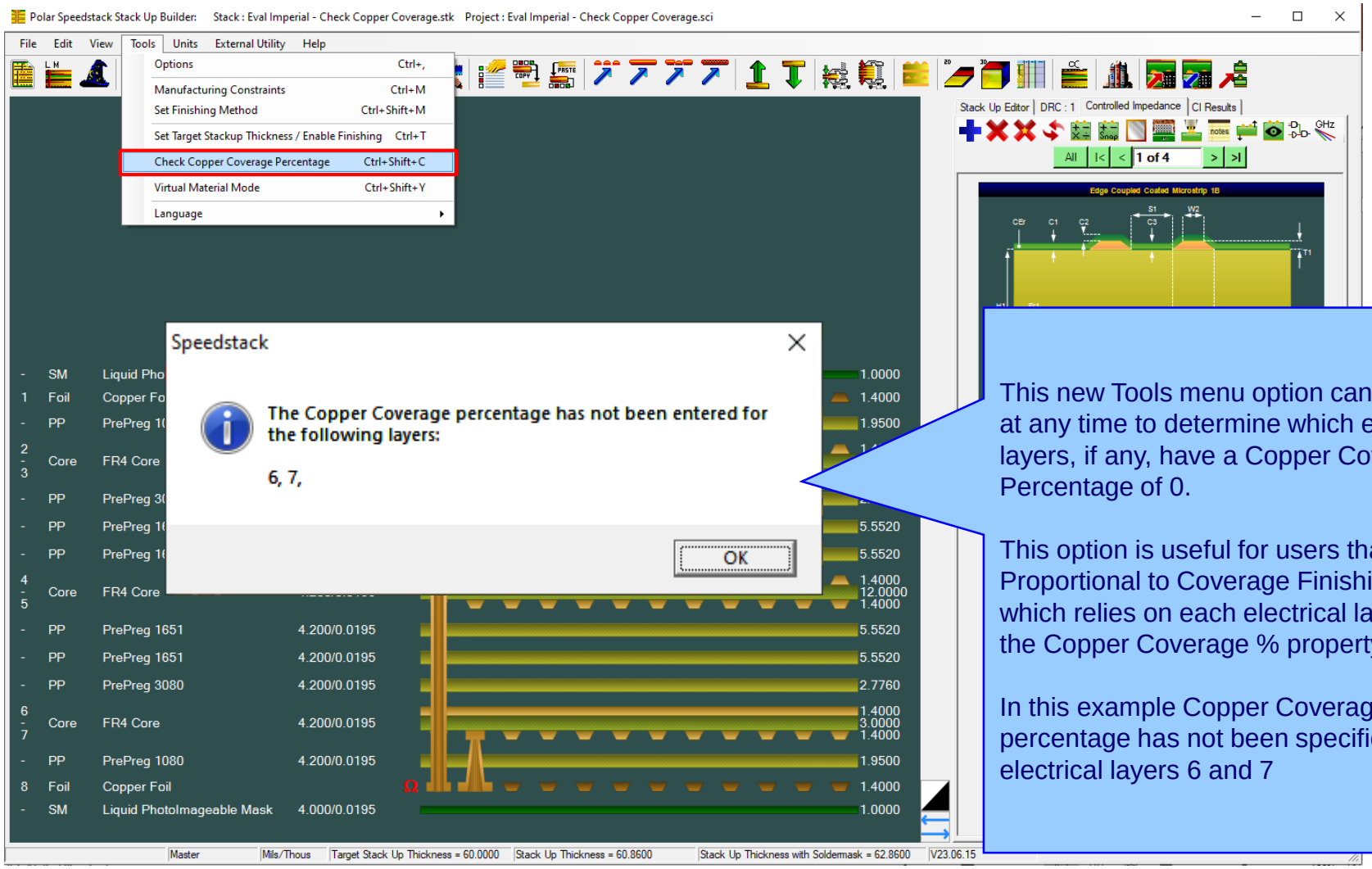
New Check Copper Coverage Percentage option



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

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

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

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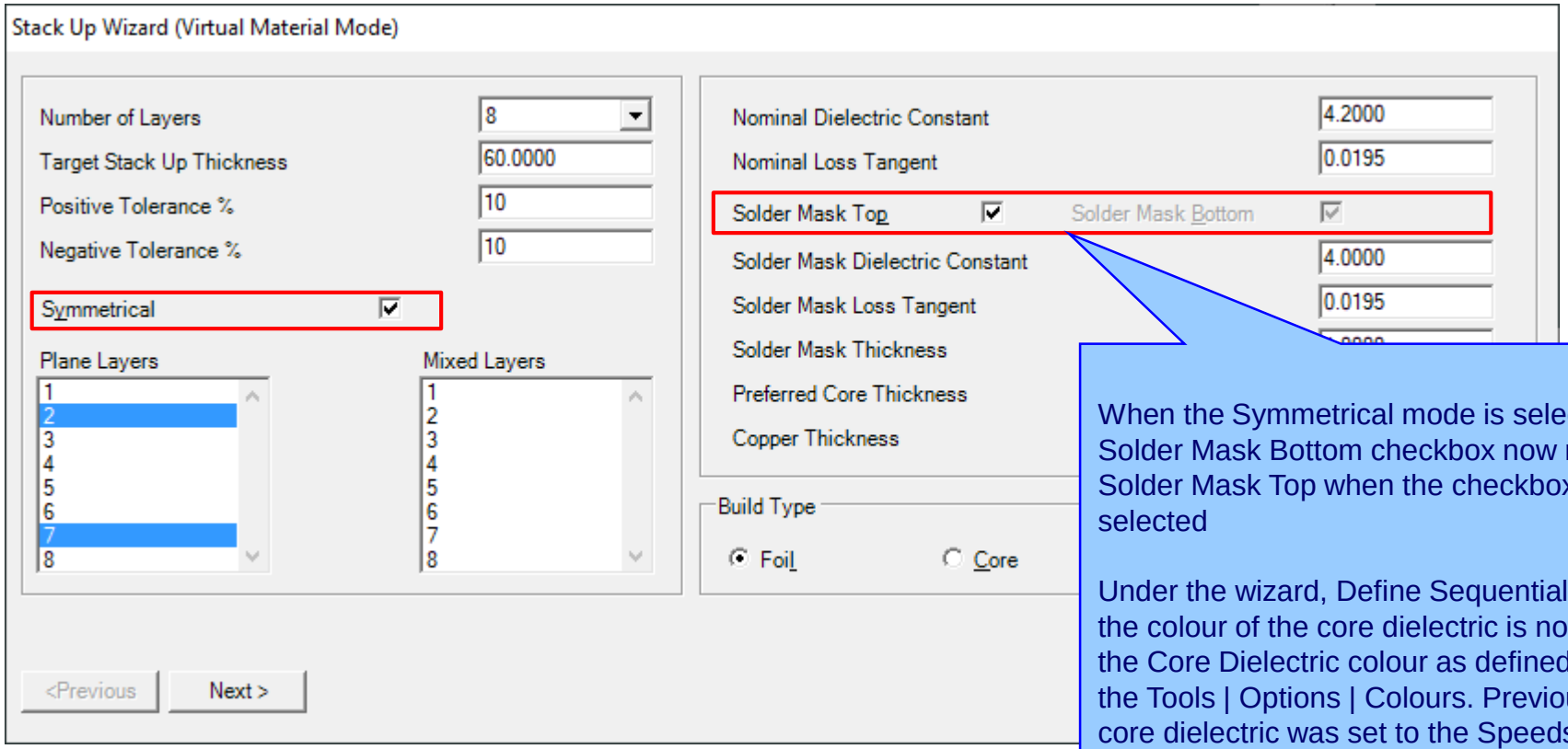
Virtual Material Wizard Improvements



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

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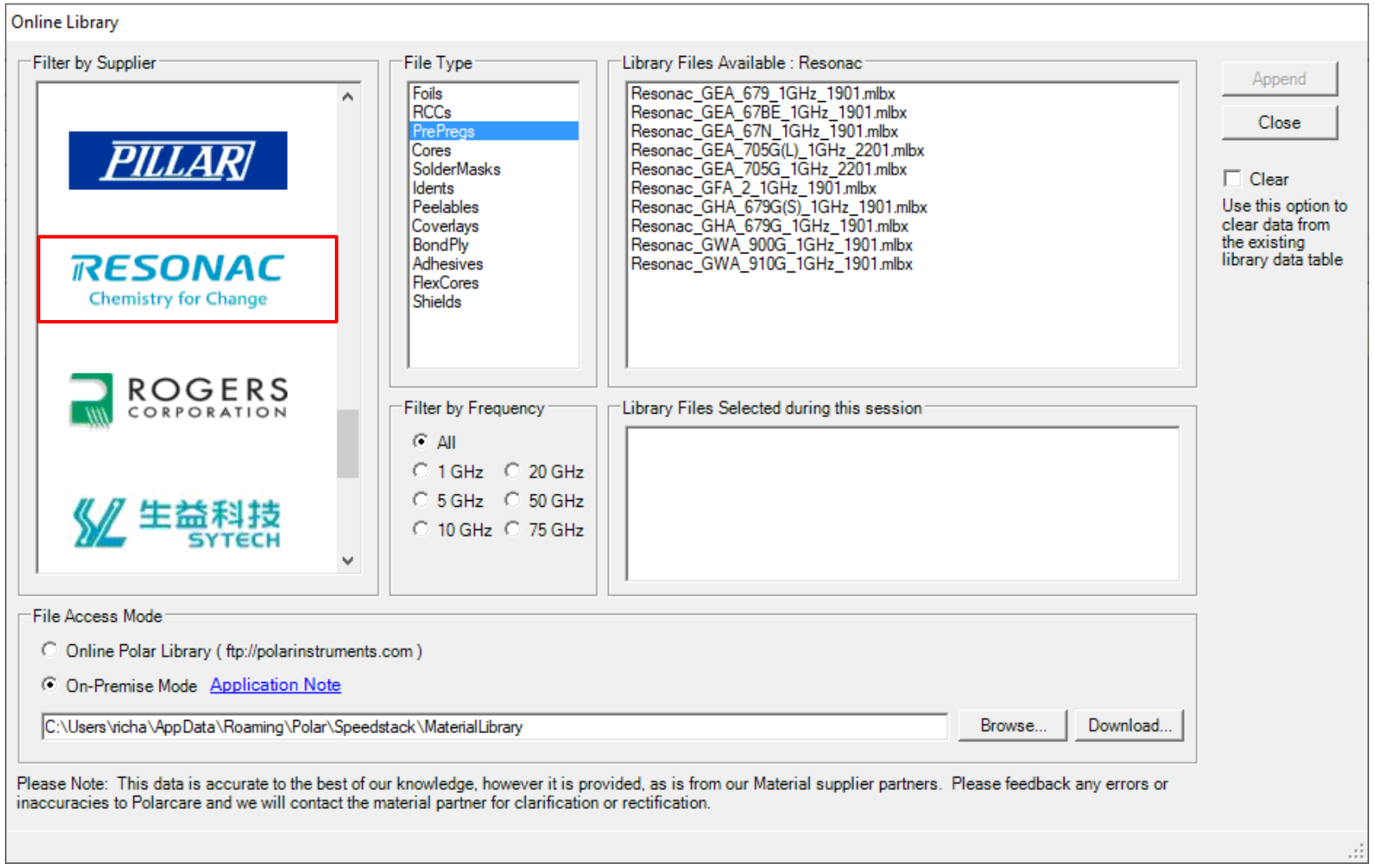
Resonac materials added to the Online Library



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Speedstack v23.04.02 (April 2023)

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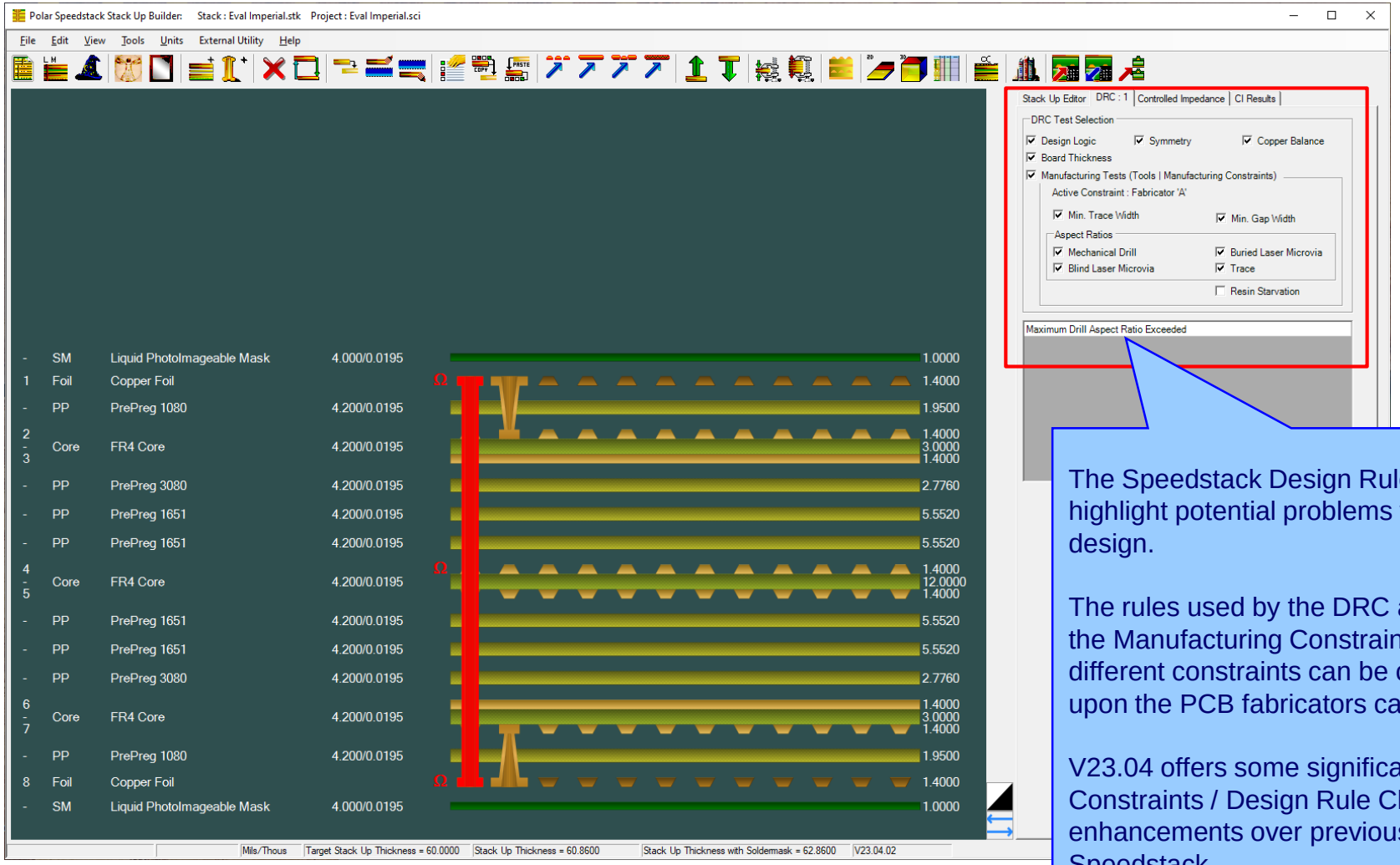
Manufacturing Constraints / Design Rule Check Enhancements



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.

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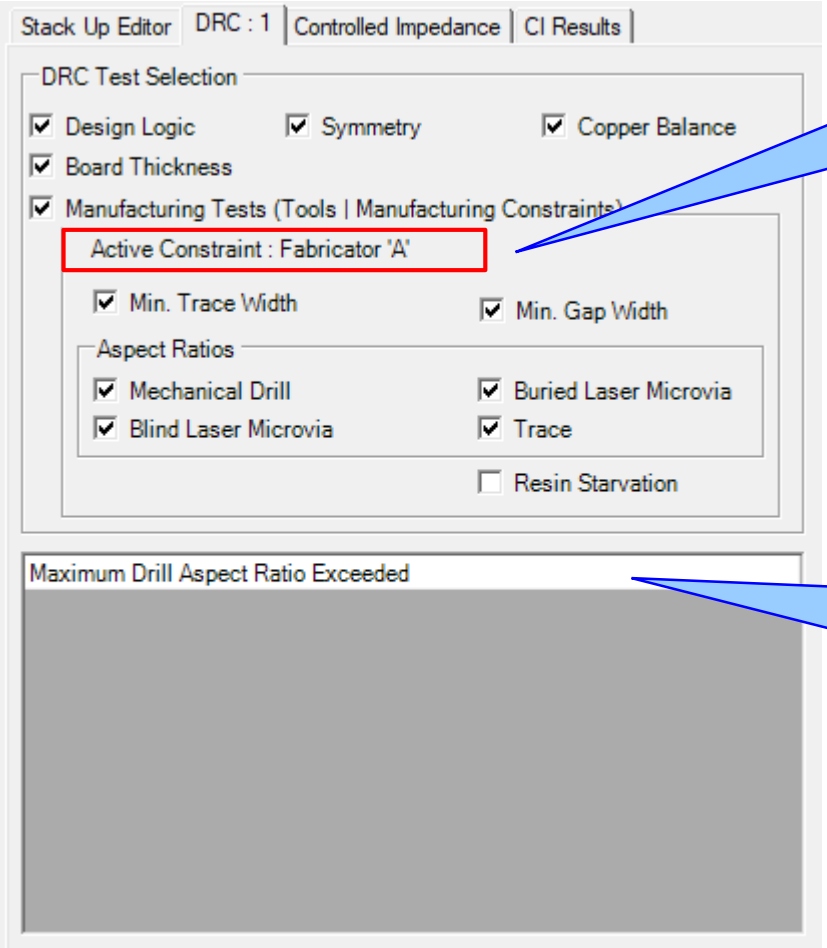
Manufacturing Constraints / Design Rule Check Enhancements



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

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

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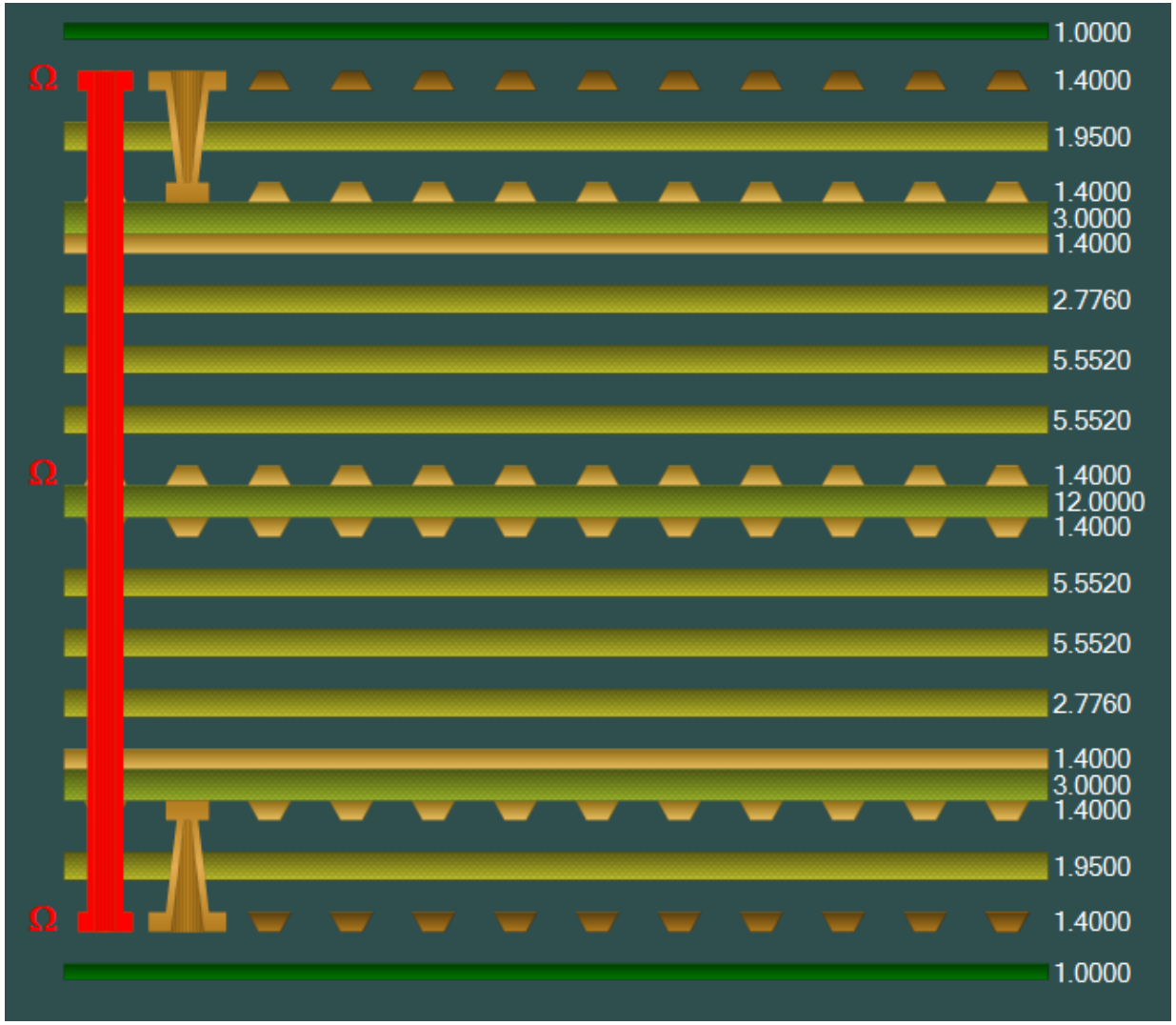
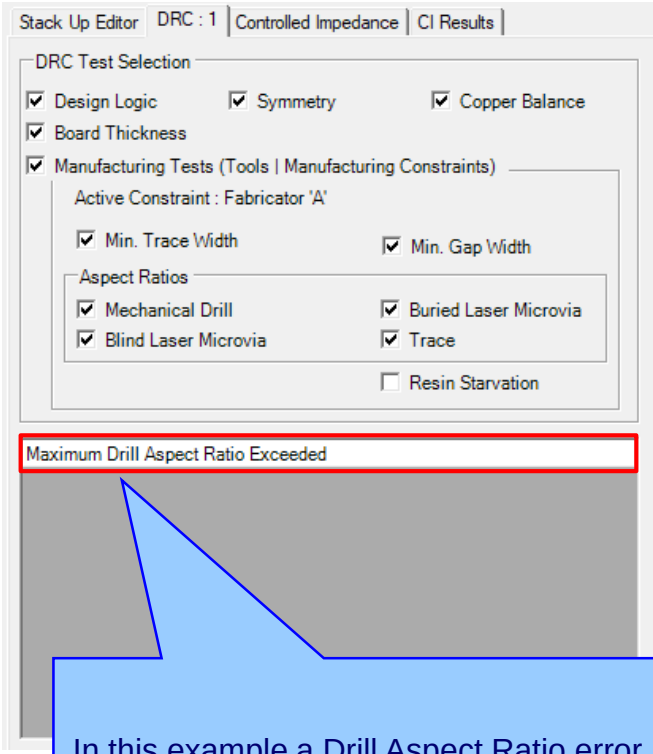
Manufacturing Constraints / Design Rule Check Enhancements





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

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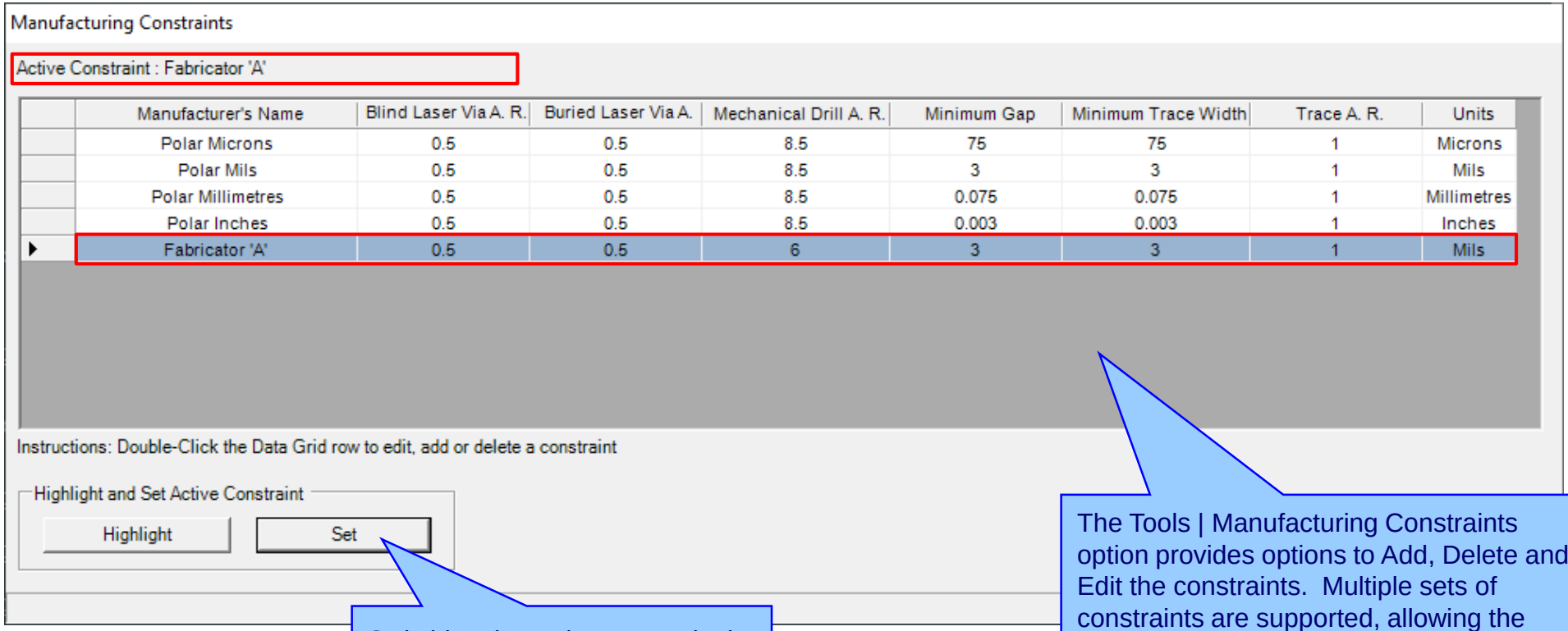
Manufacturing Constraints / Design Rule Check Enhancements



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

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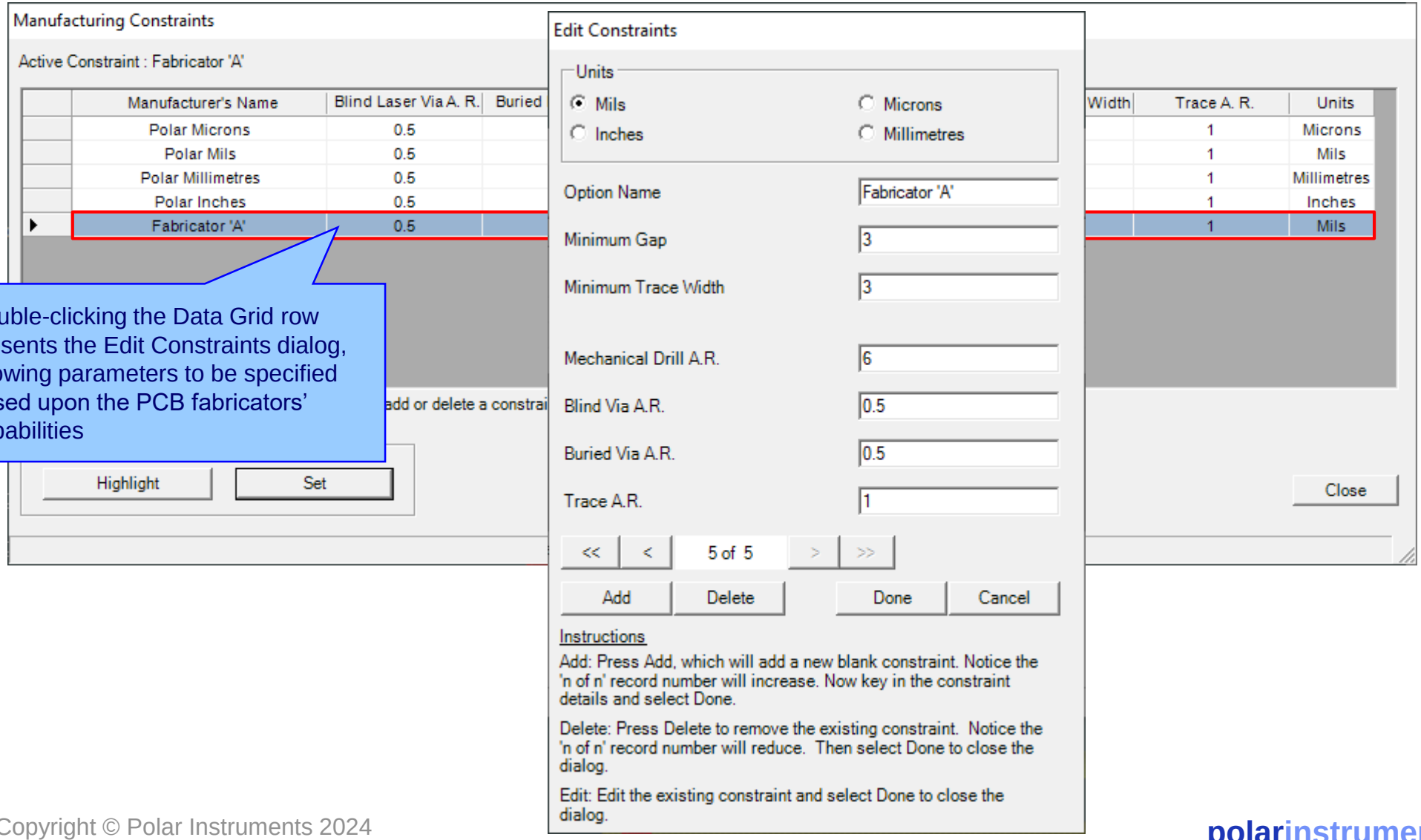
Manufacturing Constraints / Design Rule Check Enhancements



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Speedstack v23.03.01 (March 2023)

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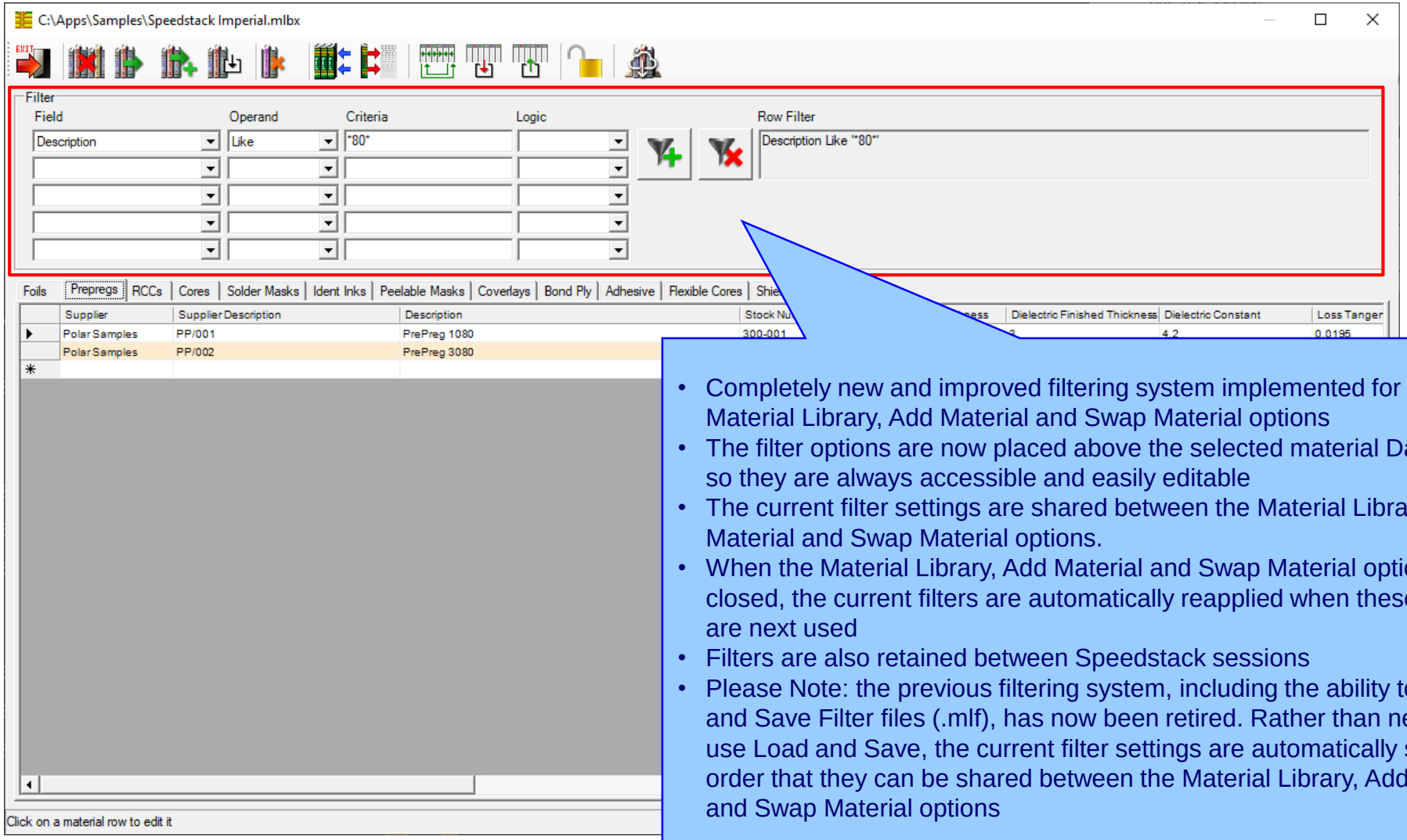
Material Library Filter / Search Enhancements



- 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

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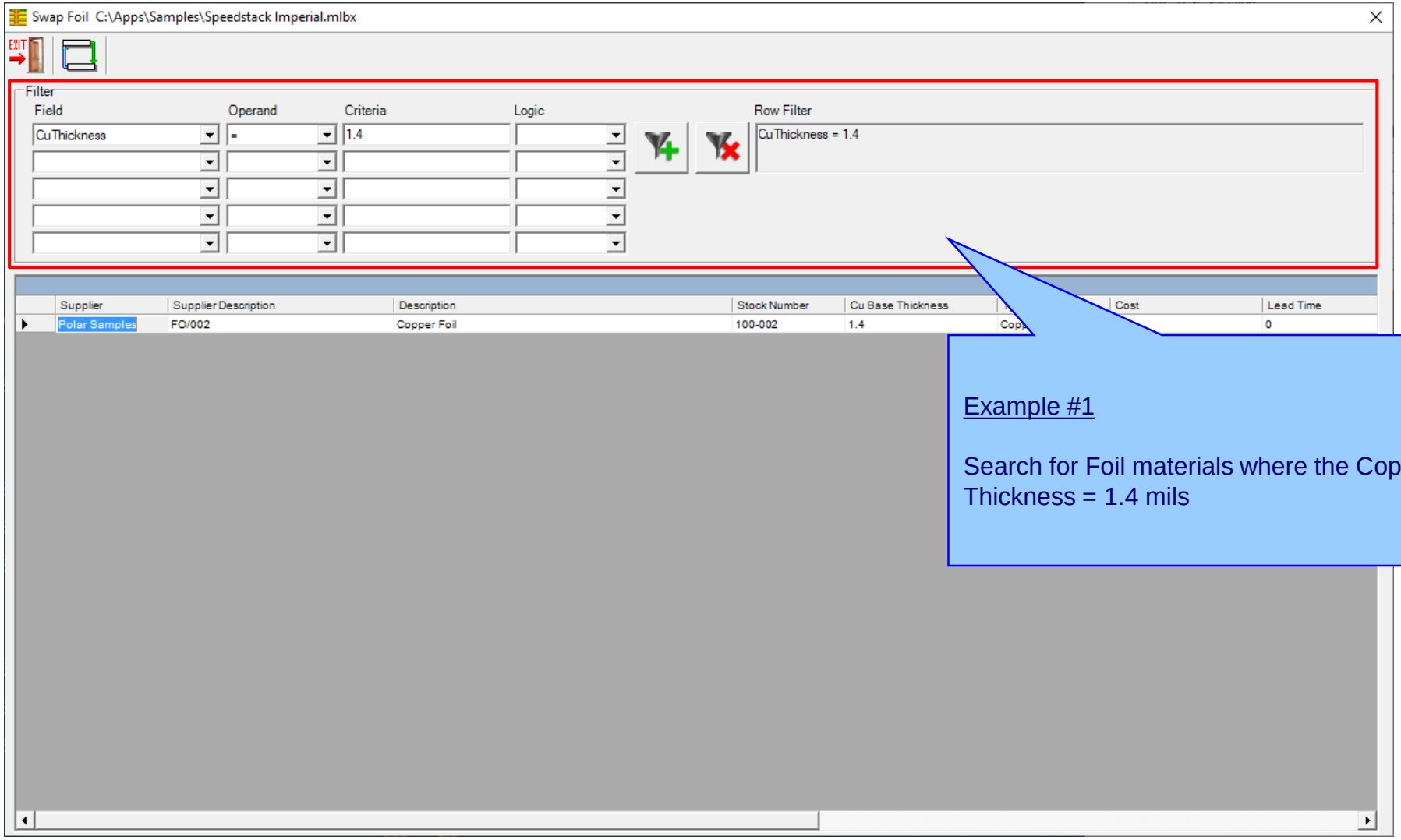
Material Library Filter / Search Enhancements



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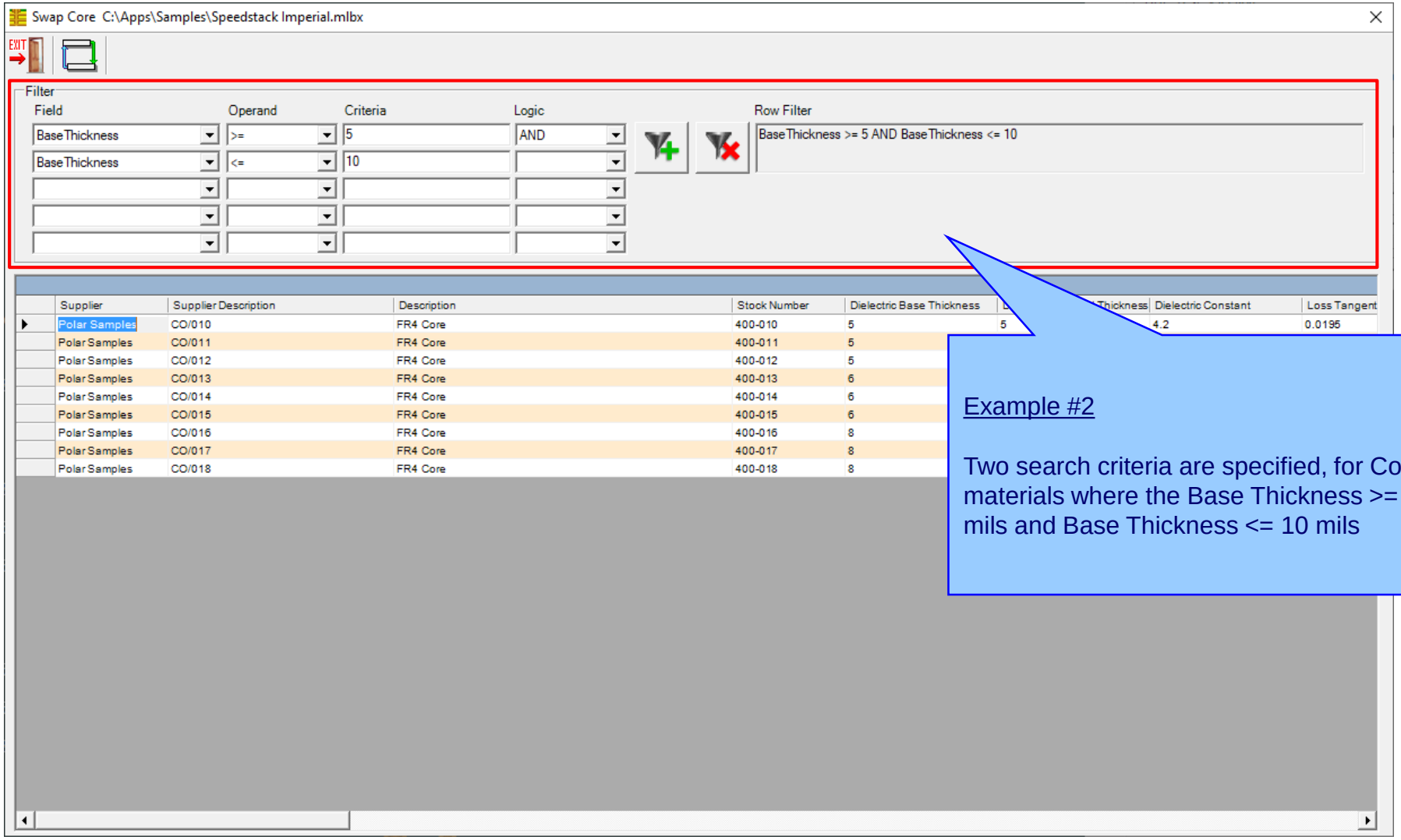
Material Library Filter / Search Enhancements



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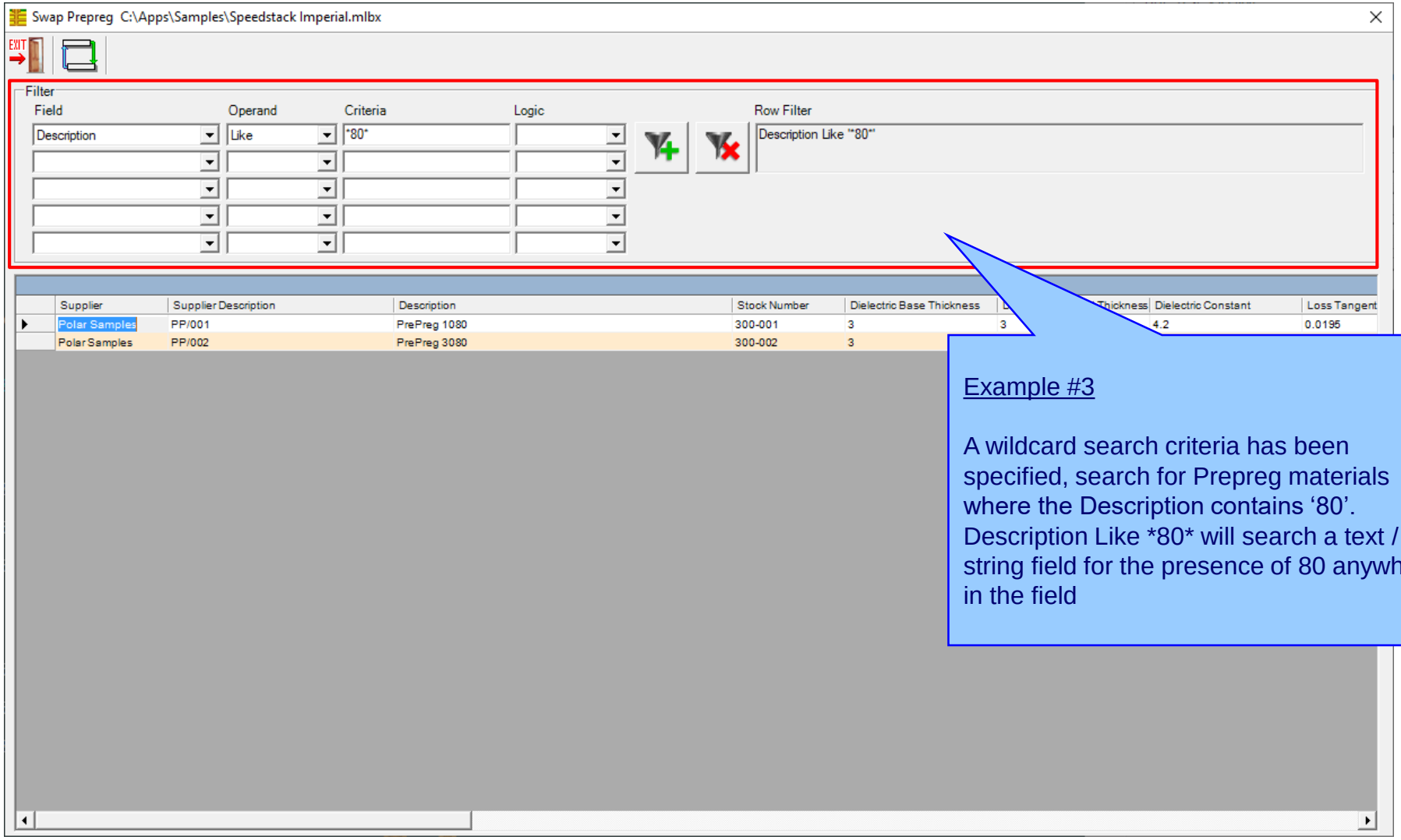
Material Library Filter / Search Enhancements



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

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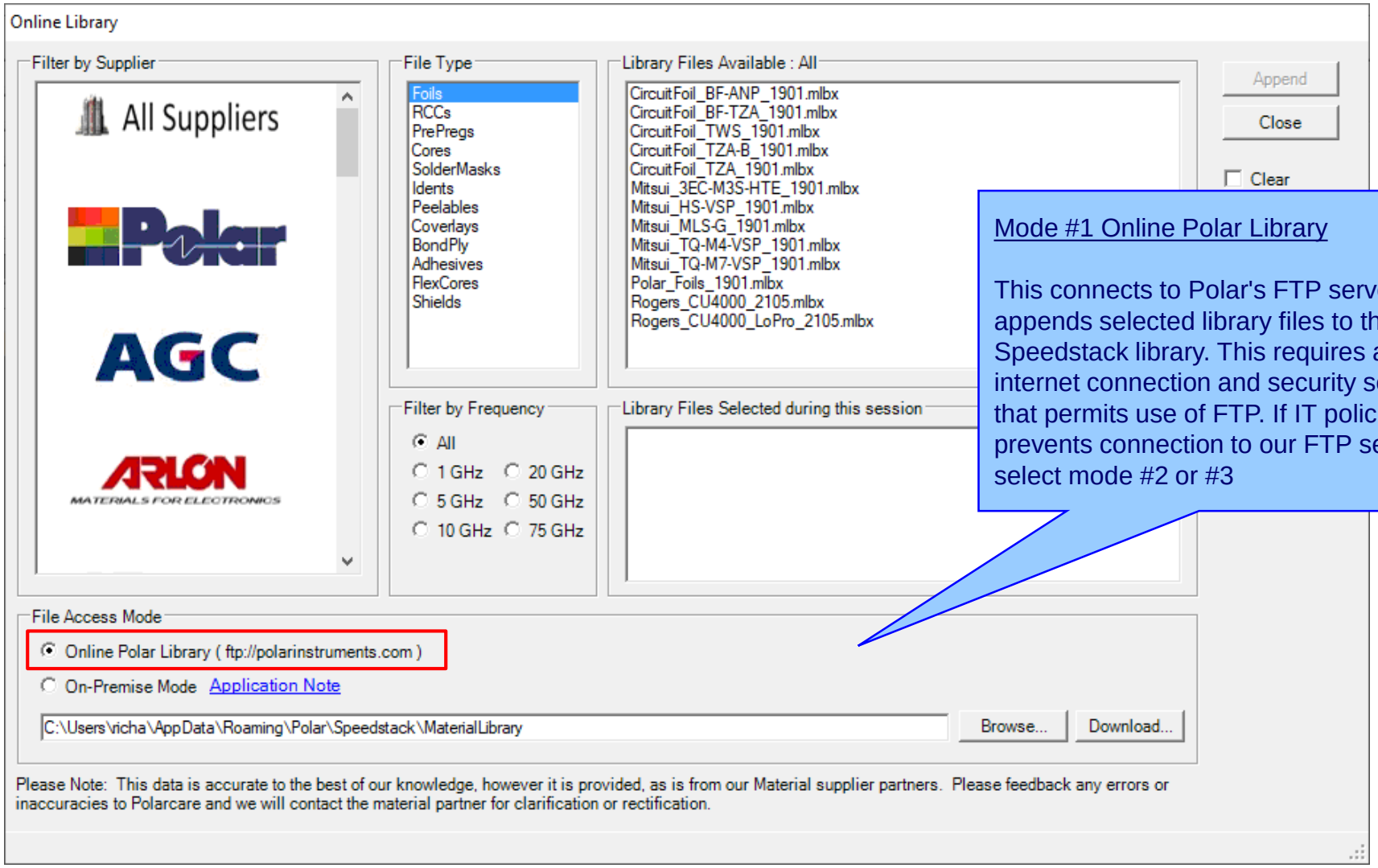
Online Library – Now supports three modes



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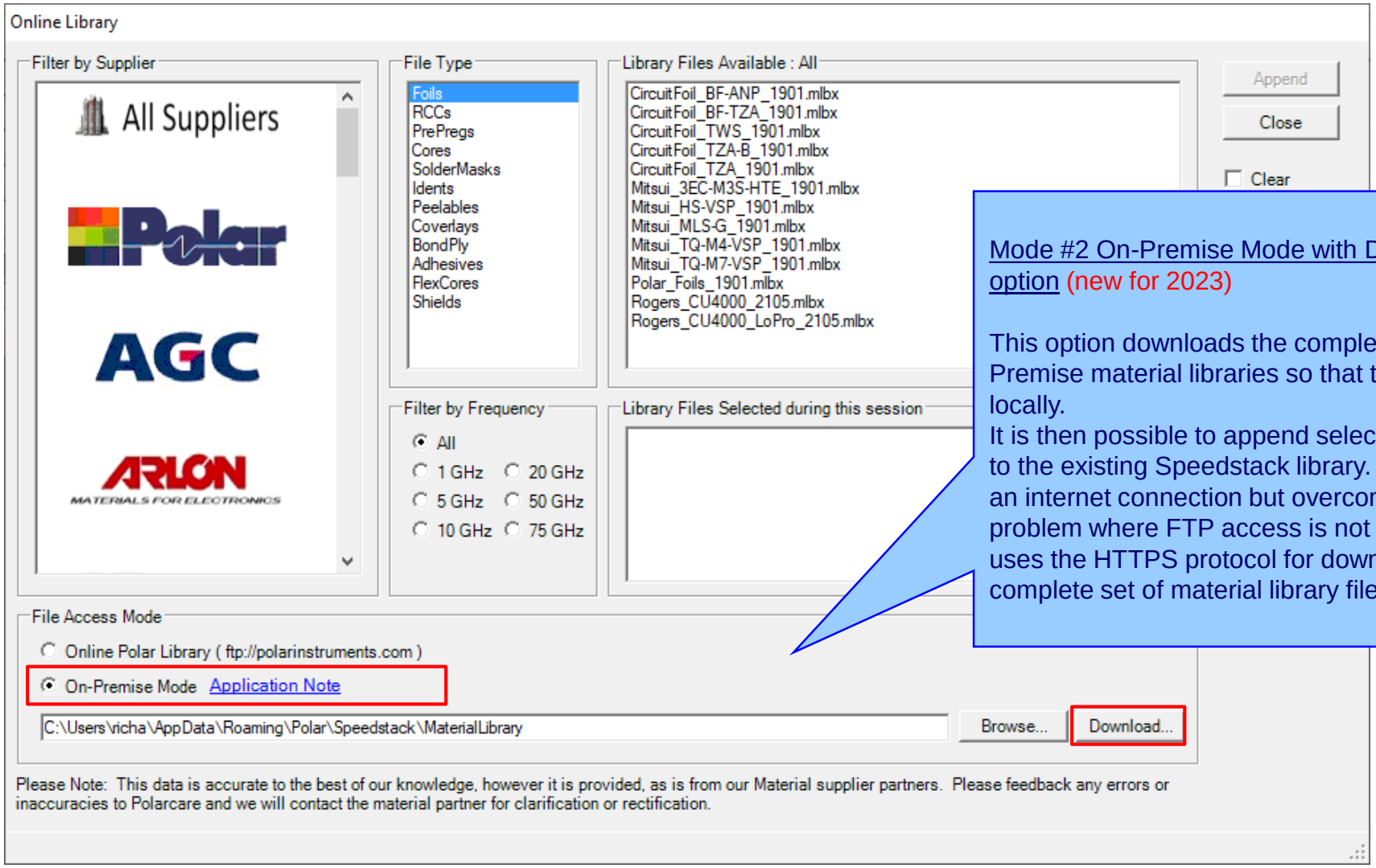
Online Library – Now supports three modes



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.

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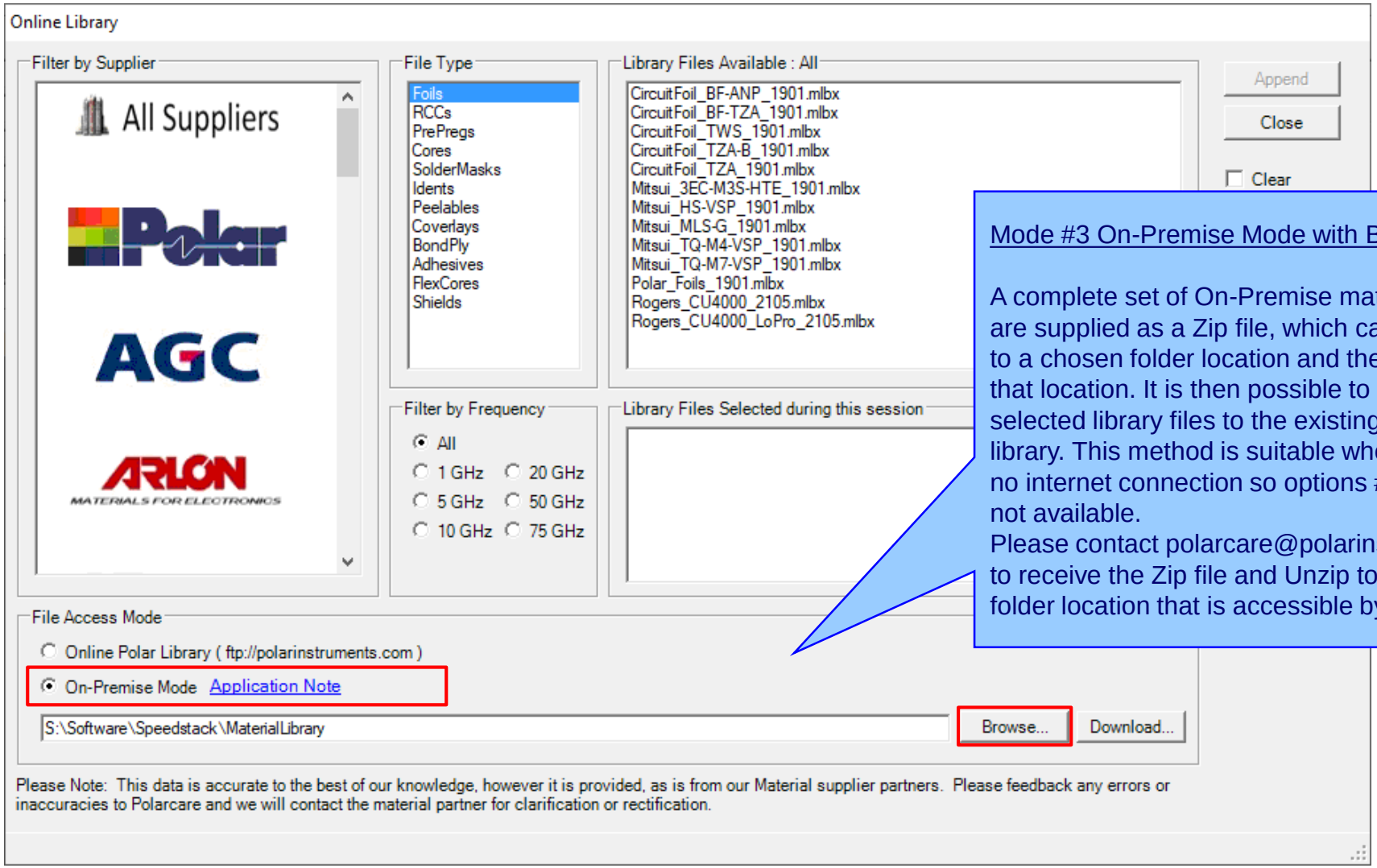
Online Library – Now supports three modes



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

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Speedstack v22.11.01 (November 2022)

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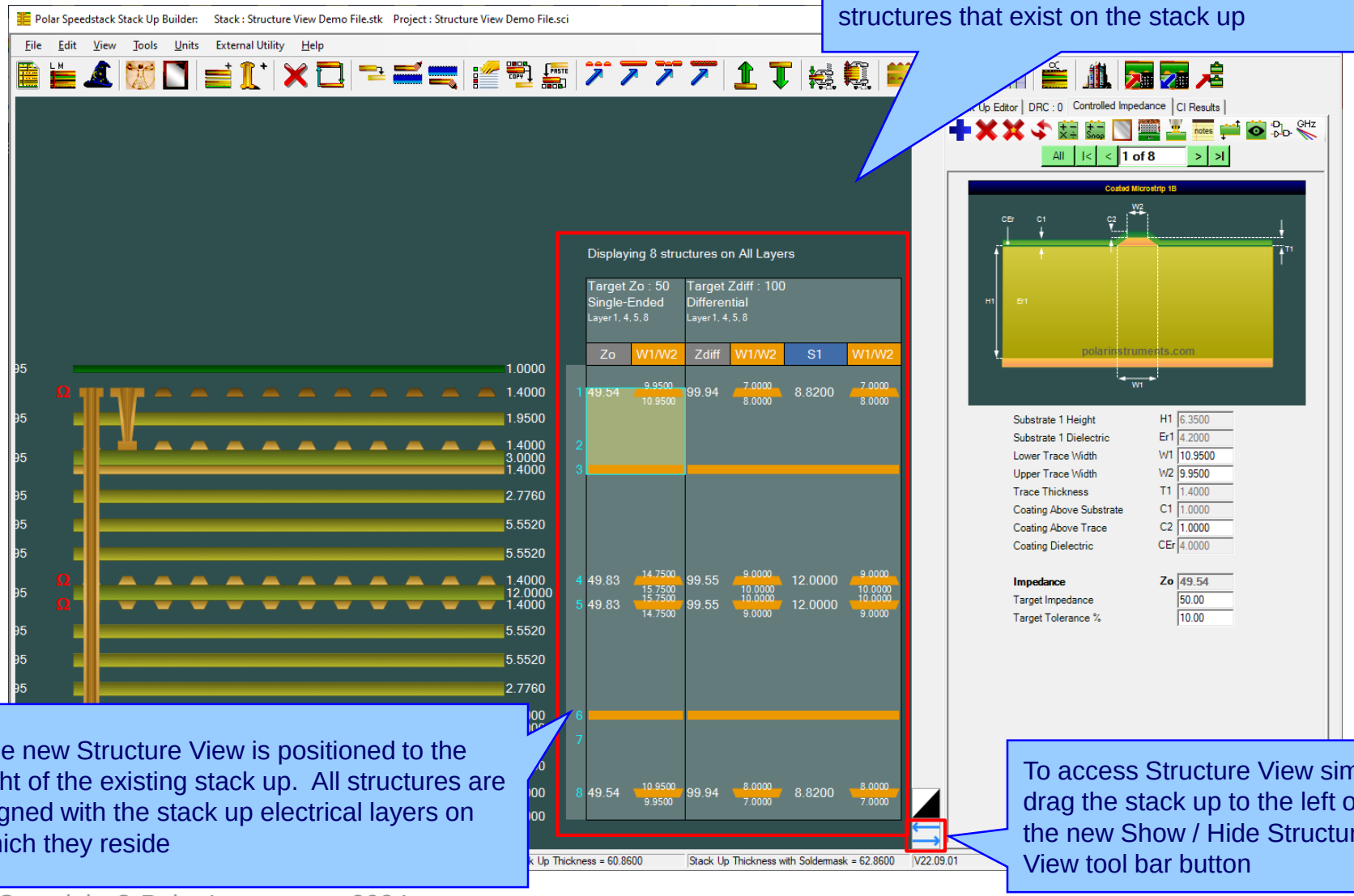
Introducing Structure View

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



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

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

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Introducing Structure View

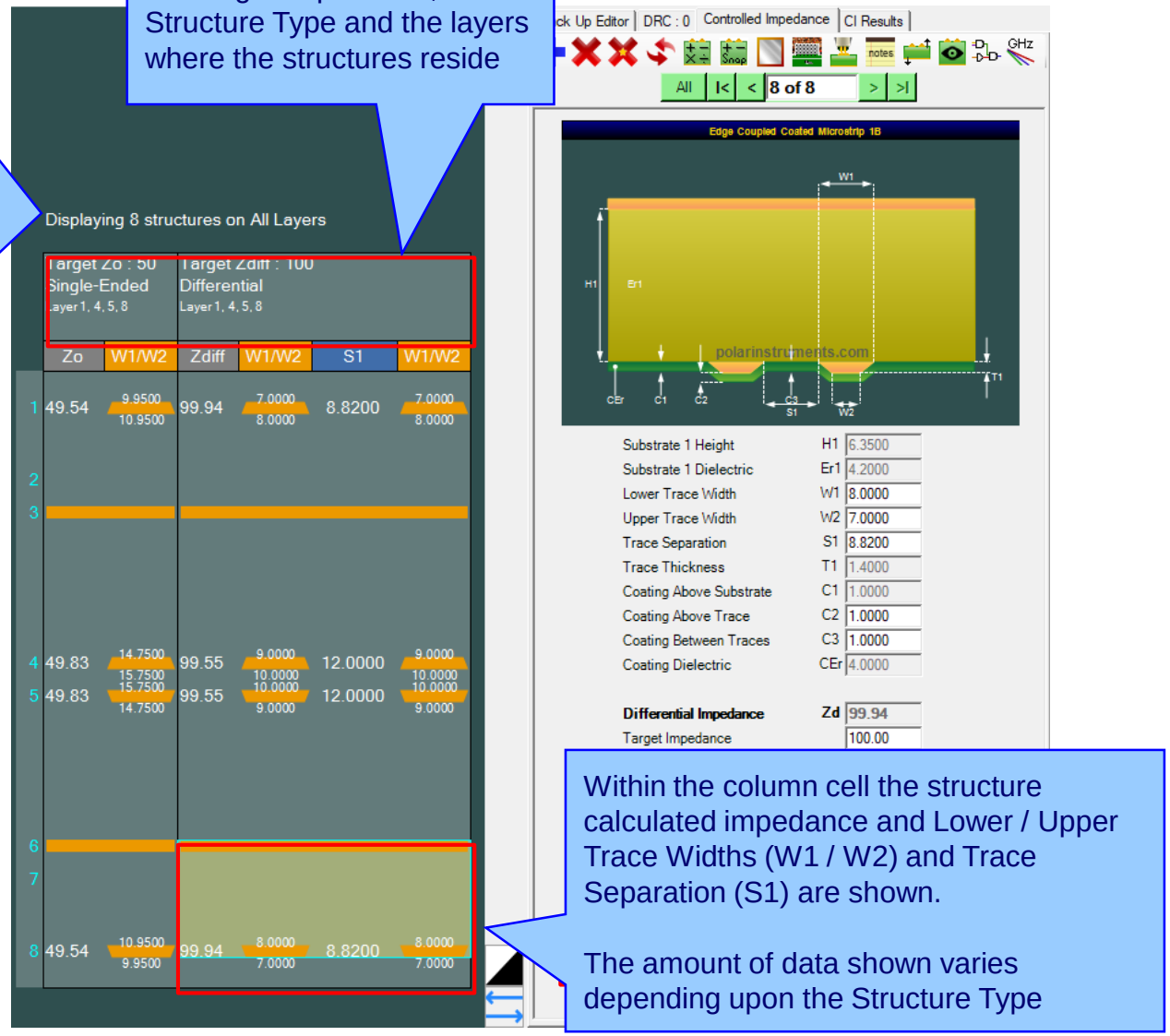
Structures are arranged by Target Impedance, low to high, then by Structure Type.

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

In this example there are 8 structures in total:

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

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



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

The amount of data shown varies depending upon the Structure Type

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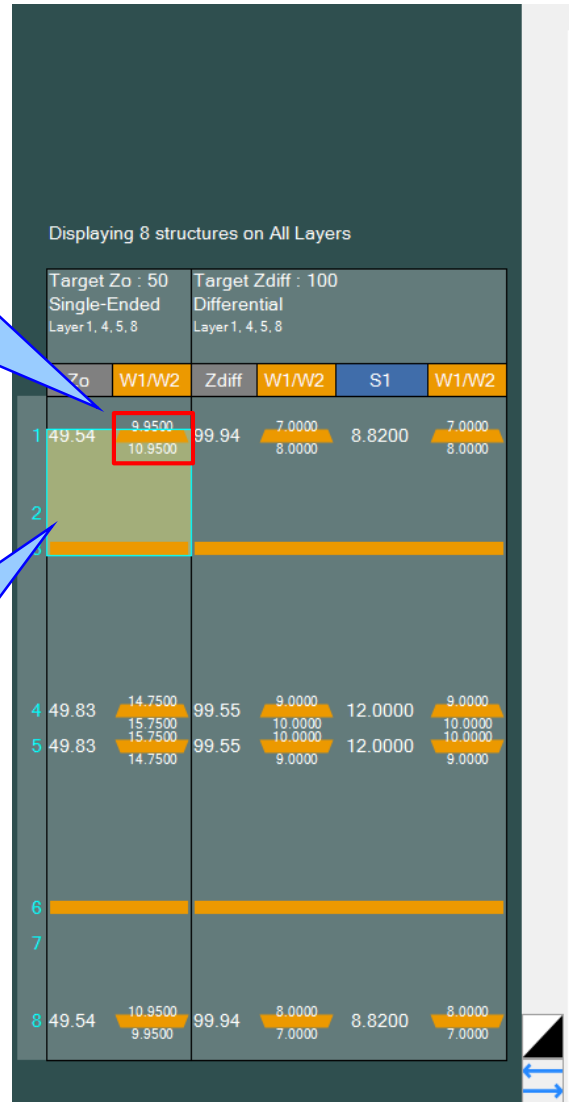
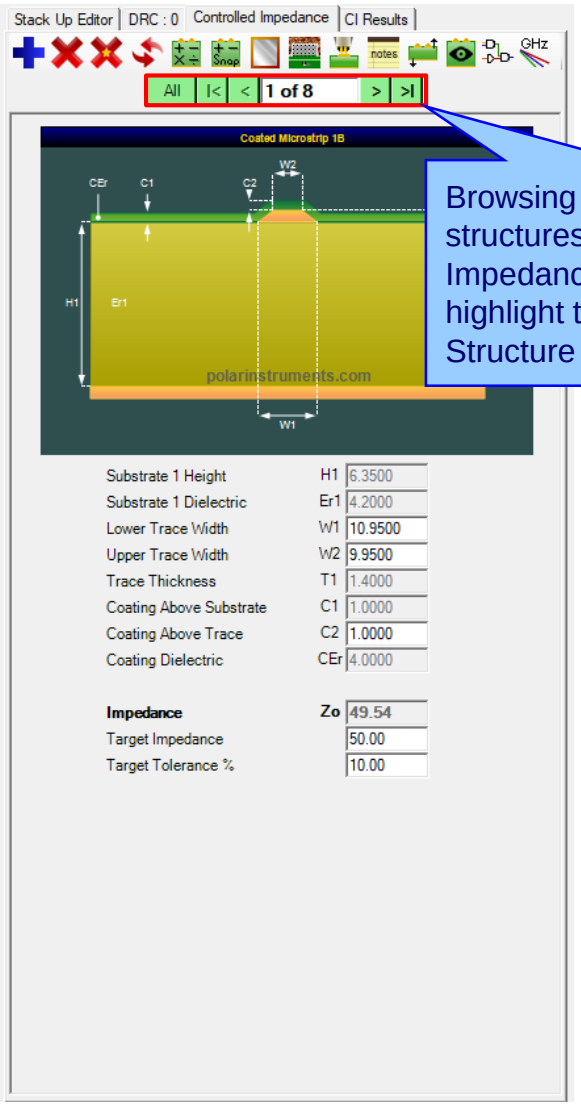
Introducing Structure View

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

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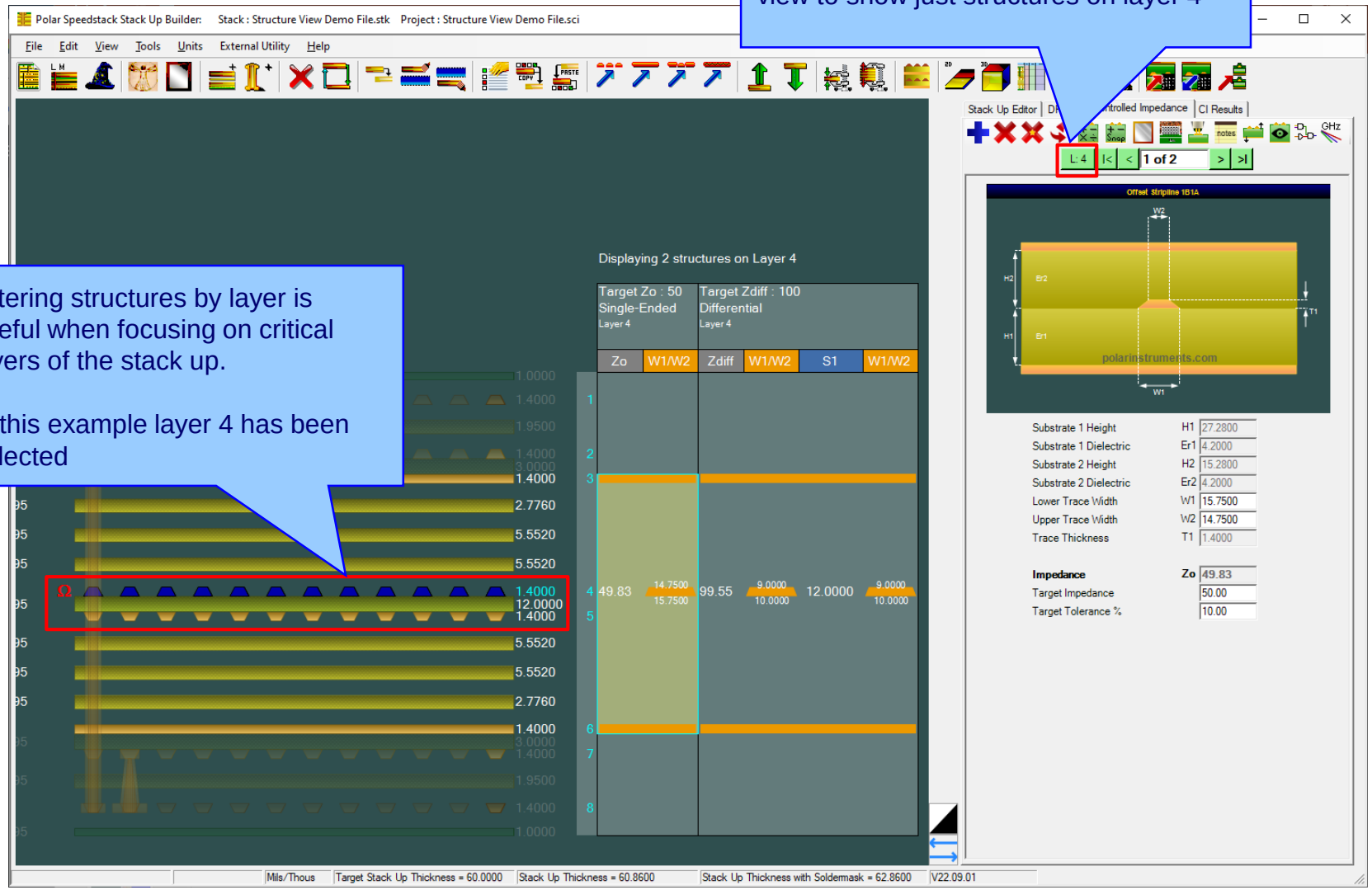
Introducing Structure View

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

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

In this example layer 4 has been selected



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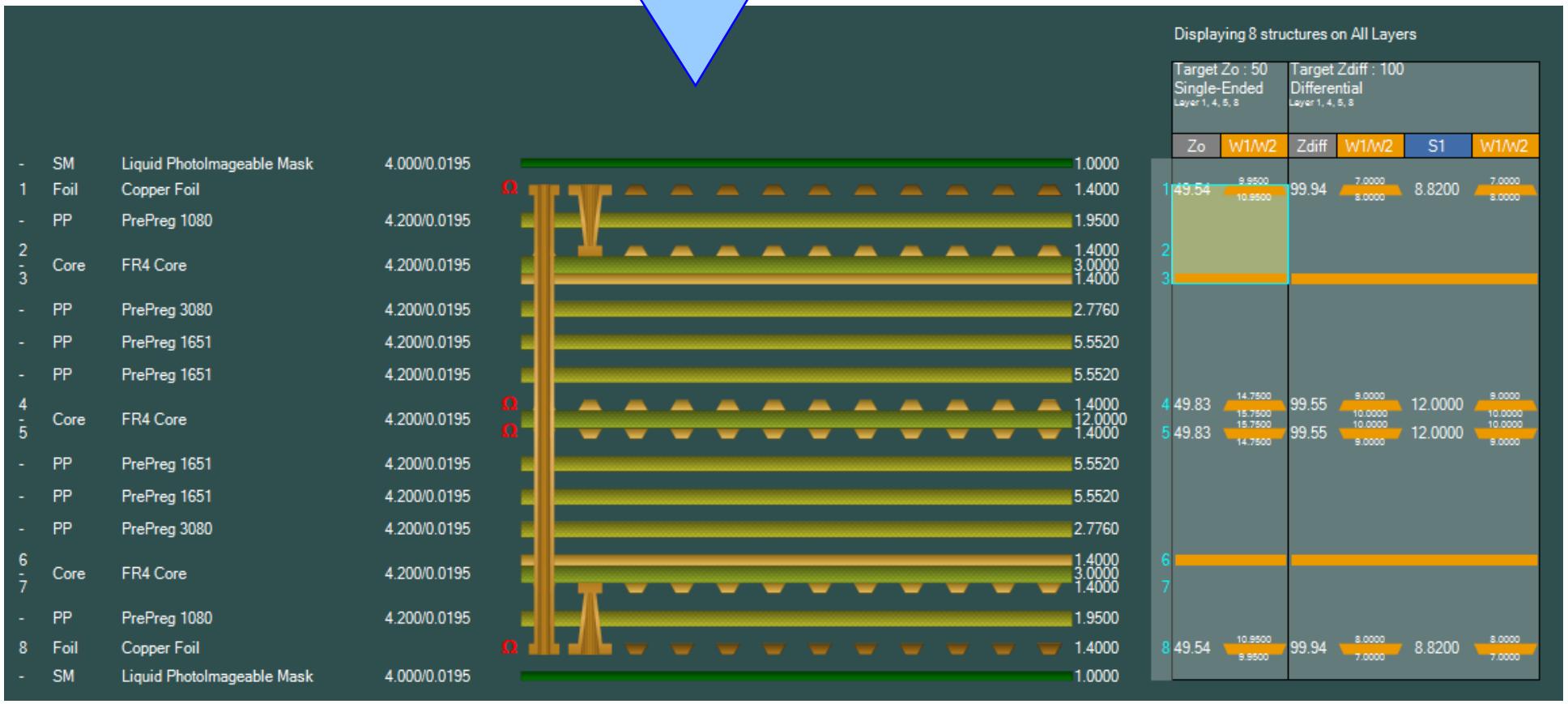
Introducing Structure View

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



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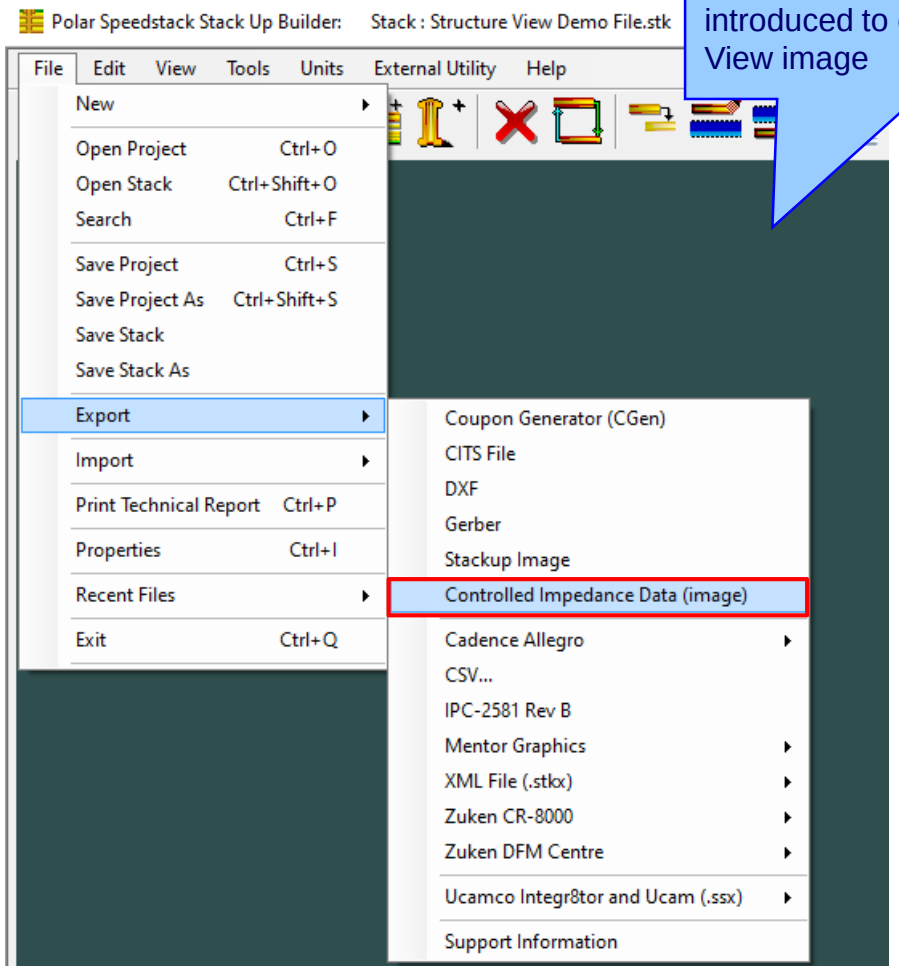
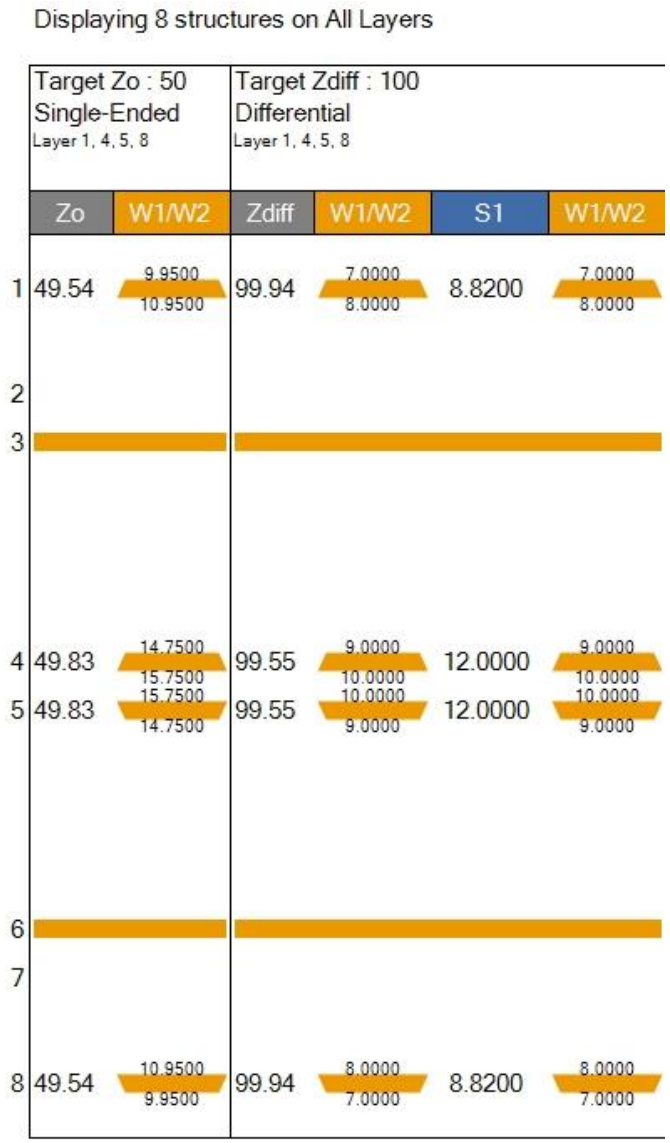
Introducing Structure View

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





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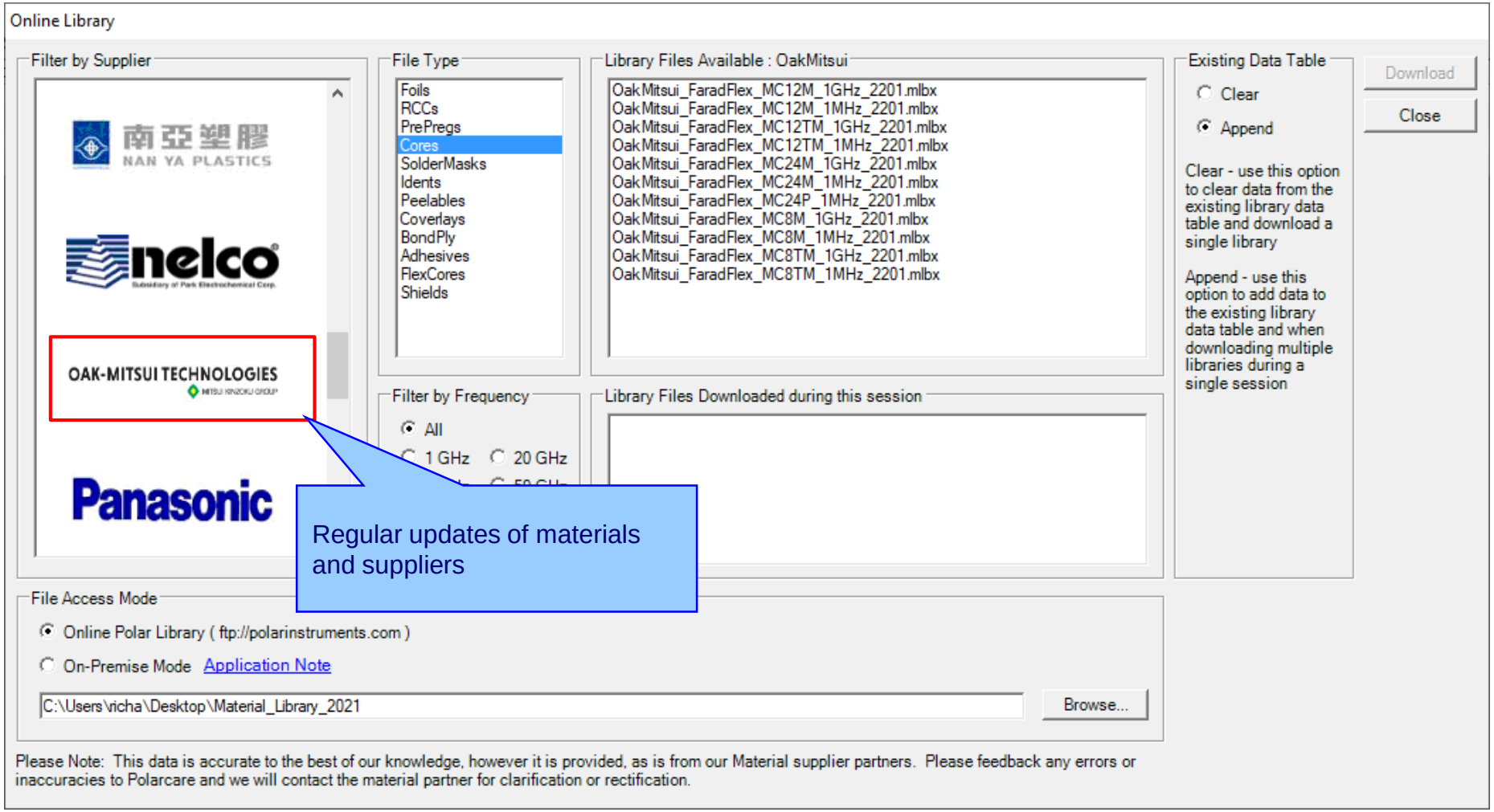
Online Library enhancements



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Speedstack v22.07.20 (July 2022)

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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

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

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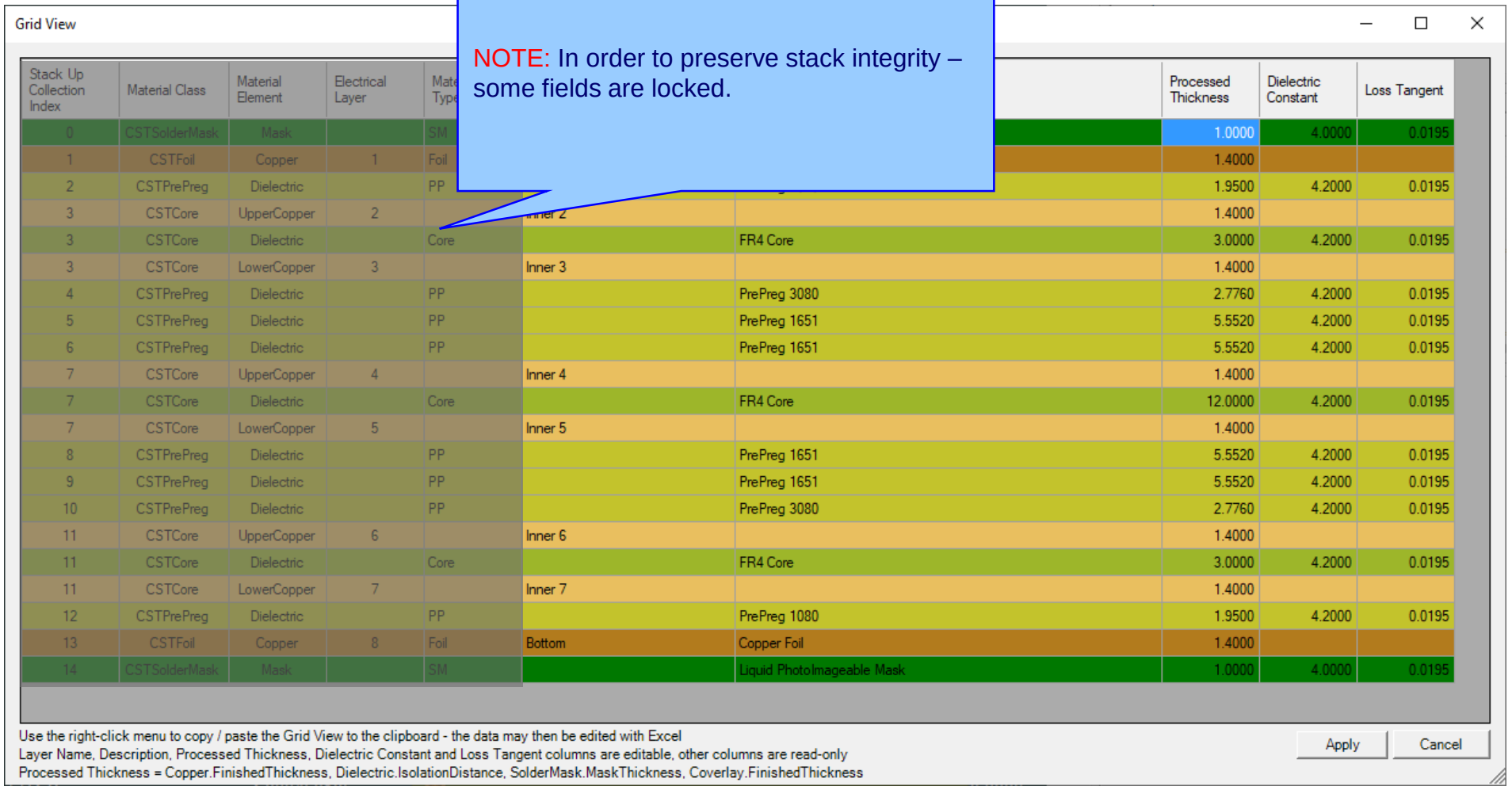
Introducing Grid View



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		1.4000		
3	CSTCore	Dielectric		Core		FR4 Core	3.0000	4.2000	0.0195
3	CSTCore	LowerCopper	3		Inner 3		1.4000		
4	CSTPrePreg	Dielectric		PP		PrePreg 3080	2.7760	4.2000	0.0195
5	CSTPrePreg	Dielectric		PP		PrePreg 1651	5.5520	4.2000	0.0195
6	CSTPrePreg	Dielectric		PP		PrePreg 1651	5.5520	4.2000	0.0195
7	CSTCore	UpperCopper	4		Inner 4		1.4000		
7	CSTCore	Dielectric		Core		FR4 Core	12.0000	4.2000	0.0195
7	CSTCore	LowerCopper	5		Inner 5		1.4000		
8	CSTPrePreg	Dielectric		PP		PrePreg 1651	5.5520	4.2000	0.0195
9	CSTPrePreg	Dielectric		PP		PrePreg 1651	5.5520	4.2000	0.0195
10	CSTPrePreg	Dielectric		PP		PrePreg 3080	2.7760	4.2000	0.0195
11	CSTCore	UpperCopper	6		Inner 6		1.4000		
11	CSTCore	Dielectric		Core		FR4 Core	3.0000	4.2000	0.0195
11	CSTCore	LowerCopper	7		Inner 7		1.4000		
12	CSTPrePreg	Dielectric		PP		PrePreg 1080	1.9500	4.2000	0.0195
13	CSTFoil	Copper	8	Foil	Bottom	Copper Foil	1.4000		
14	CSTSolderMask	Mask		SM		Liquid PhotoImageable Mask	1.0000	4.0000	0.0195

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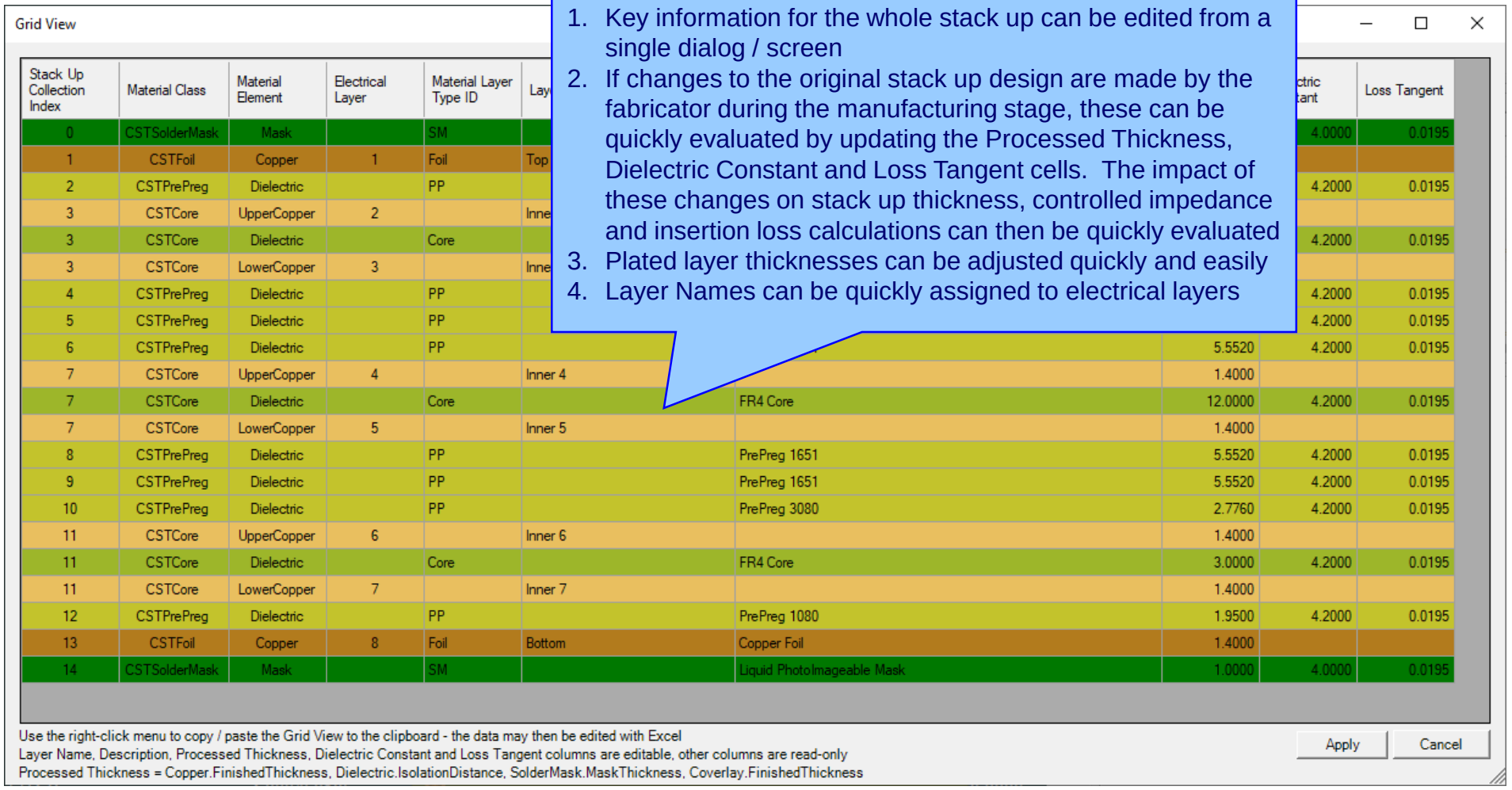
Introducing Grid View

Grid View has many uses, some are highlighted here:

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



Stack Up Collection Index	Material Class	Material Element	Electrical Layer	Material Layer Type ID	Lay			ctric tant	Loss Tangent
0	CSTSolderMask	Mask		SM				4.0000	0.0195
1	CSTFoil	Copper	1	Foil	Top				
2	CSTPrePreg	Dielectric		PP				4.2000	0.0195
3	CSTCore	UpperCopper	2		Inne				
3	CSTCore	Dielectric		Core				4.2000	0.0195
3	CSTCore	LowerCopper	3		Inne				
4	CSTPrePreg	Dielectric		PP				4.2000	0.0195
5	CSTPrePreg	Dielectric		PP				4.2000	0.0195
6	CSTPrePreg	Dielectric		PP			5.5520	4.2000	0.0195
7	CSTCore	UpperCopper	4		Inner 4		1.4000		
7	CSTCore	Dielectric		Core		FR4 Core	12.0000	4.2000	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

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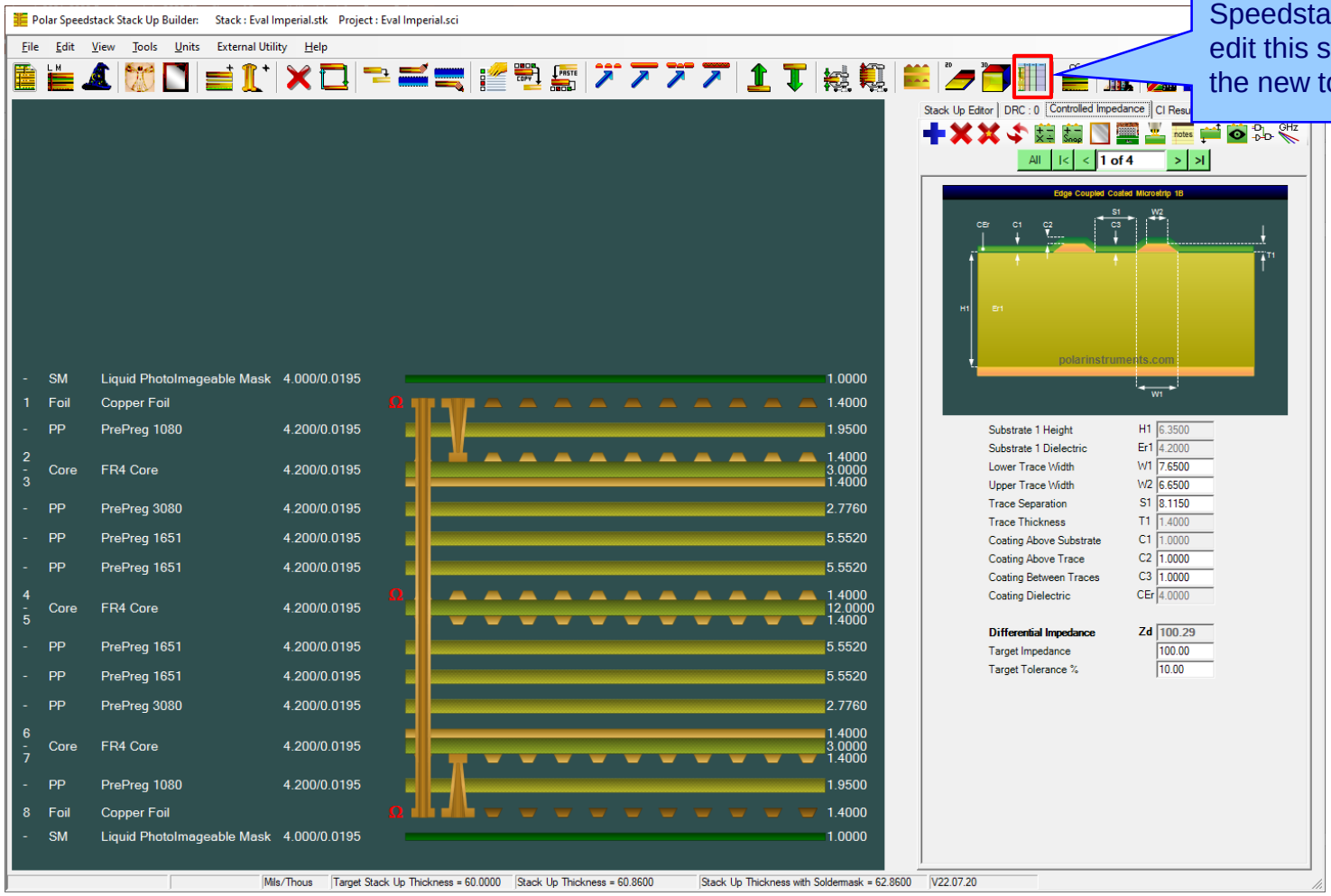
Grid View – Walkthrough Step #1

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



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Grid View – Walkthrough Step #2

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

Grid View

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

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

Apply Cancel

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

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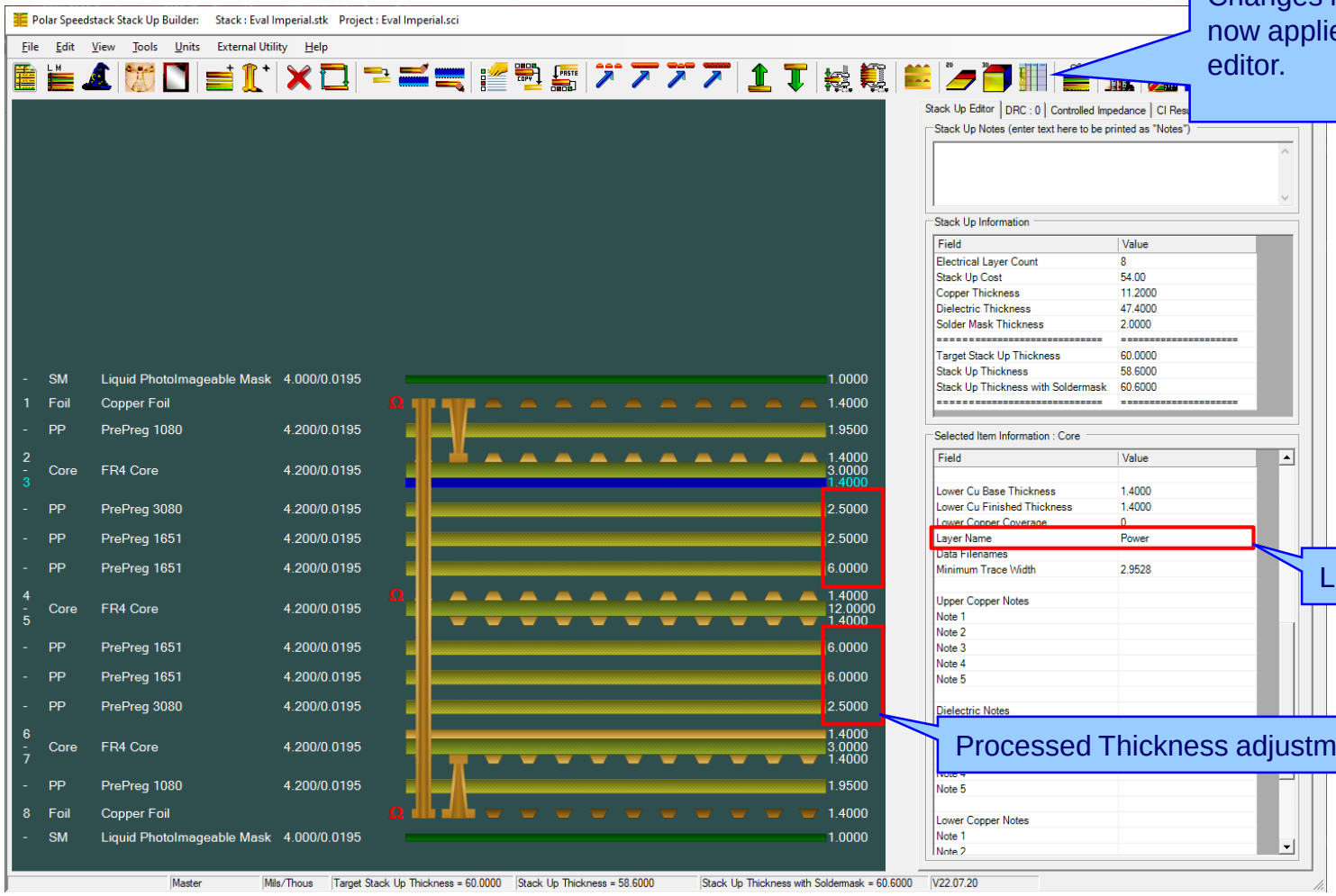
Grid View – Walkthrough Step #3



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

Layer Name change

Processed Thickness adjustments

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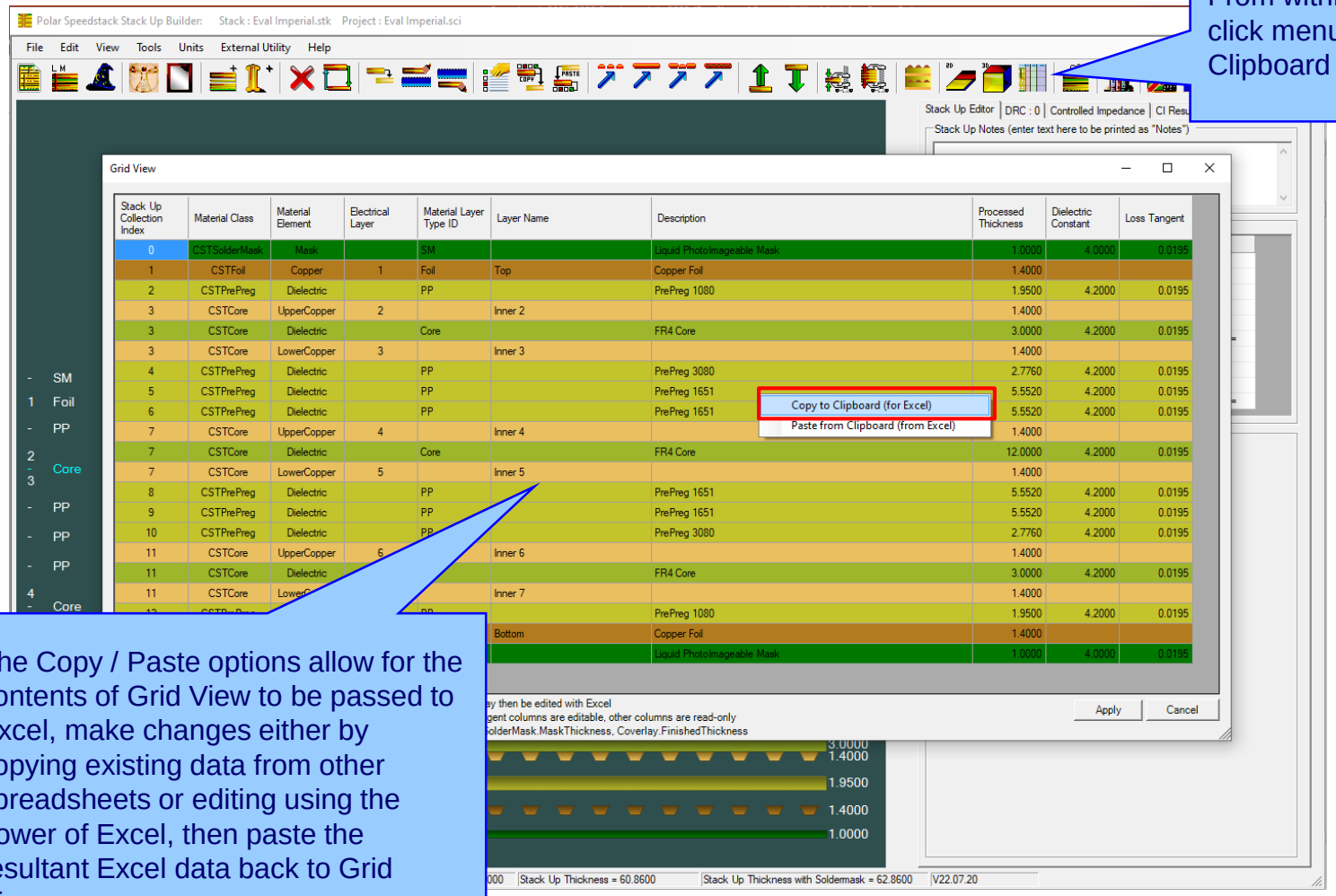
Using Grid View with Microsoft Excel – Step #1

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



The 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.

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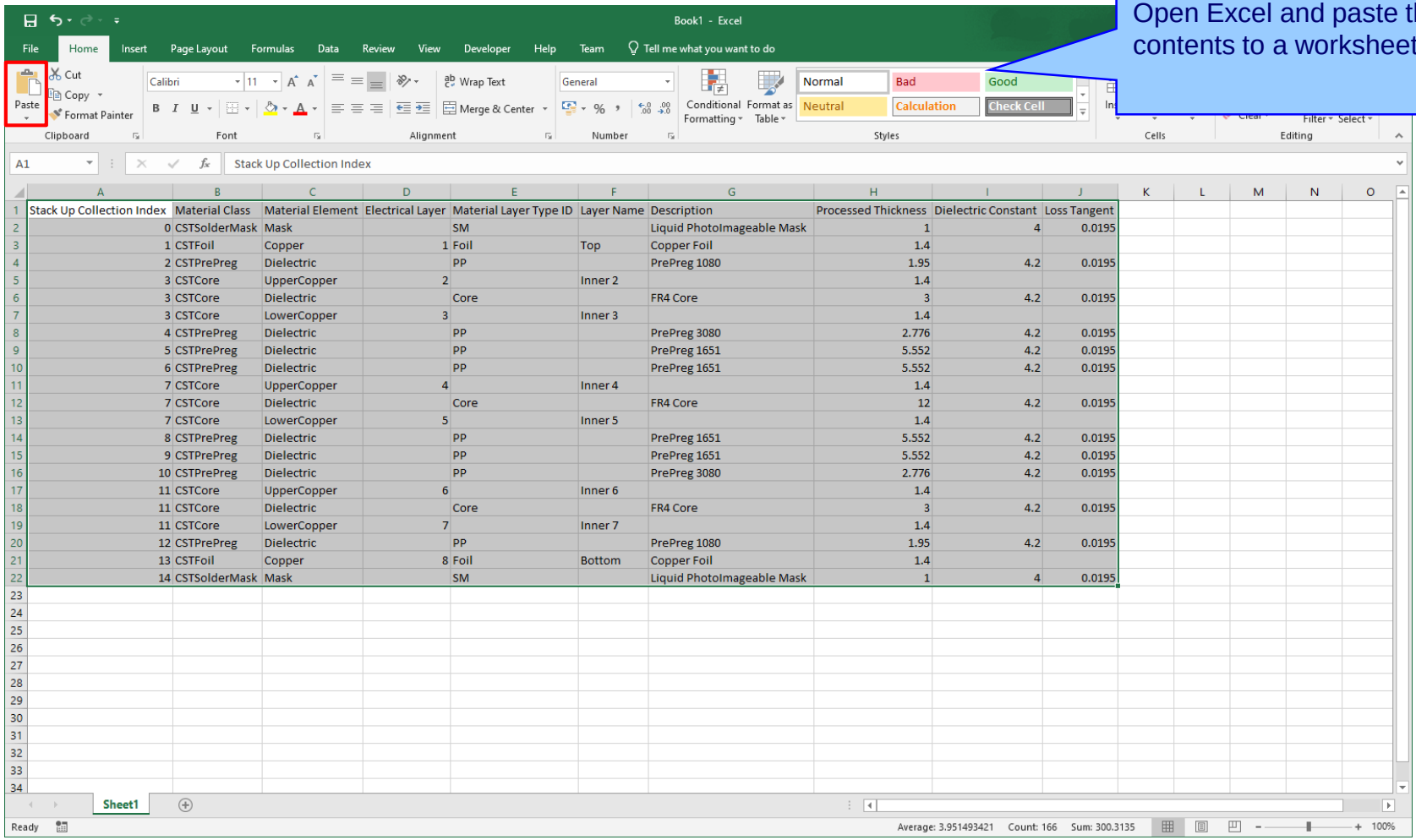
Using Grid View with Microsoft Excel – Step #2

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



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

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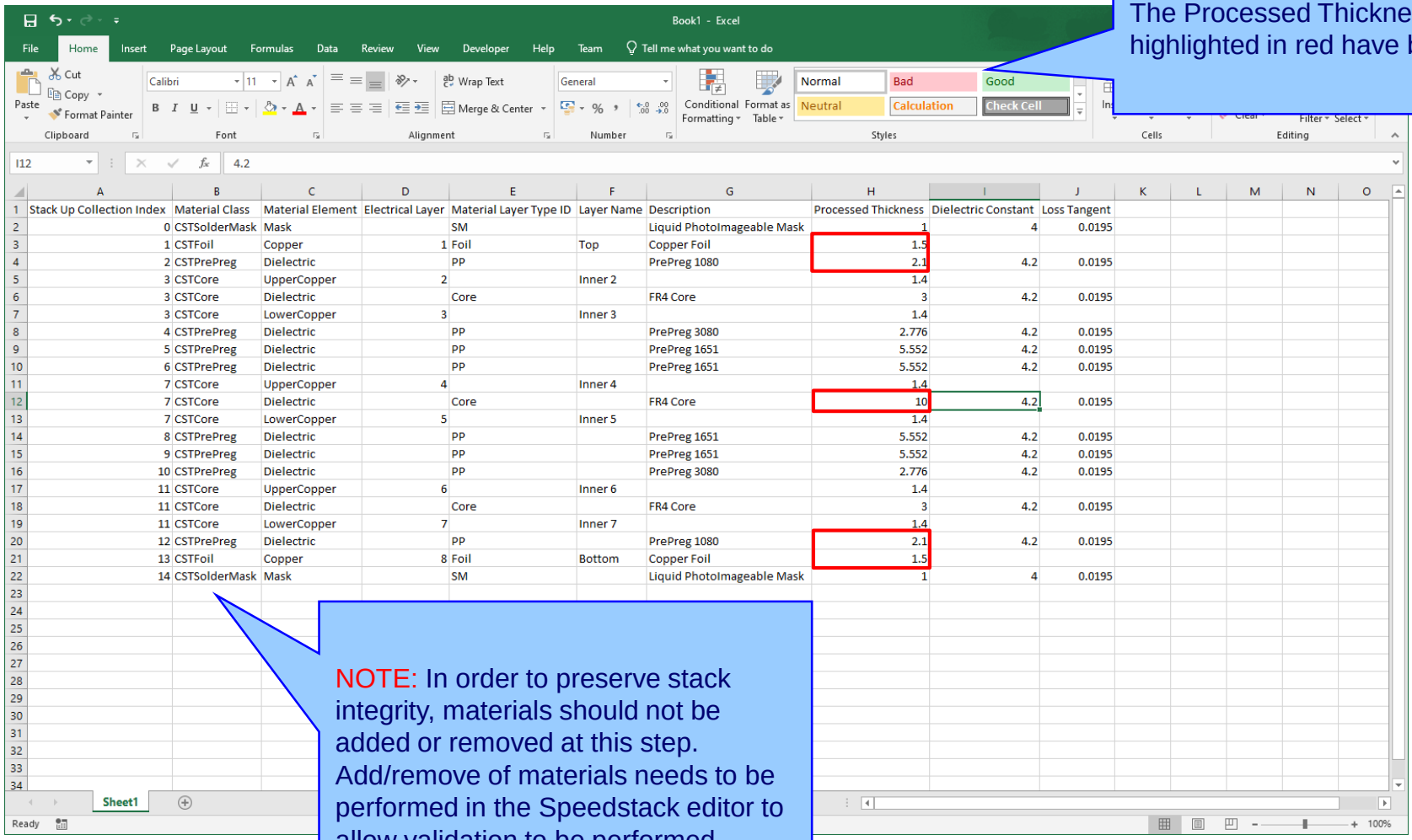
Using Grid View with Microsoft Excel – Step #3

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



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

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.

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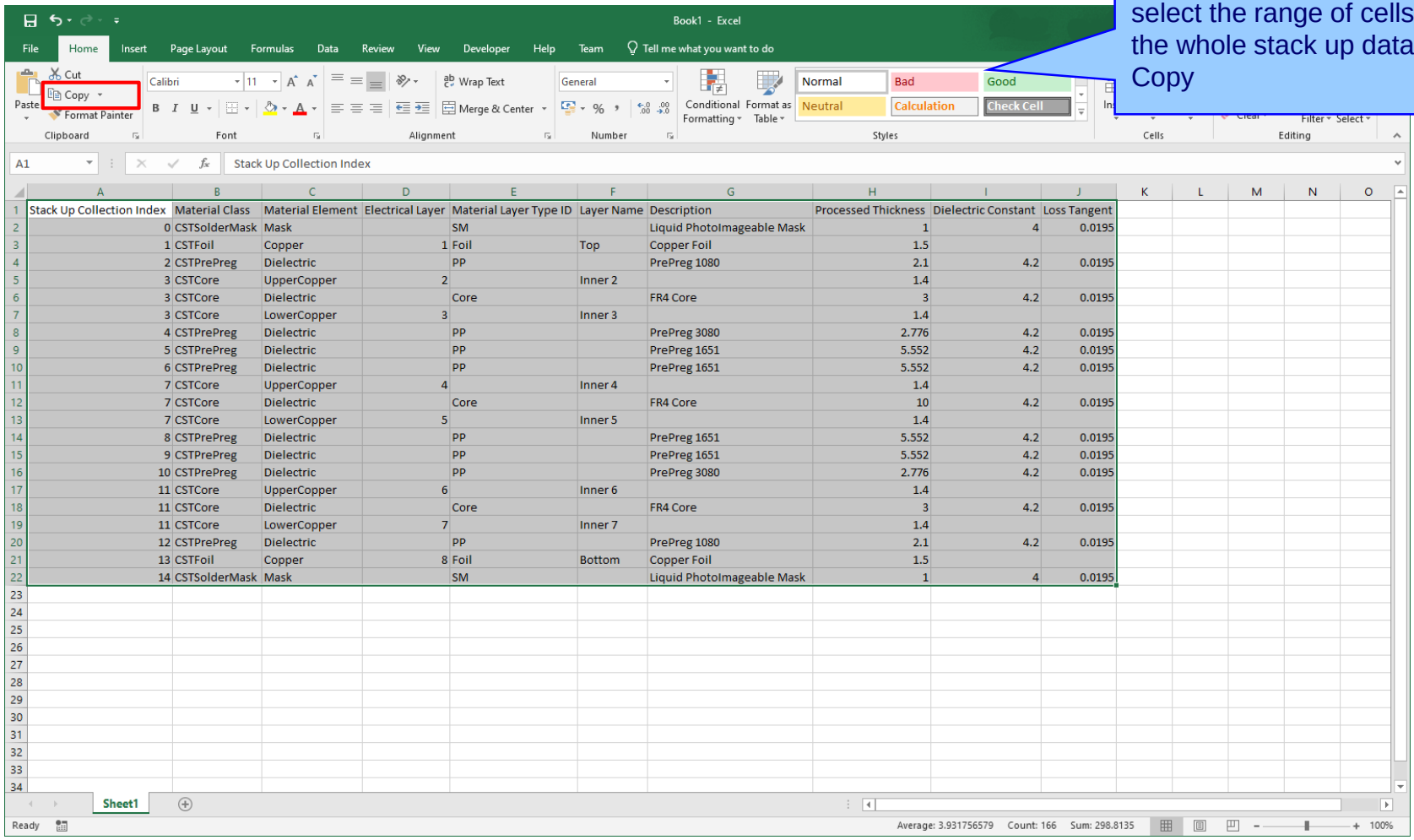
Using Grid View with Microsoft Excel – Step #4

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



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

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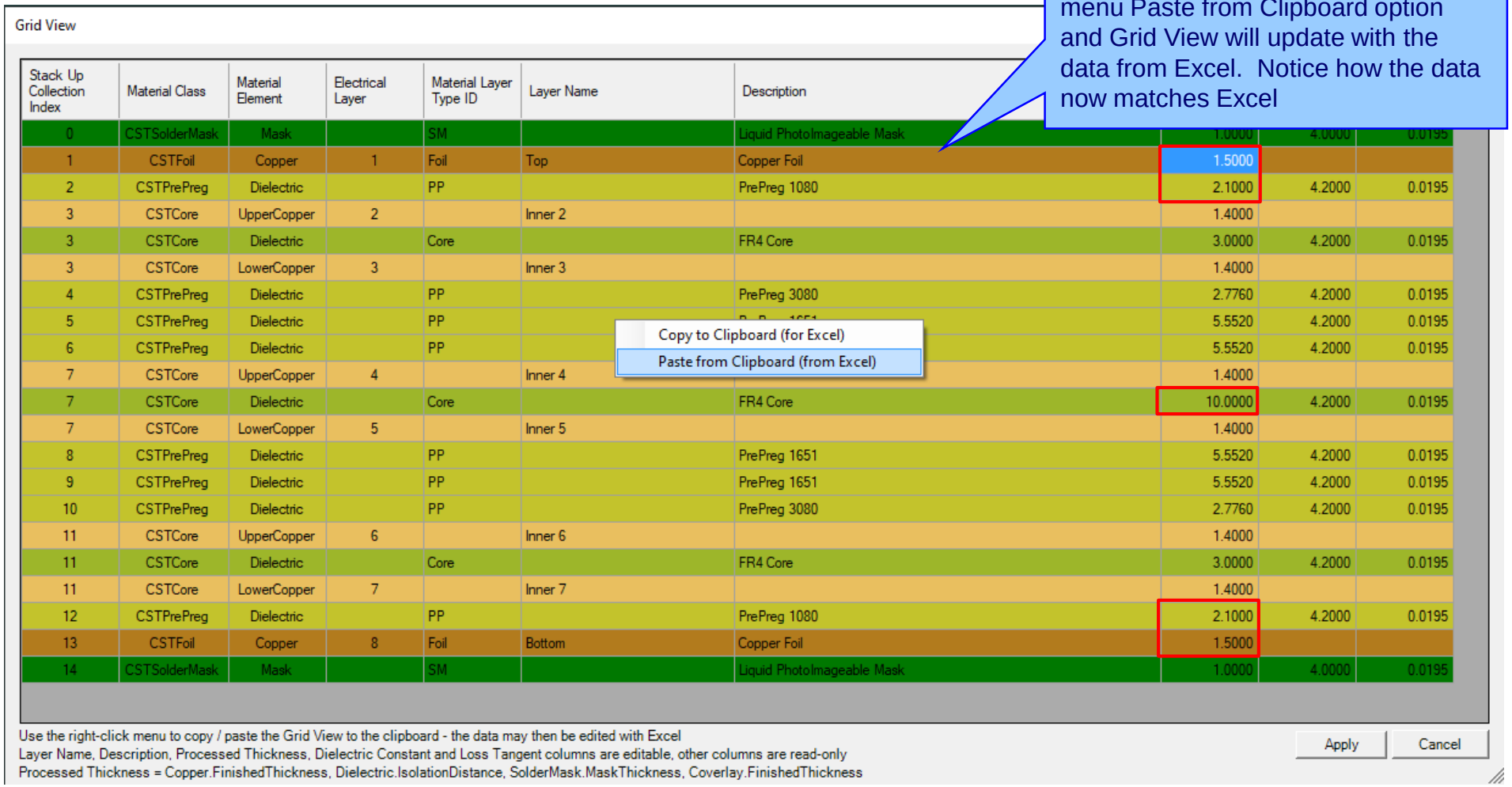
Using Grid View with Microsoft Excel – Step #5

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



Stack Up Collection Index	Material Class	Material Element	Electrical Layer	Material Layer Type ID	Layer Name	Description			
0	CSTSolderMask	Mask		SM		Liquid PhotoImageable Mask	1.0000	4.0000	0.0195
1	CSTFoil	Copper	1	Foil	Top	Copper Foil	1.5000		
2	CSTPrePreg	Dielectric		PP		PrePreg 1080	2.1000	4.2000	0.0195
3	CSTCore	UpperCopper	2		Inner 2		1.4000		
3	CSTCore	Dielectric		Core		FR4 Core	3.0000	4.2000	0.0195
3	CSTCore	LowerCopper	3		Inner 3		1.4000		
4	CSTPrePreg	Dielectric		PP		PrePreg 3080	2.7760	4.2000	0.0195
5	CSTPrePreg	Dielectric		PP			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 PhotoImageable Mask	1.0000	4.0000	0.0195

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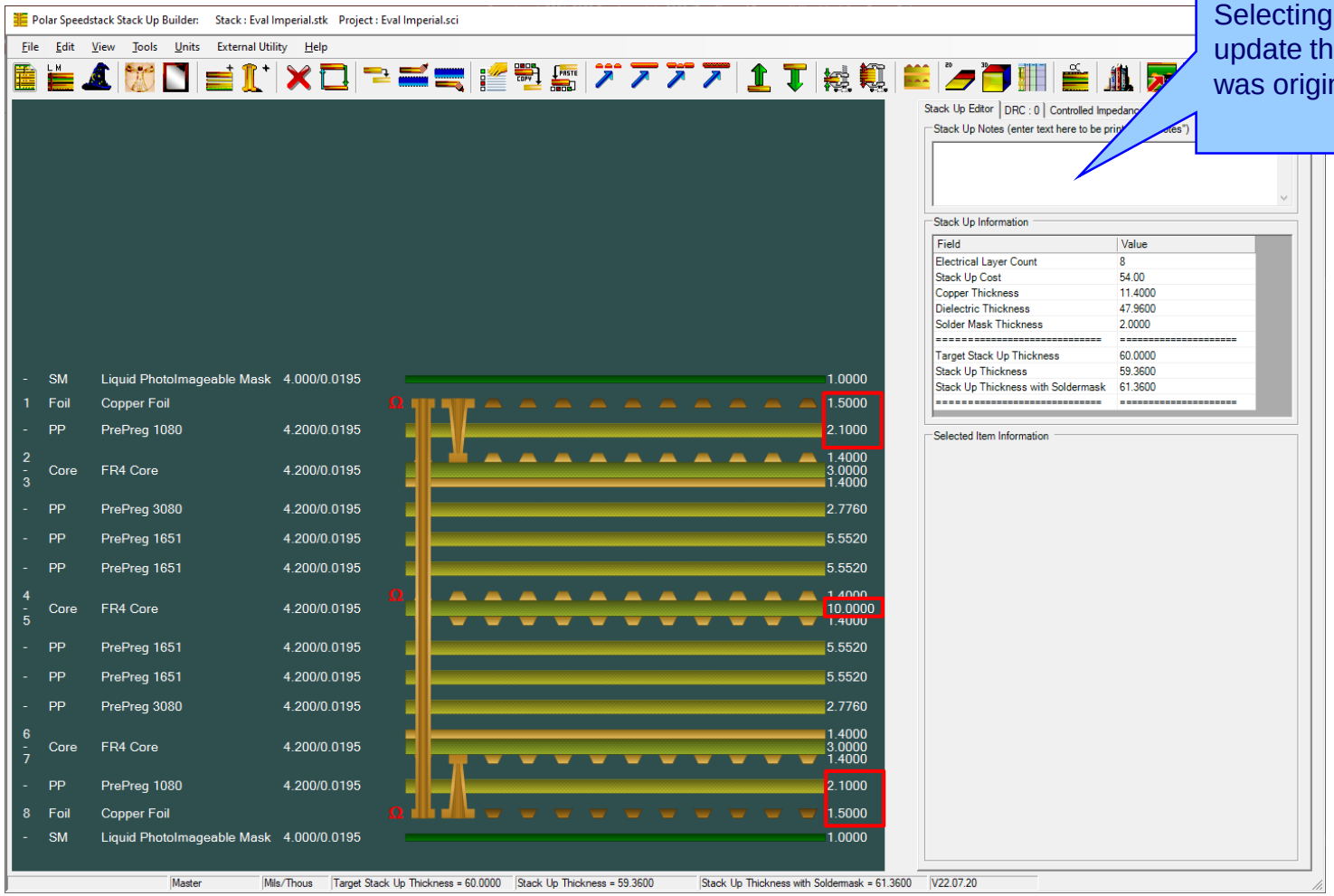
Using Grid View with Microsoft Excel – Step #6

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



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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

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Speedstack v22.05.06 (May 2022)

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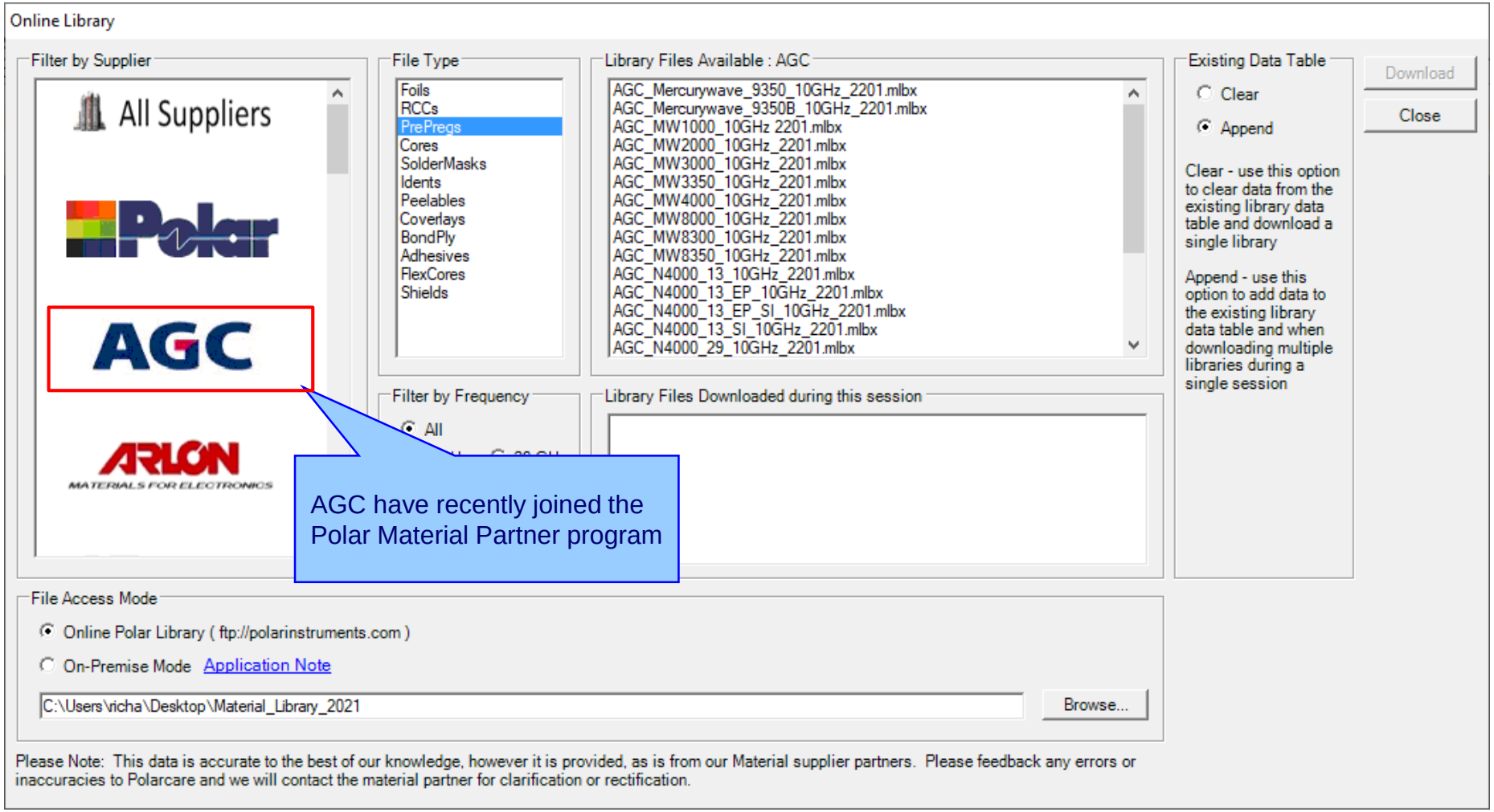
Online Library enhancements



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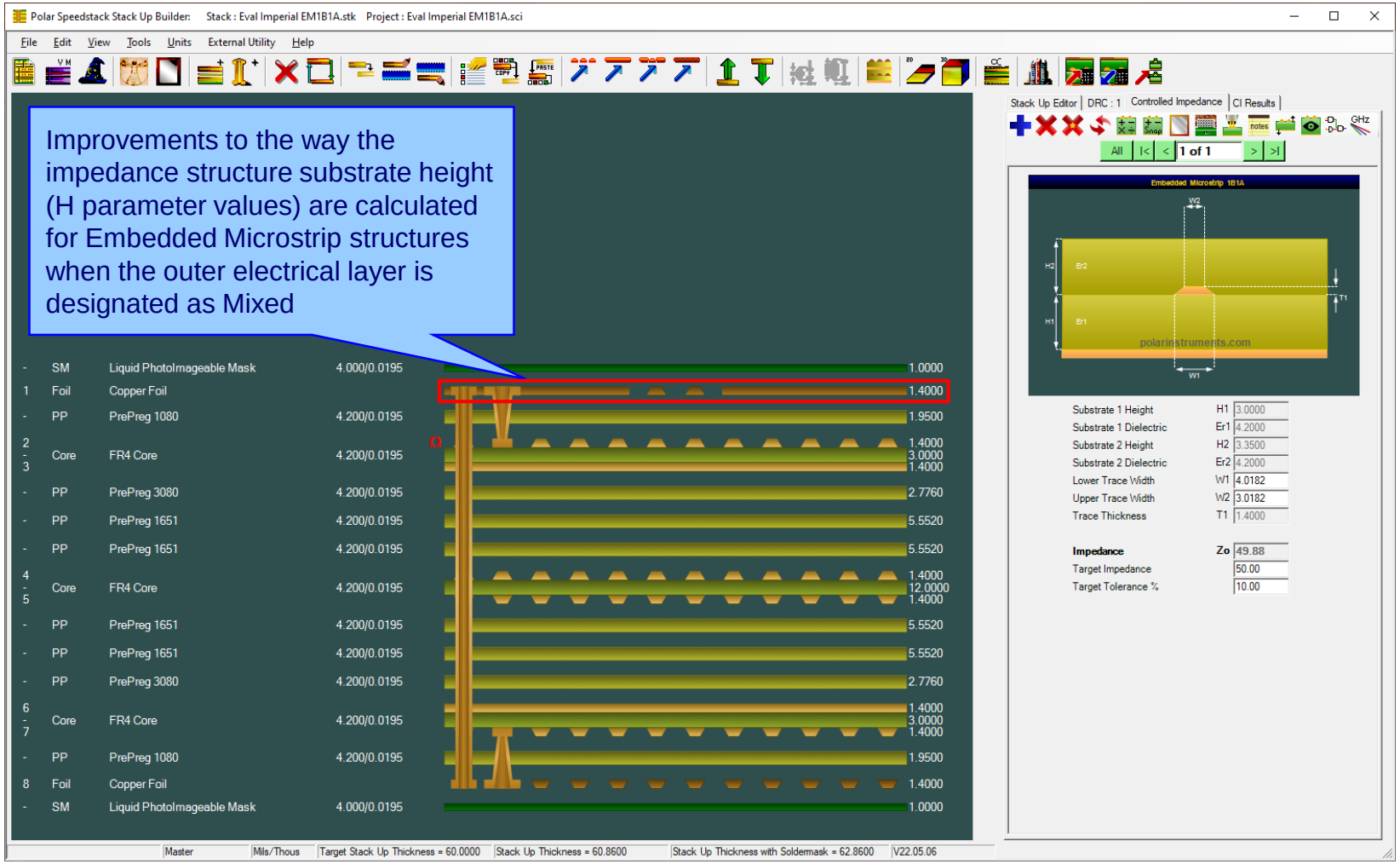
Embedded Microstrip structure enhancements



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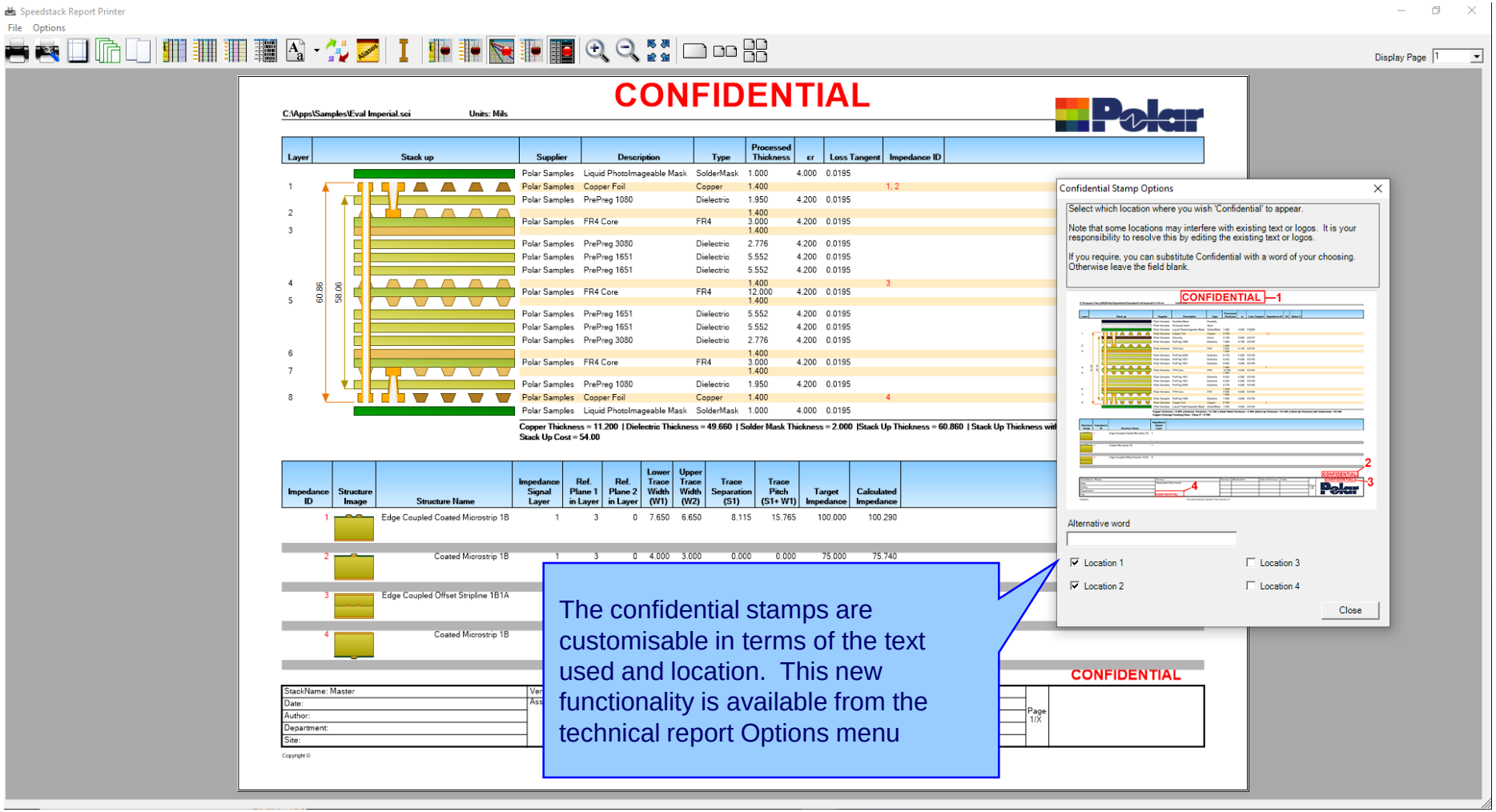
New Confidential Stamp options added to the technical report



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Speedstack v22.01.01 (January 2022)

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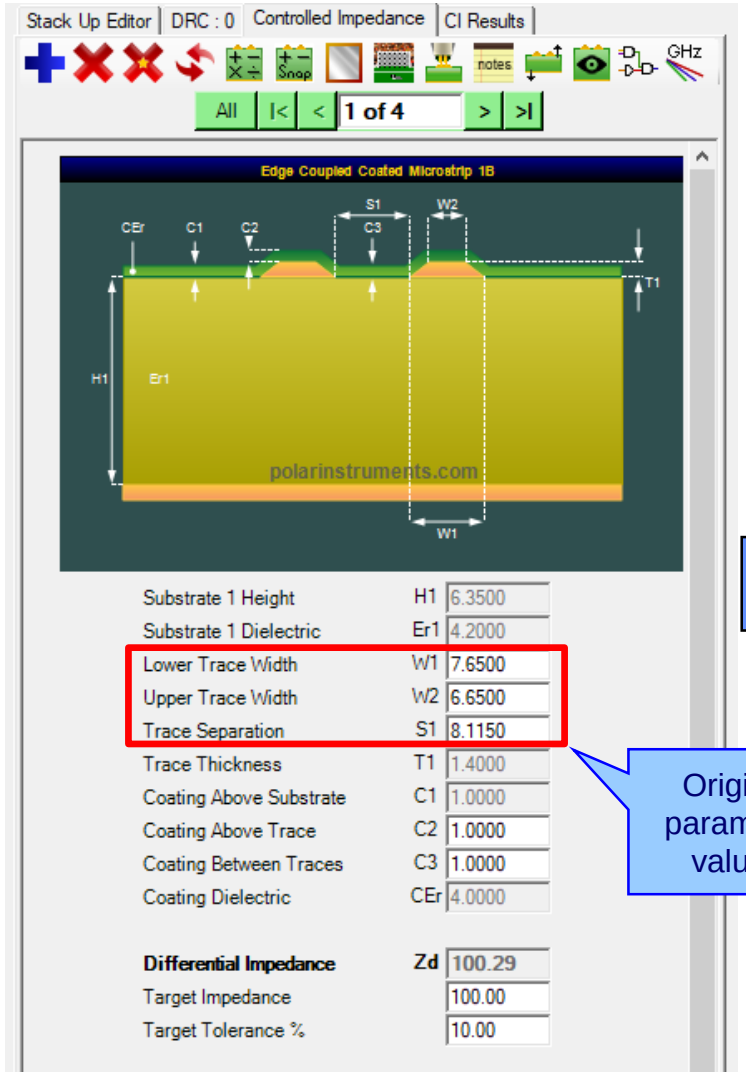
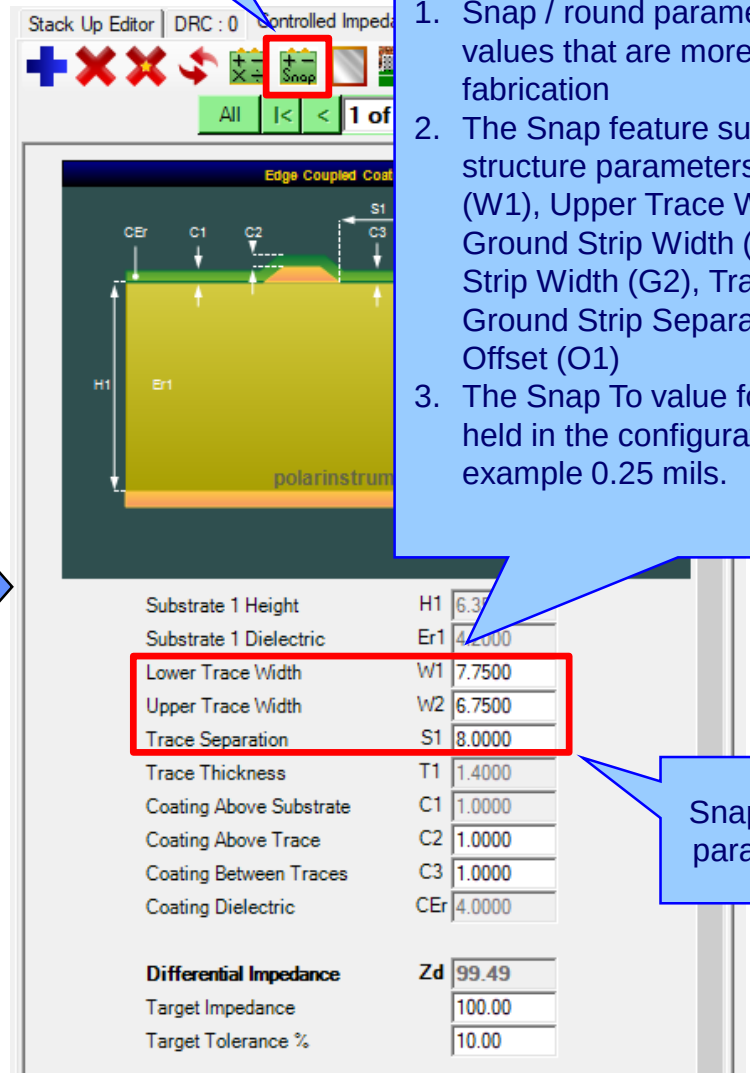
Snap Parameters and Calculate Structure



Original parameter values



Snapped/rounded parameter values

New option

Snap Parameters and Calculate Structure

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

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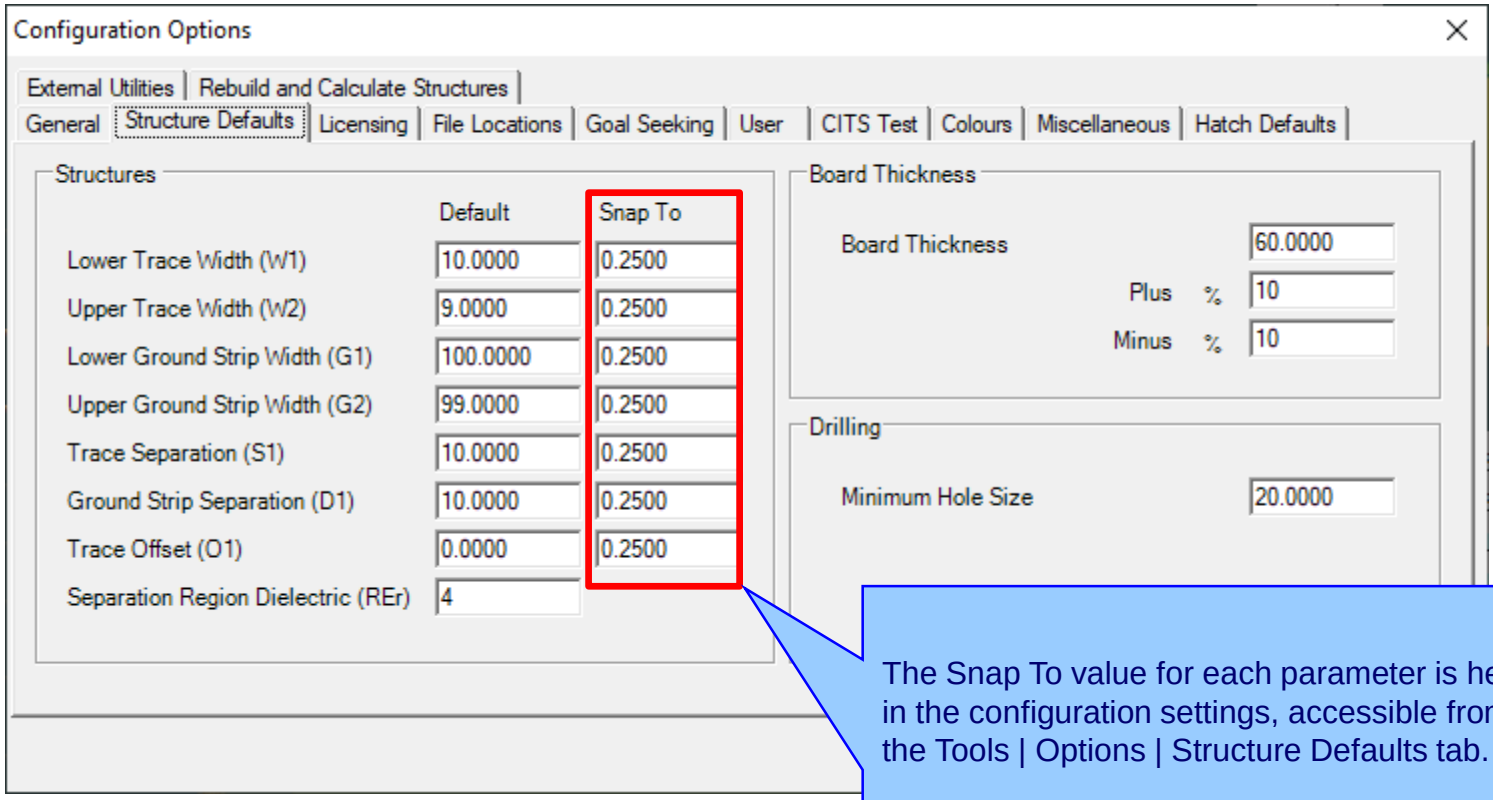
Snap Parameters and Calculate Structure



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

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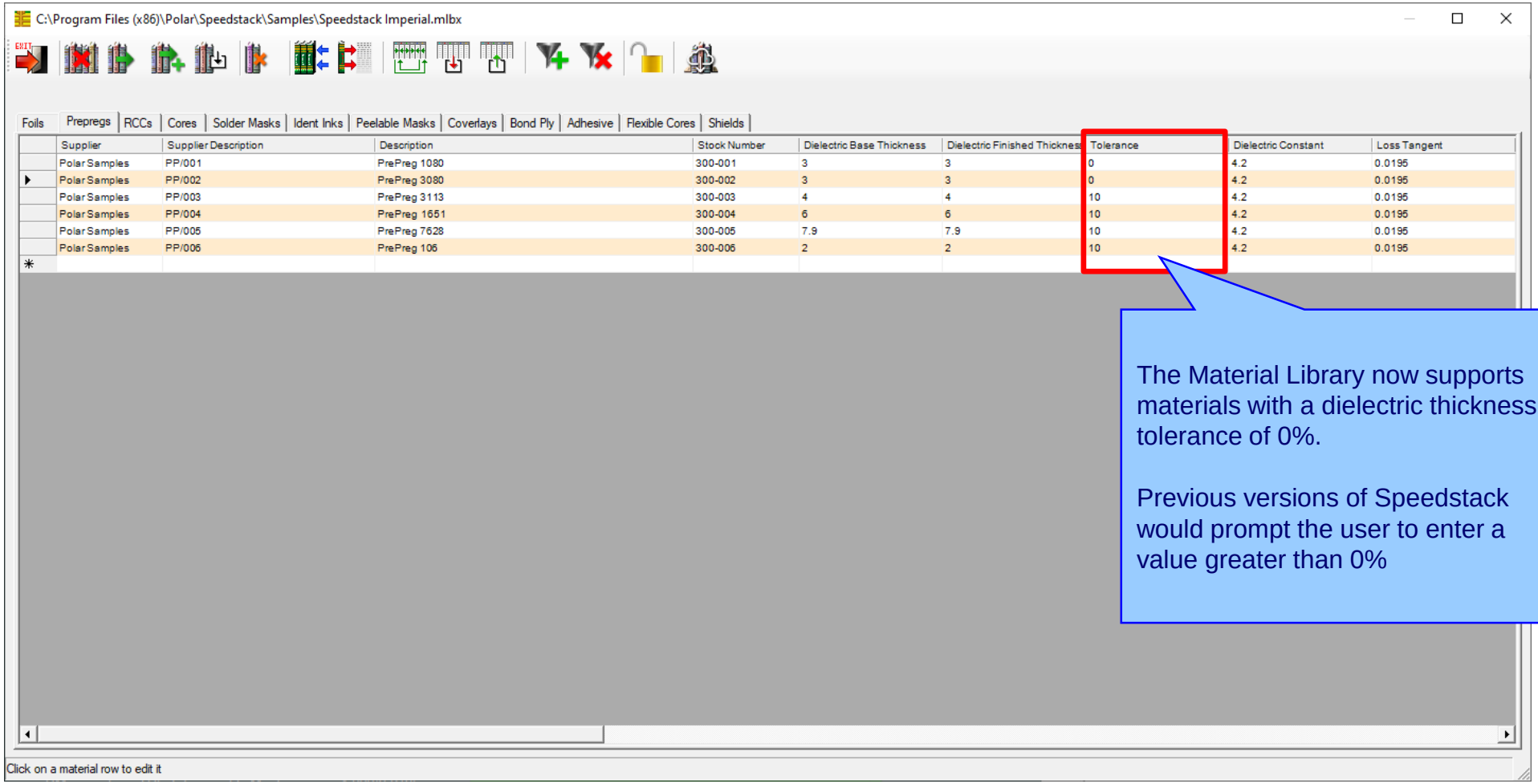
Material Library Enhancements



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

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

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Speedstack v21.11.01 (November 2021)

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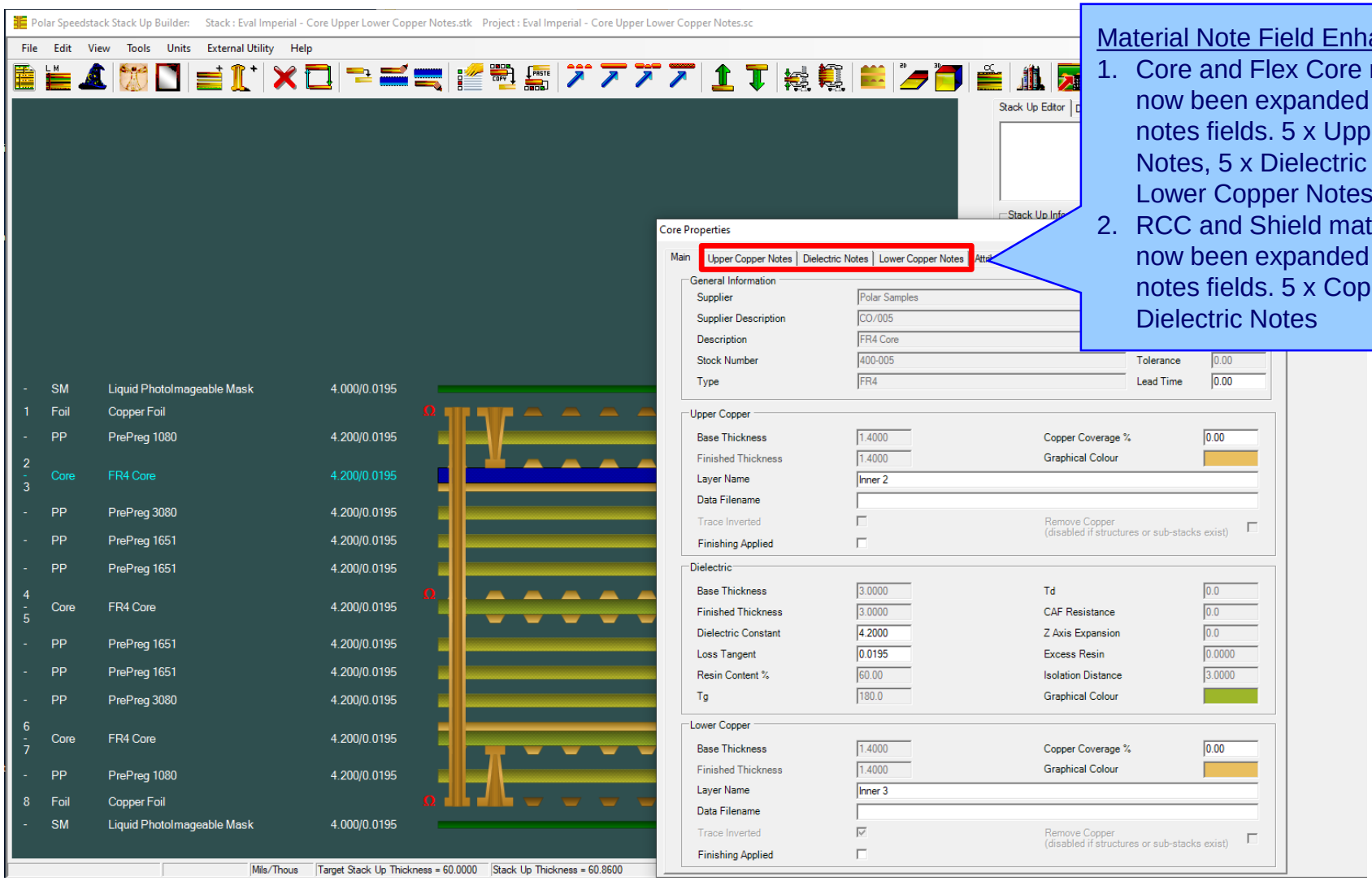
Material Note Field Enhancements – improvements to stack up documentation



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

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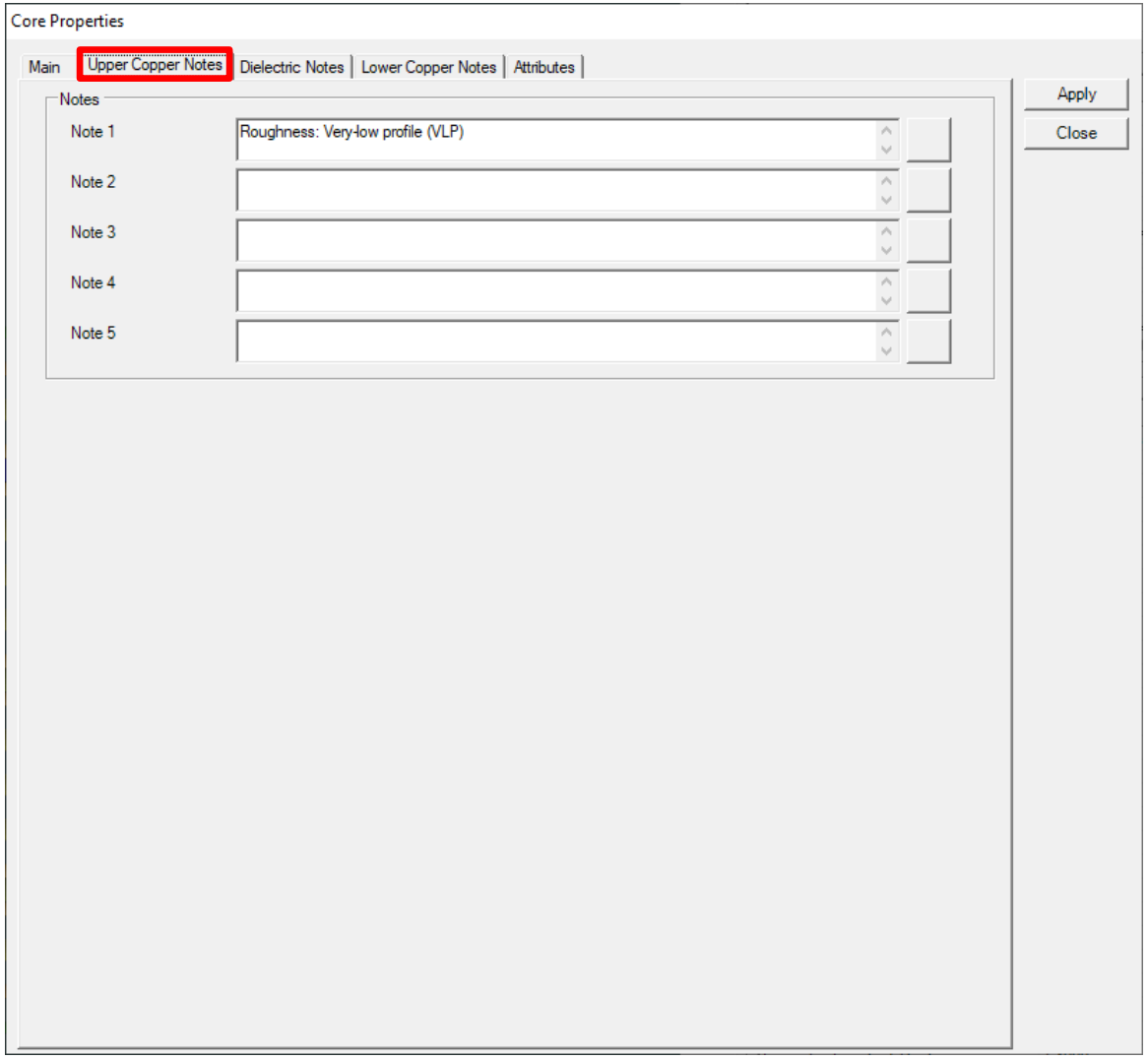
Material Note Field Enhancements – improvements to stack up documentation



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

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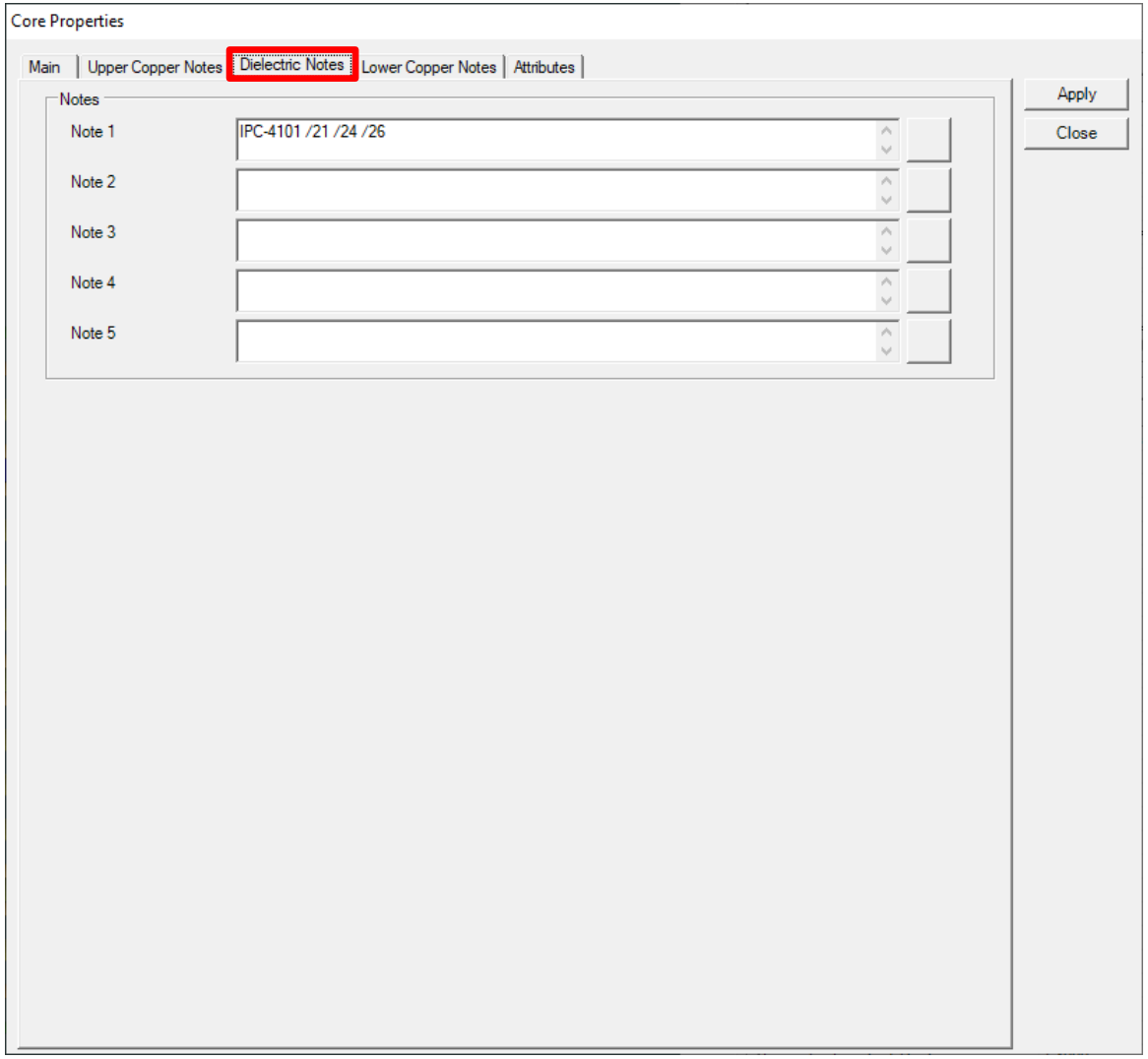
Material Note Field Enhancements – improvements to stack up documentation



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.

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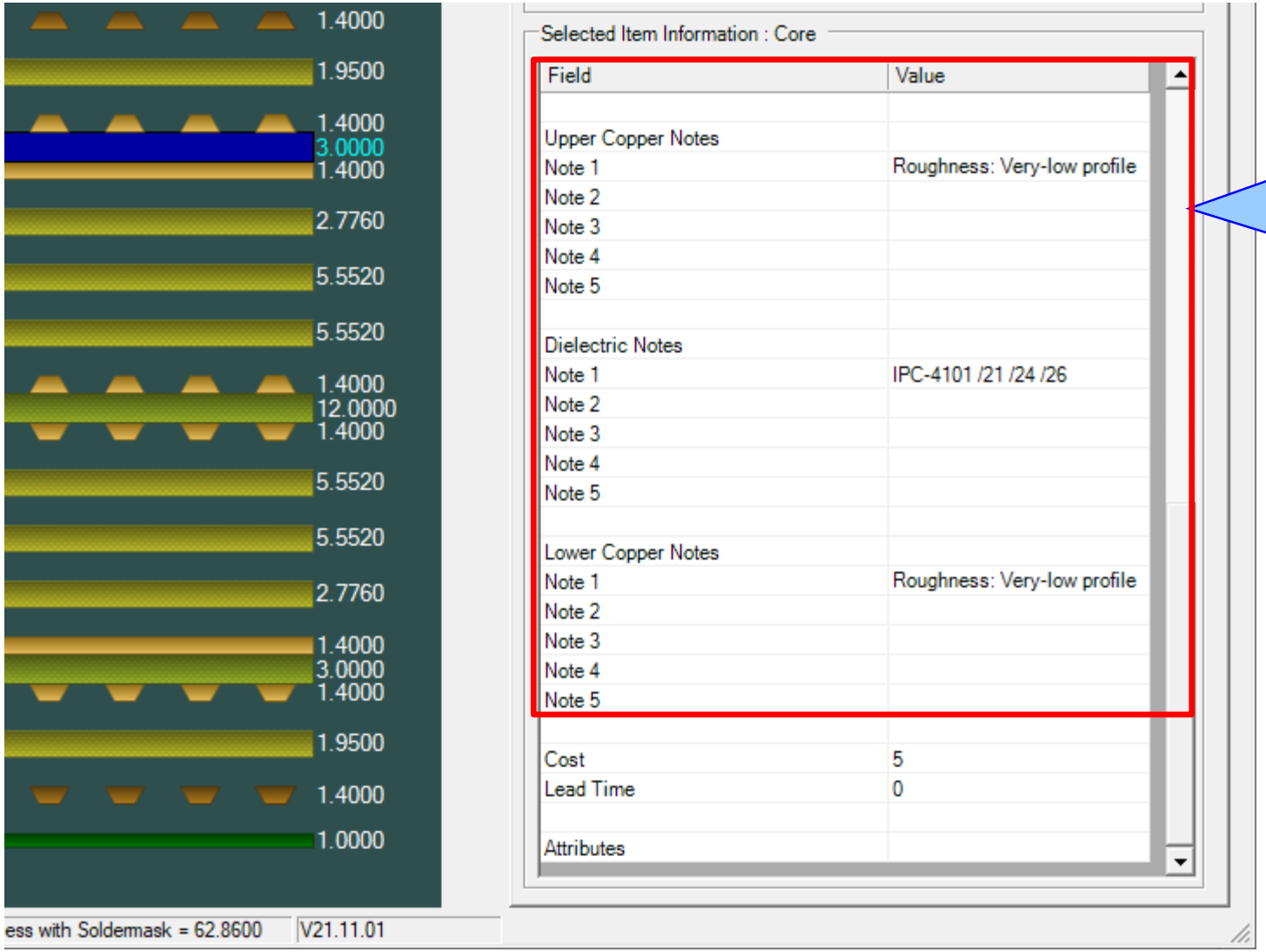
Material Note Field Enhancements – improvements to stack up documentation



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

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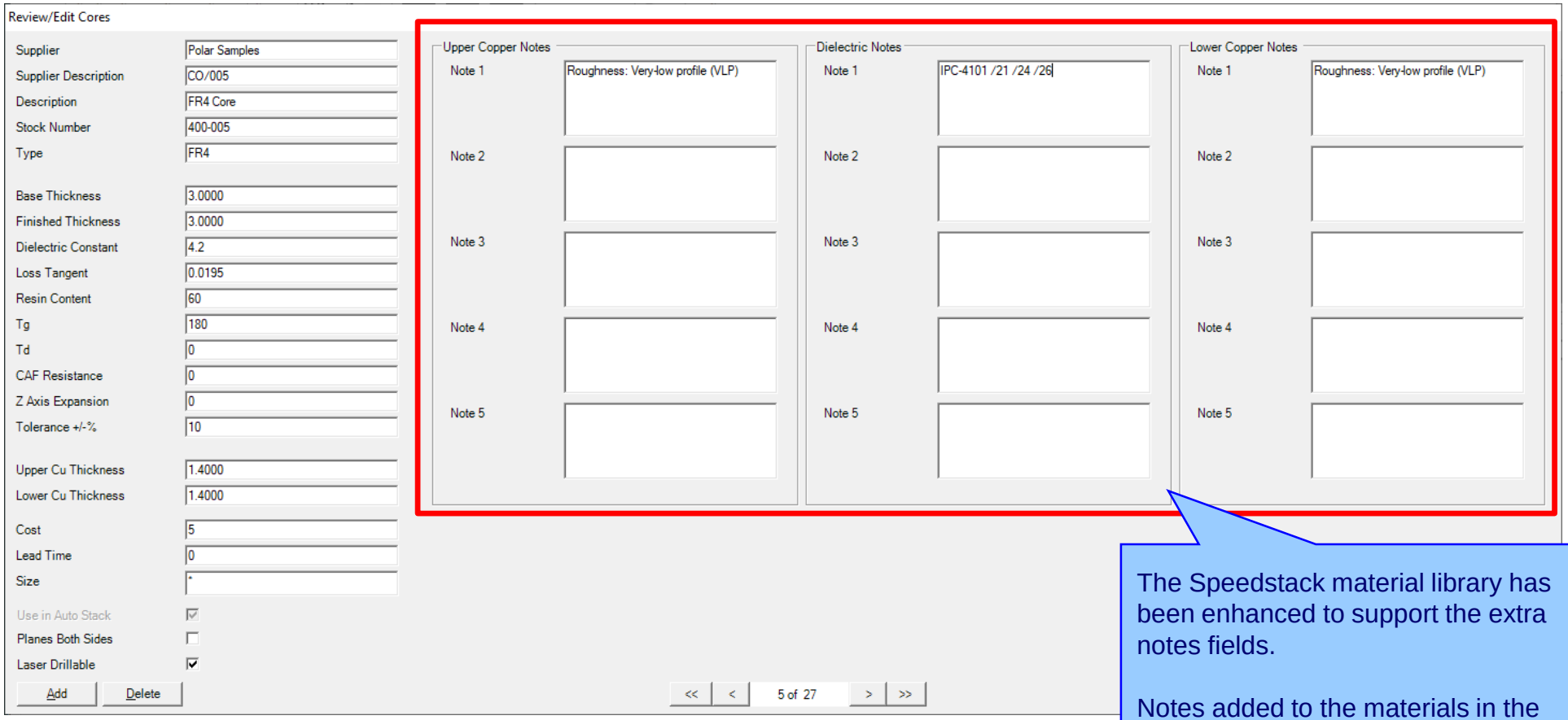
Material Note Field Enhancements – library enhancements



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.

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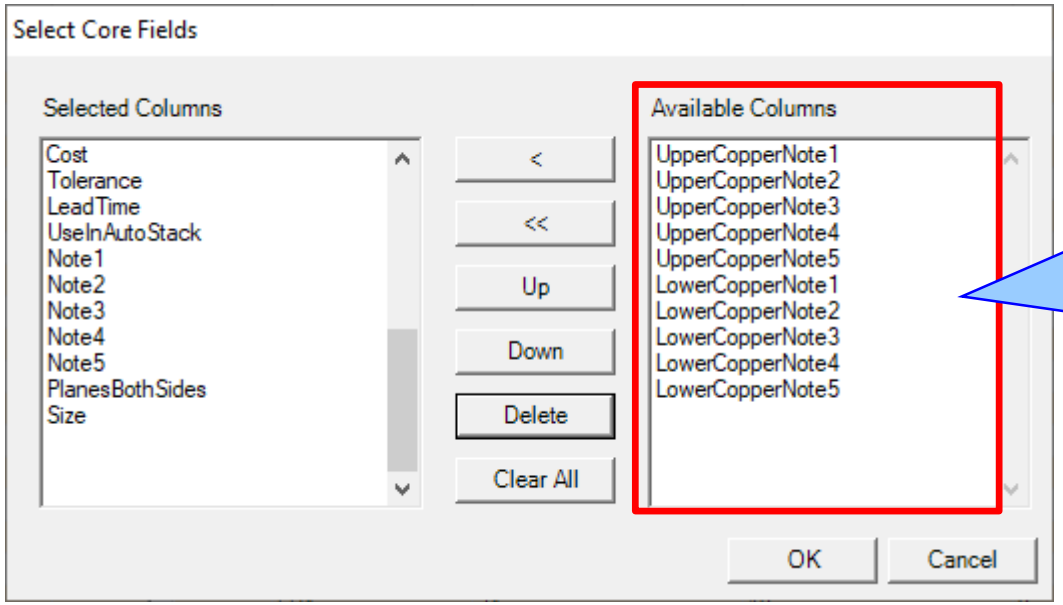
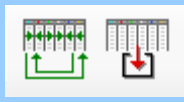
Material Note Field Enhancements – library enhancements



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.

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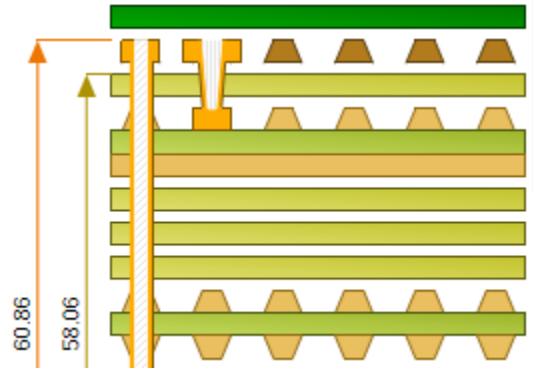
Material Note Field Enhancements – technical report enhancements

C:\Apps\Samples\Eval Imperial - Core Upper Lower Copper Notes.sci Units: Mils

Layer	Stack up	Manufacturing Notes	Copper Layer Name	Supplier	Description
				Polar Samples	Liquid PhotoImageable Mask
1			Top	Polar Samples	Copper Foil
				Polar Samples	PrePreg 1080
2		Roughness: Very-low profile (VLP) IPC-4101 /21 /24 /26	Inner 2	Polar Samples	FR4 Core
3		Roughness: Very-low profile (VLP)	Inner 3		
				Polar Samples	PrePreg 3080
				Polar Samples	PrePreg 1651
4					
5					

The technical report has been updated to support the additional notes fields. Notice the Upper Copper, Dielectric and Lower Copper Notes align with the appropriate part of the Core material.

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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

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Speedstack v21.07.08 (July 2021)

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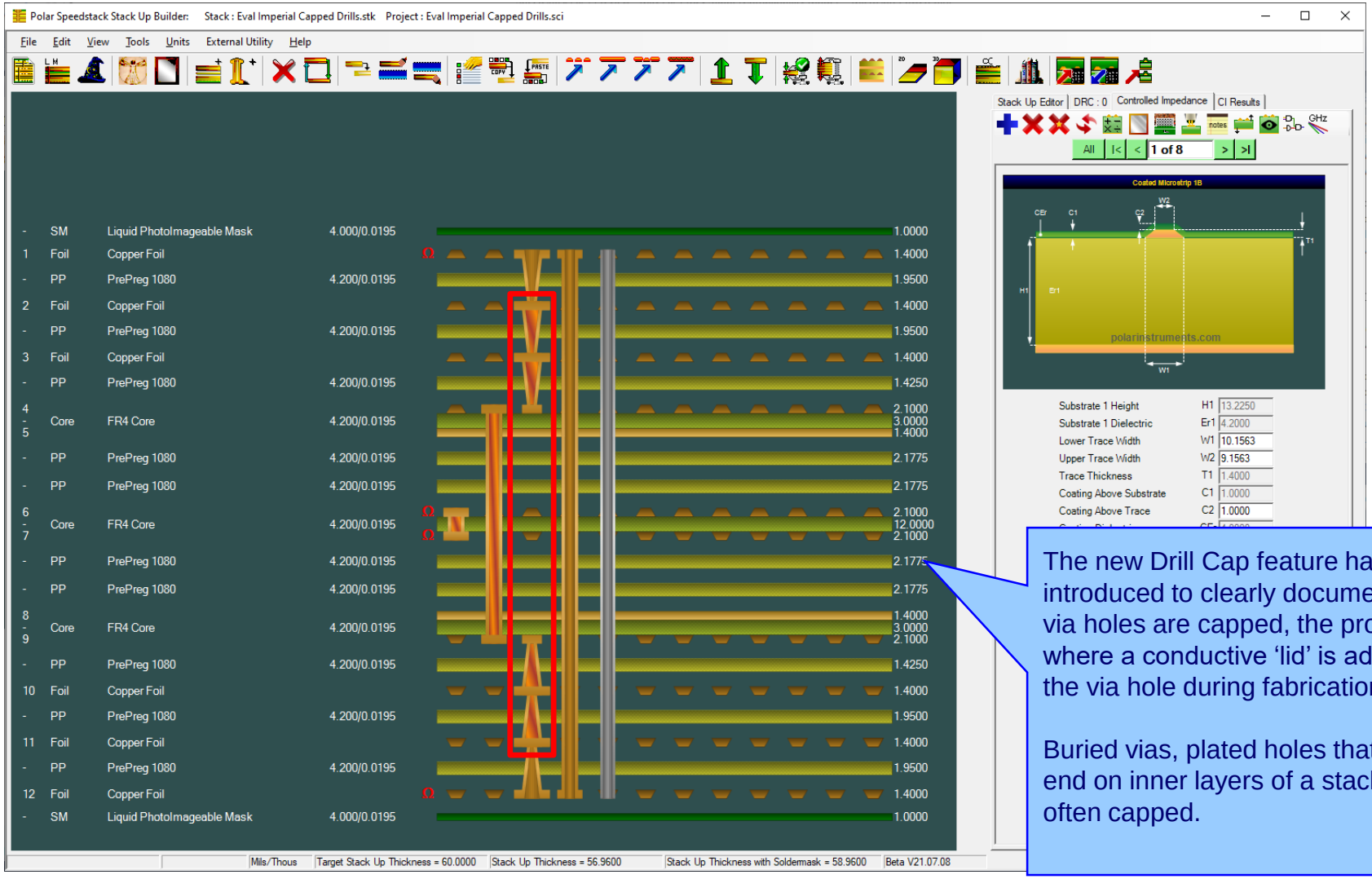
New Drill Cap feature



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

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

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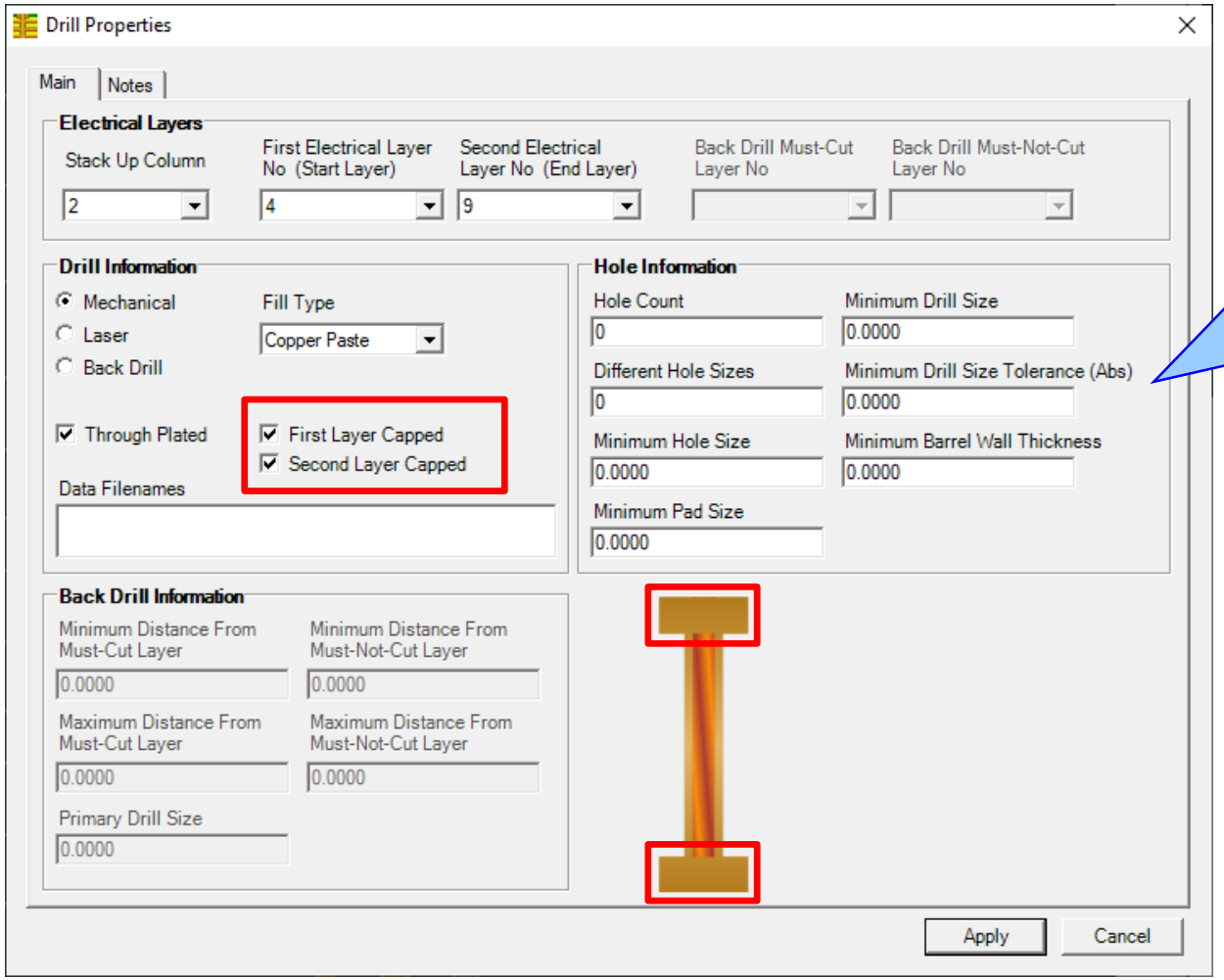
Drill Cap option – mechanical through plated drills



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

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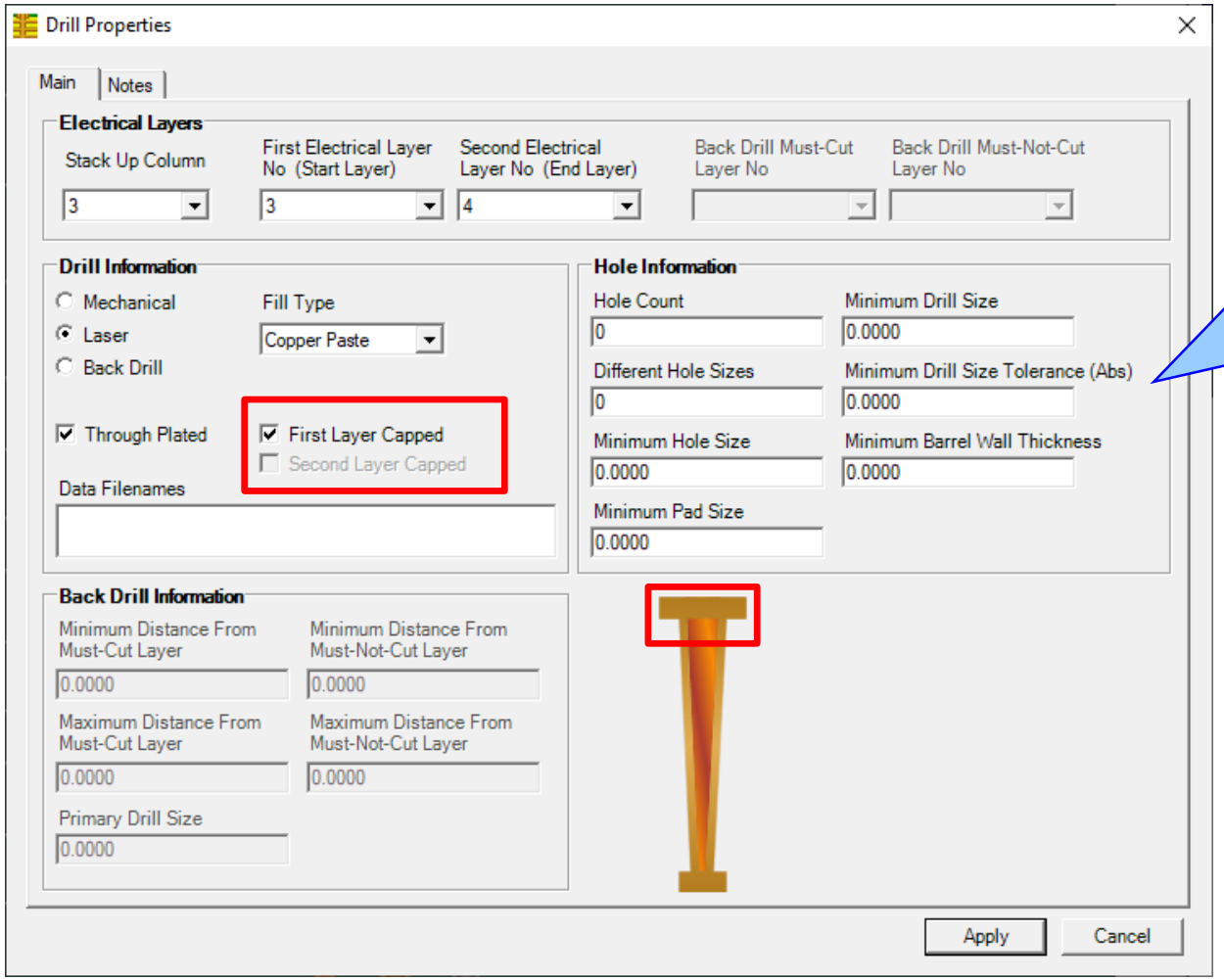
Drill Cap option – laser drills



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

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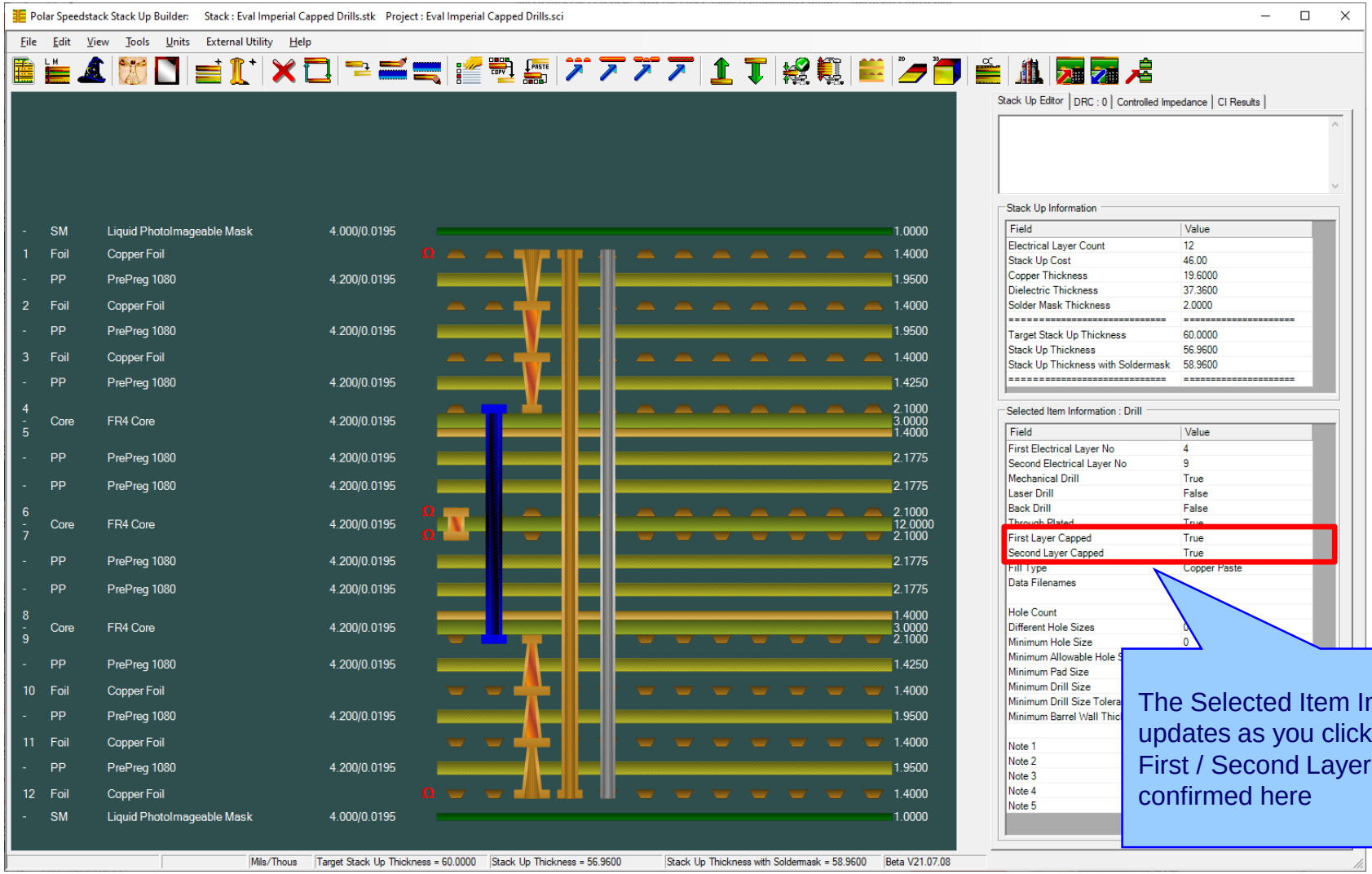
New Drill Cap feature



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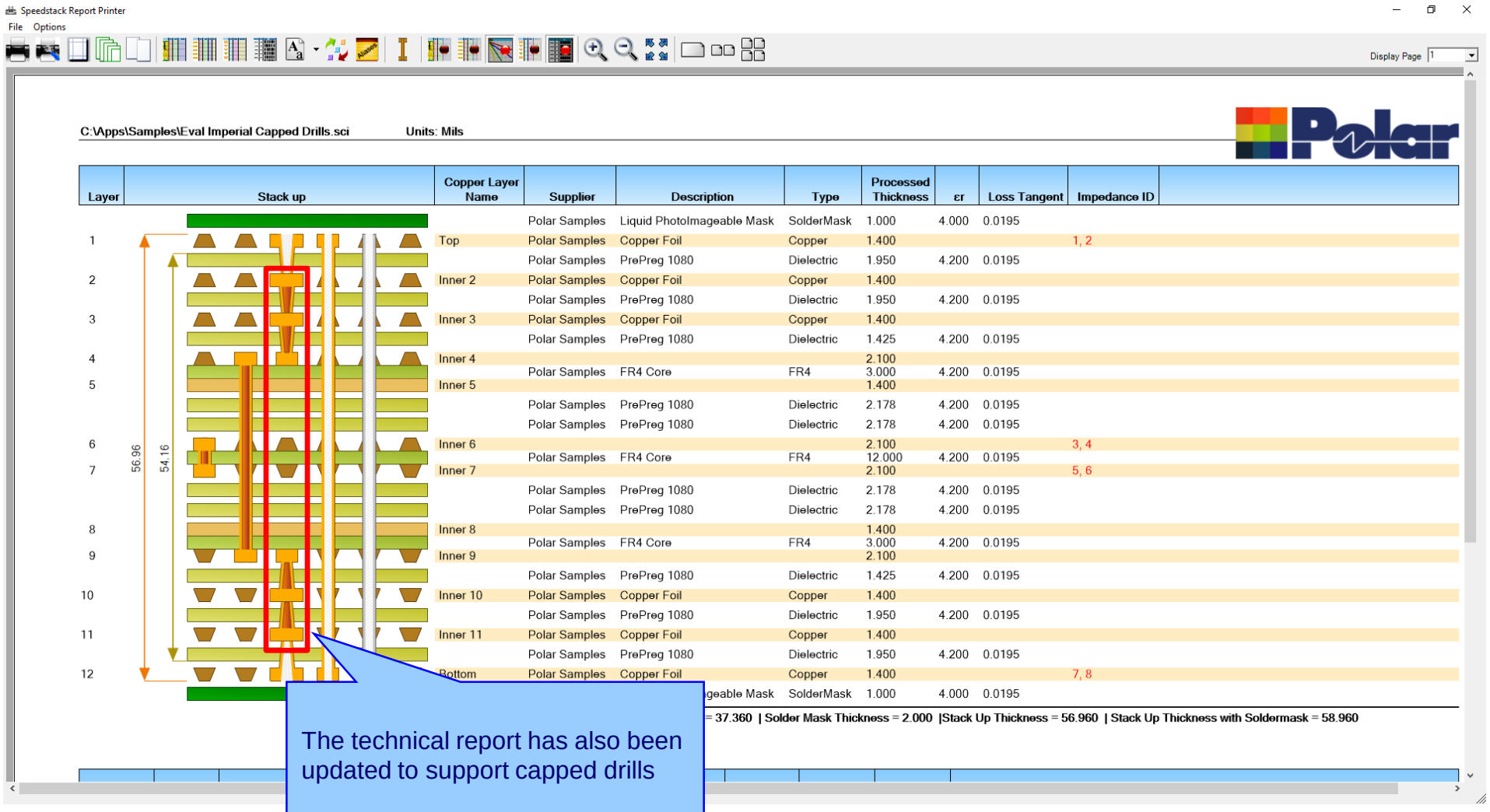
New Drill Cap feature – technical report enhancements



Layer	Stack up	Copper Layer Name	Supplier	Description	Type	Processed Thickness	εr	Loss Tangent	Impedance ID
			Polar Samples	Liquid PhotoImageable Mask	SolderMask	1.000	4.000	0.0195	
1		Top	Polar Samples	Copper Foil	Copper	1.400			1, 2
			Polar Samples	PrePreg 1080	Dielectric	1.950	4.200	0.0195	
2		Inner 2	Polar Samples	Copper Foil	Copper	1.400			
			Polar Samples	PrePreg 1080	Dielectric	1.950	4.200	0.0195	
3		Inner 3	Polar Samples	Copper Foil	Copper	1.400			
			Polar Samples	PrePreg 1080	Dielectric	1.425	4.200	0.0195	
4		Inner 4				2.100			
			Polar Samples	FR4 Core	FR4	3.000	4.200	0.0195	
5		Inner 5				1.400			
			Polar Samples	PrePreg 1080	Dielectric	2.178	4.200	0.0195	
			Polar Samples	PrePreg 1080	Dielectric	2.178	4.200	0.0195	
6		Inner 6				2.100			3, 4
			Polar Samples	FR4 Core	FR4	12.000	4.200	0.0195	
7		Inner 7				2.100			5, 6
			Polar Samples	PrePreg 1080	Dielectric	2.178	4.200	0.0195	
			Polar Samples	PrePreg 1080	Dielectric	2.178	4.200	0.0195	
8		Inner 8				1.400			
			Polar Samples	FR4 Core	FR4	3.000	4.200	0.0195	
9		Inner 9				2.100			
			Polar Samples	PrePreg 1080	Dielectric	1.425	4.200	0.0195	
10		Inner 10	Polar Samples	Copper Foil	Copper	1.400			
			Polar Samples	PrePreg 1080	Dielectric	1.950	4.200	0.0195	
11		Inner 11	Polar Samples	Copper Foil	Copper	1.400			
			Polar Samples	PrePreg 1080	Dielectric	1.950	4.200	0.0195	
12		Bottom	Polar Samples	Copper Foil	Copper	1.400			7, 8
				ageable Mask	SolderMask	1.000	4.000	0.0195	

= 37.360 | Solder Mask Thickness = 2.000 |Stack Up Thickness = 56.960 | Stack Up Thickness with Soldermask = 58.960

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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

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Speedstack v21.05.06 (May 2021)

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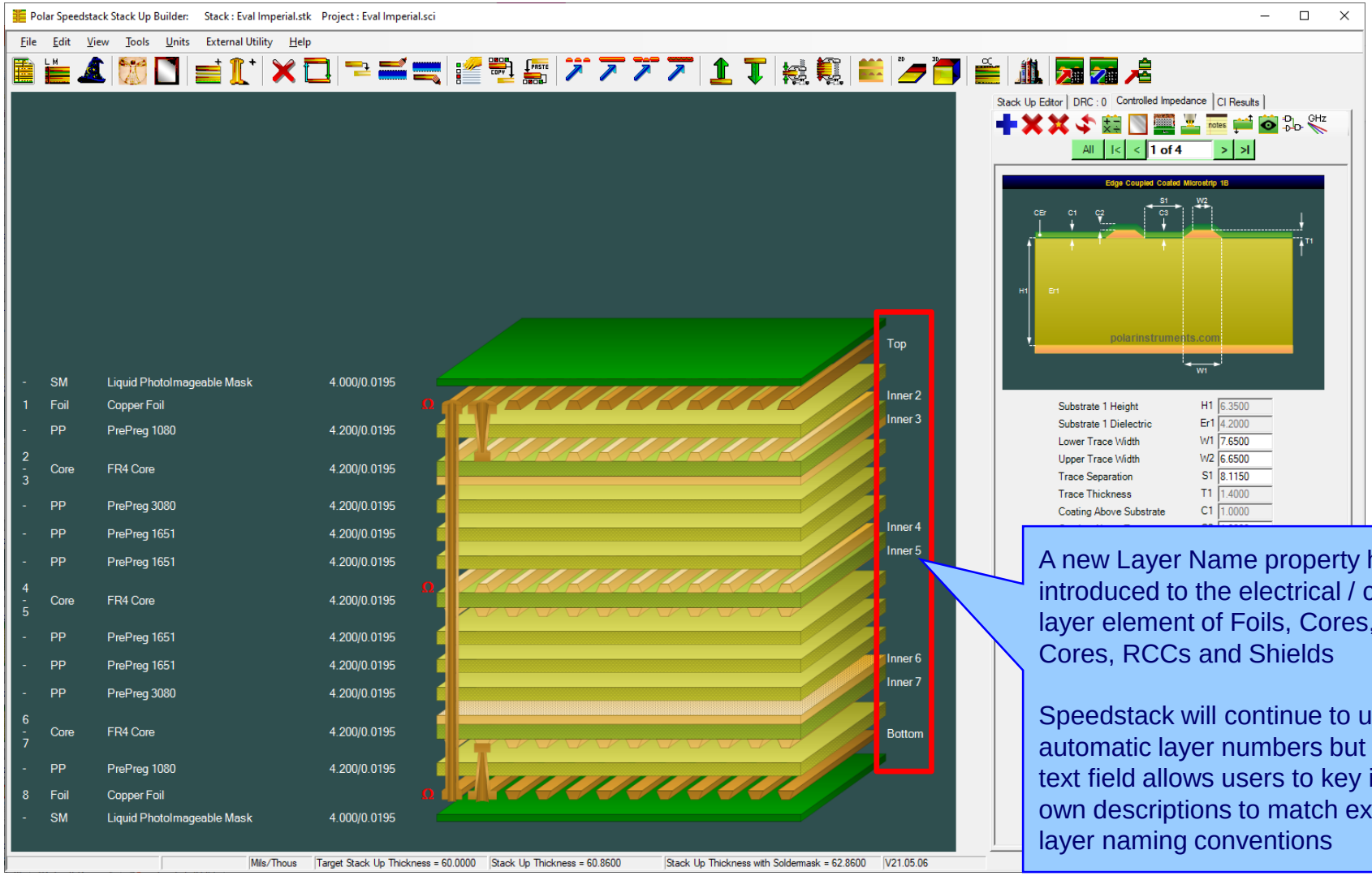
New Layer Name property for electrical / copper layers



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

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

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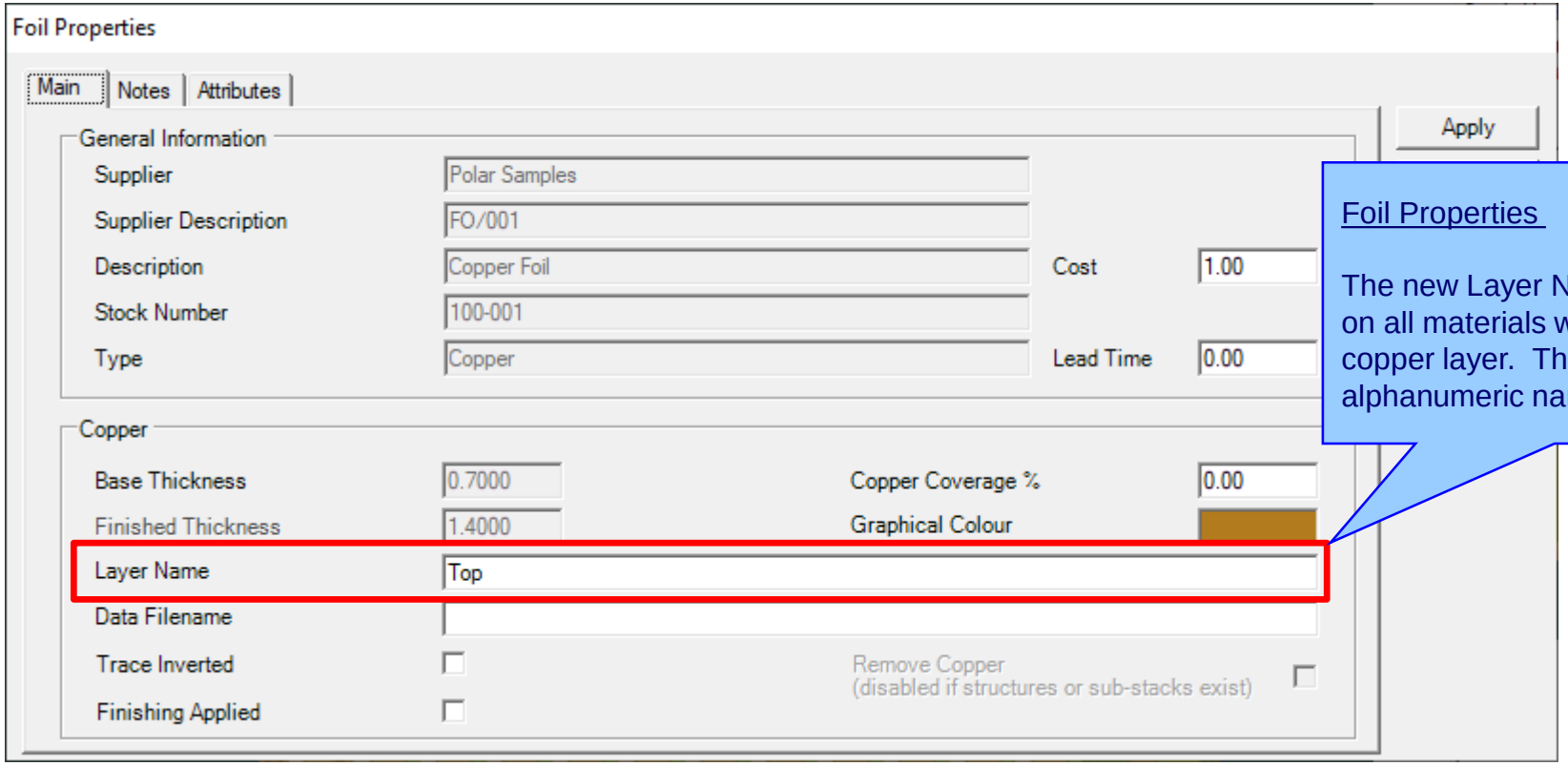
New Layer Name property for electrical / copper layers



Foil Properties

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

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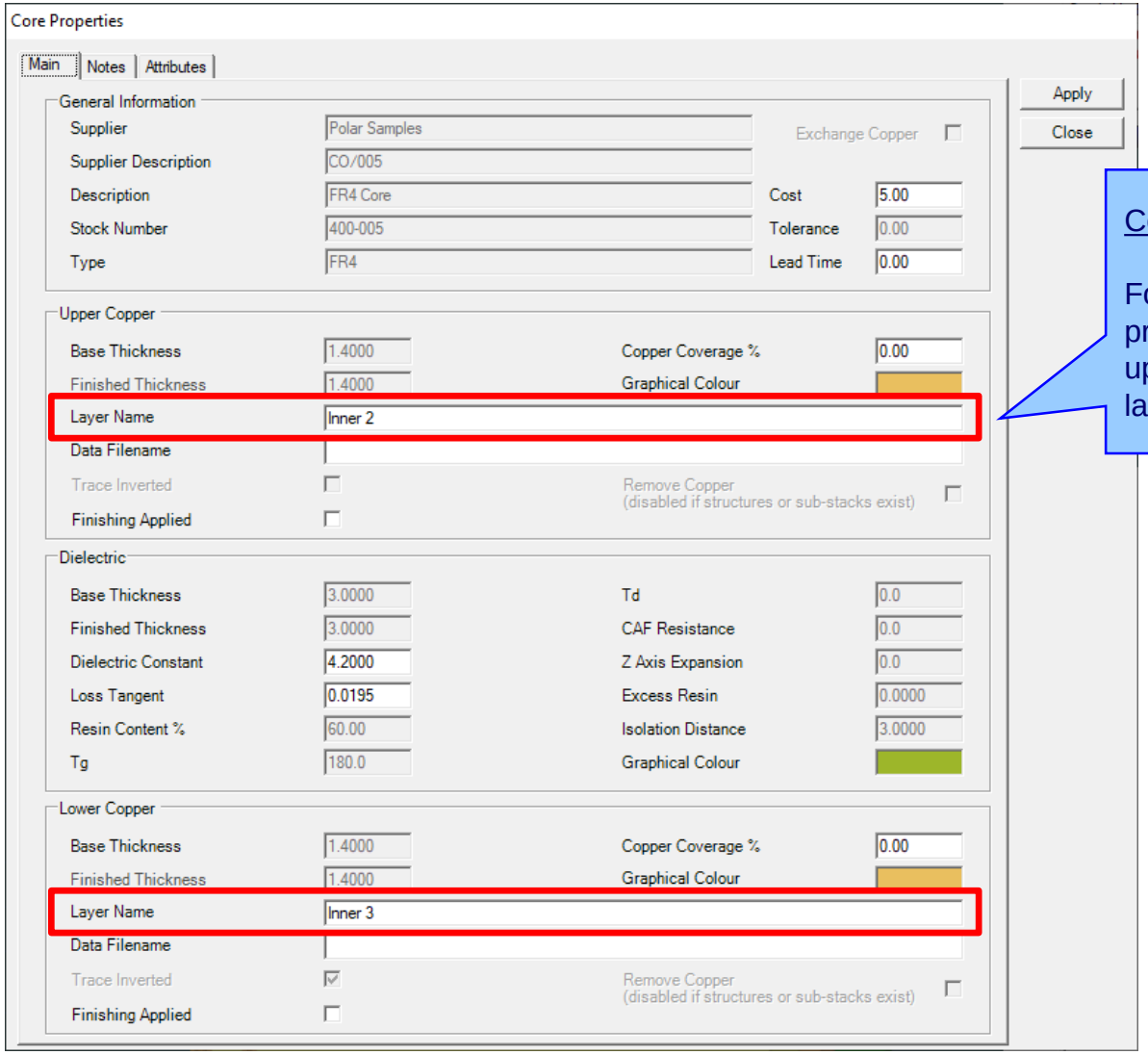
New Layer Name property for electrical / copper layers



Core Properties

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

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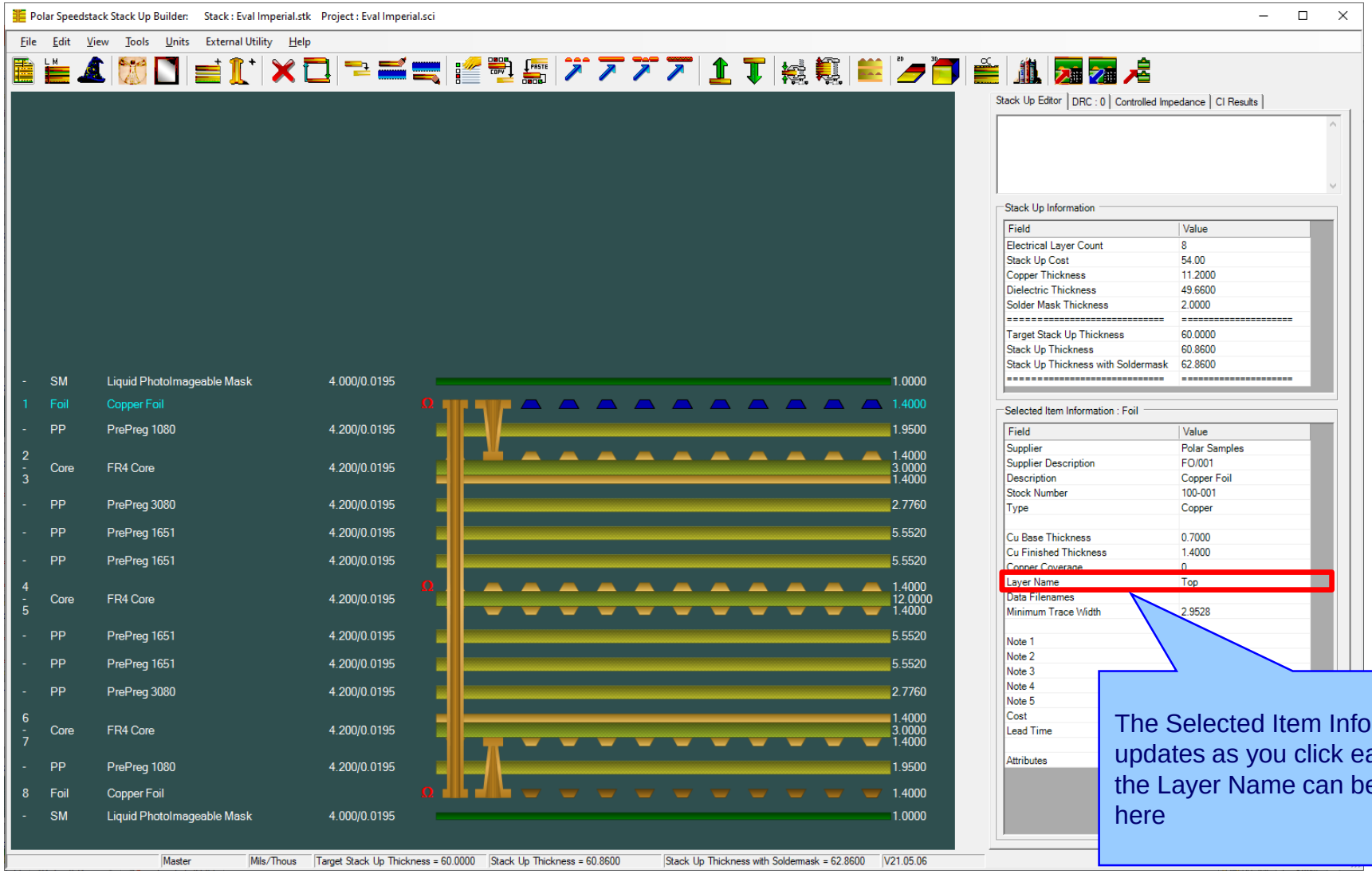
New Layer Name property for electrical / copper layers



The Selected Item Information auto updates as you click each material, the Layer Name can be confirmed here

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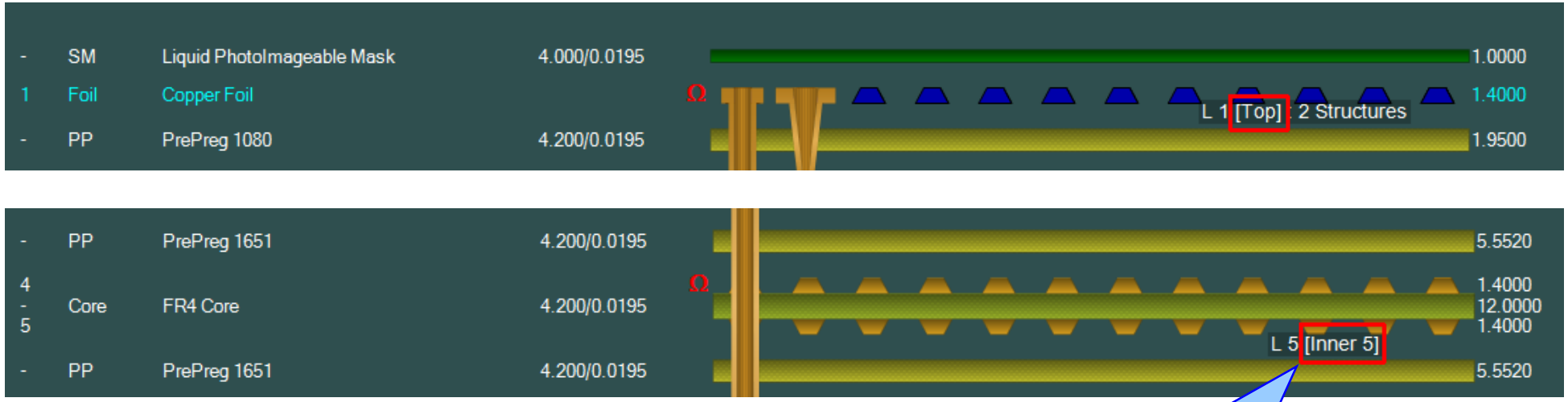
New Layer Name property for electrical / copper layers



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

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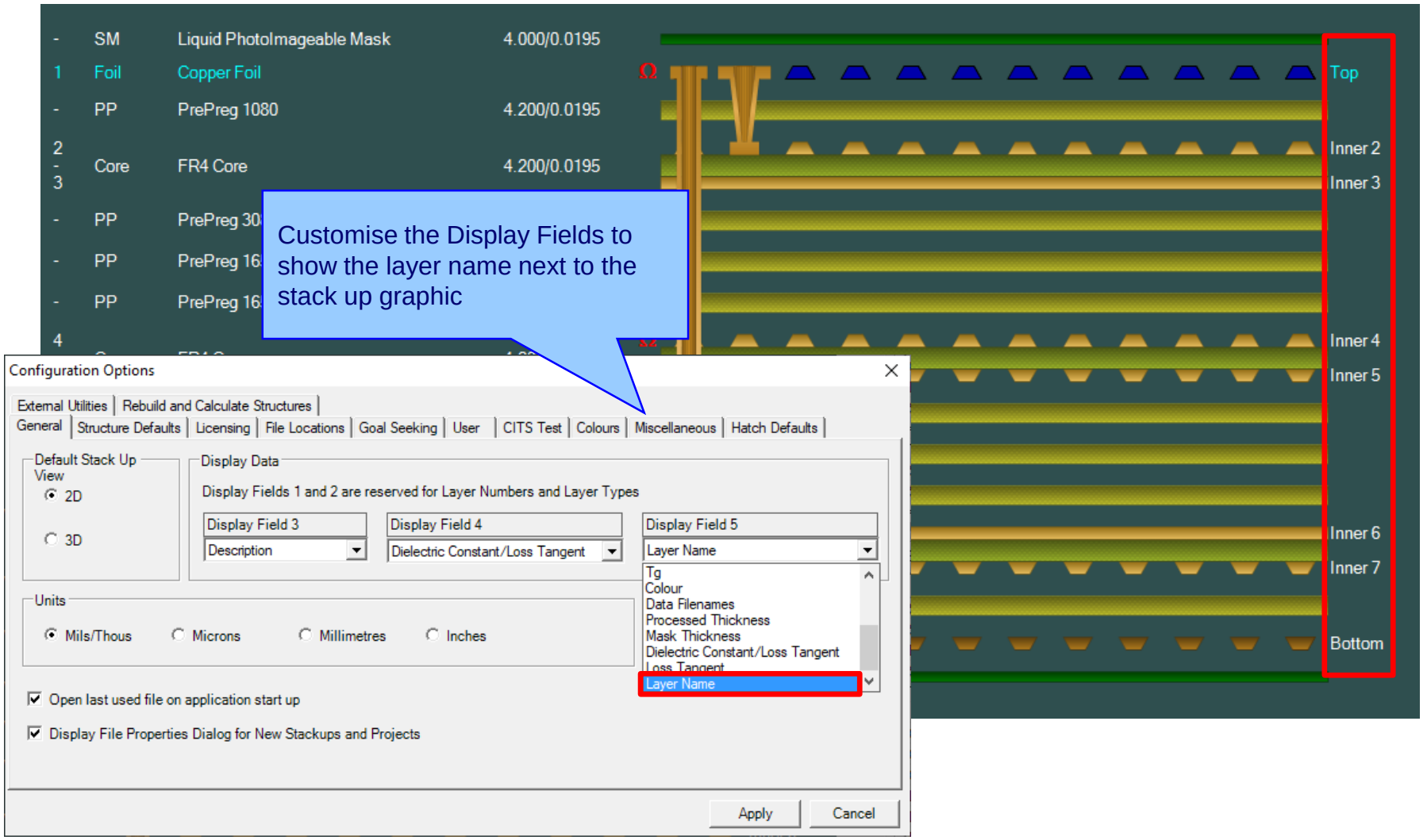
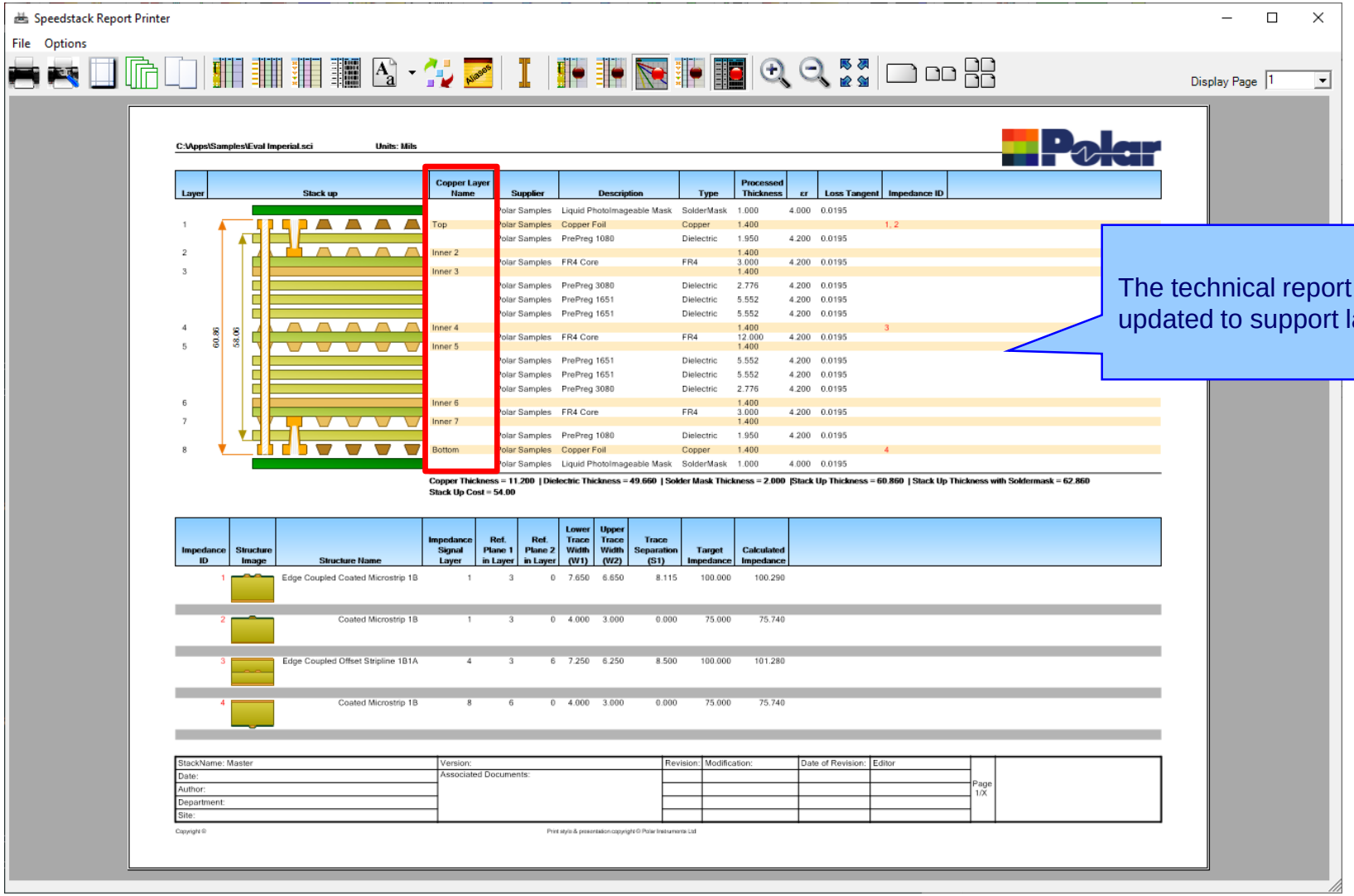
New Layer Name property for electrical / copper layers



Copyright © Polar Instruments 2024

New Layer Name property for electrical / copper layers



The technical report has also been updated to support layer names

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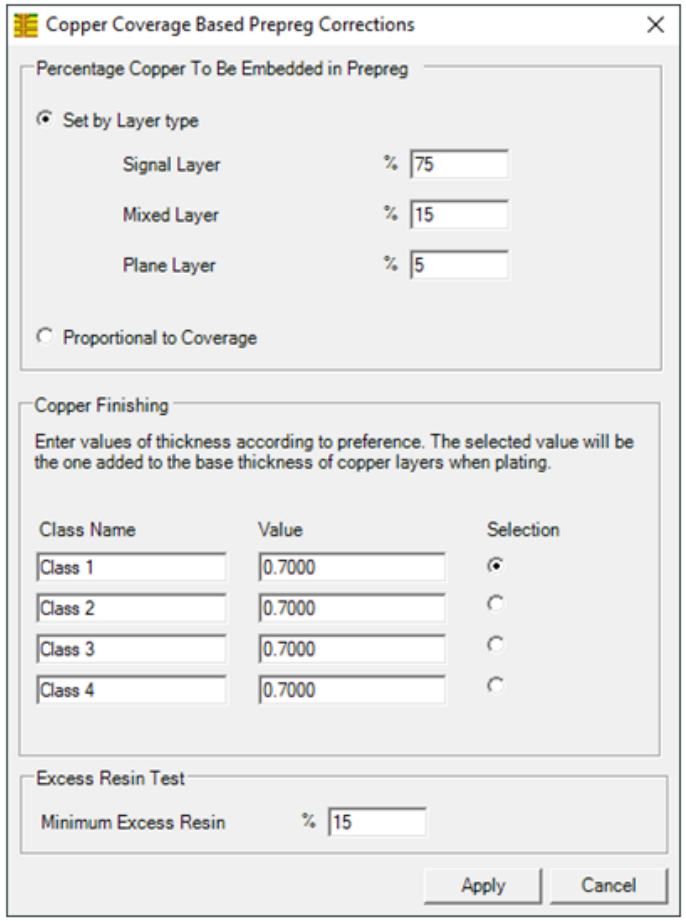
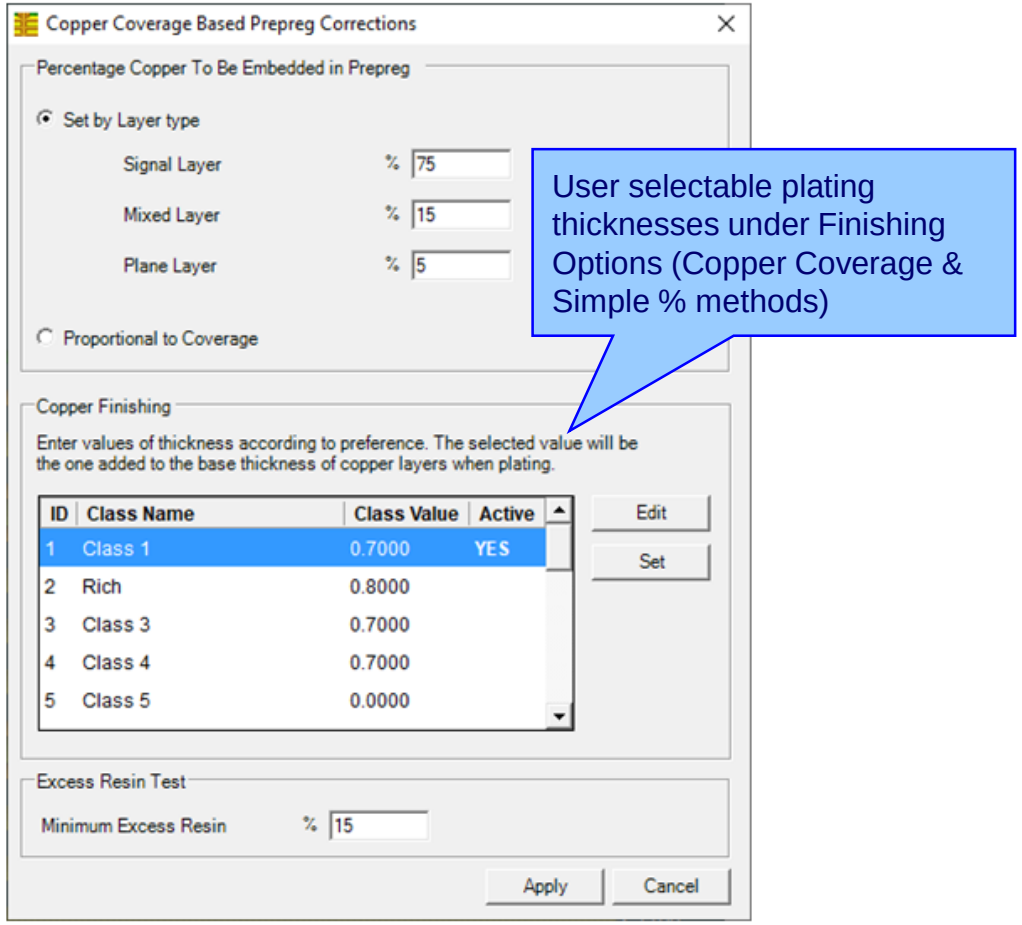
Copper Finishing classes increased



Speedstack v21.04 and earlier supported 4 classes



Speedstack v21.05 now supports 20 classes

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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

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Speedstack v21.04.00 (April 2021)

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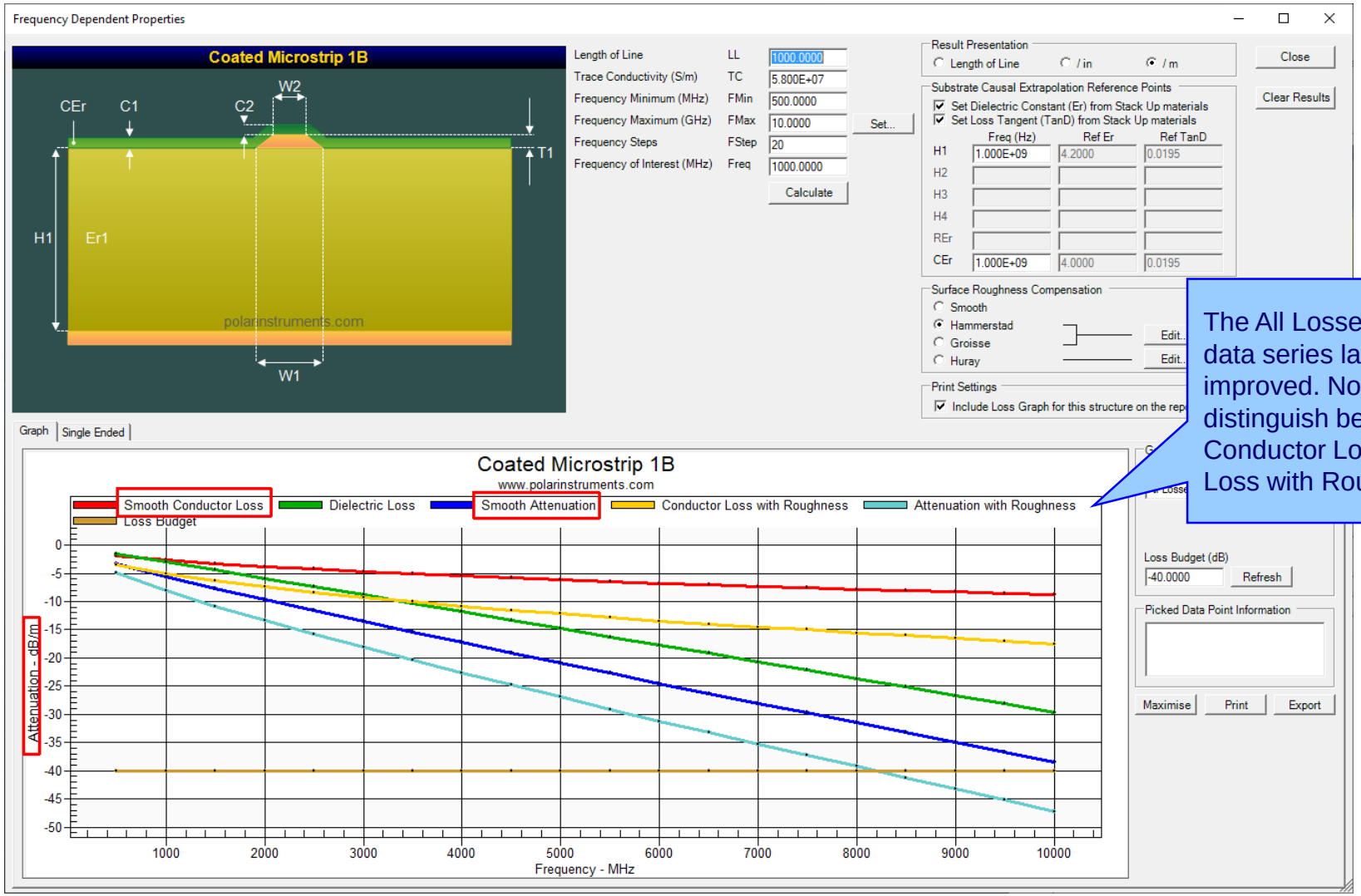
All Losses plot - clearer labelling



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

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Other enhancements

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

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Speedstack v21.03.09 (March 2021)

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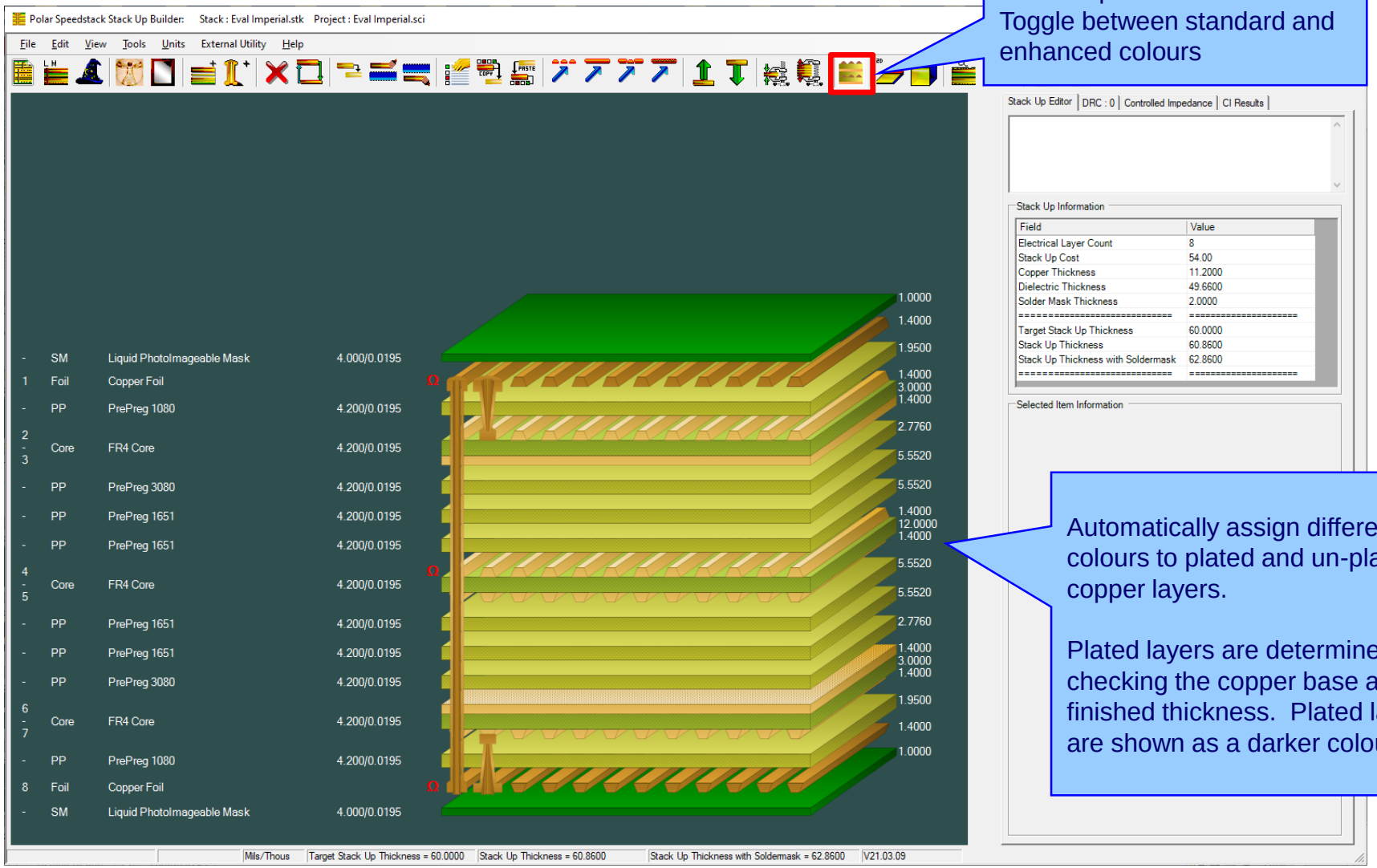
New Apply Plating Colours toolbar option



New Apply Plating Colours toolbar option.
Toggle between standard and enhanced colours

Automatically assign different colours to plated and un-plated copper layers.

Plated layers are determined by checking the copper base and finished thickness. Plated layers are shown as a darker colour

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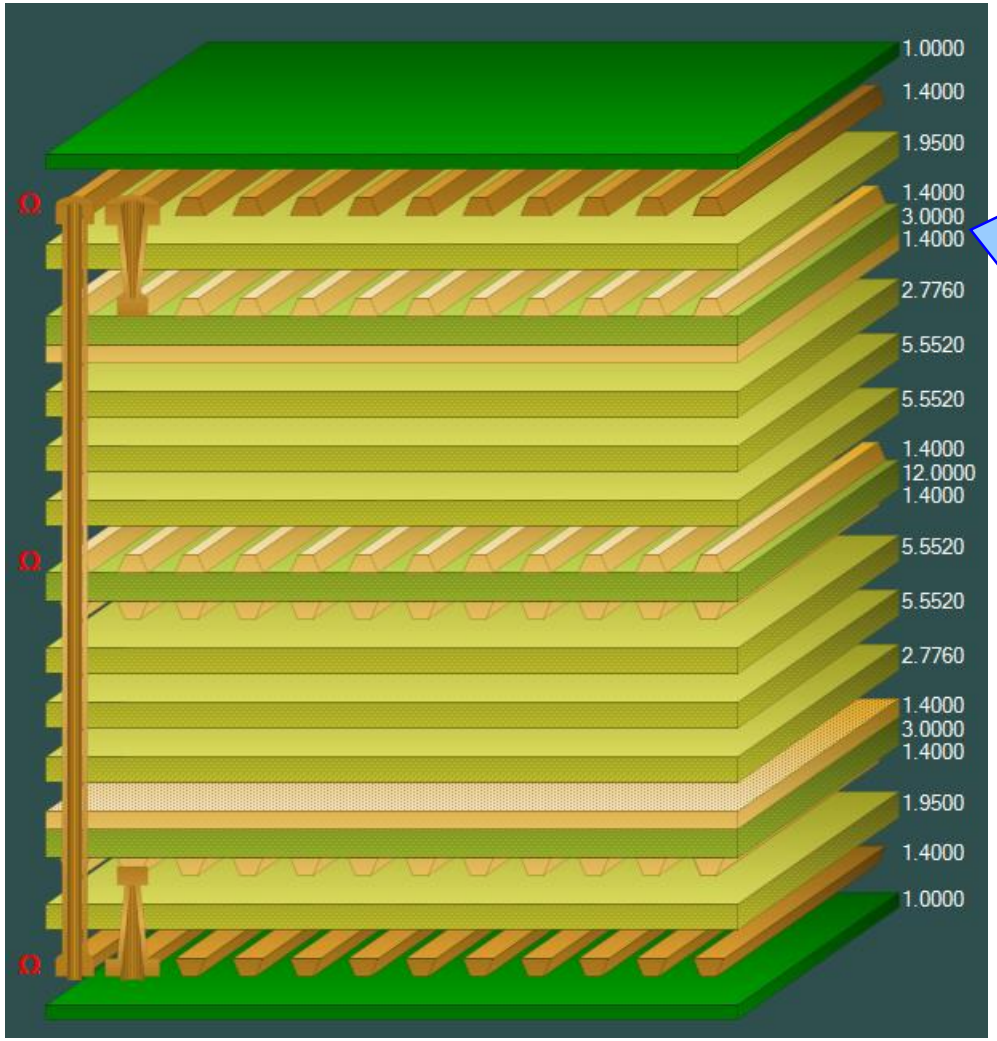
New Apply Plating Colours toolbar option



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

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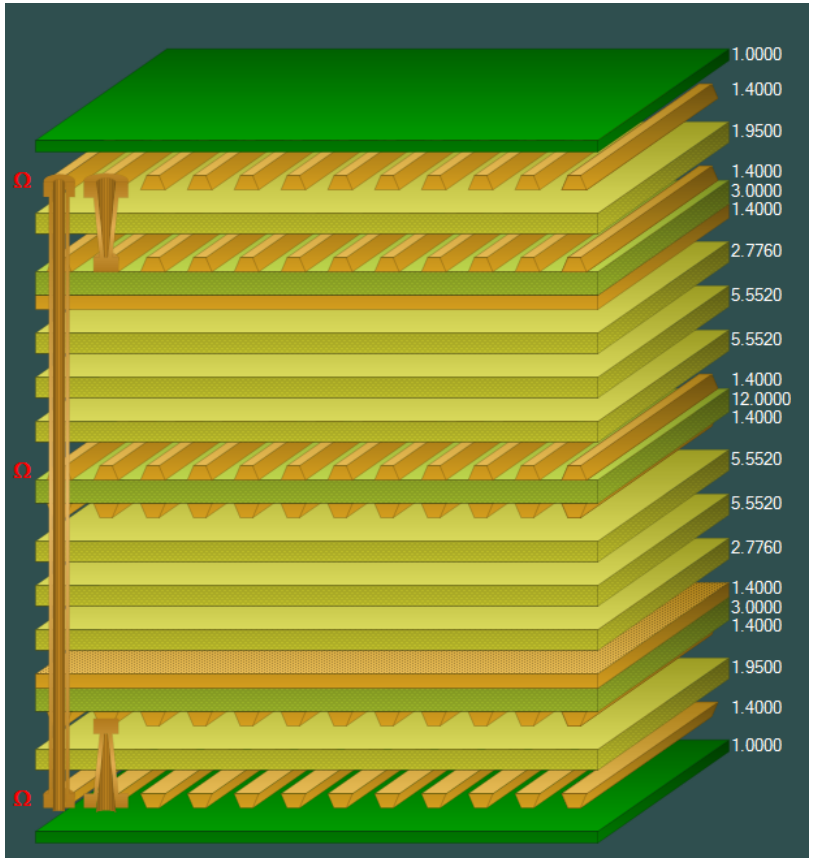
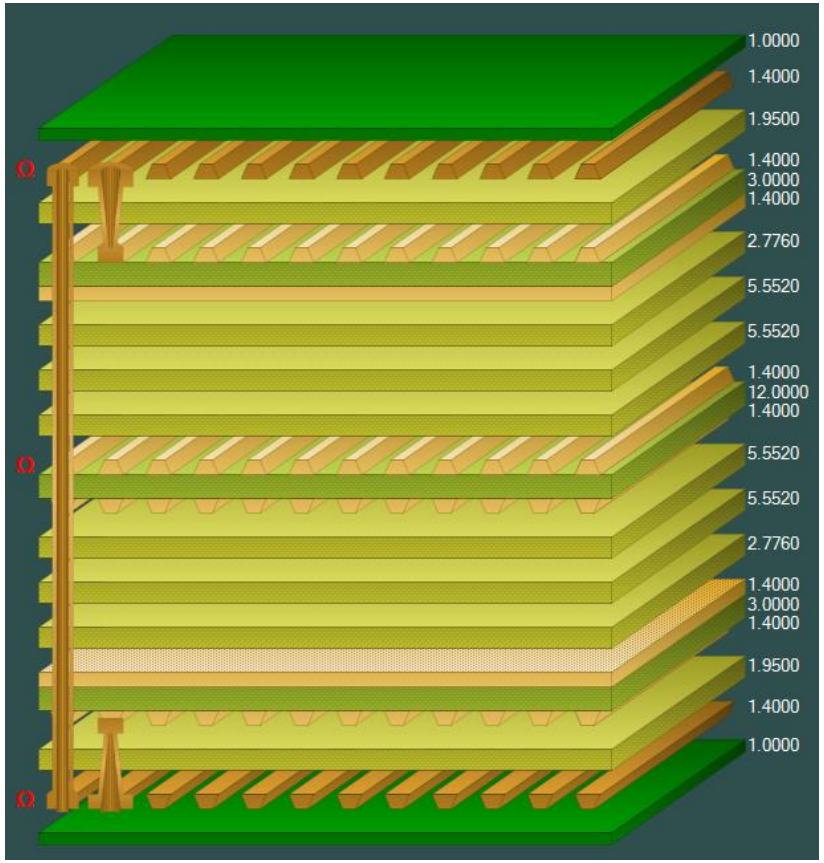
New Apply Plating Colours toolbar option

Standard Colours



Apply Plating Colours



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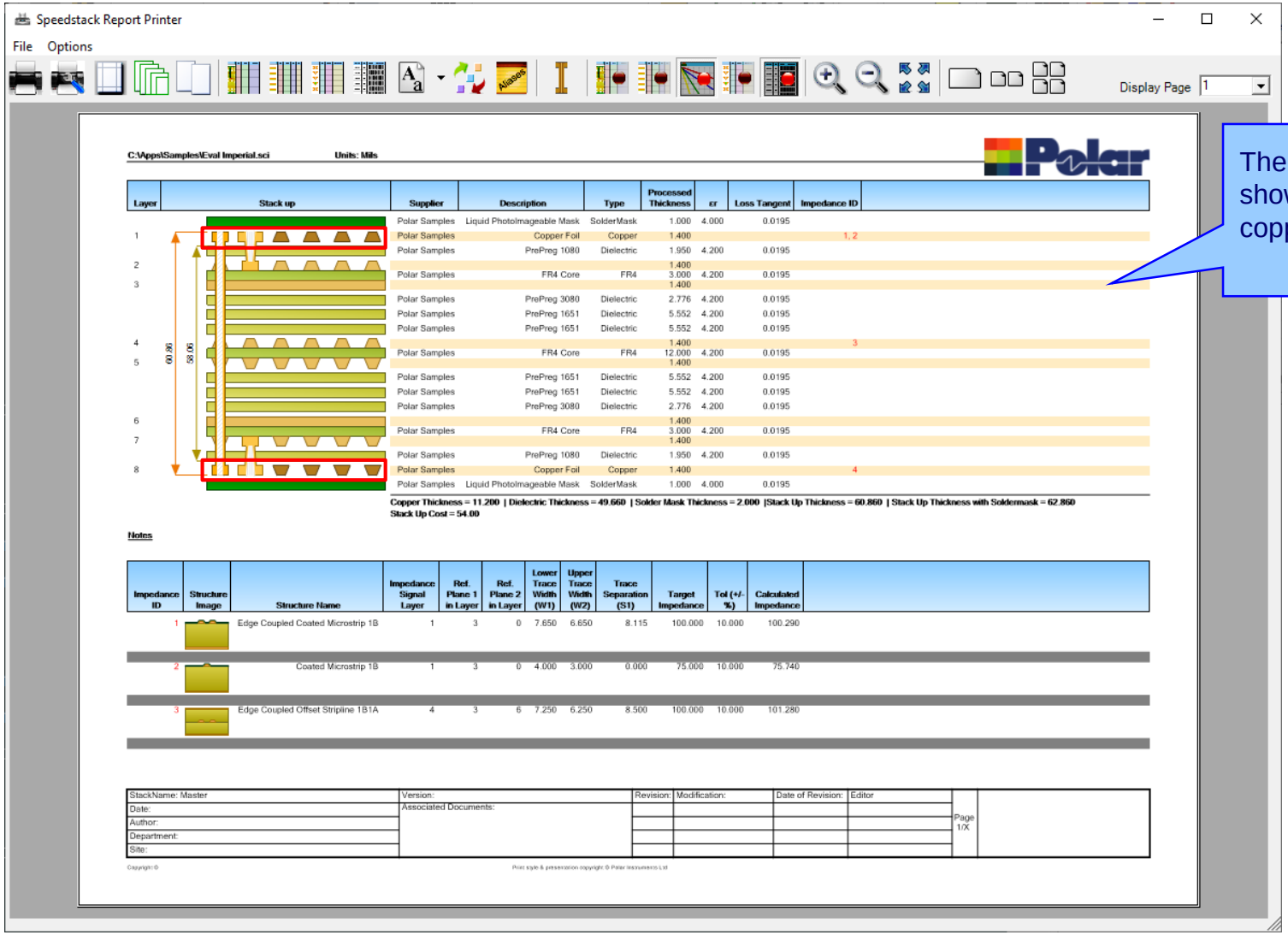
New Apply Plating Colours toolbar option



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

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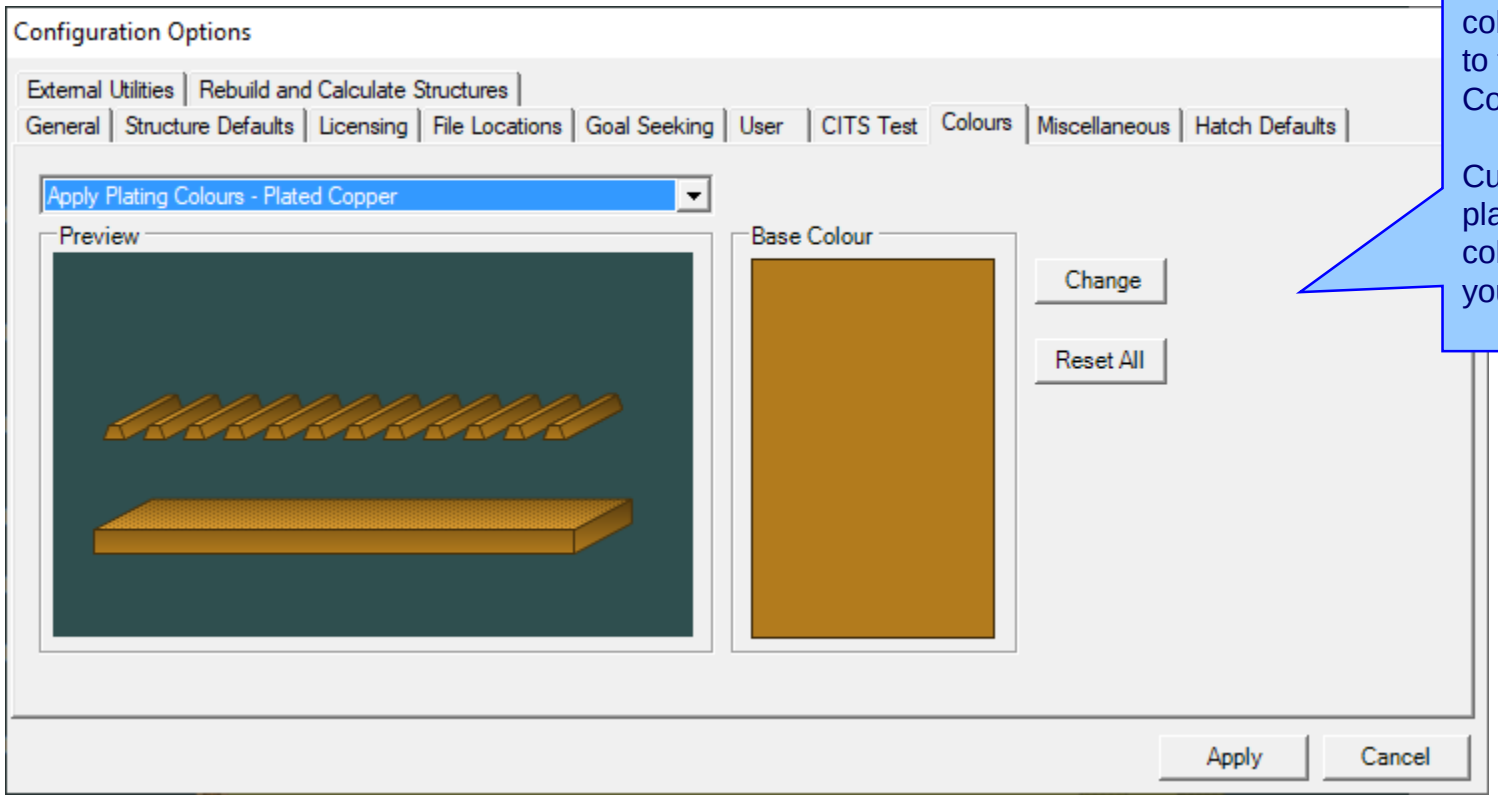
New Apply Plating Colours toolbar option



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

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

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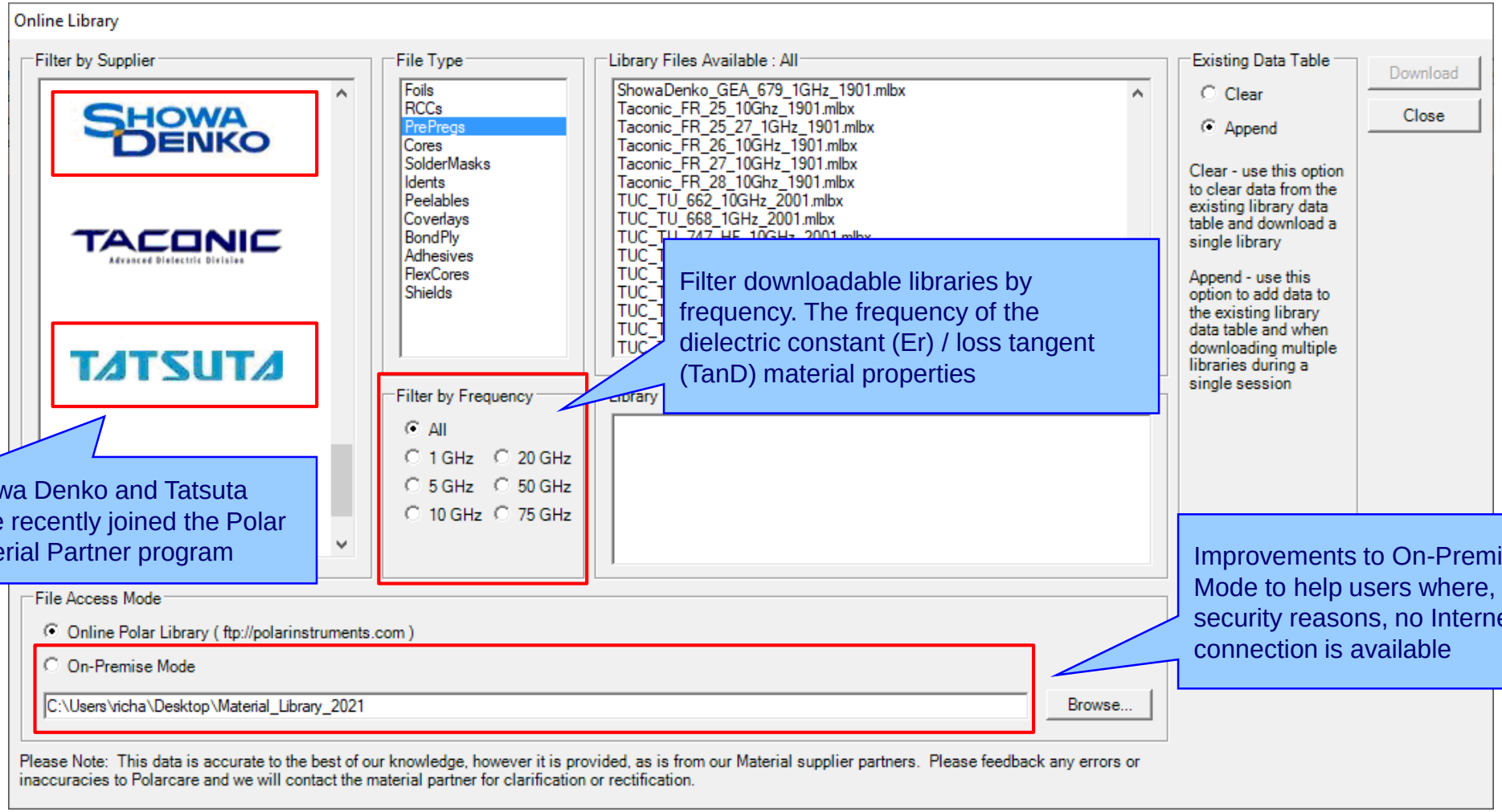
Online Library enhancements



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Speedstack v21.02.01 (February 2021)

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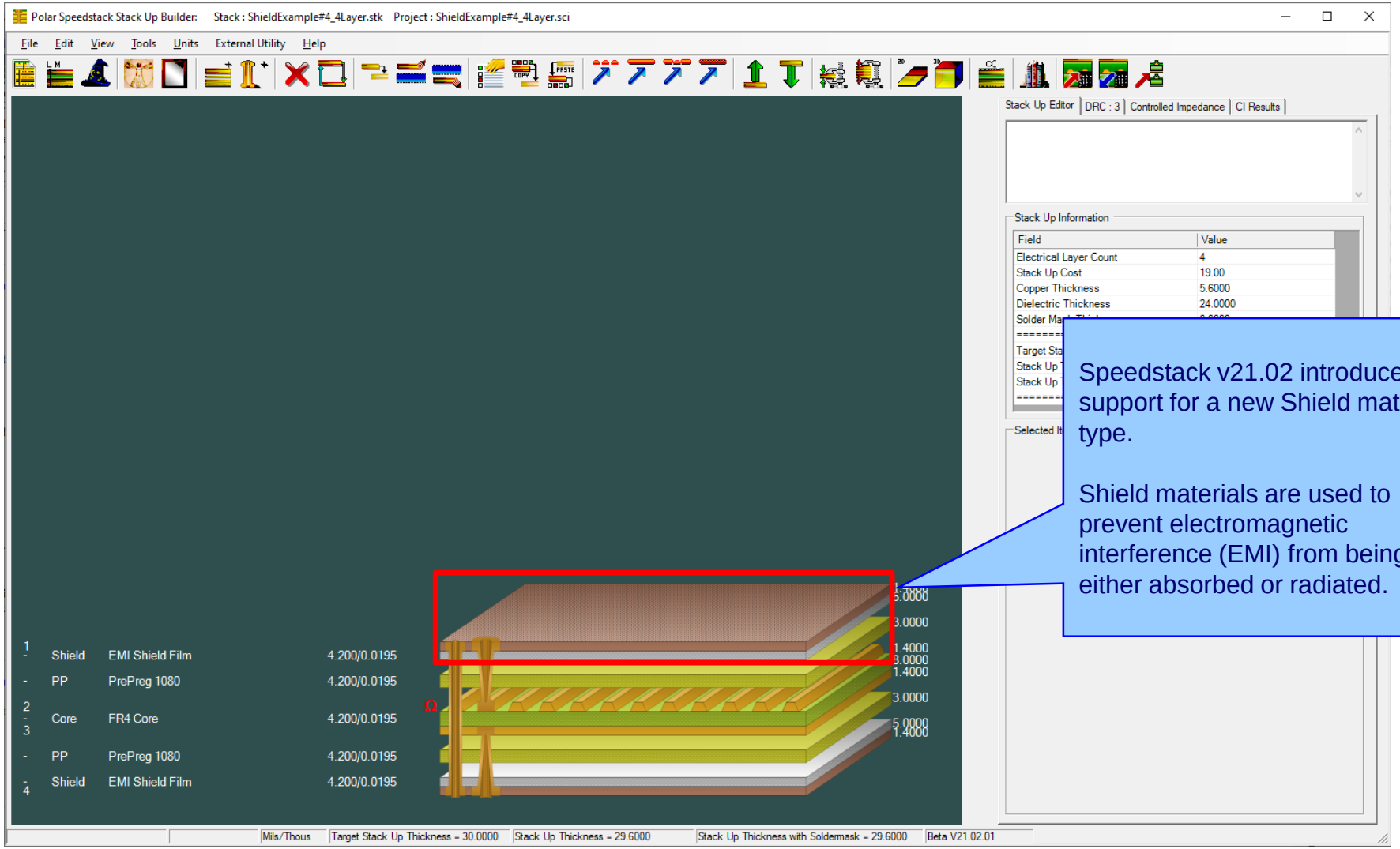
New Shield material



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

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

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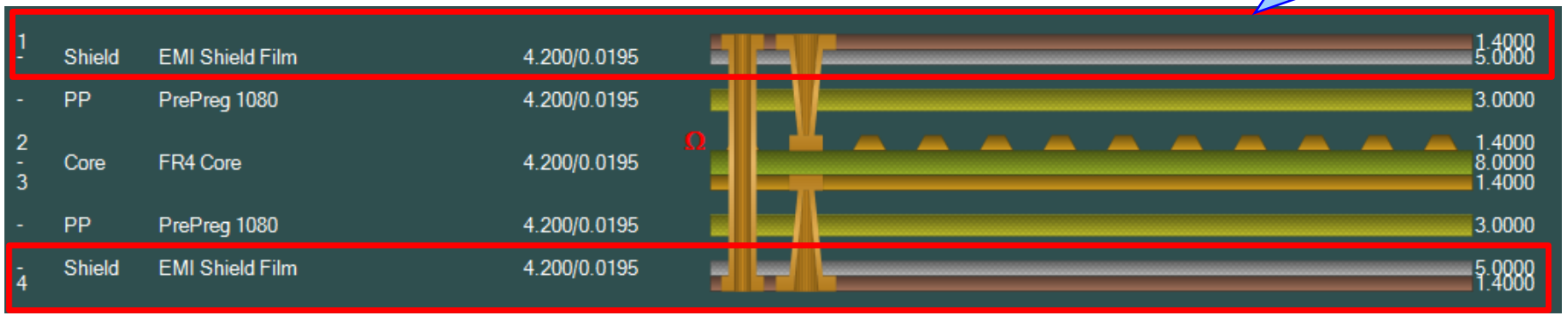
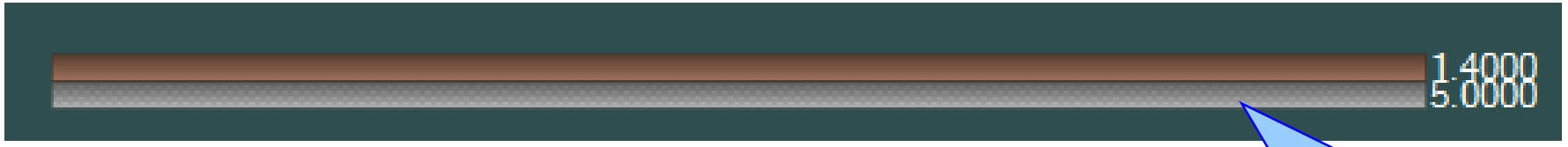
New Shield material

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





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

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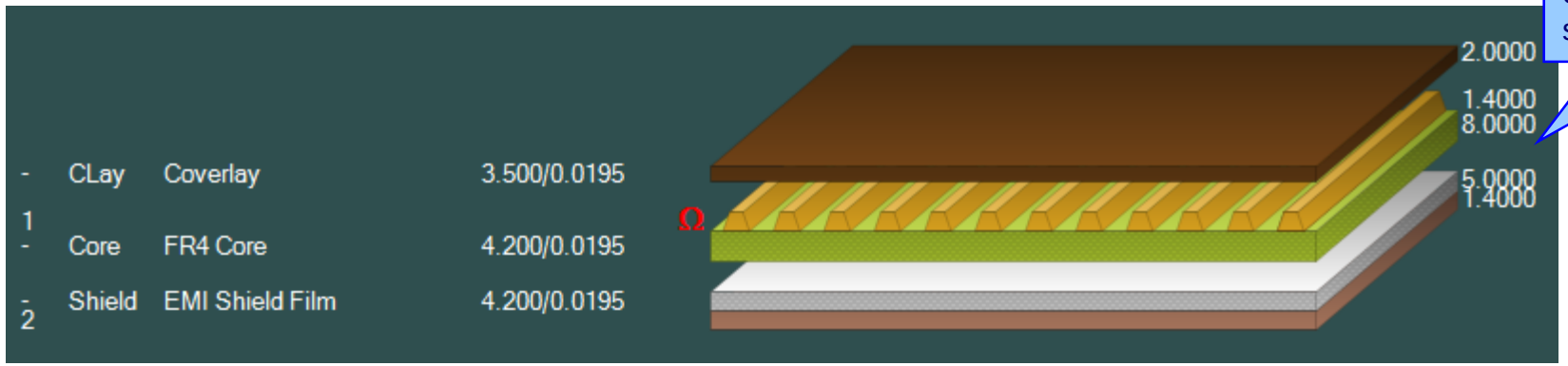
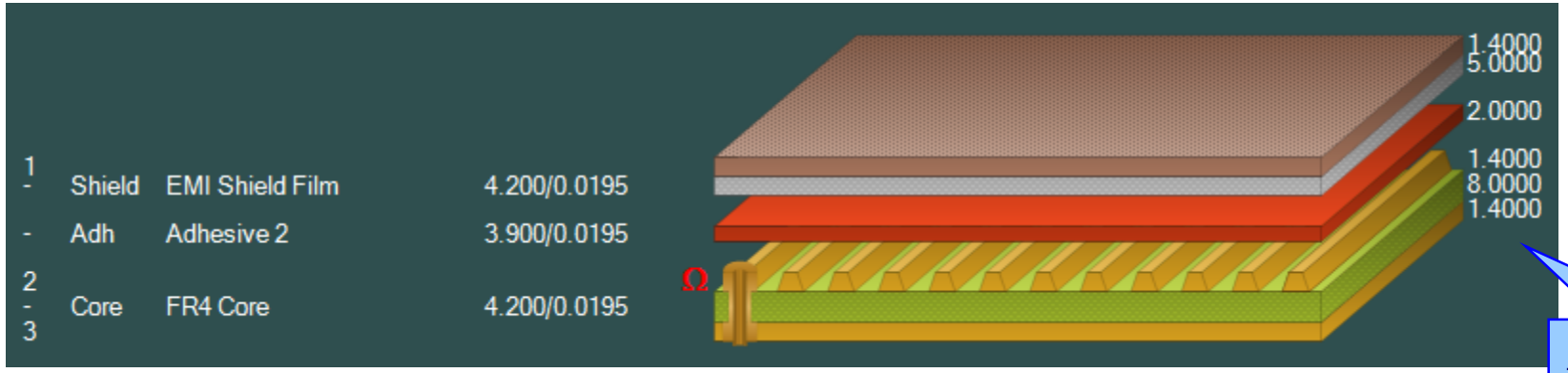
Shield material examples



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



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

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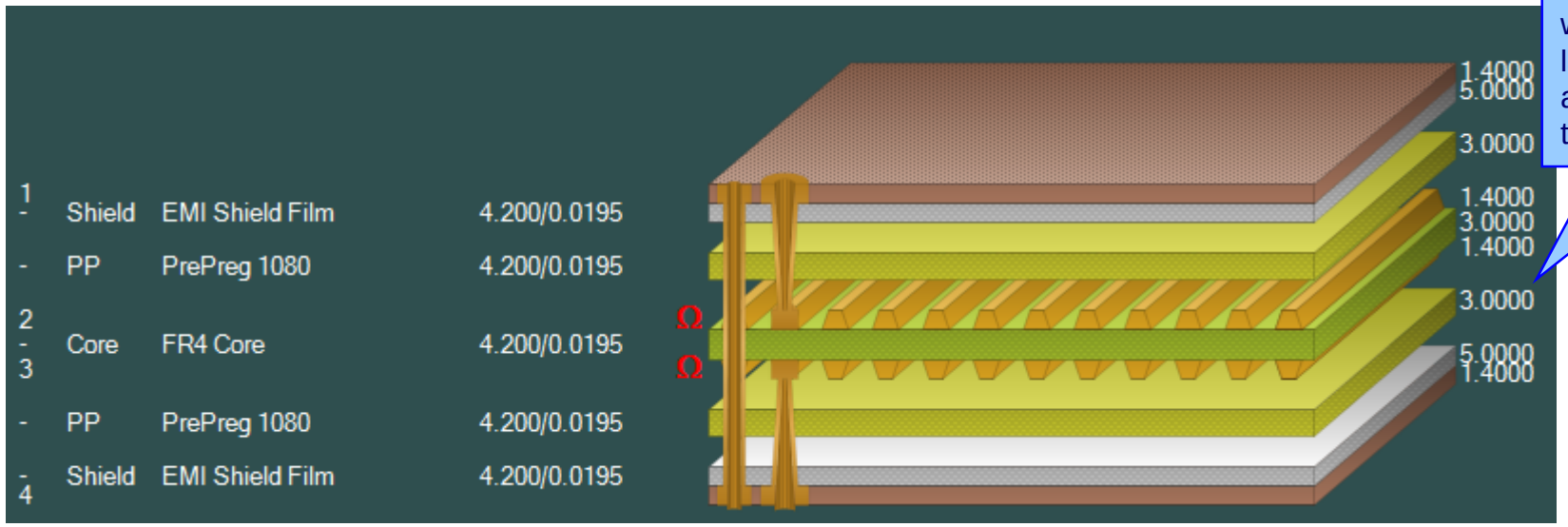
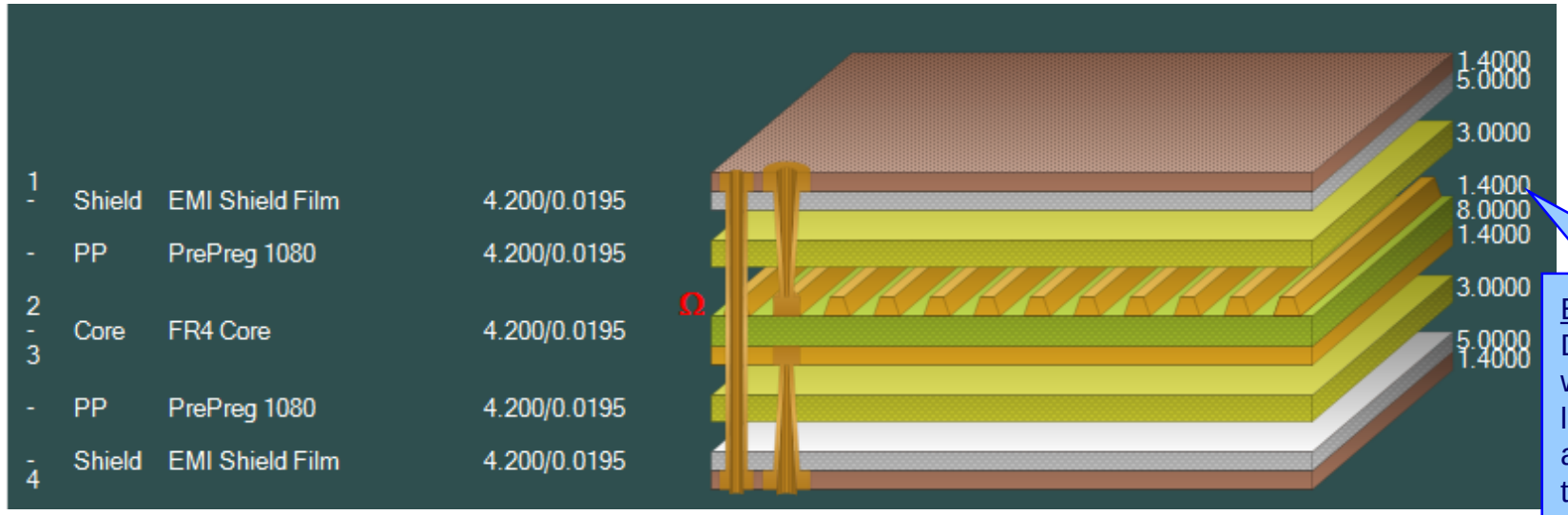
Shield material examples



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

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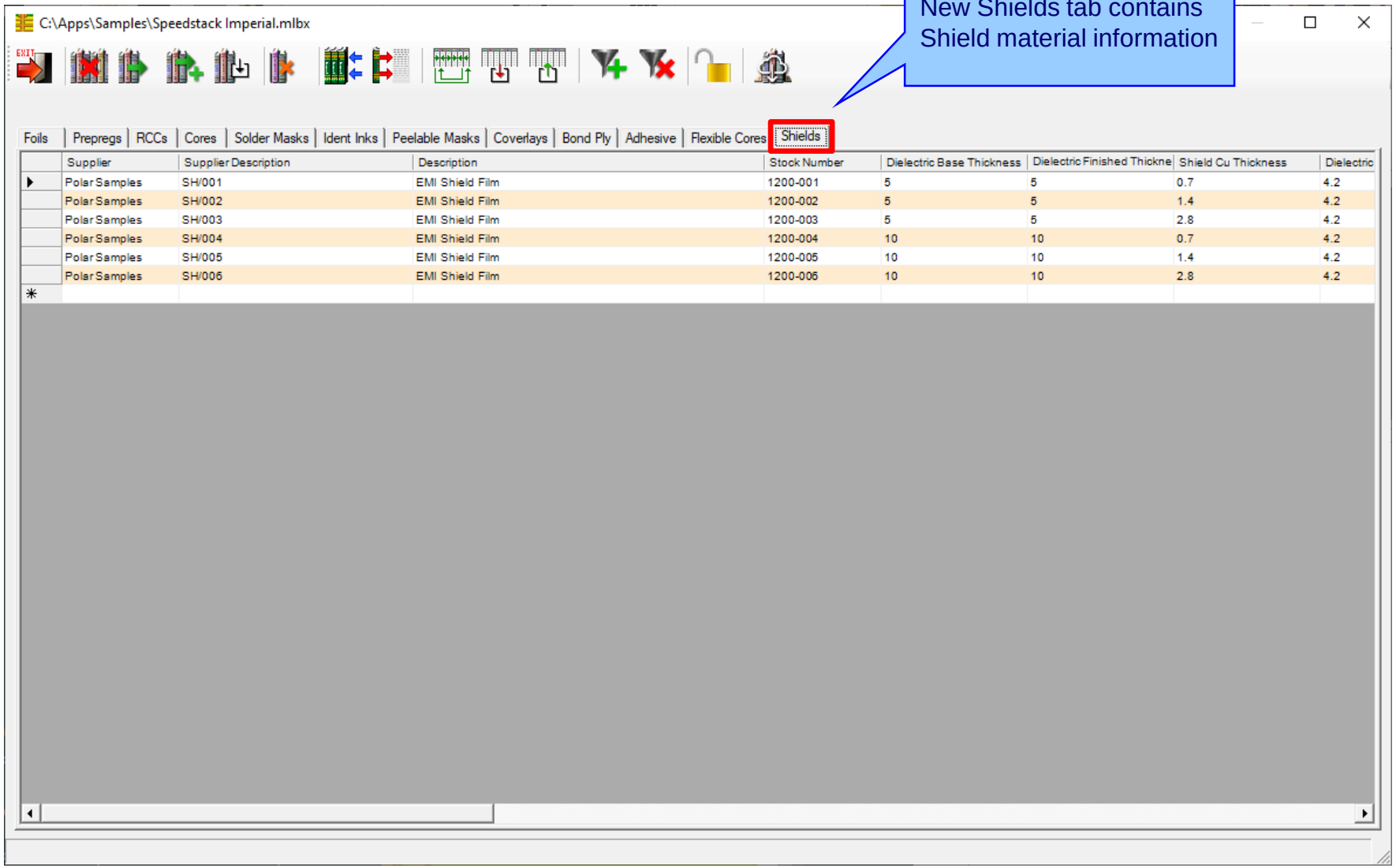
Material library enhancements



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

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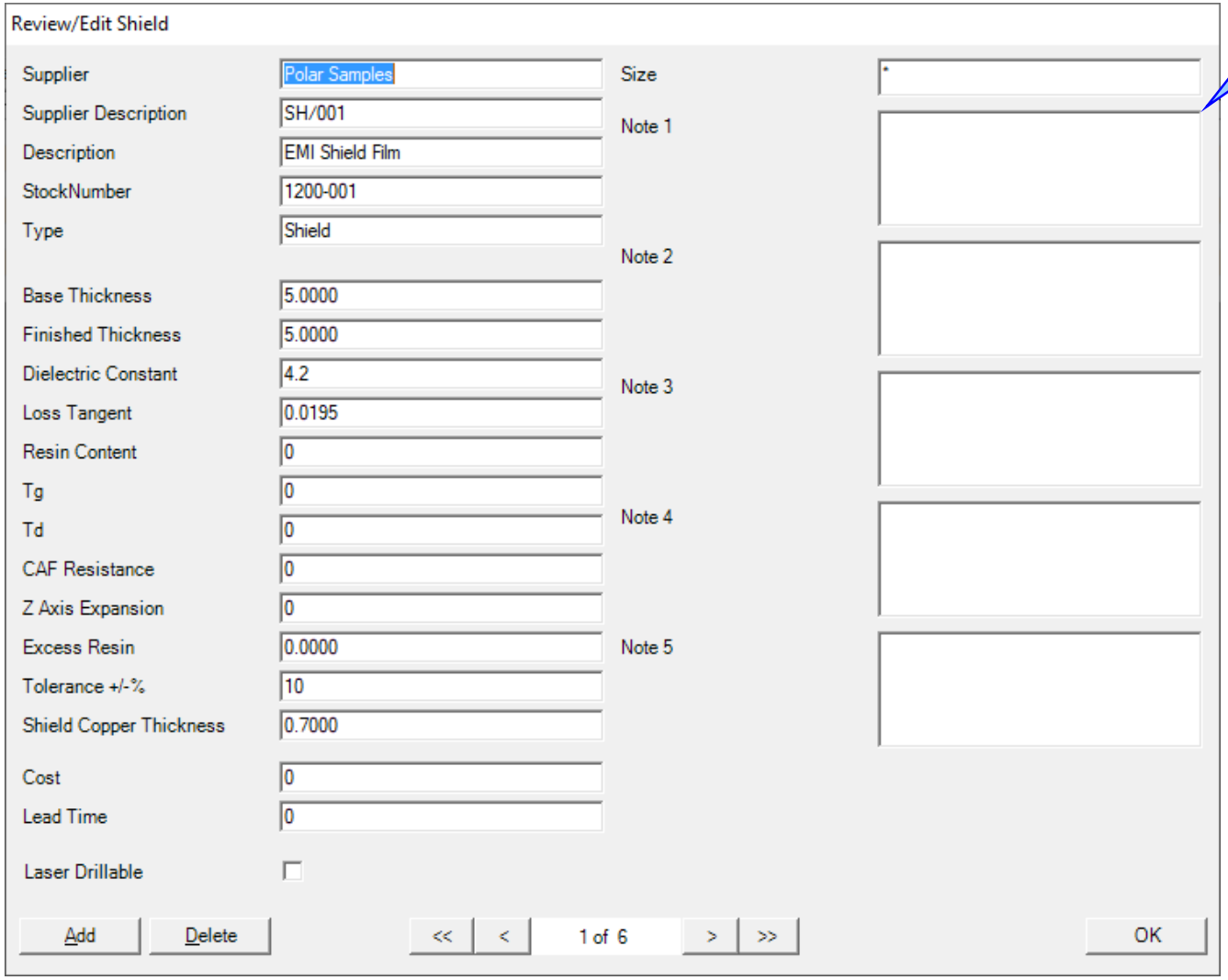
Material library enhancements



Material library Edit Shield dialog

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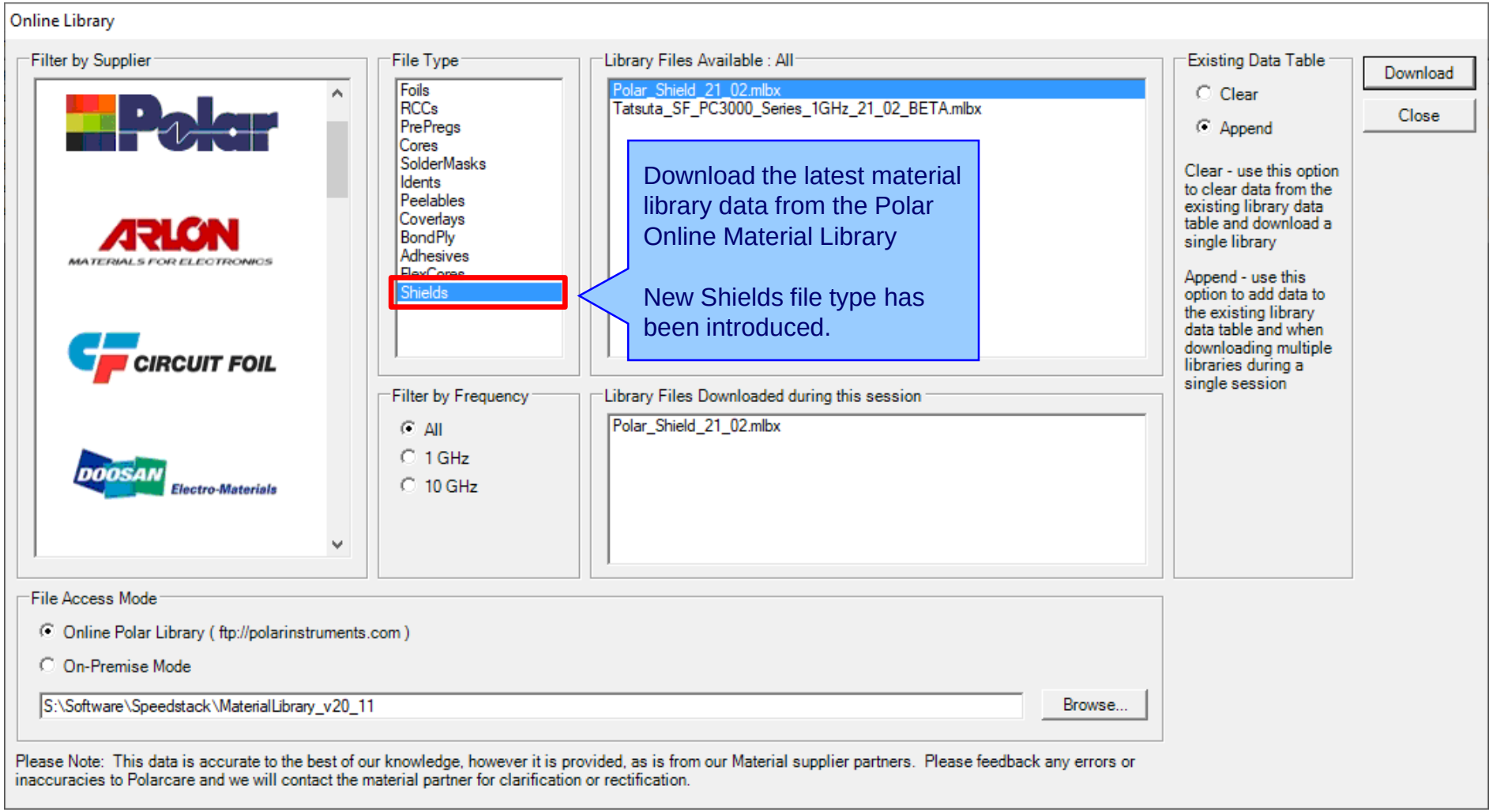
Online Library enhanced to support Shield materials



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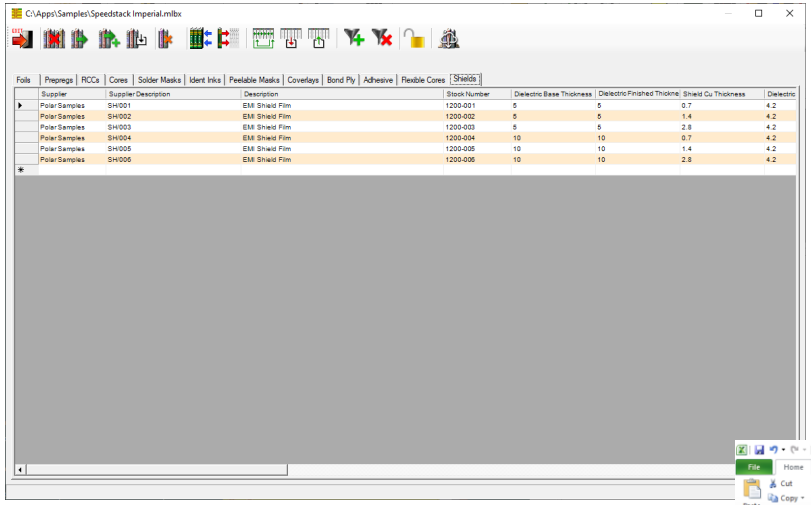
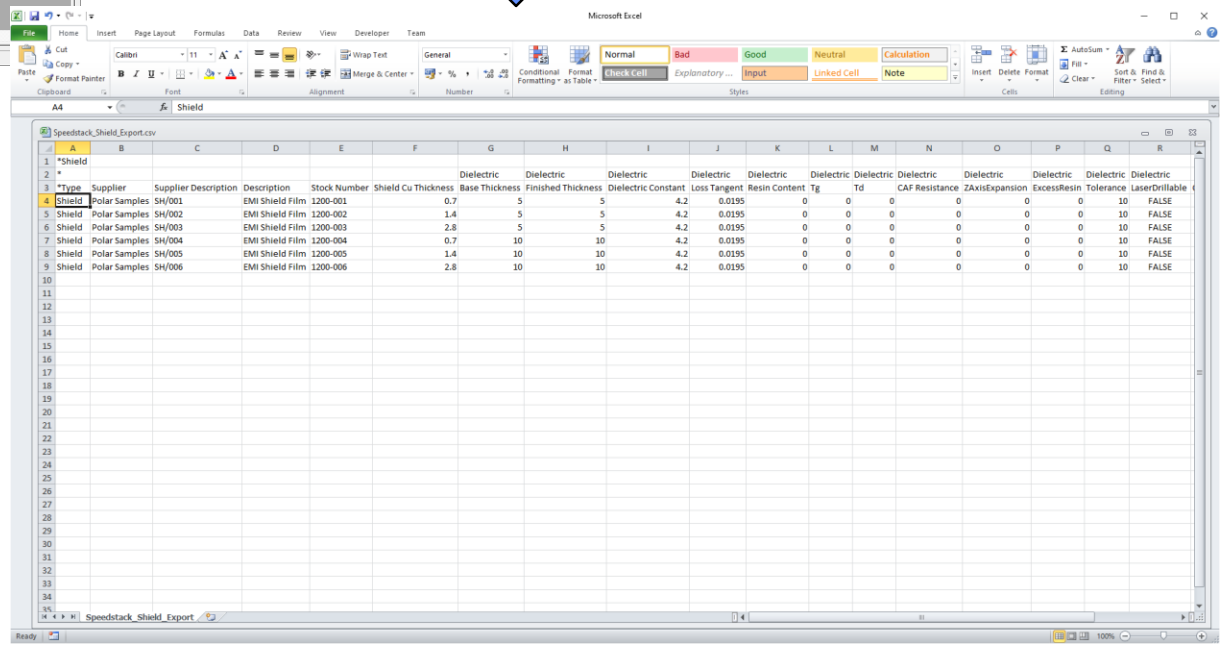
Export / Import Shield library to Excel



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



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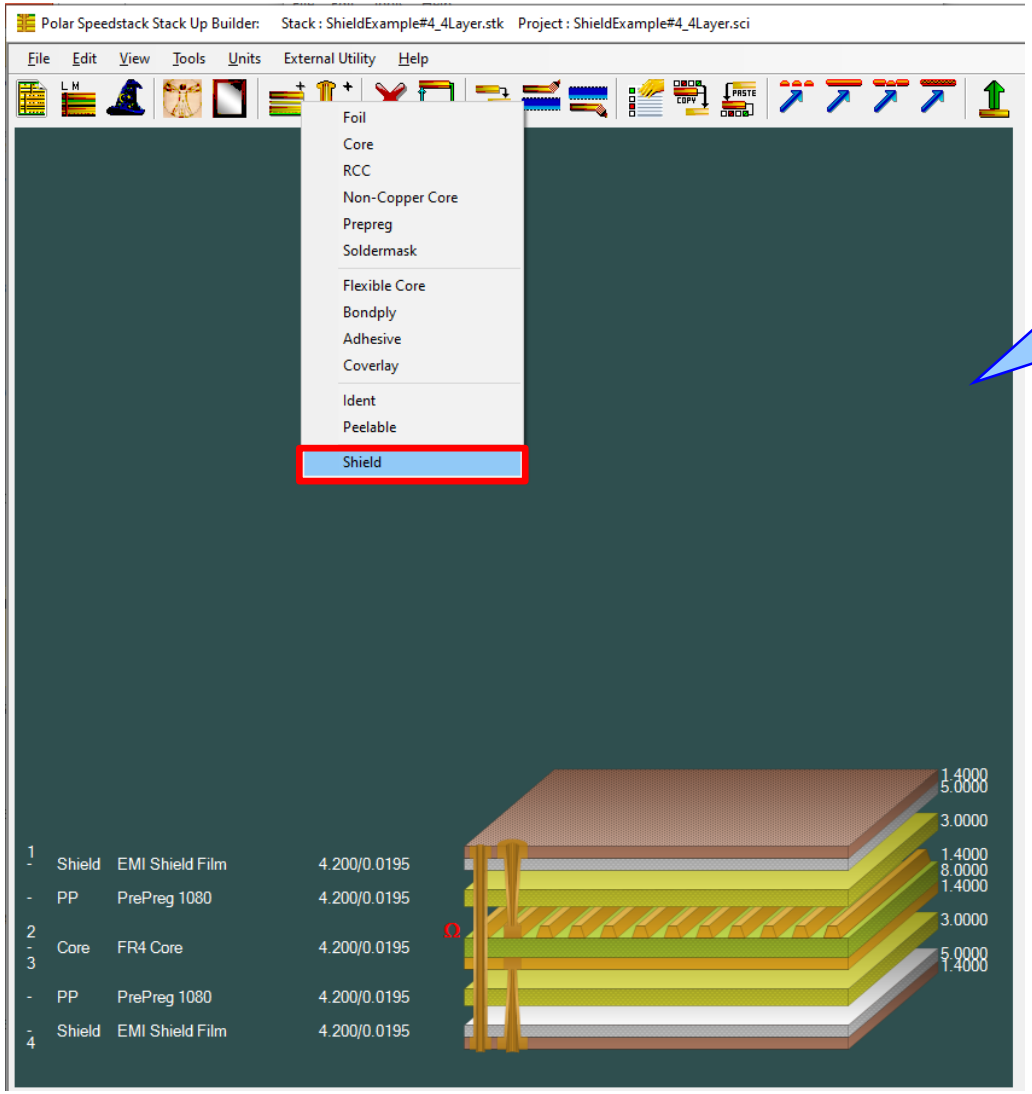
Stack up editor enhancements



Stack Up editor enhancements:

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

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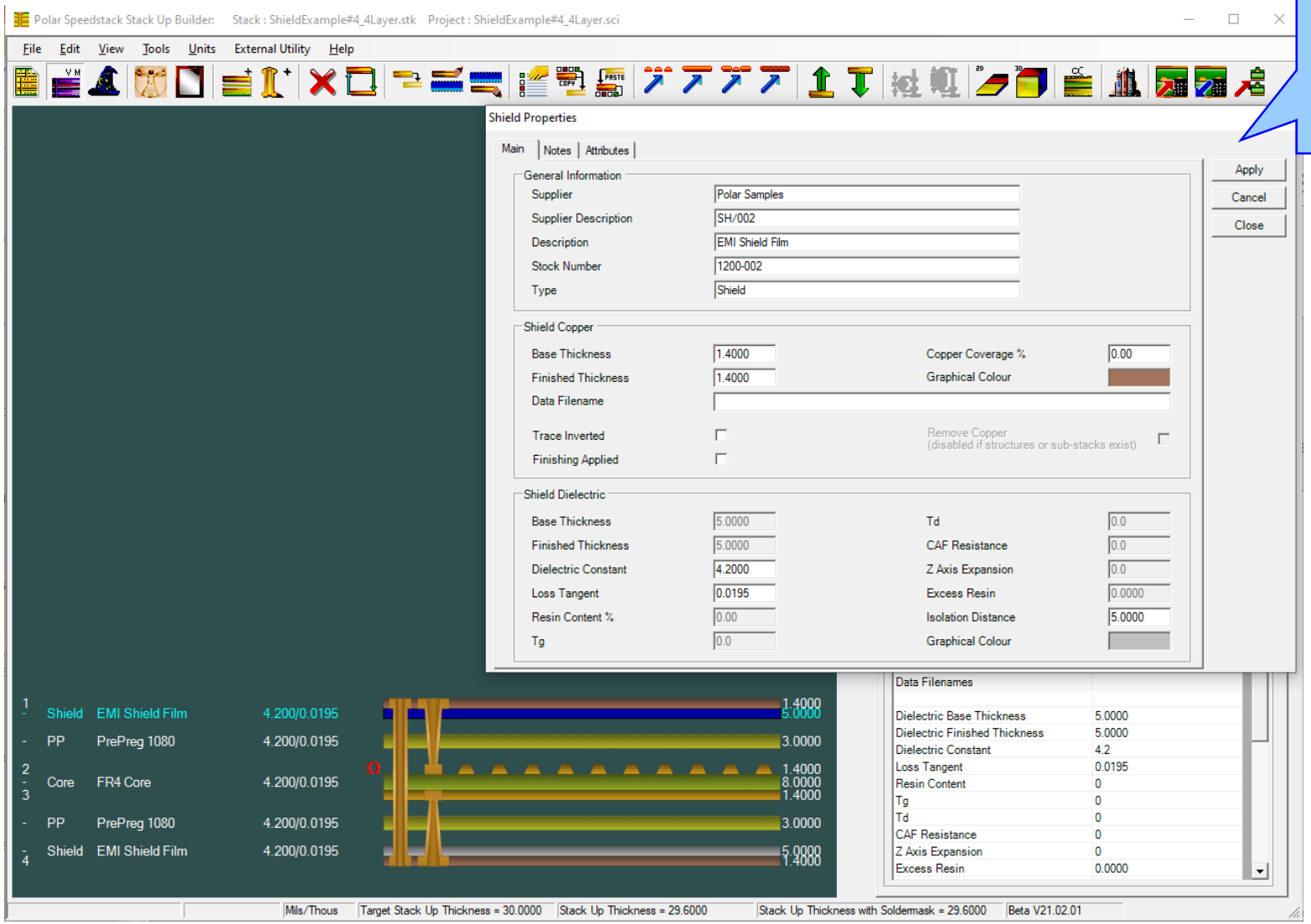
Shield properties



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

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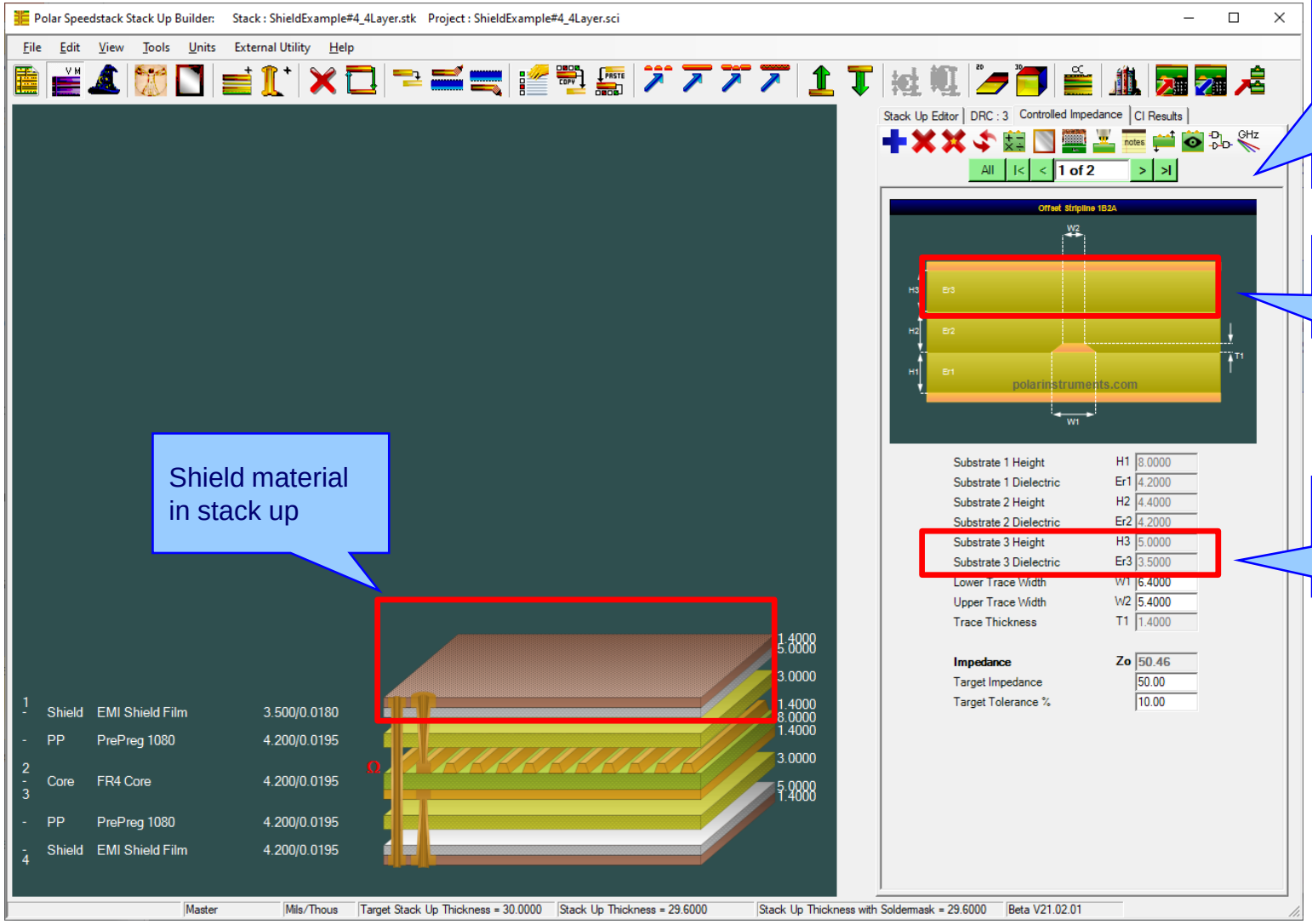
Controlled impedance and insertion loss calculations



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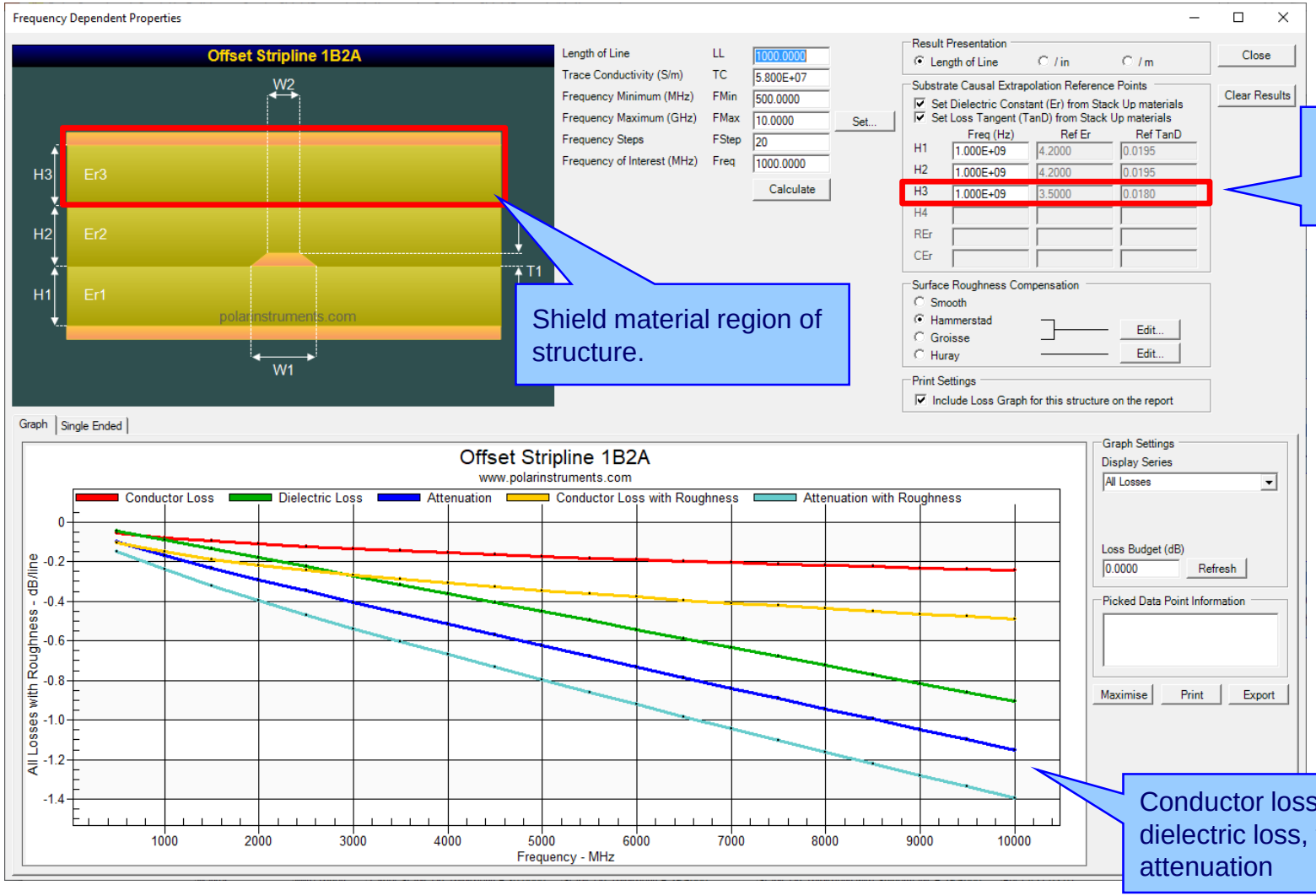
Controlled impedance and insertion loss calculations



Shield material region of structure.

Shield adhesive dielectric constant / loss tangent.

Conductor loss, dielectric loss, total attenuation

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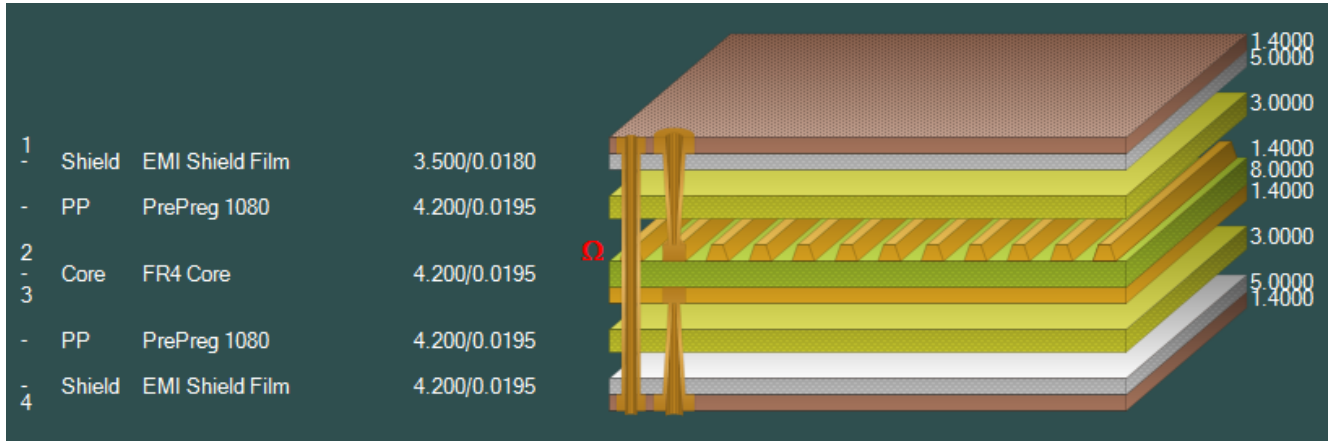
Controlled impedance and insertion loss calculations

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'.



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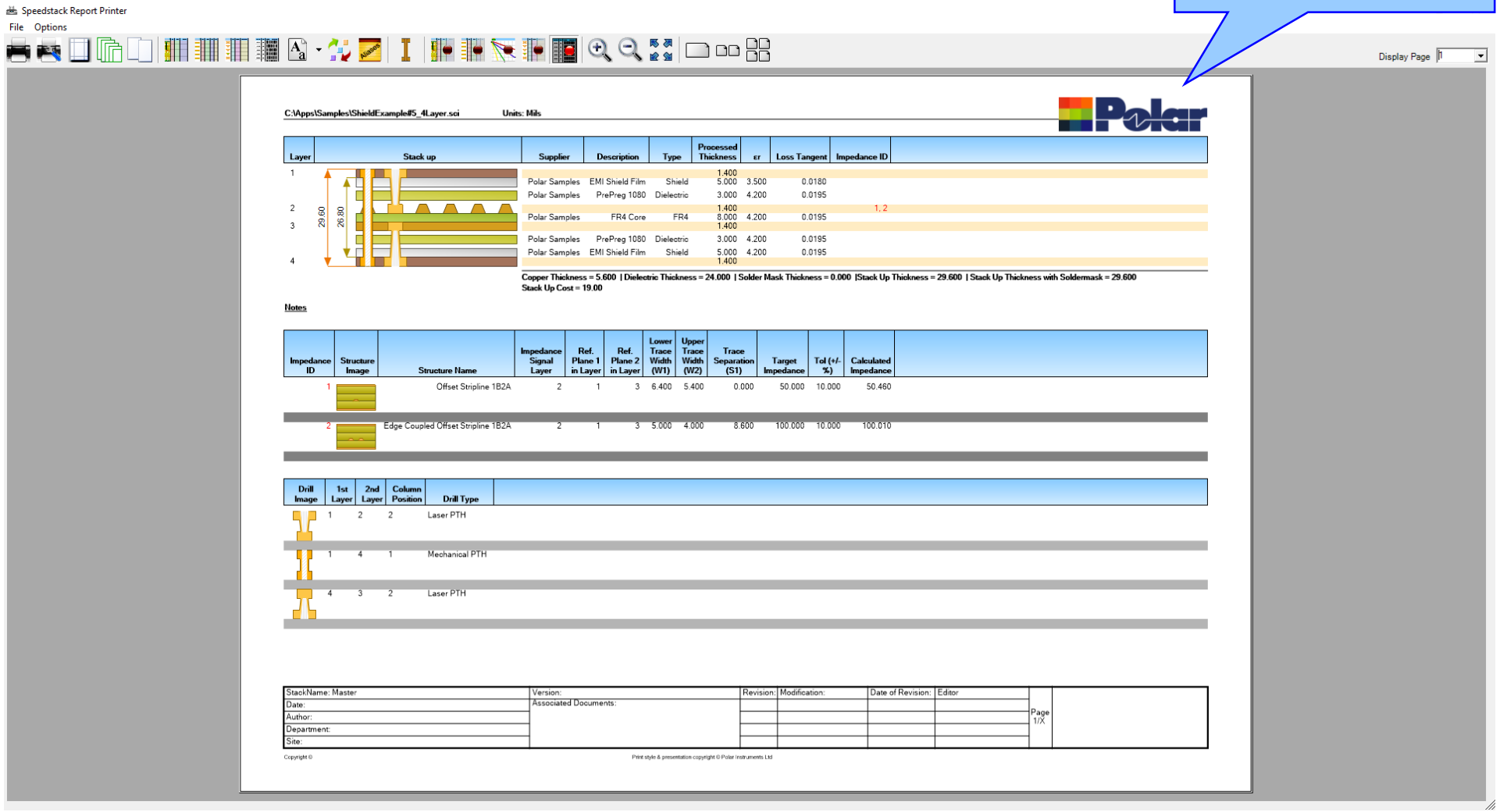
Technical report enhancements

Technical report showing shield materials



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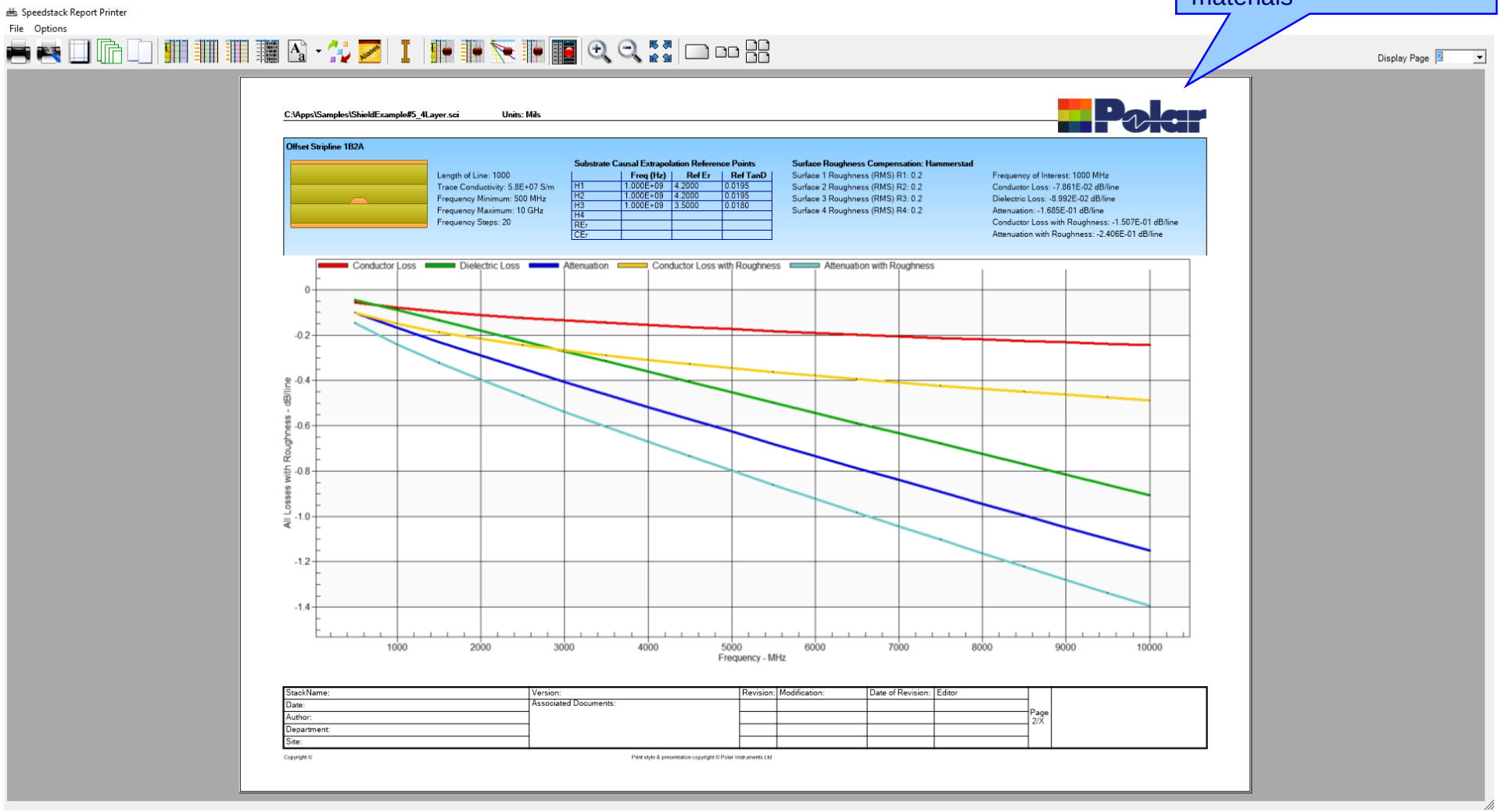
Technical report enhancements

Insertion loss report supporting shield materials



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Import / Export enhancements

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

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

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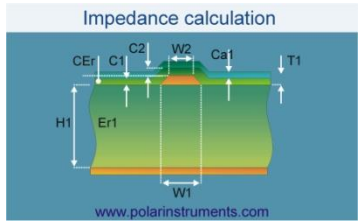

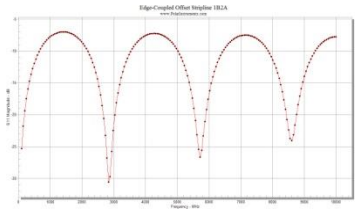

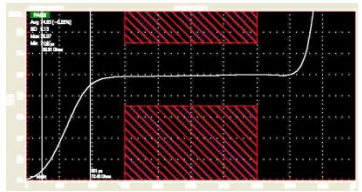

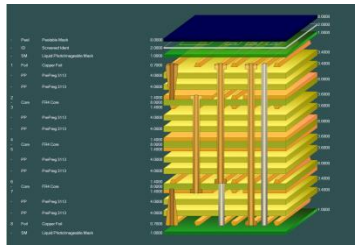

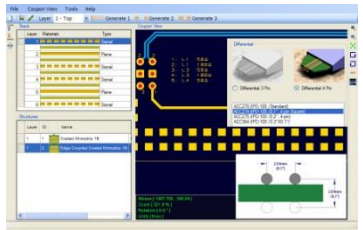

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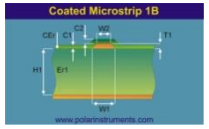

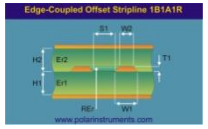

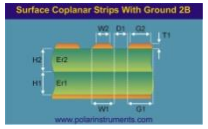

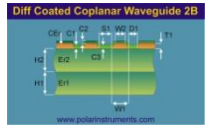

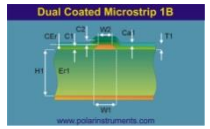

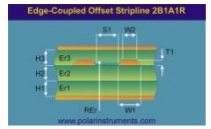

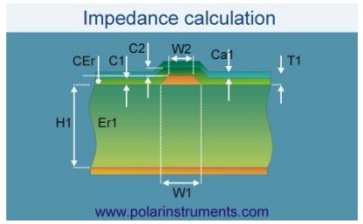

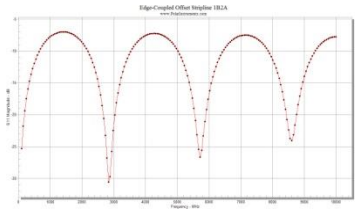

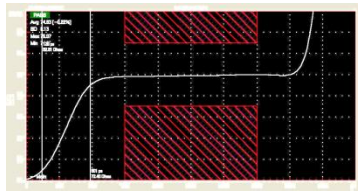

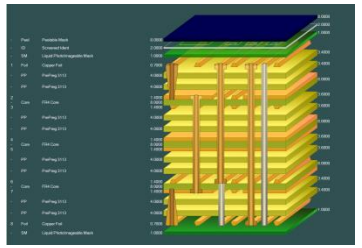

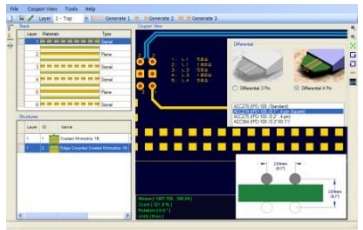

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