Speedstack updates – now with *Structure View*

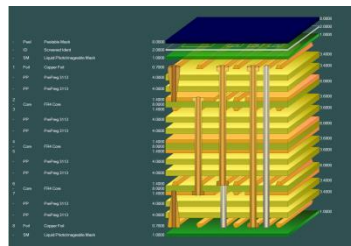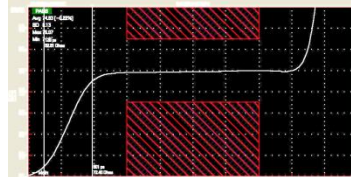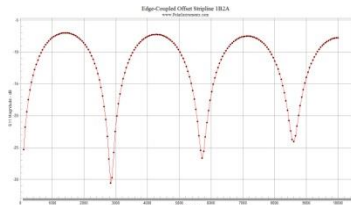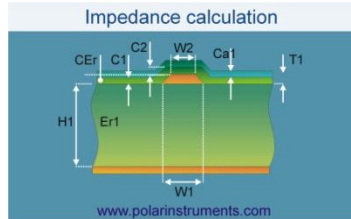Richard Attrill – November 2022 (Rev 10)
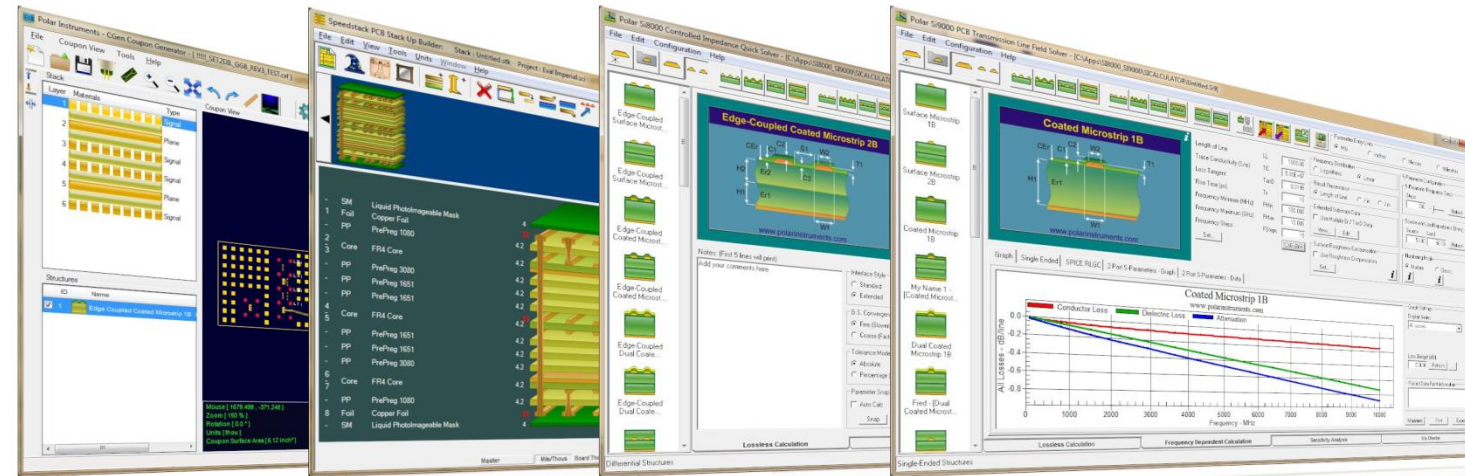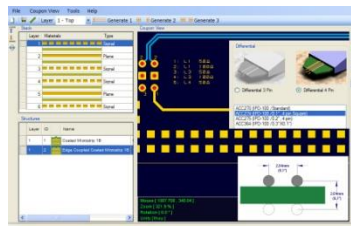
Speedstack v22.11.01 (November 2022)

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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

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

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)

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

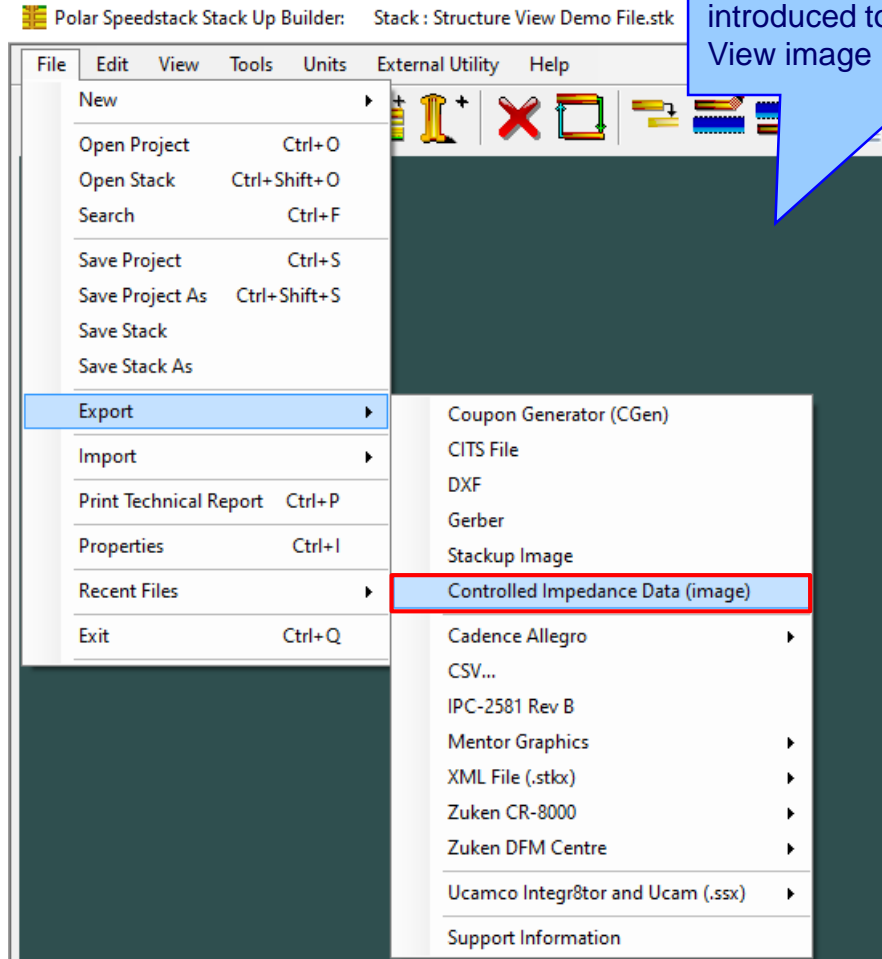Use the mouse wheel to zoom out and show the complete stack up together with the structures.

All data is now visible in one view
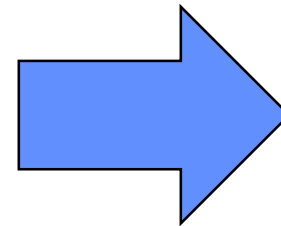
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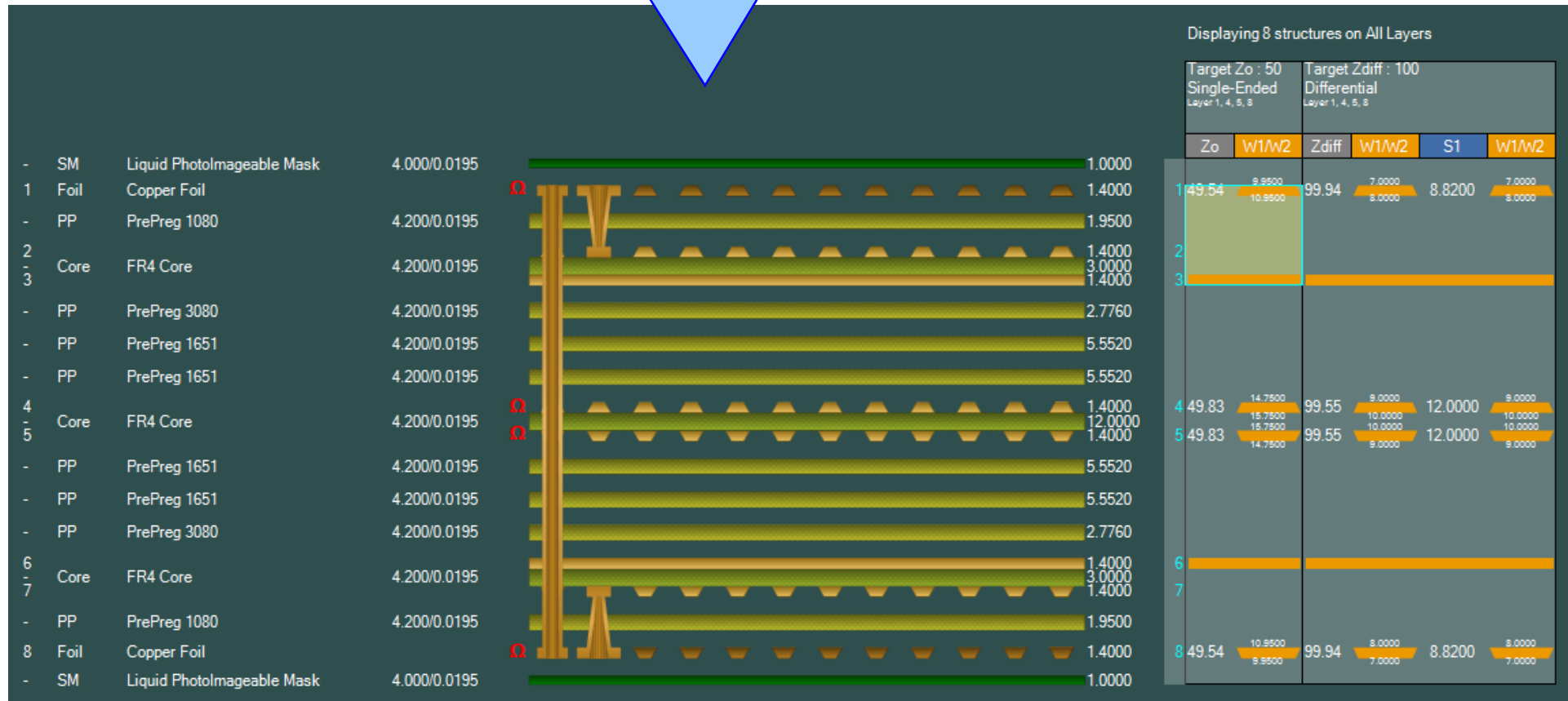
Introducing Structure View

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

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Online Library enhancements

Oak-Mitsui have recently joined the Polar Material Partner program

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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

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

...y then be edited with Excel
...ent columns are editable, other colum...
...olderMask.MaskThickness, Coverlay,...

Apply   Cancel

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

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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

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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

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

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Using Grid View with Microsoft Excel – Step #3

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

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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

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	1.5000		
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 PhotoImageable Mask	1.0000	4.0000	0.0195

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

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

Apply   Cancel

Using Grid View with Microsoft Excel – Step #6

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

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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

AGC have recently joined the Polar Material Partner program

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Embedded Microstrip structure enhancements

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

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New Confidential Stamp options added to the technical report

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

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Speedstack v22.01.01 (January 2022)

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Snap Parameters and Calculate Structure

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.

Original parameter values

Snapped/rounded parameter values

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Snap Parameters and Calculate Structure

Configuration Options ✕

External Utilities | Rebuild and Calculate Structures

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

Structures

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

Board Thickness

Board Thickness	60.0000
Plus %	10
Minus %	10
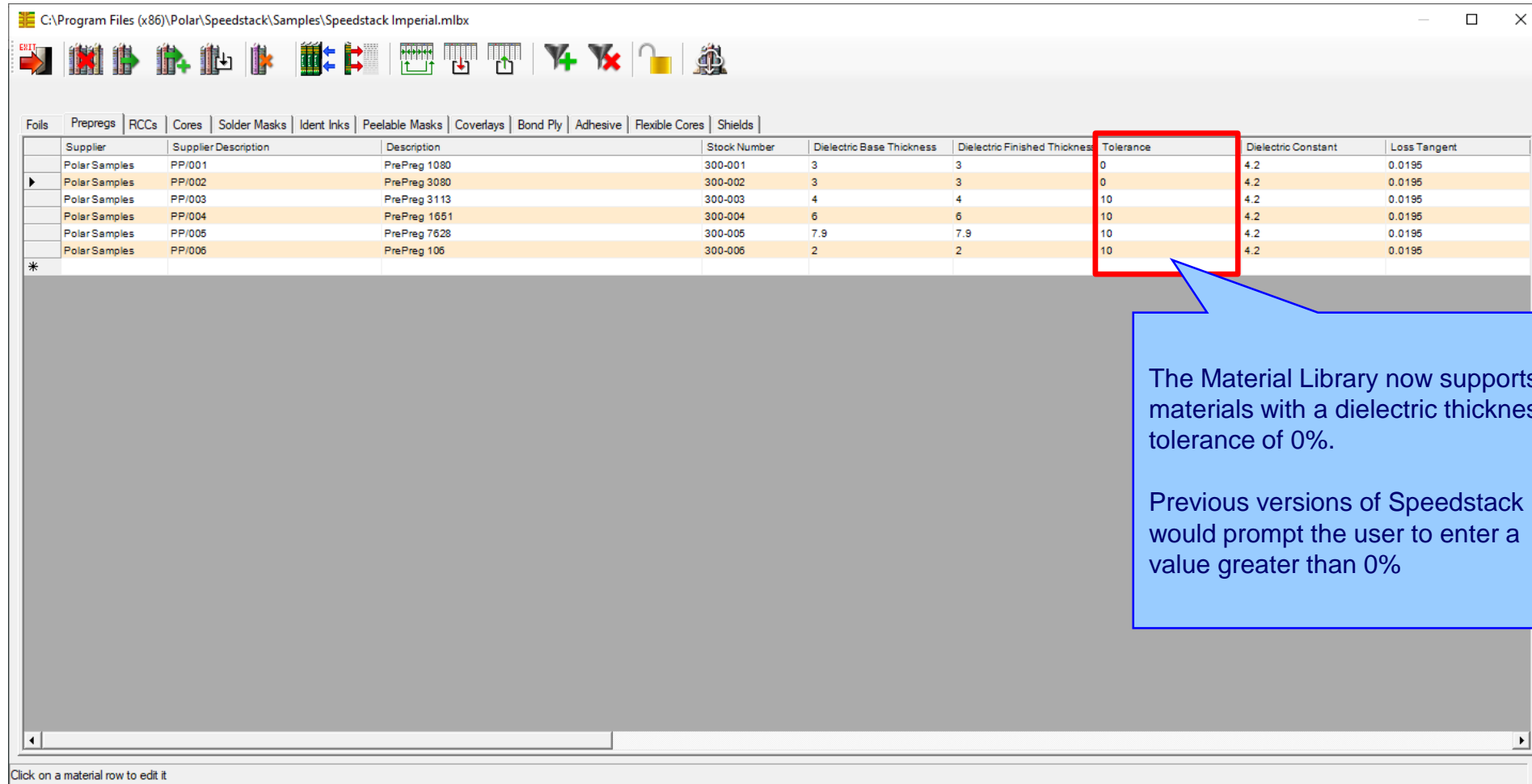
Drilling

Minimum Hole Size	20.0000

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

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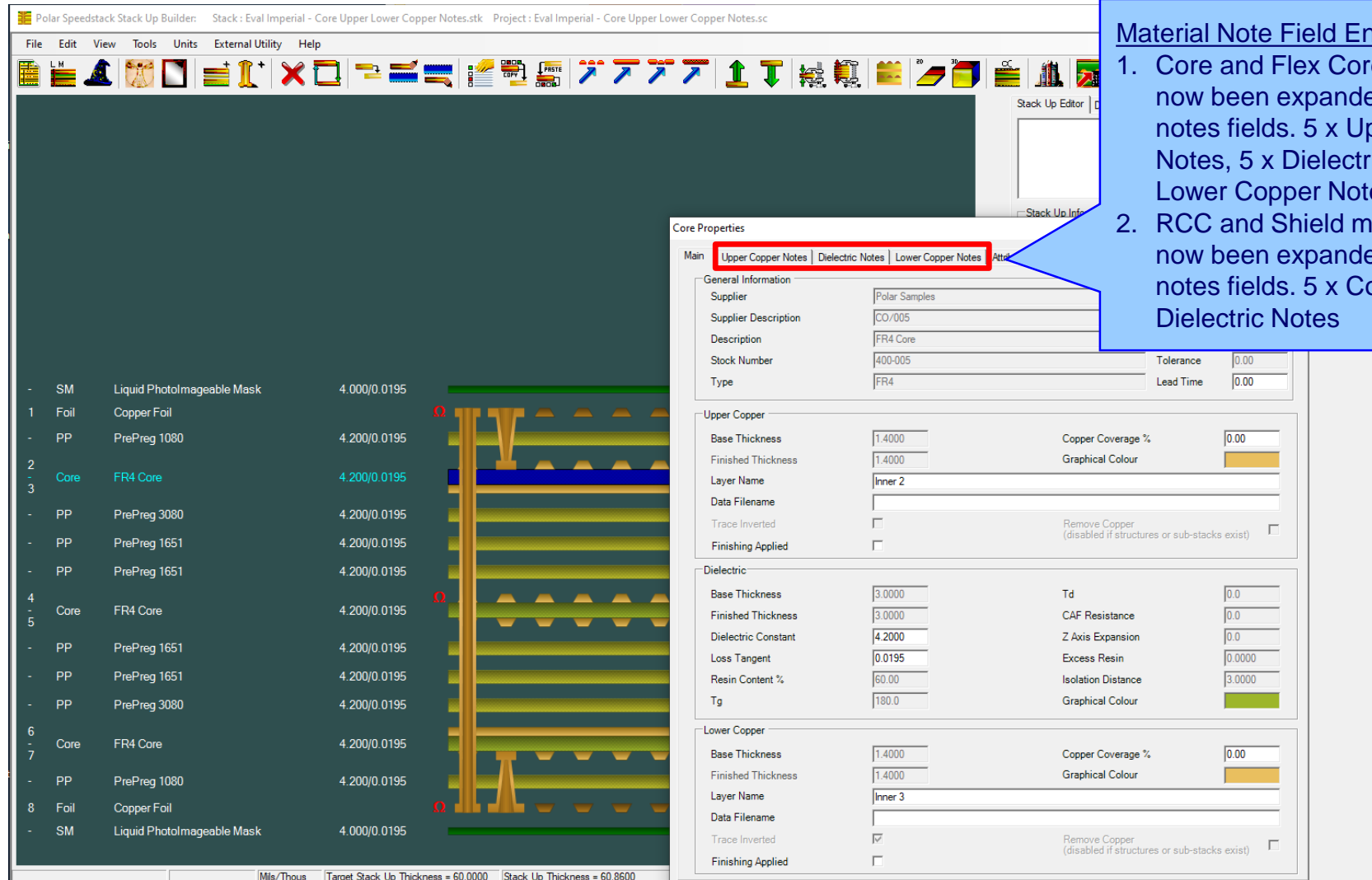
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Material Library Enhancements

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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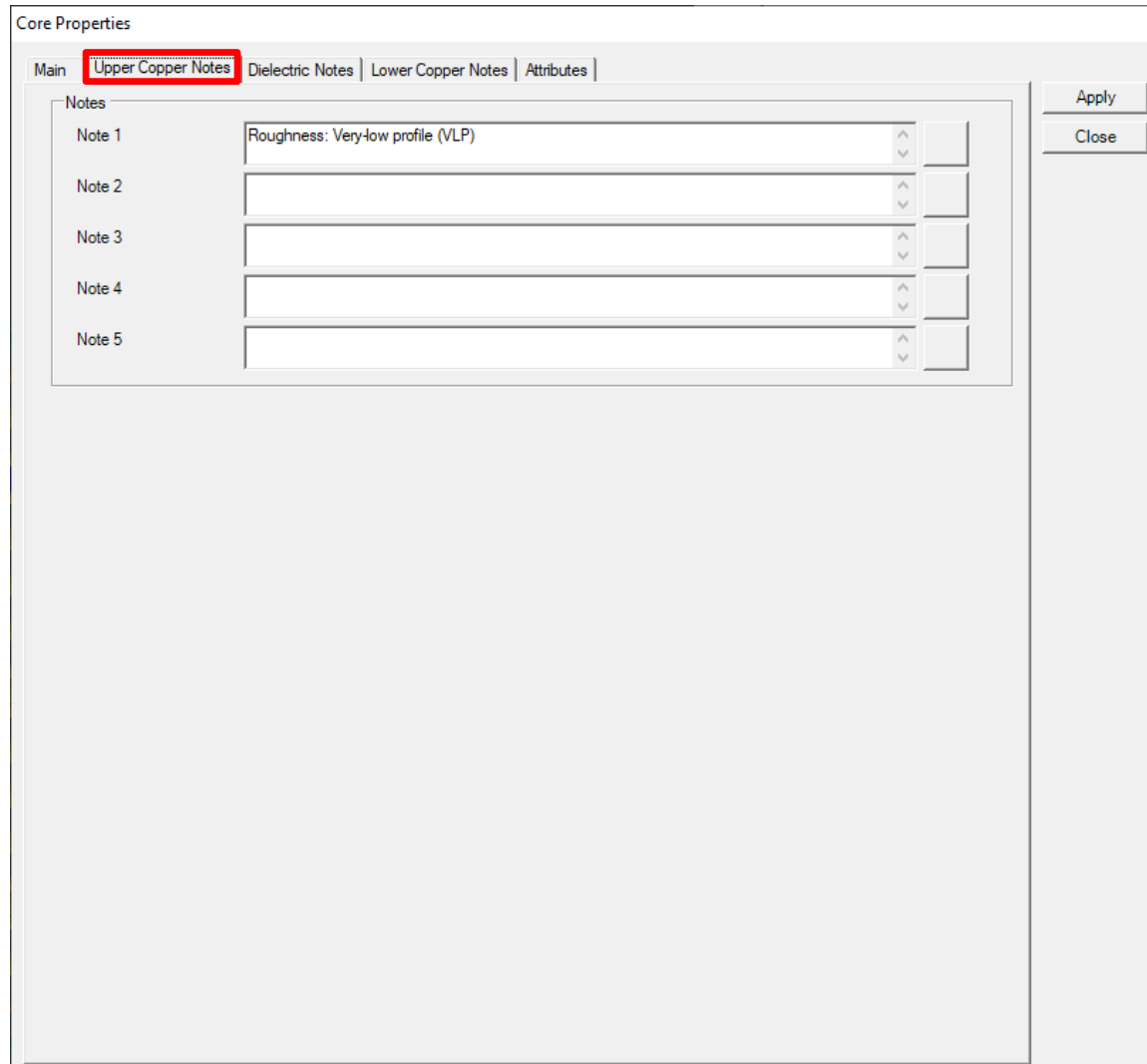# Speedstack v21.11.01 (November 2021)

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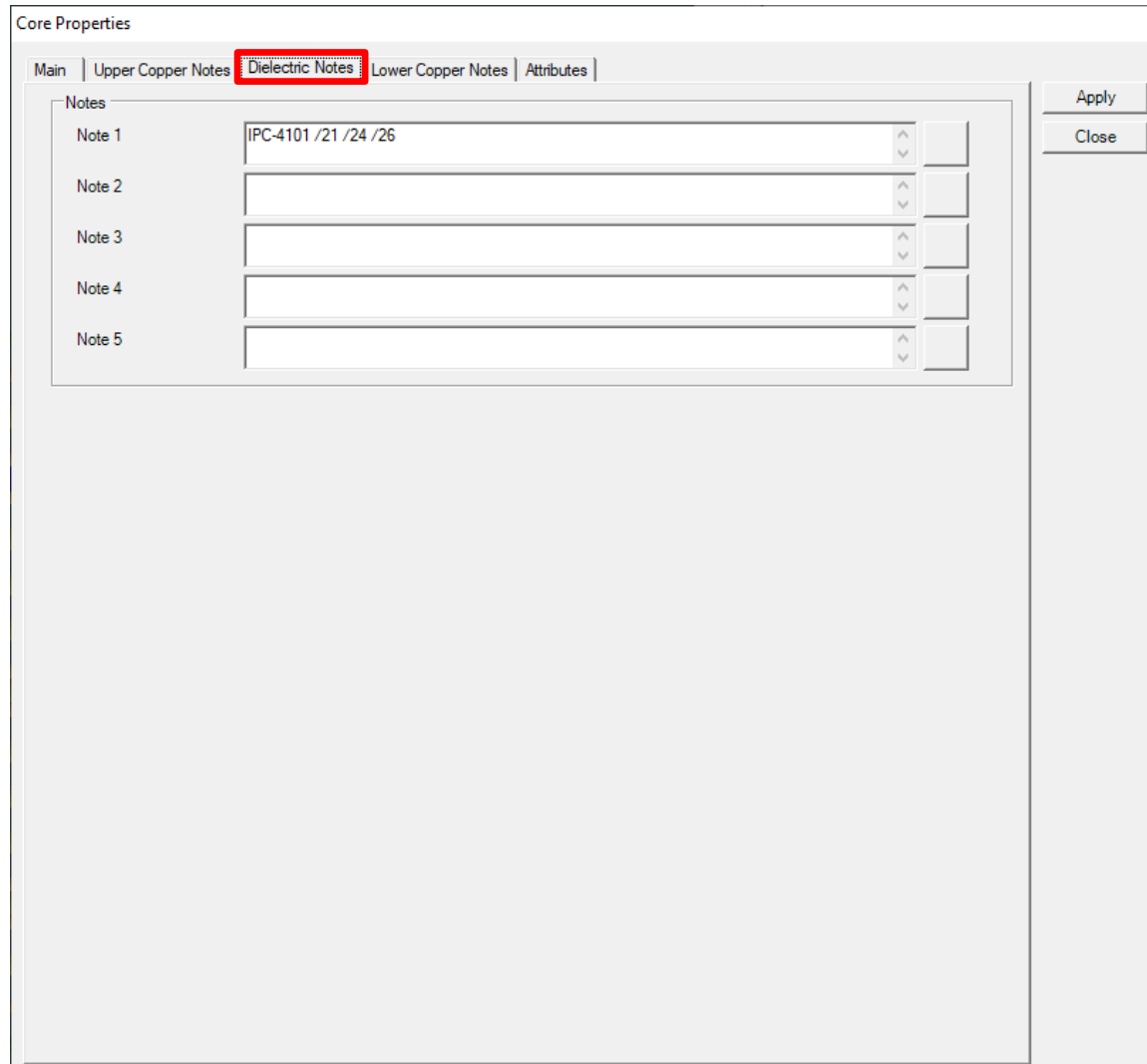
The new Upper and Lower Copper Notes allow the user to specify important information about the copper surfaces for a Core and Flex Core material.

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

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Material Note Field Enhancements – improvements to stack up documentation
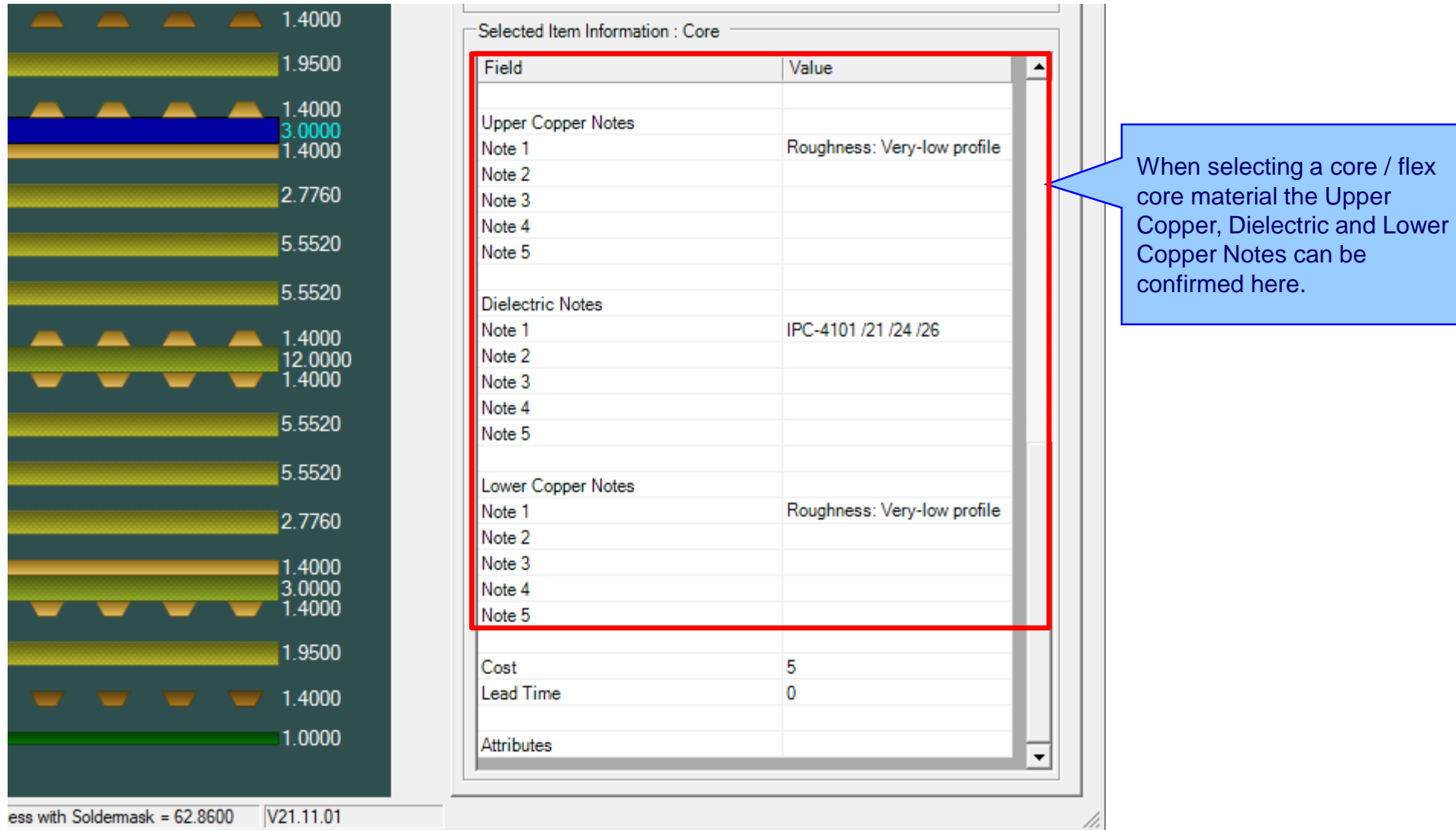
Dielectric Notes are useful for specifying IPC-4101 slash sheet categories, glass weave information (spread glass) and other important information regarding the dielectric region of the core.

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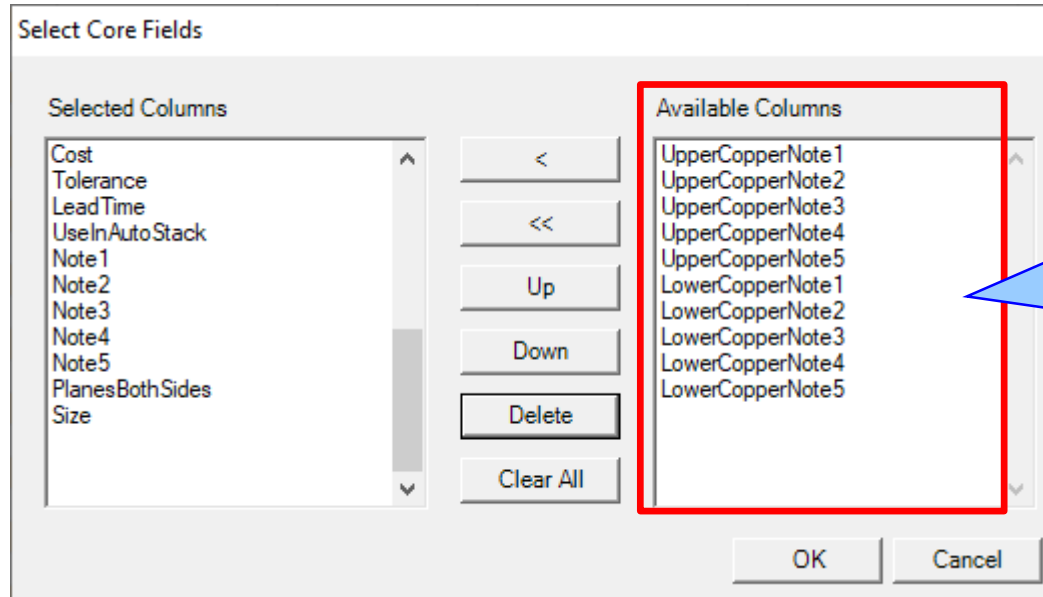
For existing Speedstack users upgrading to v21.11, use the Select and Arrange Columns and Save Column Order toolbar options to add these new material library columns to the Data Grid view

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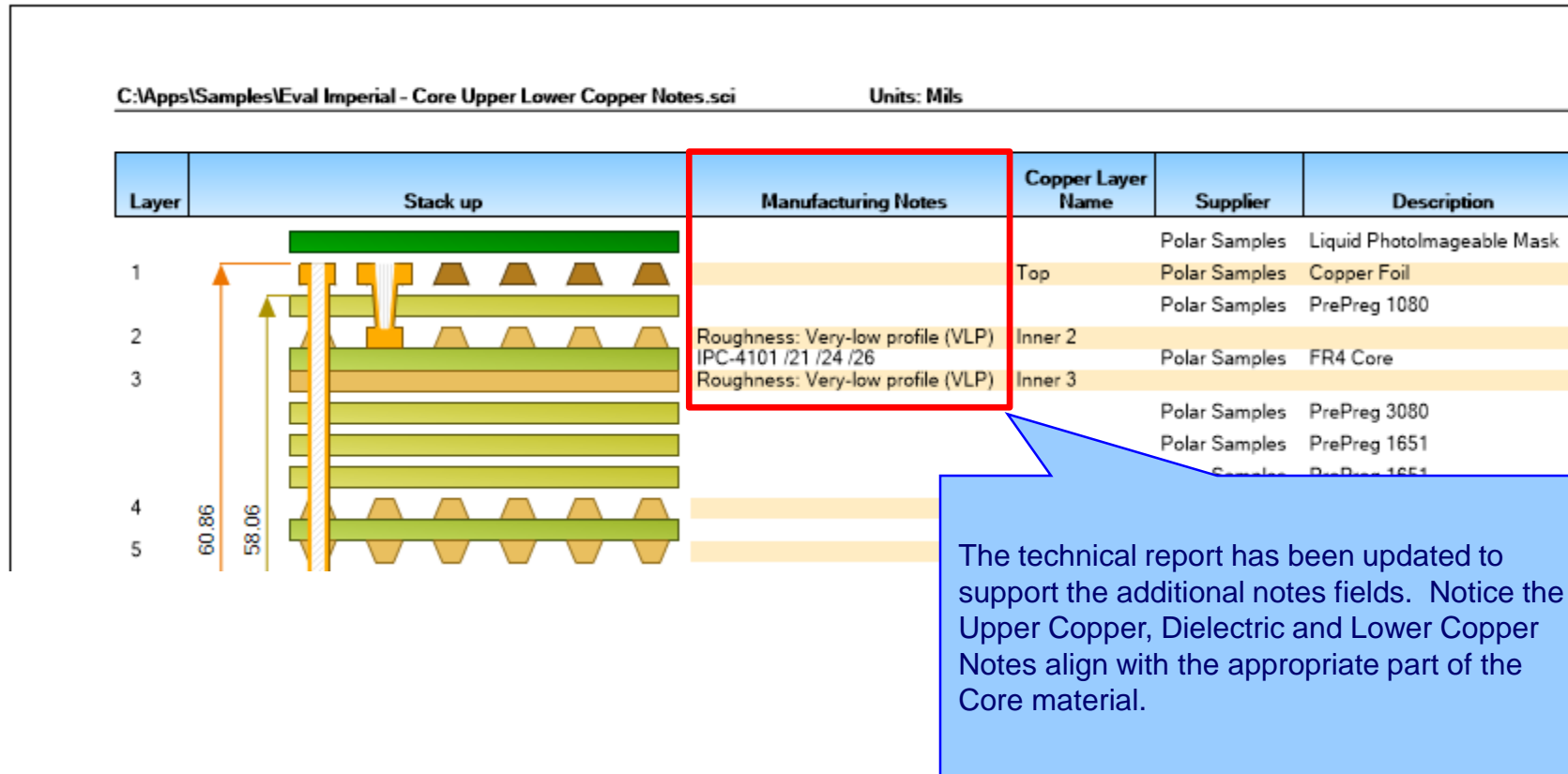
The technical report has been updated to support the additional notes fields. Notice the Upper Copper, Dielectric and Lower Copper Notes align with the appropriate part of the Core material.

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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

Speedstack v21.07.08 (July 2021)
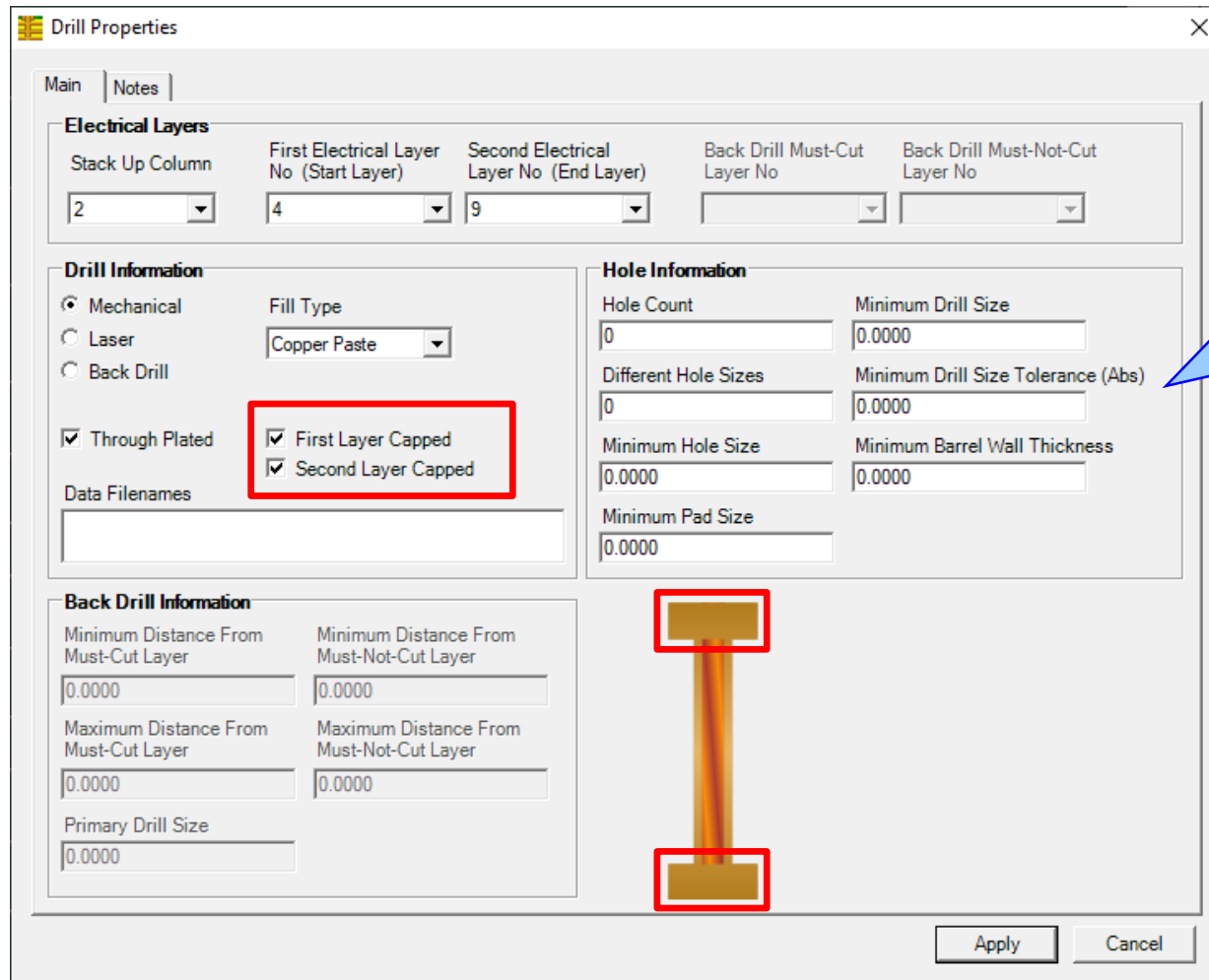
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New Drill Cap feature

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
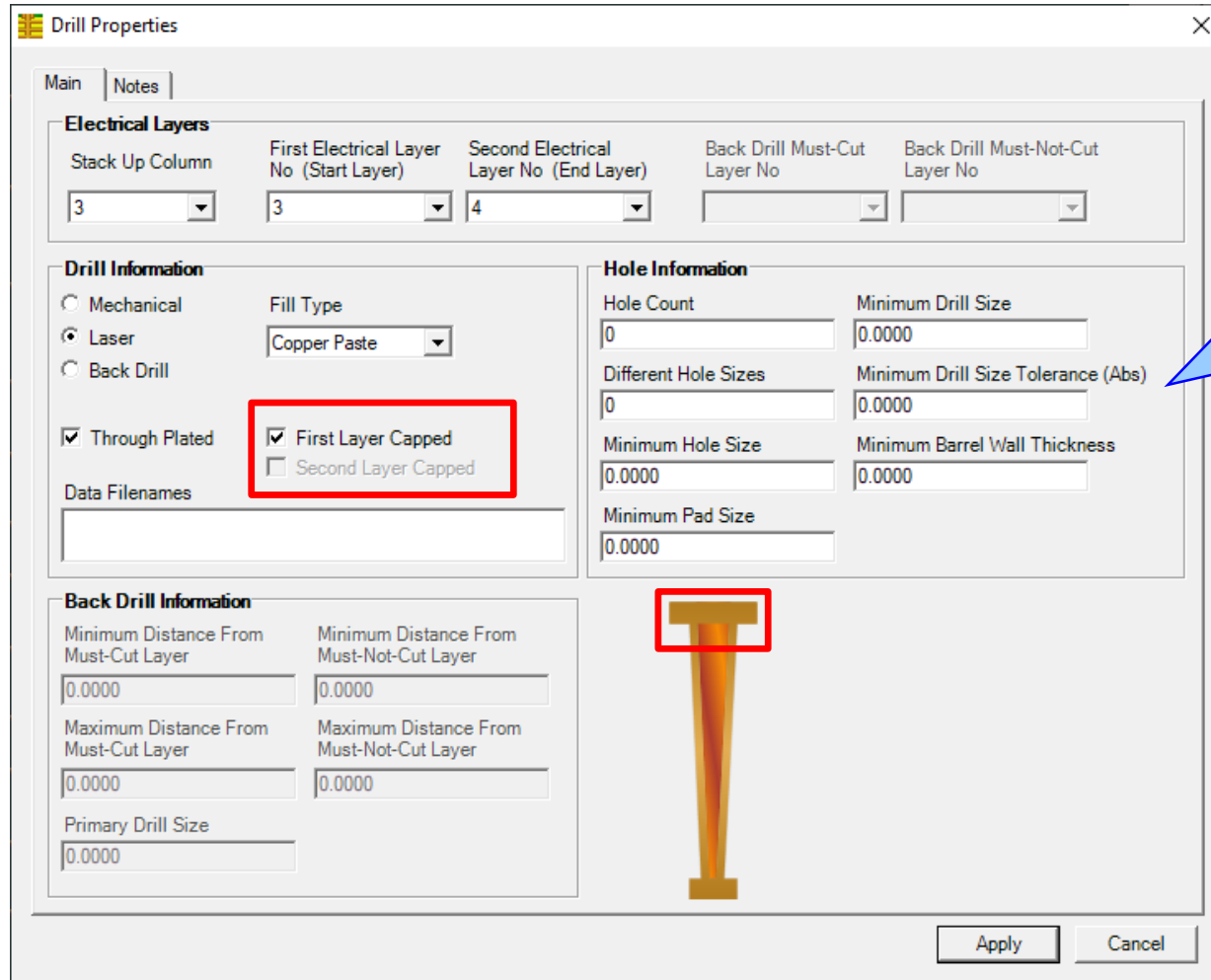
Mechanical
For mechanical drills it is possible to have four states:
1.Neither first or second layer capped (default when adding a drill)
2.First layer capped
3.Second layer capped
4.Both layers capped

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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

The Selected Item Information auto updates as you click each drill, the First / Second Layer Capped can be confirmed here

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New Drill Cap feature – technical report enhancements

The technical report has also been updated to support capped drills

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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

Main | Notes | Attributes

General Information

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

Copper

Base Thickness	0.7000	Copper Coverage %	0.00
Finished Thickness	1.4000	Graphical Colour	
Layer Name	Top		
Data Filename			
Trace Inverted	☐	Remove Copper (disabled if structures or sub-stacks exist)	☐
Finishing Applied	☐		

Apply

Foil Properties

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

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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

	SM	Liquid PhotoImageable Mask	4.000/0.0195	1.0000
1	Foil	Copper Foil		1.4000
				L 1 [Top] : 2 Structures
-	PP	PrePreg 1080	4.200/0.0195	1.9500

-	PP	PrePreg 1651	4.200/0.0195	5.5520
4				1.4000
-	Core	FR4 Core	4.200/0.0195	12.0000
5				1.4000
				L 5 [Inner 5]
-	PP	PrePreg 1651	4.200/0.0195	5.5520

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

Customise the Display Fields to show the layer name next to the stack up graphic

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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

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

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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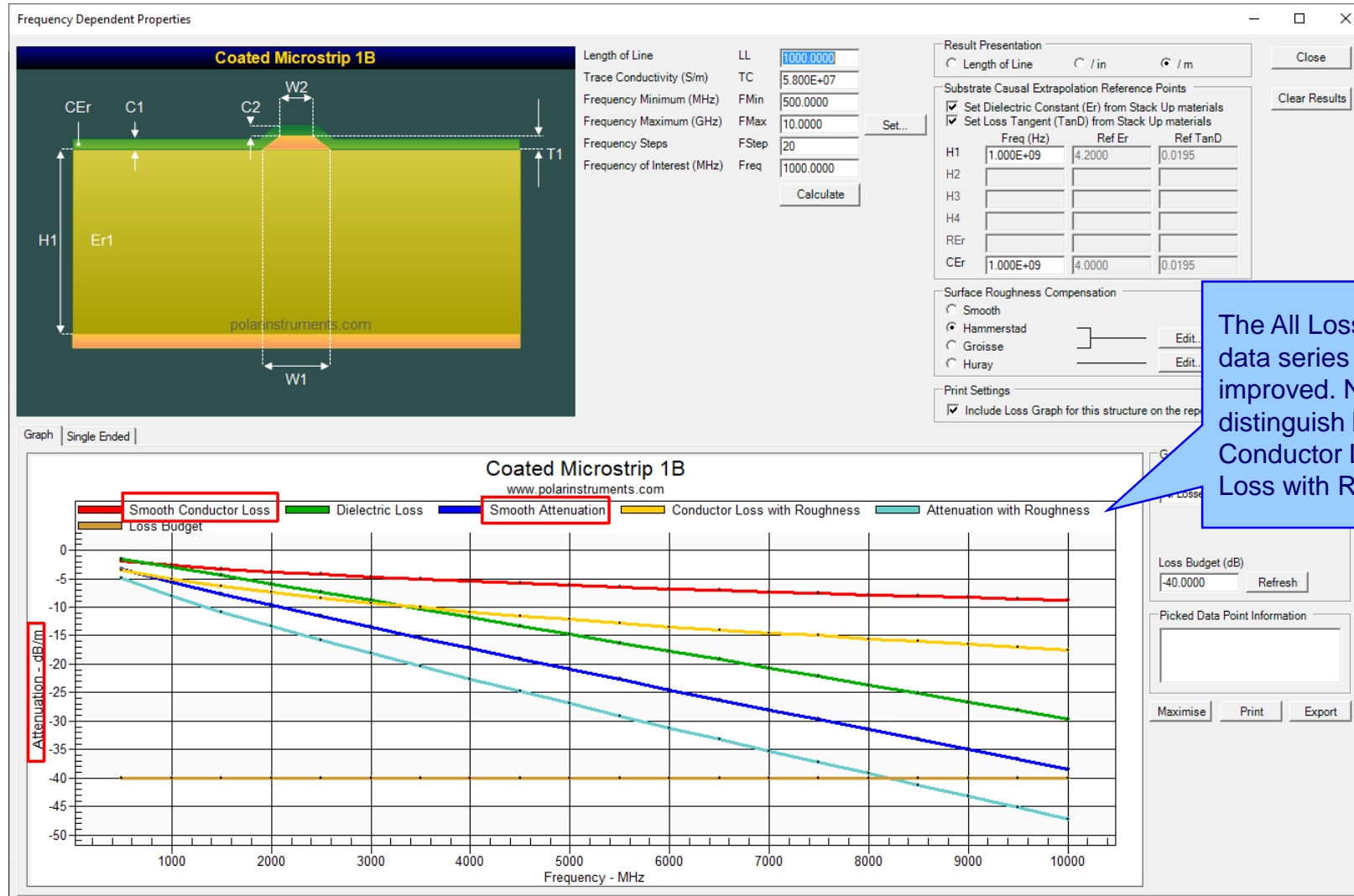
Other enhancements

- 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
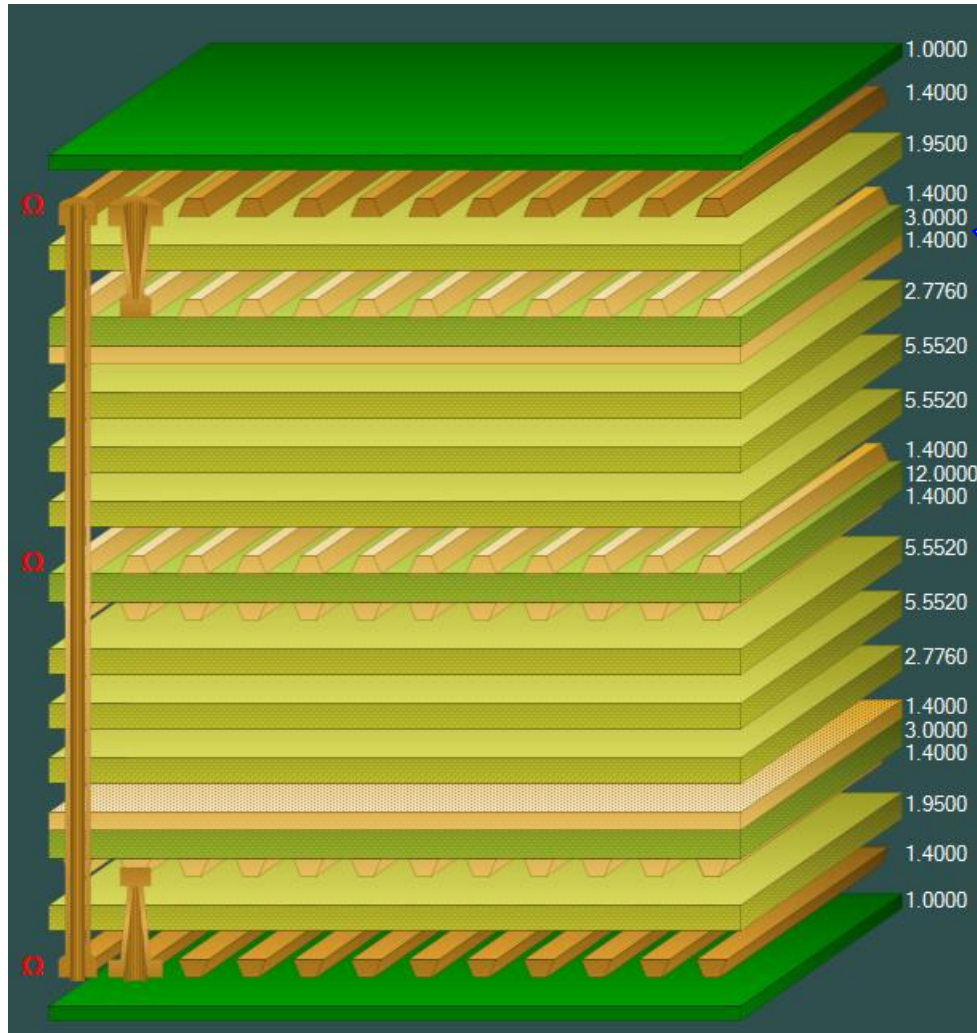
Plated Copper Layers

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

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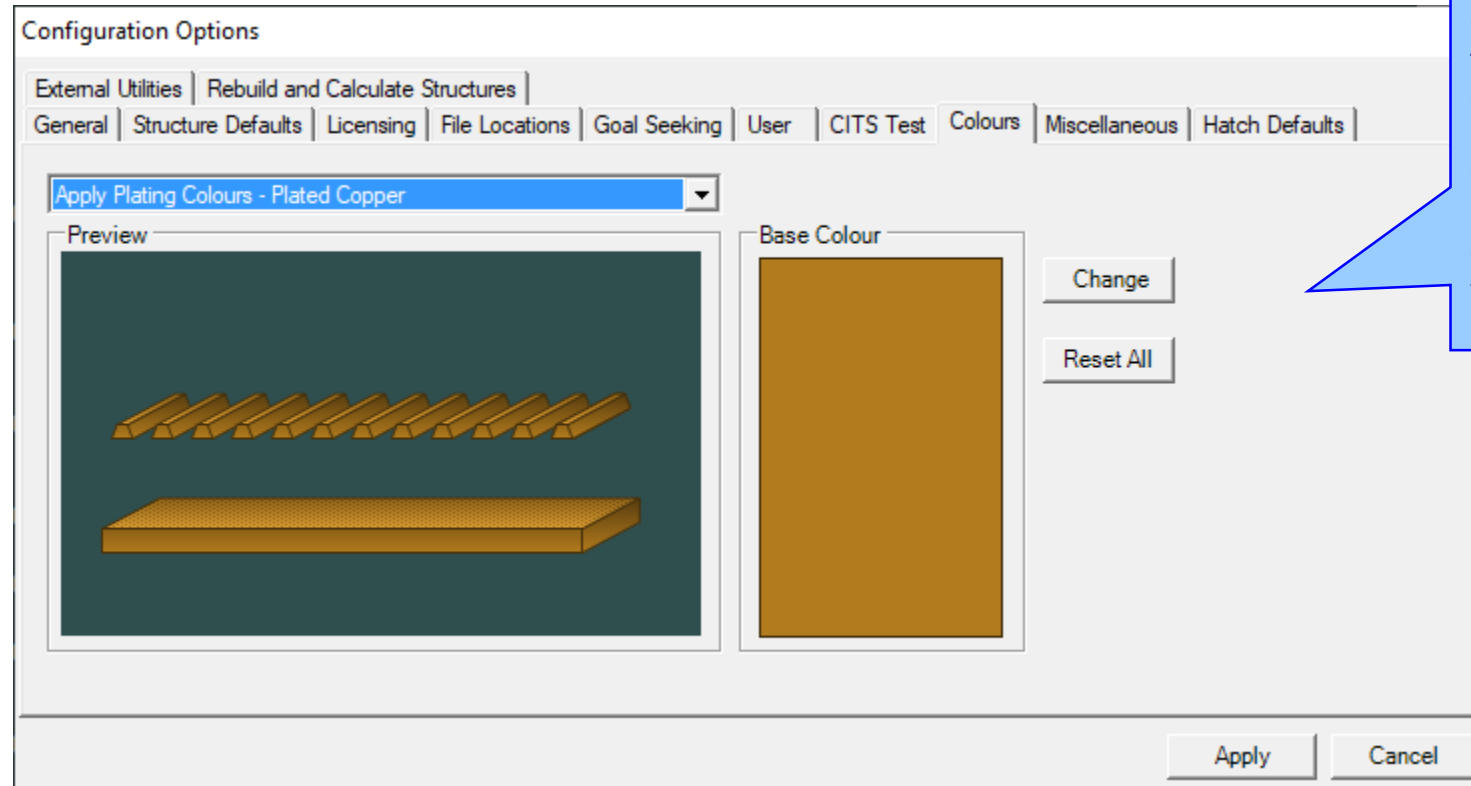
Two new user-definable colours have been introduced to the Speedstack Configuration Options.

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

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Online Library enhancements

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

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

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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

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

Ω

1.4000
5.0000

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

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Shield material examples
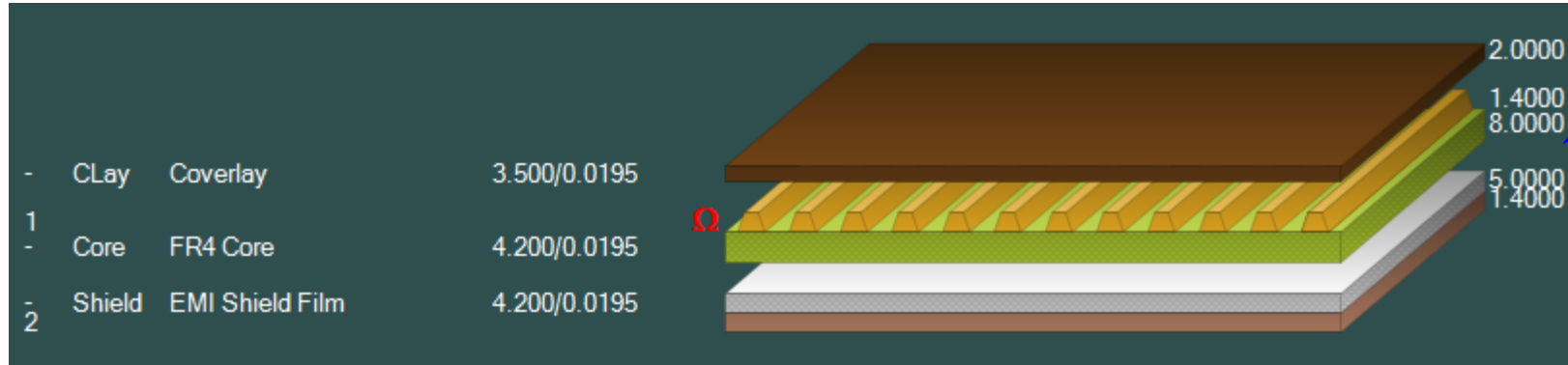
Example #1
Single-sided core, coverlay above trace, shield below
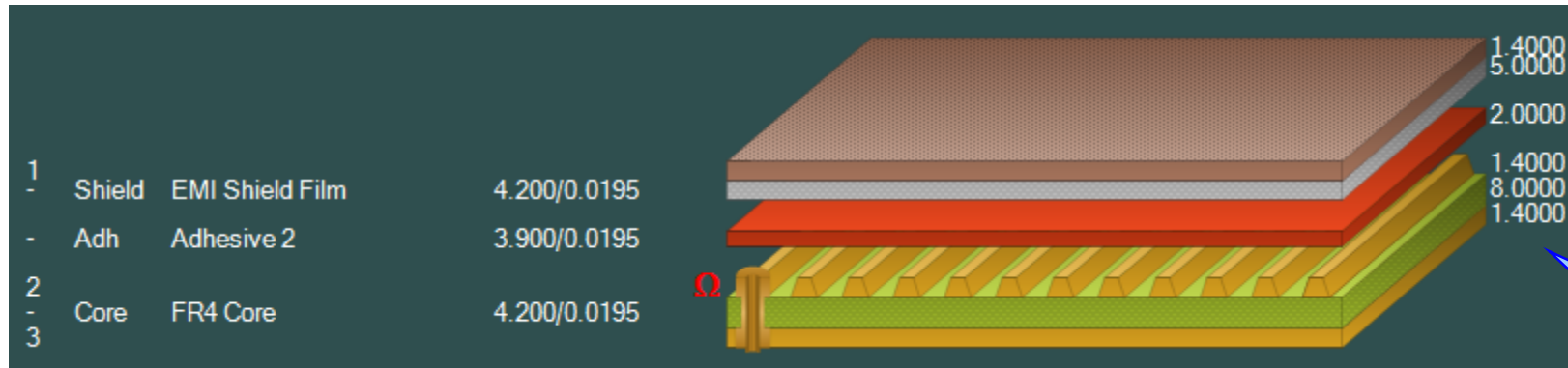
Example #2
Double-sided core, adhesive and shield above

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Shield material examples

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

1.4000
5.0000
3.0000
1.4000
3.0000
1.4000
3.0000
5.0000
1.4000
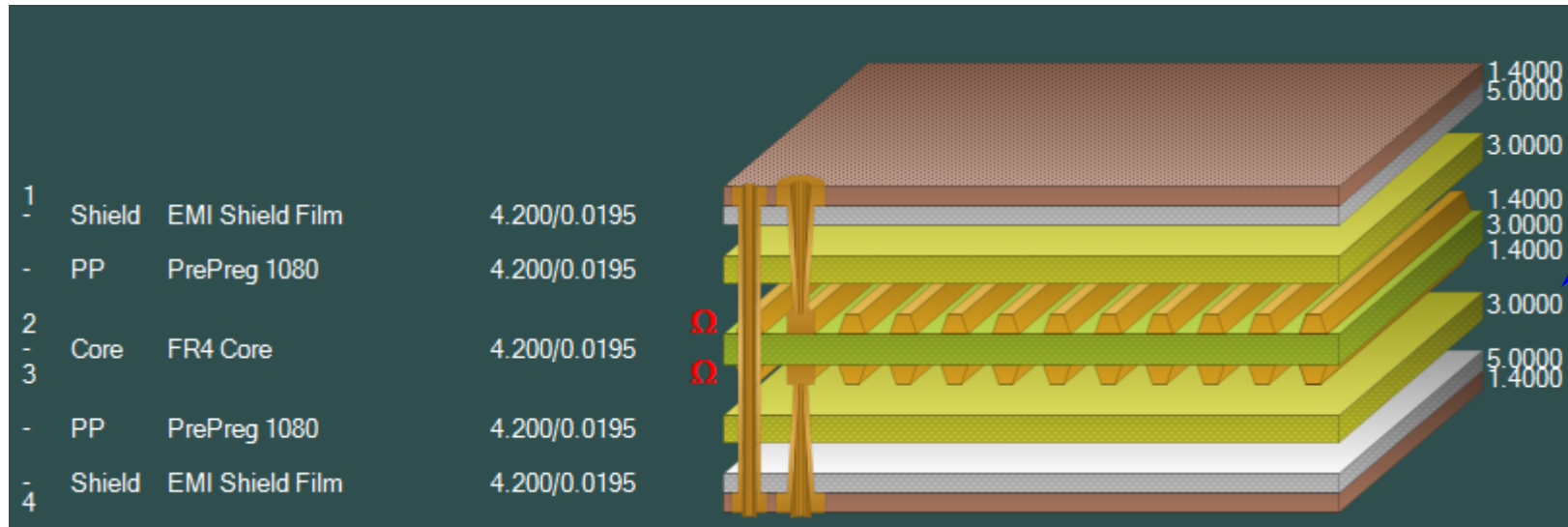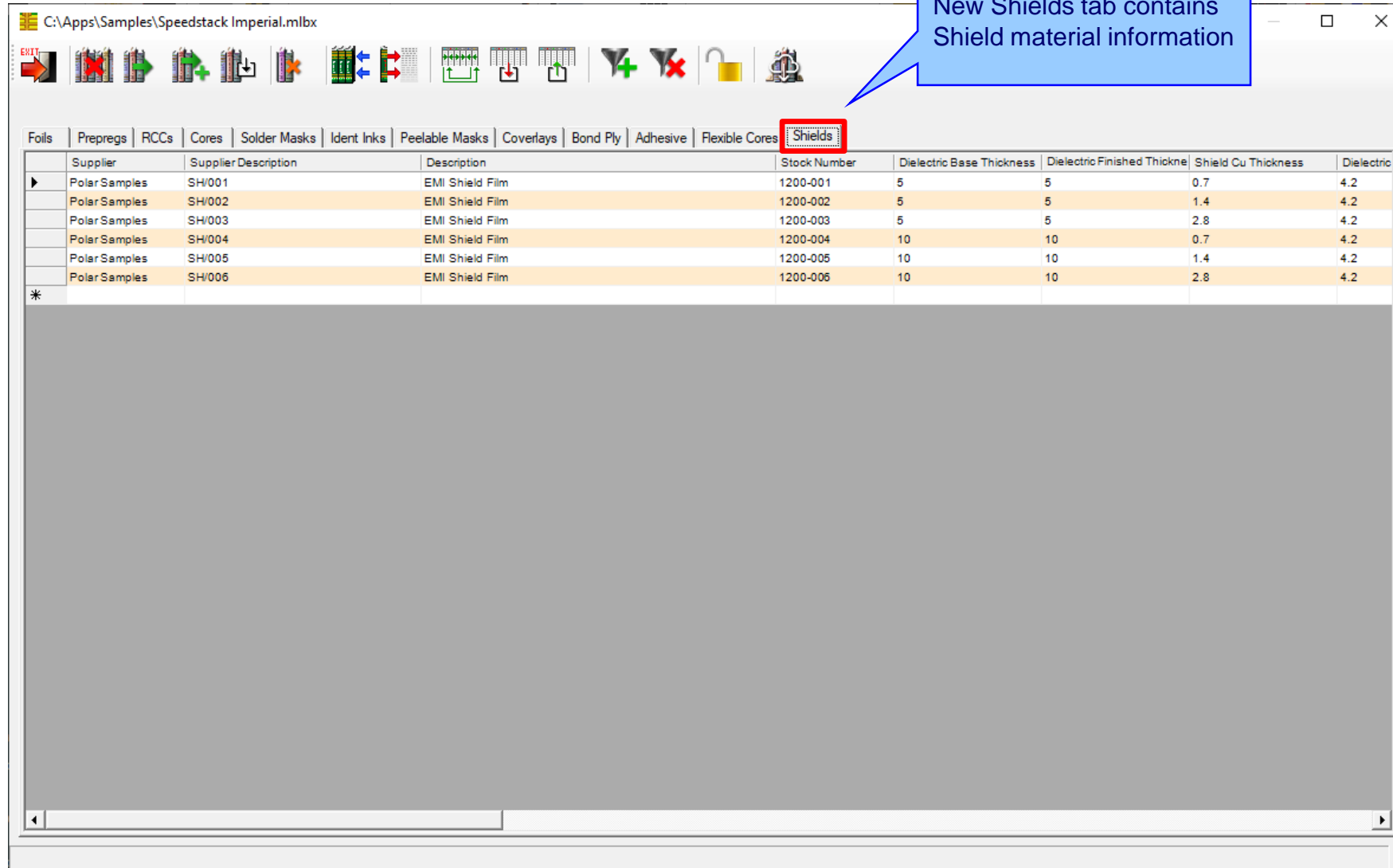
Example #3
Double-sided core with two signal trace layers with shield above and below trace layers

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

1.4000
5.0000
3.0000
1.4000
8.0000
1.4000
3.0000
5.0000
1.4000
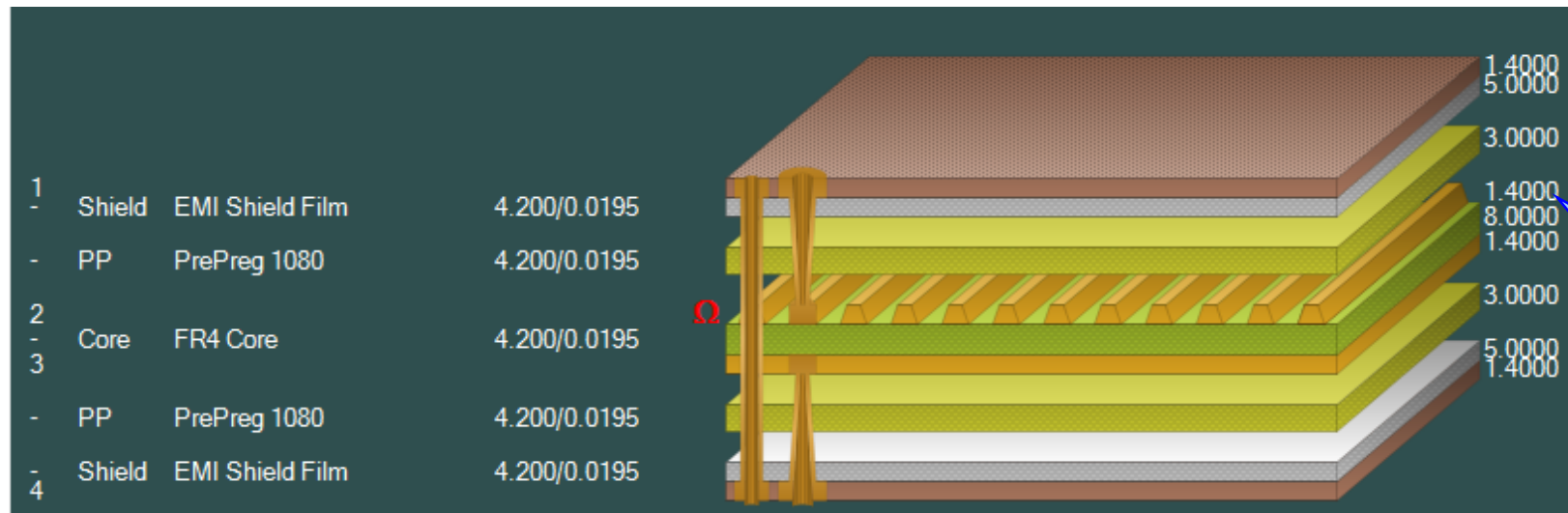
Example #4
Double-sided core with one signal trace layer with shield above and below trace layers

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Material library enhancements

New Shields tab contains
Shield material information

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Material library enhancements

Material library Edit Shield dialog
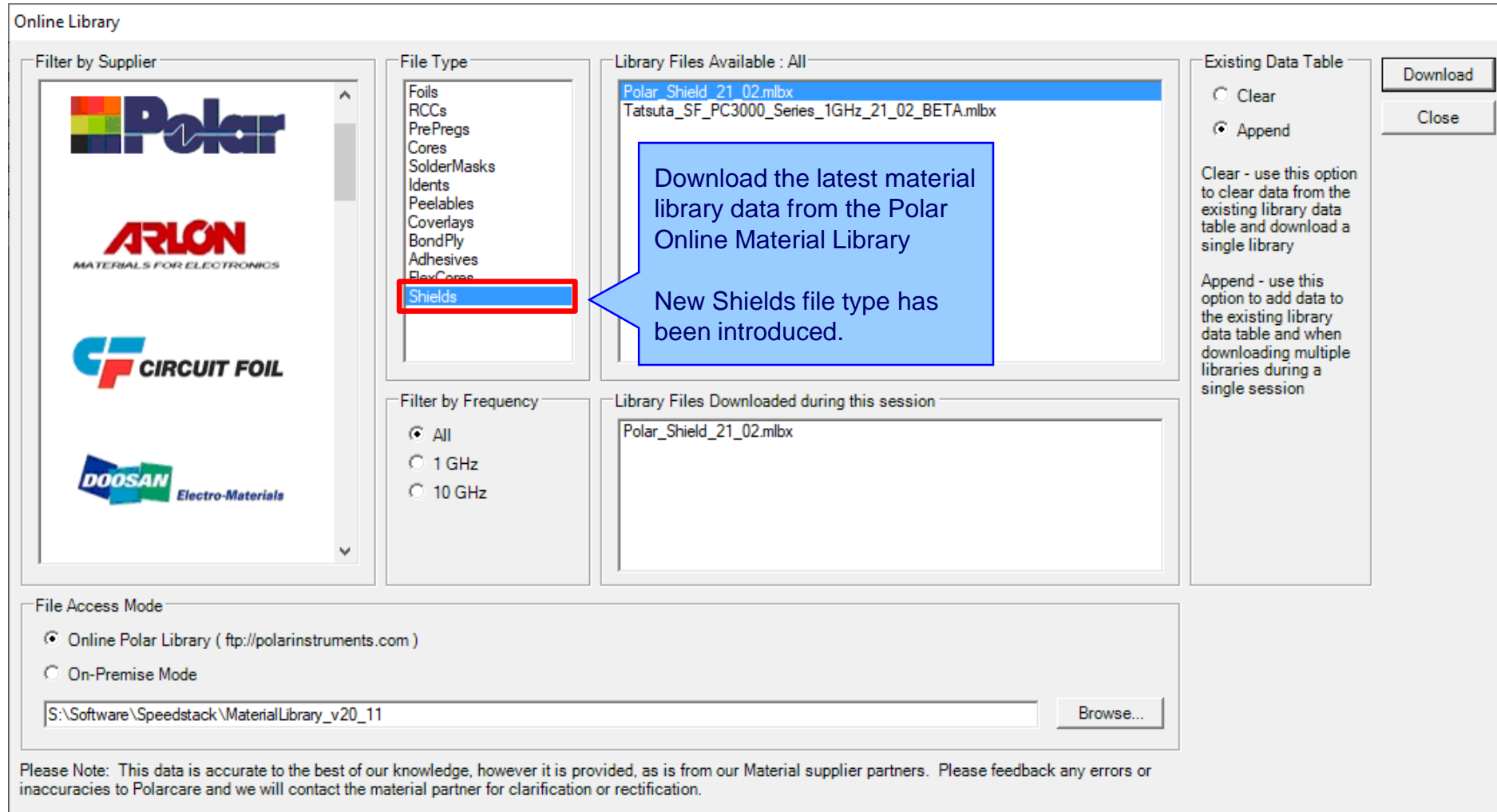
Review/Edit Shield

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		
Loss Tangent	0.0195	Note 3	
Resin Content	0		
Tg	0		
Td	0	Note 4	
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	☐		

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

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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

Controlled impedance and insertion loss calculations

Shield adhesive dielectric constant / loss tangent.

Shield material region of structure.

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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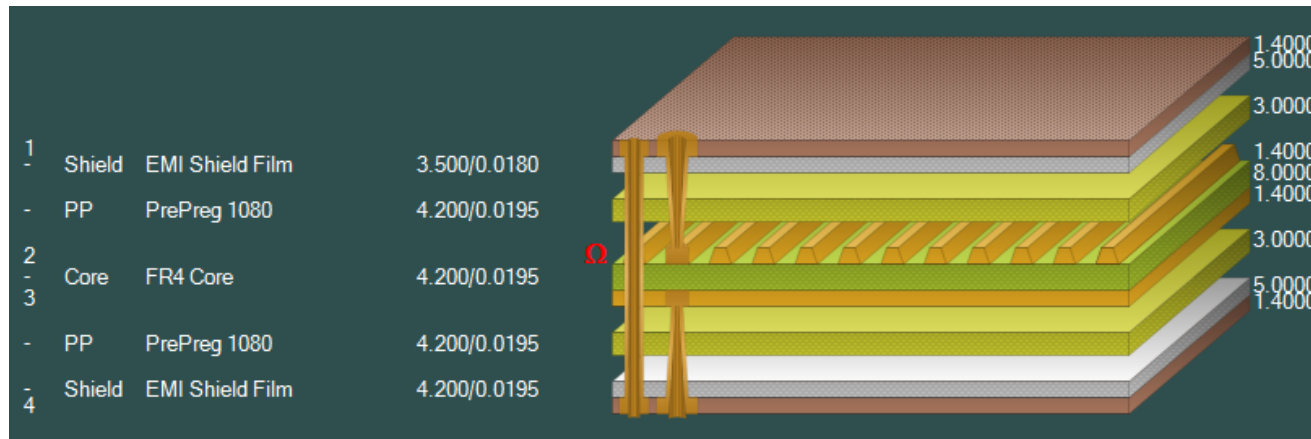
Technical report enhancements

Technical report showing shield materials

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Technical report enhancements

Insertion loss report supporting shield materials
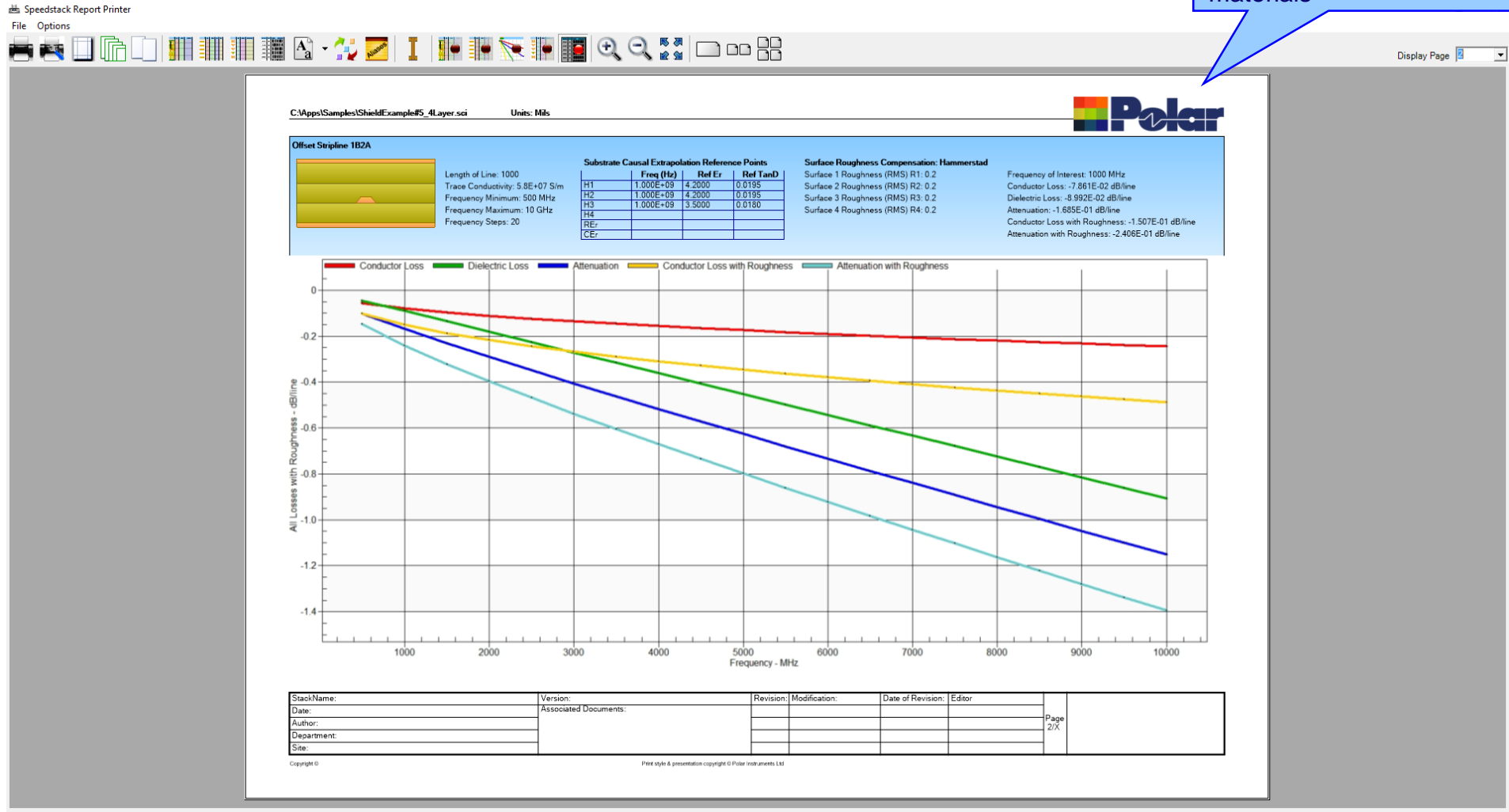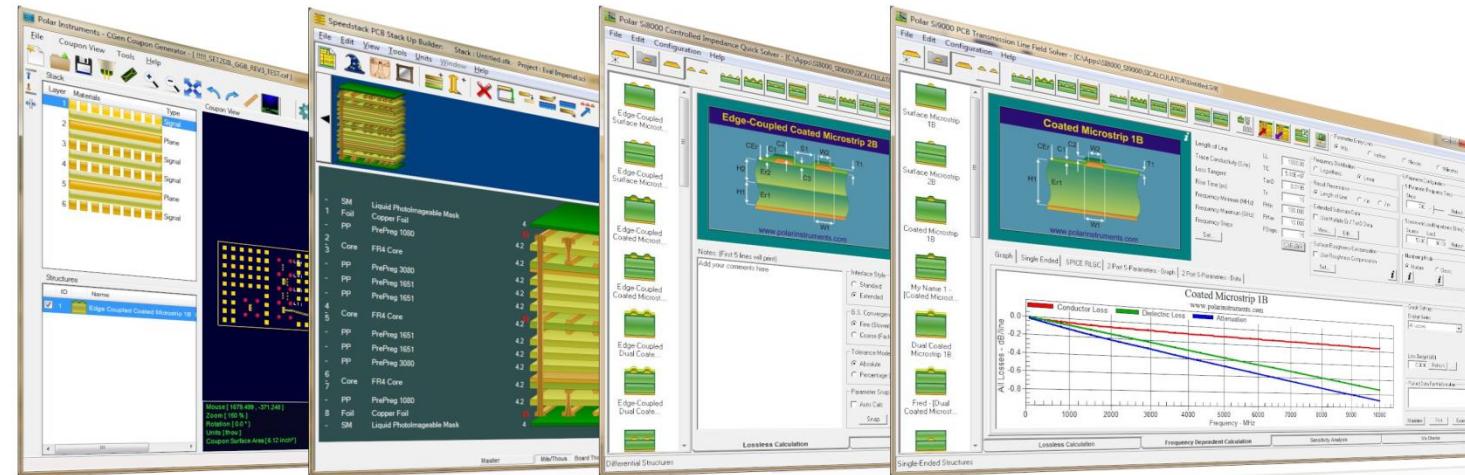
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Import / Export enhancements

The following Import / Export options have been updated to support the new shield material introduced with Speedstack 2021:
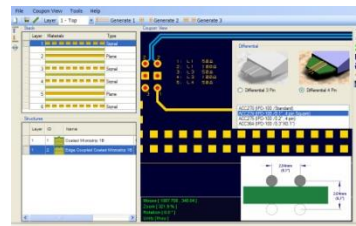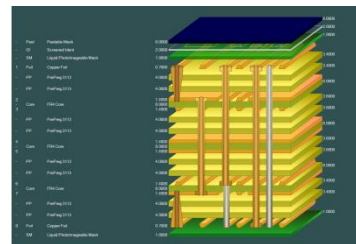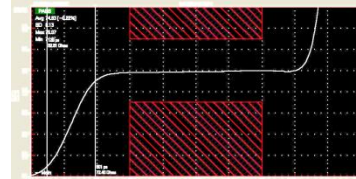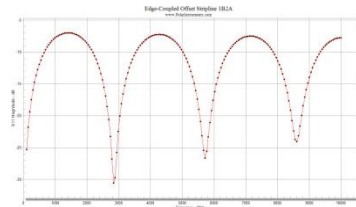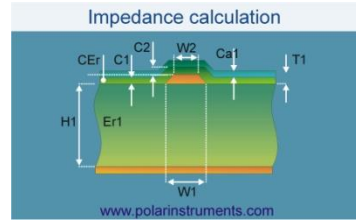
- XML STKX v20.00 and SSX v10.00 import / export options

- CSV export option

- Gerber / DXF export option
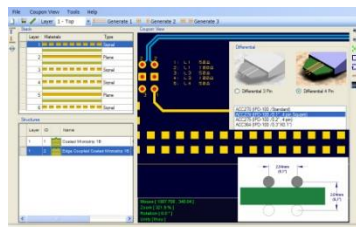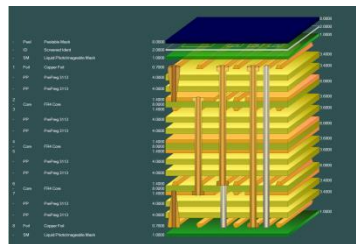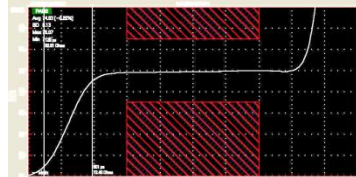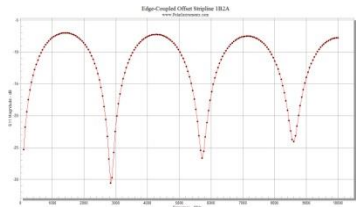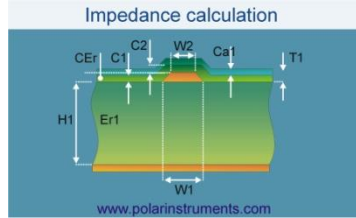
Thank you for viewing this Speedstack update. If you have questions we would be delighted to help you. Your local contact information is contained on the following slide

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Impedance calculation

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