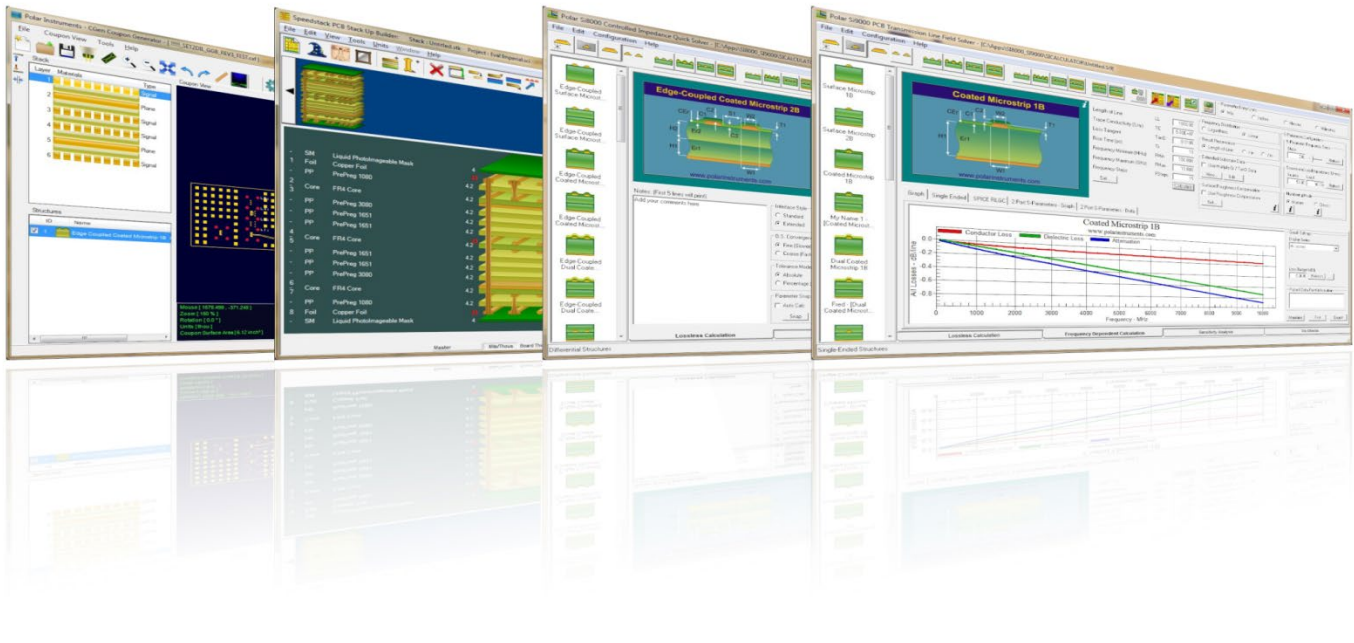
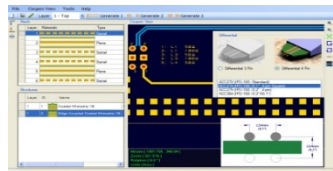
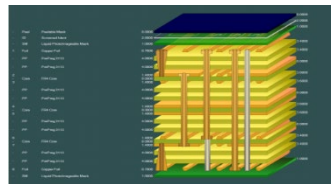
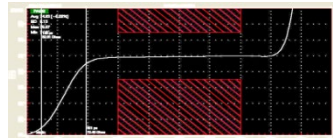
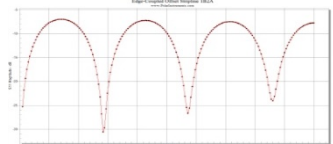
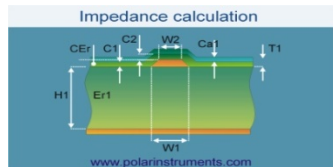




Speedstack 2021 Preview

Richard Attrill – July 2021 (Rev 4)



Introducing Speedstack 2021

Welcome to a preview of Speedstack 2021.

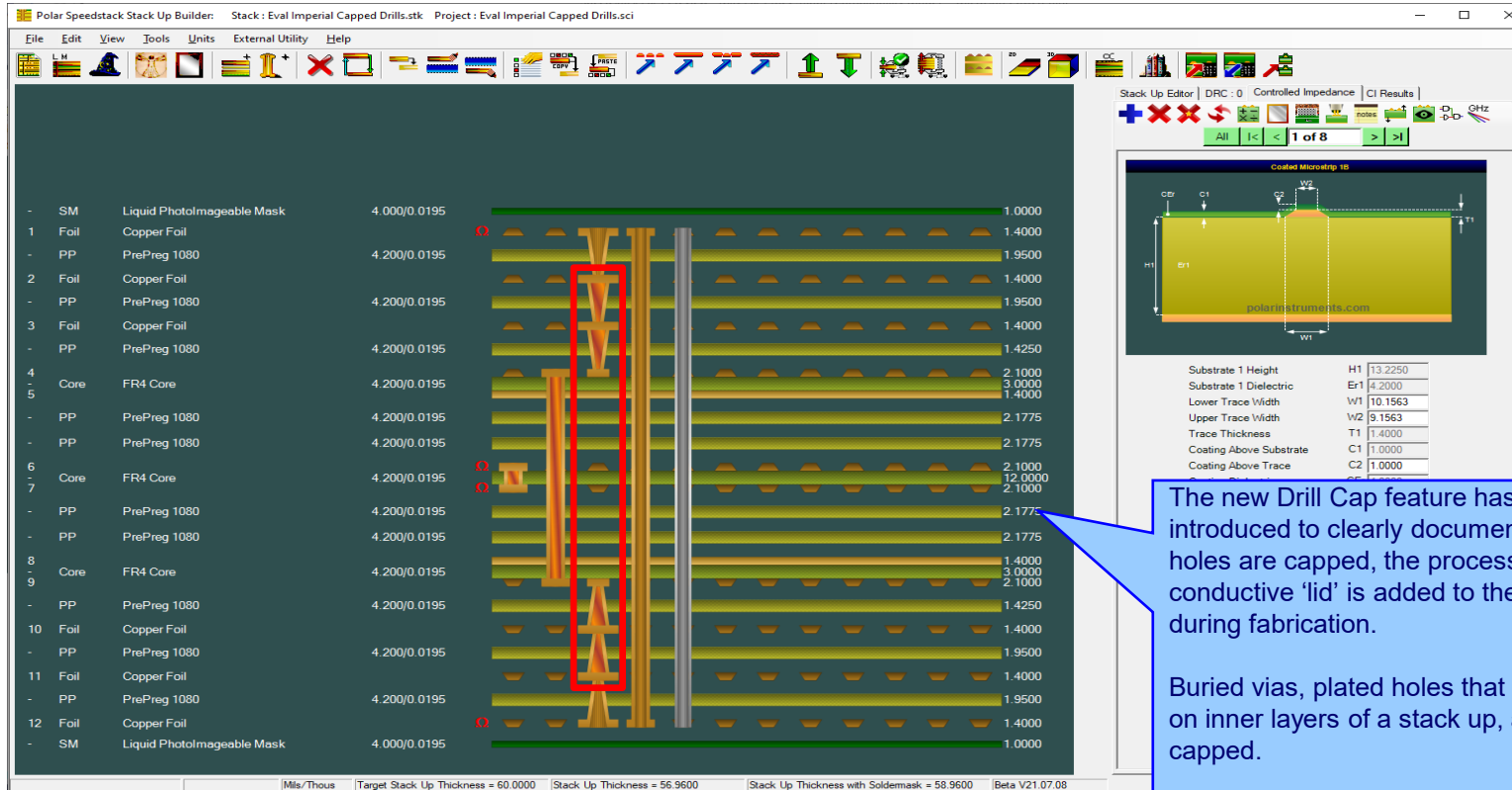
We have introduced a number of new features that have been requested through our Polarcare software maintenance service.

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

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

Speedstack v21.07.08 (July 2021)

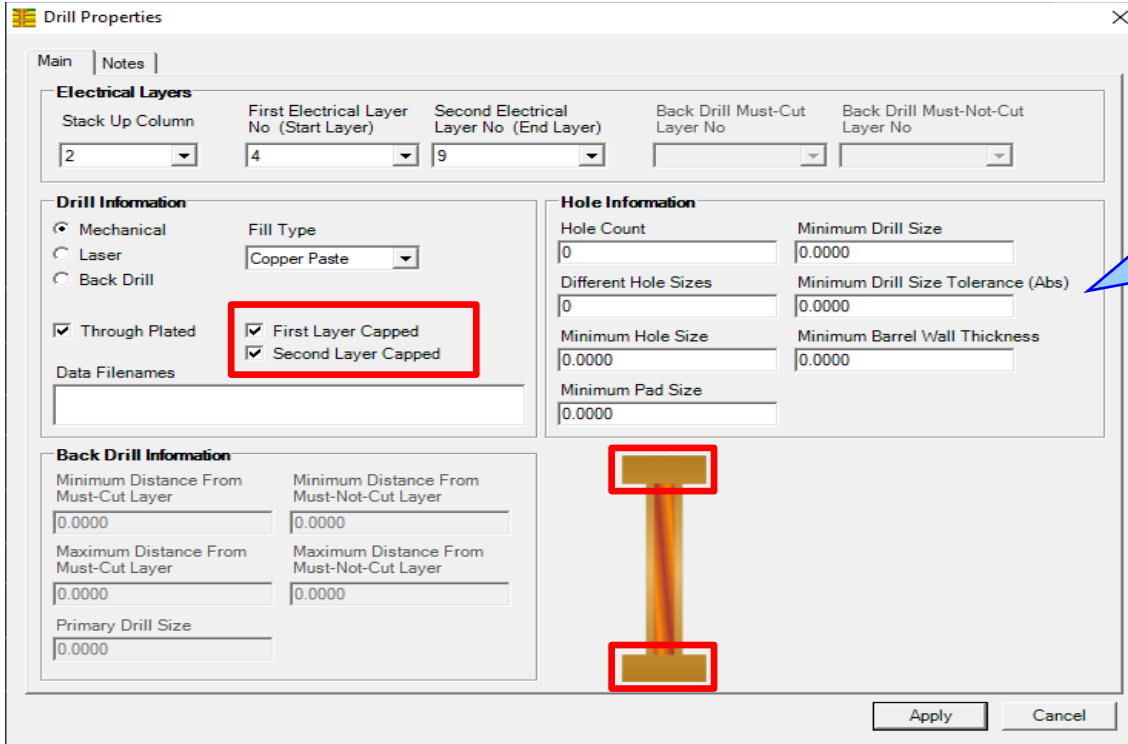
New Drill Cap feature



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

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

Drill Cap option – mechanical through plated drills

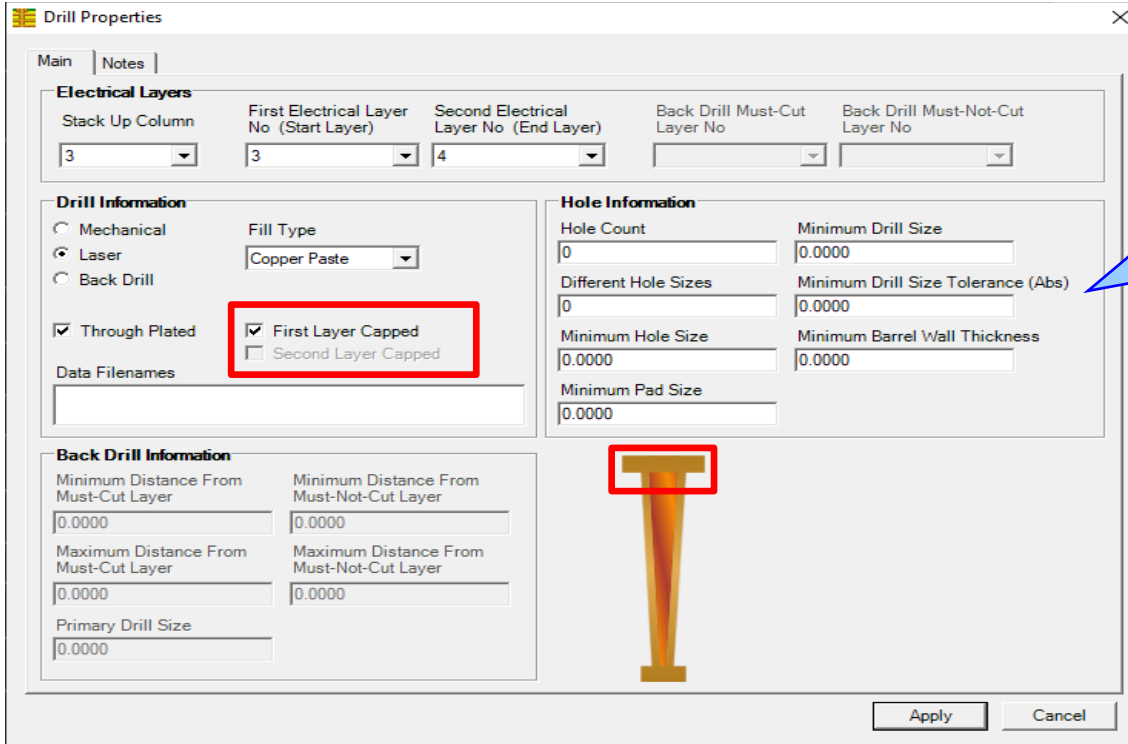


Mechanical

For mechanical drills it is possible to have four states:

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

Drill Cap option – laser drills

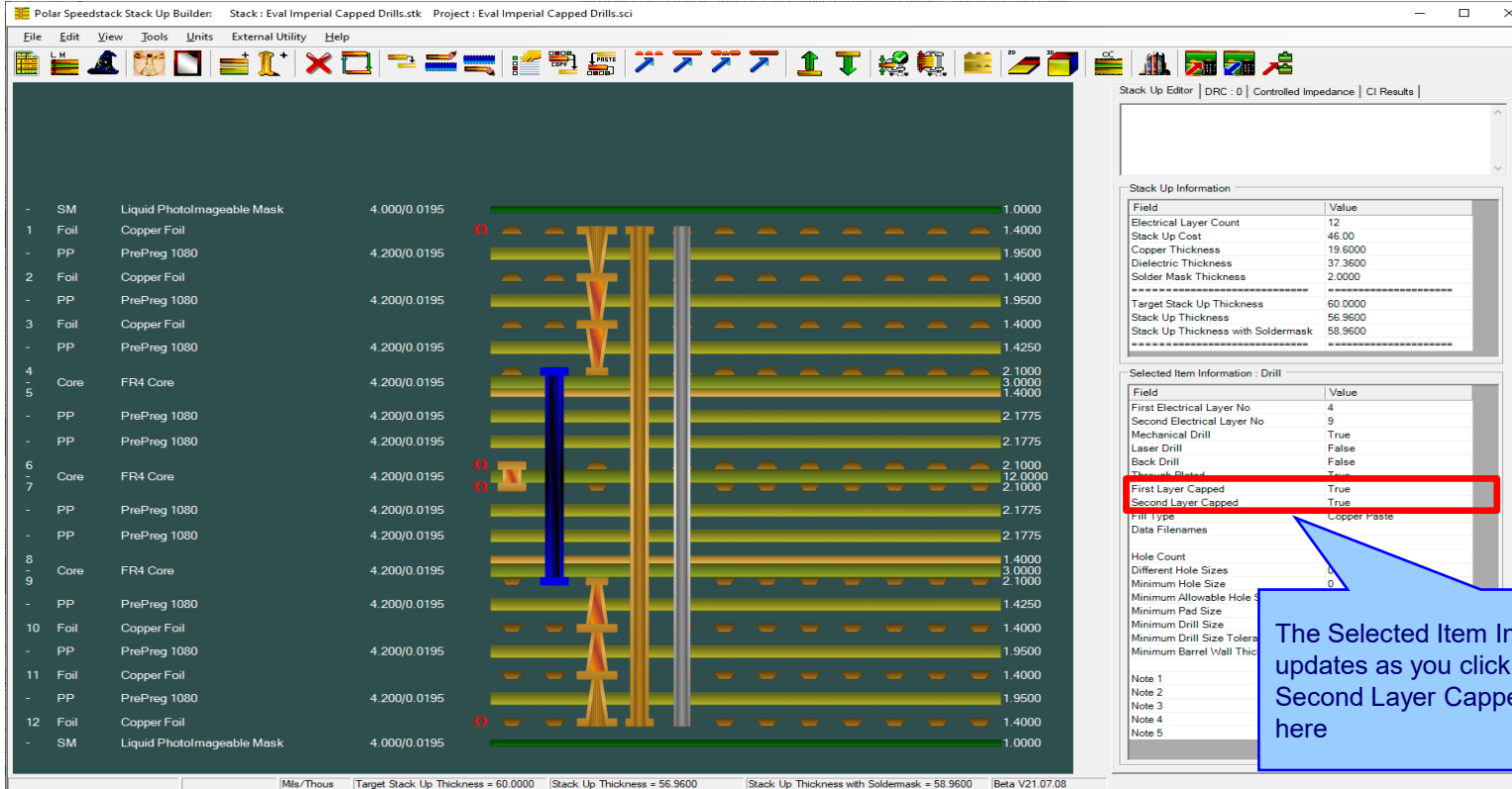


Laser

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

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

New Drill Cap feature



The screenshot shows the Polar Speedstack Stack Up Builder interface. The main window displays a stack up configuration with layers and their properties. The right-hand pane shows the 'Stack Up Information' and 'Selected Item Information - Drill' sections.

Stack Up Information:

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

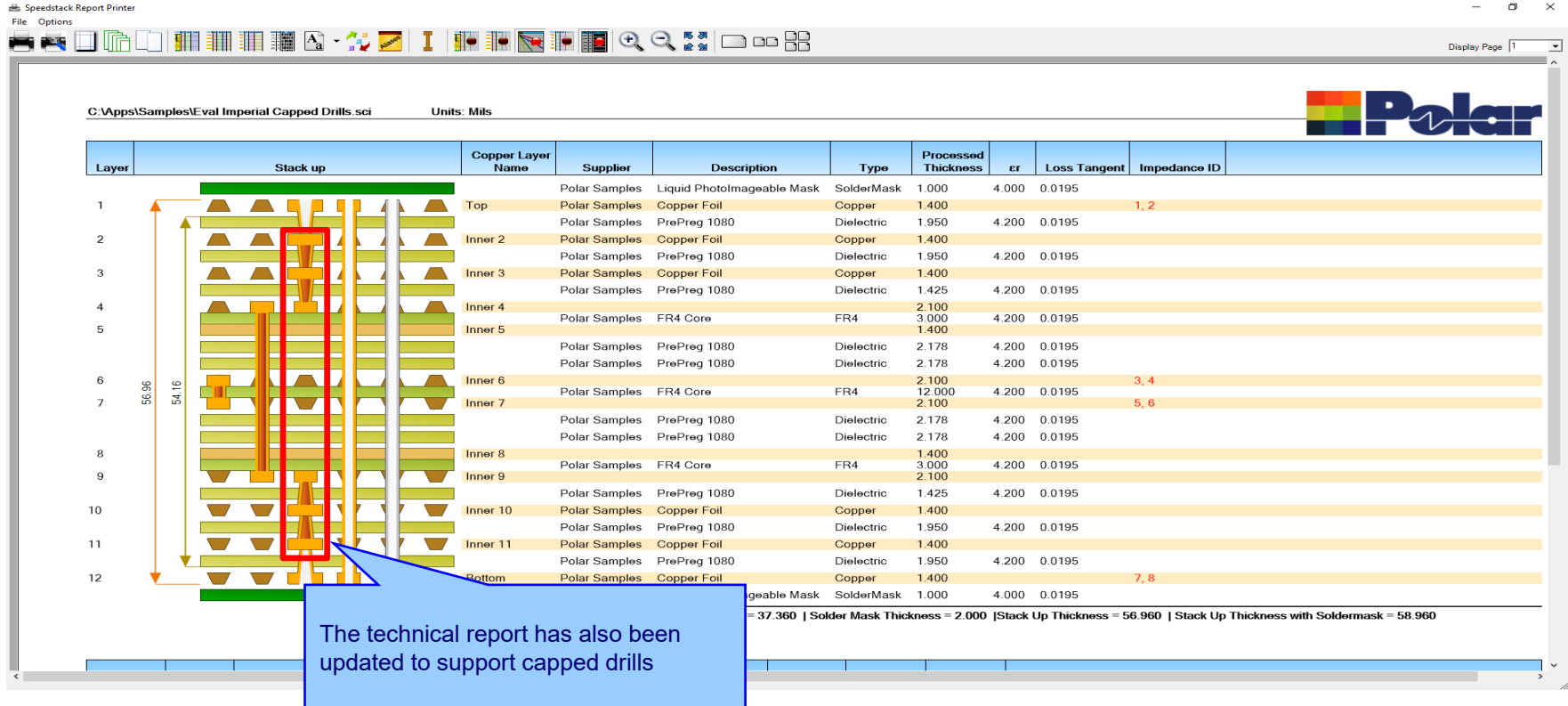
Selected Item Information - Drill:

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

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

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

New Drill Cap feature – technical report enhancements



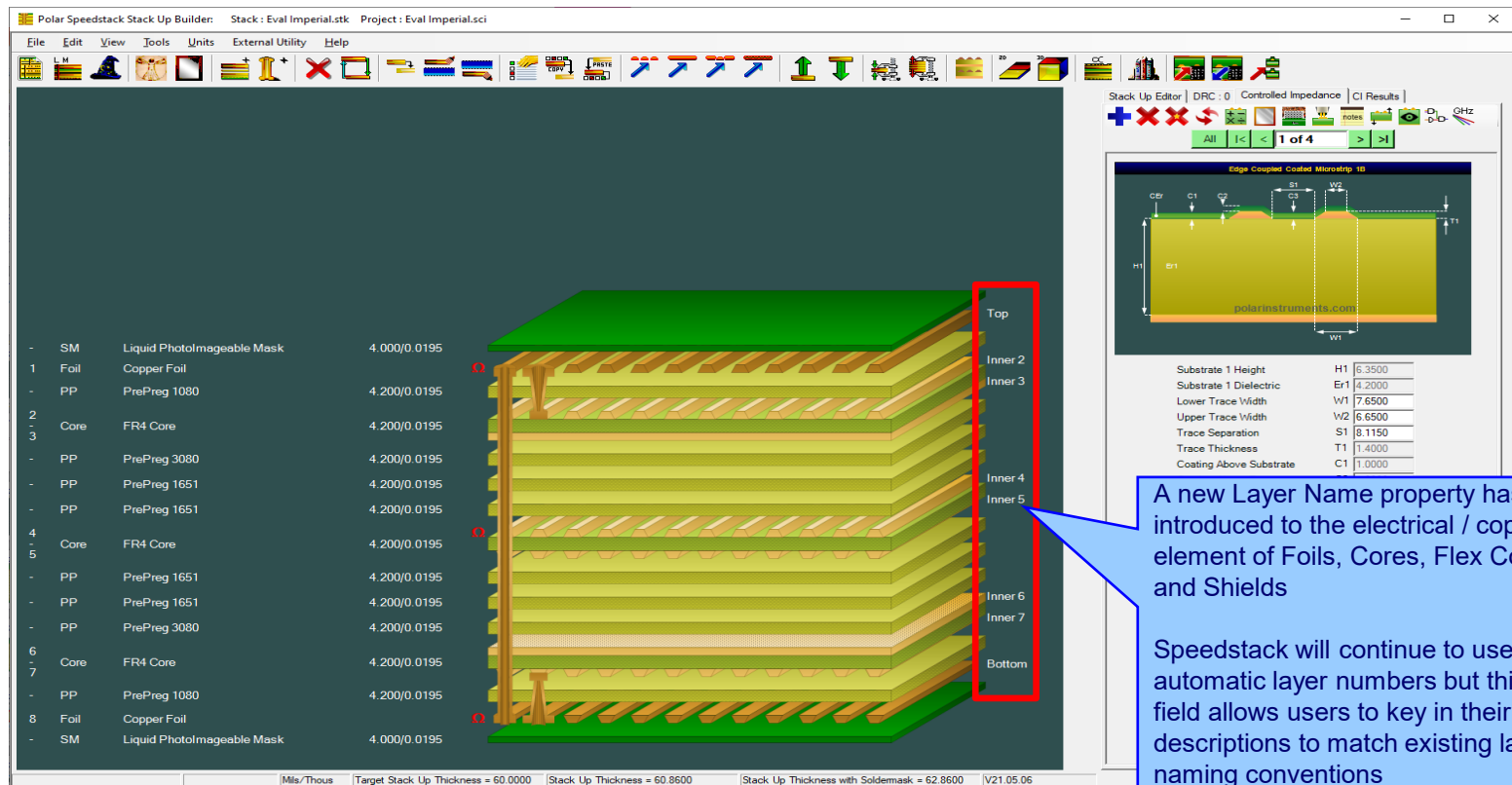
Import / Export enhancements

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

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

Speedstack v21.05.06 (May 2021)

New Layer Name property for electrical / copper layers



The screenshot shows the Polar Speedstack Stack Up Builder interface. The main window displays a 3D stack of layers with a red box highlighting the layer names. The layer names are listed on the right side of the stack:

- Top
- Inner 2
- Inner 3
- Inner 4
- Inner 5
- Inner 6
- Inner 7
- Bottom

The layer properties table on the left lists the following layers and their properties:

Layer	Material	Thickness
SM	Liquid Photoimageable Mask	4.000/0.0195
1	Foil Copper Foil	4.200/0.0195
2	PP	4.200/0.0195
3	Core FR4 Core	4.200/0.0195
4	PP	4.200/0.0195
5	PP	4.200/0.0195
6	PP	4.200/0.0195
7	Core FR4 Core	4.200/0.0195
8	PP	4.200/0.0195
9	PP	4.200/0.0195
10	PP	4.200/0.0195
11	Core FR4 Core	4.200/0.0195
12	PP	4.200/0.0195
13	PP	4.200/0.0195
14	PP	4.200/0.0195
15	Core FR4 Core	4.200/0.0195
16	PP	4.200/0.0195
17	PP	4.200/0.0195
18	PP	4.200/0.0195
19	Core FR4 Core	4.200/0.0195
20	PP	4.200/0.0195
21	PP	4.200/0.0195
22	PP	4.200/0.0195
23	Core FR4 Core	4.200/0.0195
24	PP	4.200/0.0195
25	PP	4.200/0.0195
26	PP	4.200/0.0195
27	Core FR4 Core	4.200/0.0195
28	PP	4.200/0.0195
29	PP	4.200/0.0195
30	PP	4.200/0.0195
31	Core FR4 Core	4.200/0.0195
32	PP	4.200/0.0195
33	PP	4.200/0.0195
34	PP	4.200/0.0195
35	Core FR4 Core	4.200/0.0195
36	PP	4.200/0.0195
37	PP	4.200/0.0195
38	PP	4.200/0.0195
39	Core FR4 Core	4.200/0.0195
40	PP	4.200/0.0195
41	PP	4.200/0.0195
42	PP	4.200/0.0195
43	Core FR4 Core	4.200/0.0195
44	PP	4.200/0.0195
45	PP	4.200/0.0195
46	PP	4.200/0.0195
47	Core FR4 Core	4.200/0.0195
48	PP	4.200/0.0195
49	PP	4.200/0.0195
50	PP	4.200/0.0195
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59	Core FR4 Core	4.200/0.0195
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63	Core FR4 Core	4.200/0.0195
64	PP	4.200/0.0195
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66	PP	4.200/0.0195
67	Core FR4 Core	4.200/0.0195
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71	Core FR4 Core	4.200/0.0195
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247	Core FR4 Core	4.200/0.0195
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249	PP	4.200/0.0195
250	PP	4.200/0.0195
251	Core FR4 Core	4.200/0.0195
252	PP	4.200/0.0195
253	PP	4.200/0.0195
254	PP	4.200/0.0195
255	Core FR4 Core	4.200/0.0195
256	PP	4.200/0.0195
257	PP	4.200/0.0195
258	PP	4.200/0.0195
259	Core FR4 Core	4.200/0.0195
260	PP	4.200/0.0195
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262	PP	4.200/0.0195
263	Core FR4 Core	4.200/0.0195
264	PP	4.200/0.0195
265	PP	4.200/0.0195
266	PP	4.200/0.0195
267	Core FR4 Core	4.200/0.0195
268	PP	4.200/0.0195
269	PP	4.200/0.0195
270	PP	4.200/0.0195
271	Core FR4 Core	4.200/0.0195
272	PP	4.200/0.0195
273	PP	4.200/0.0195
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279	Core FR4 Core	4.200/0.0195
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282	PP	4.200/0.0195
283	Core FR4 Core	4.200/0.0195
284	PP	4.200/0.0195
285	PP	4.200/0.0195
286	PP	4.200/0.0195
287	Core FR4 Core	4.200/0.0195
288	PP	4.200/0.0195
289		

New Layer Name property for electrical / copper layers

Foil Properties


Main | Notes | Attributes

Apply

General Information

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

Copper

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

Foil Properties

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

New Layer Name property for electrical / copper layers


Core Properties

Main | Notes | Attributes


General Information

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


Upper Copper

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

Dielectric

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

Lower Copper

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

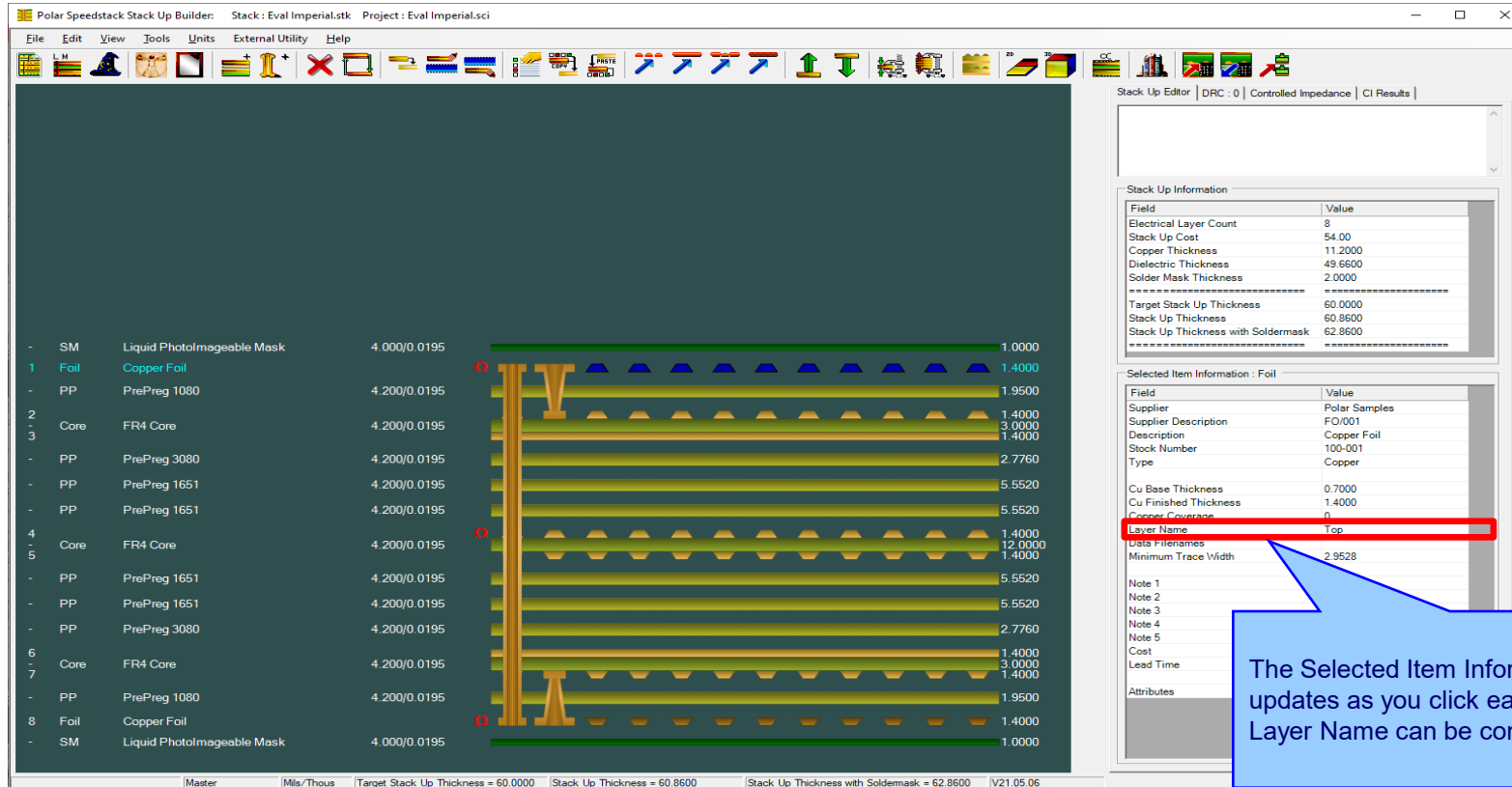
Apply

Close

Core Properties

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

New Layer Name property for electrical / copper layers



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

Stack Up Information

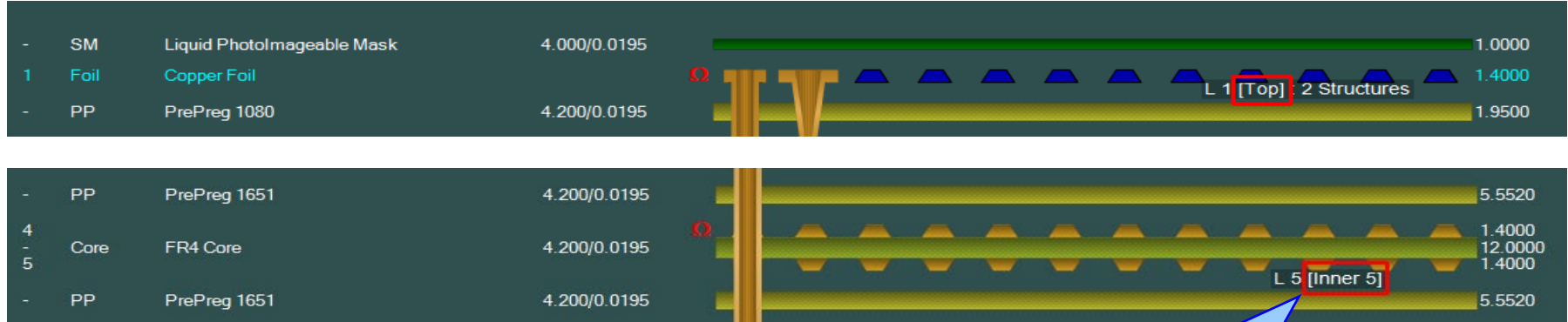
Field	Value
Electrical Layer Count	8
Stack Up Cost	54.00
Copper Thickness	11.2000
Dielectric Thickness	49.6600
Solder Mask Thickness	2.0000
Target Stack Up Thickness	60.0000
Stack Up Thickness	60.8600
Stack Up Thickness with Soldermask	62.8600

Selected Item Information : Foil

Field	Value
Supplier	Polar Samples
Supplier Description	FOI001
Description	Copper Foil
Stock Number	100-001
Type	Copper
Cu Base Thickness	0.7000
Cu Finished Thickness	1.4000
Copper Coverage	0
Layer Name	Top
Data filenames	
Minimum Trace Width	2.9528
Note 1	
Note 2	
Note 3	
Note 4	
Note 5	
Cost	
Lead Time	
Attributes	

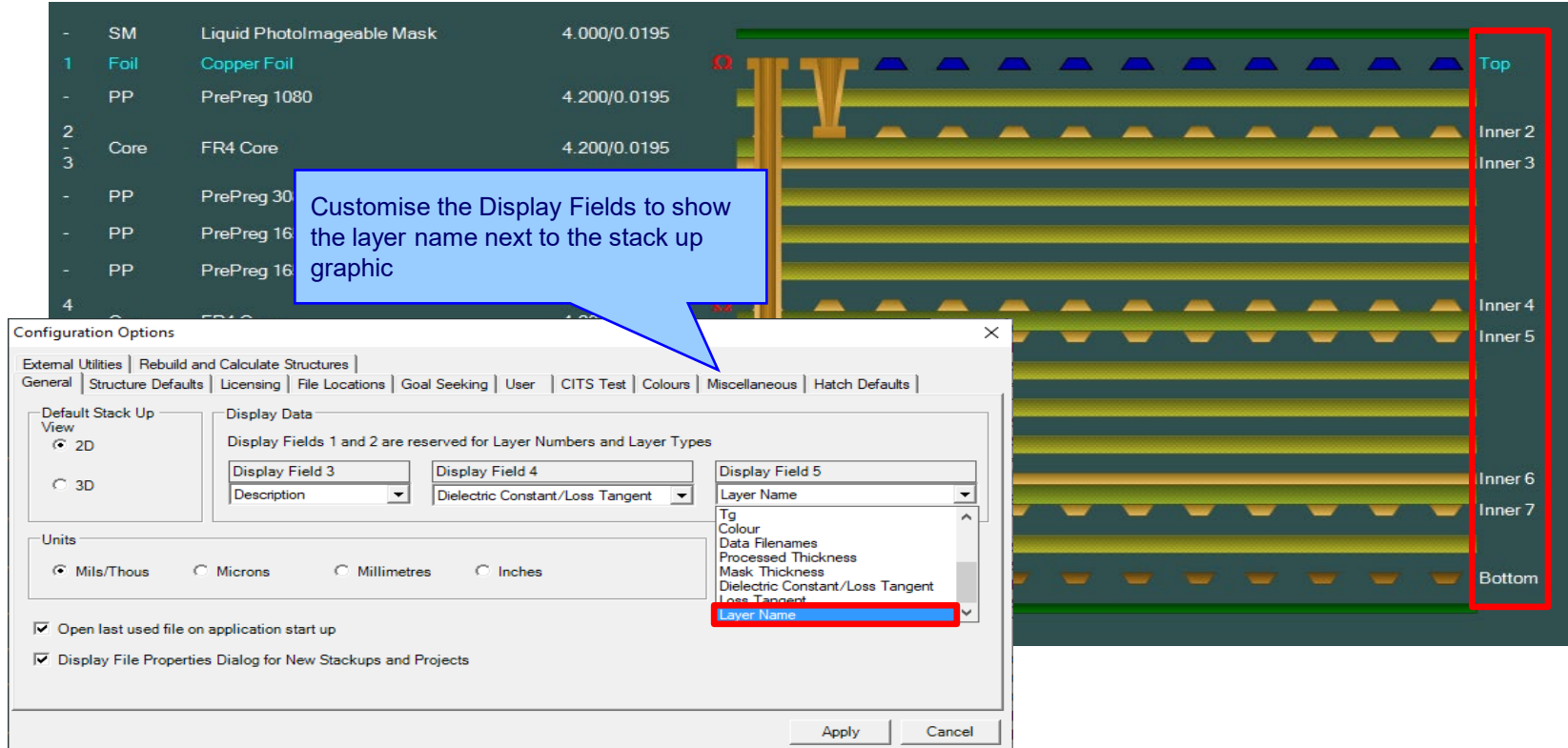
The Selected Item Information auto updates as you click each material, the Layer Name can be confirmed here

New Layer Name property for electrical / copper layers



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

New Layer Name property for electrical / copper layers



The screenshot displays the Speedstack 2021 interface. On the left, a table lists the stackup layers:

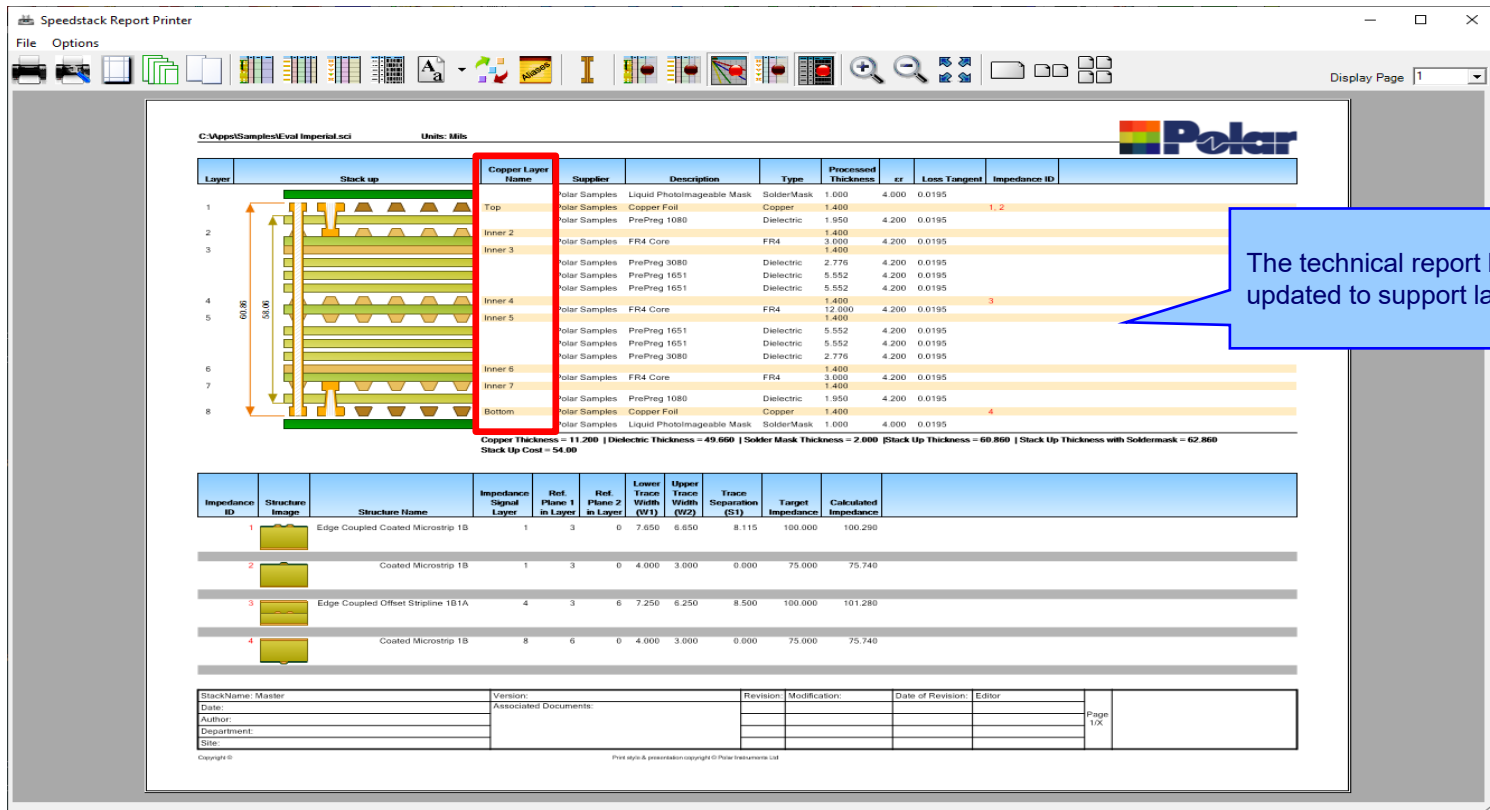
Layer	Material	Thickness
SM	Liquid PhotoImageable Mask	4.000/0.0195
1	Foil Copper Foil	
PP	PreReg 1080	4.200/0.0195
2	Core FR4 Core	4.200/0.0195
3	PreReg 30	
PP	PreReg 16	
PP	PreReg 16	
4	FR4 Core	

On the right, a 3D cross-section of the stackup is shown, with layers labeled: Top, Inner 2, Inner 3, Inner 4, Inner 5, Inner 6, Inner 7, and Bottom. A red box highlights these labels.

A blue callout box points to the Configuration Options dialog box, stating: "Customise the Display Fields to show the layer name next to the stack up graphic".

The Configuration Options dialog box is open, showing the Display Data section. The Display Fields 1 and 2 are reserved for Layer Numbers and Layer Types. The Display Field 3 is set to Description, and the Display Field 4 is set to Dielectric Constant/Loss Tangent. The Display Field 5 is set to Layer Name, which is highlighted with a red box. The Units section shows Mils/Thous selected. The Open last used file on application start up and Display File Properties Dialog for New Stackups and Projects options are checked.

New Layer Name property for electrical / copper layers



The technical report has also been updated to support layer names

Copper Finishing classes increased

Copper Coverage Based Prepreg Corrections

Percentage Copper To Be Embedded in Prepreg

☒ Set by Layer type

Signal Layer % 75

Mixed Layer % 15

Plane Layer % 5

☐ Proportional to Coverage

Copper Finishing

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

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

Excess Resin Test

Minimum Excess Resin % 15

Apply Cancel

Speedstack v21.04 and earlier supported 4 classes

Copper Coverage Based Prepreg Corrections

Percentage Copper To Be Embedded in Prepreg

☒ Set by Layer type

Signal Layer % 75

Mixed Layer % 15

Plane Layer % 5

☐ Proportional to Coverage

Copper Finishing

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

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

Excess Resin Test

Minimum Excess Resin % 15

Apply Cancel

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

Speedstack v21.05 now supports 20 classes

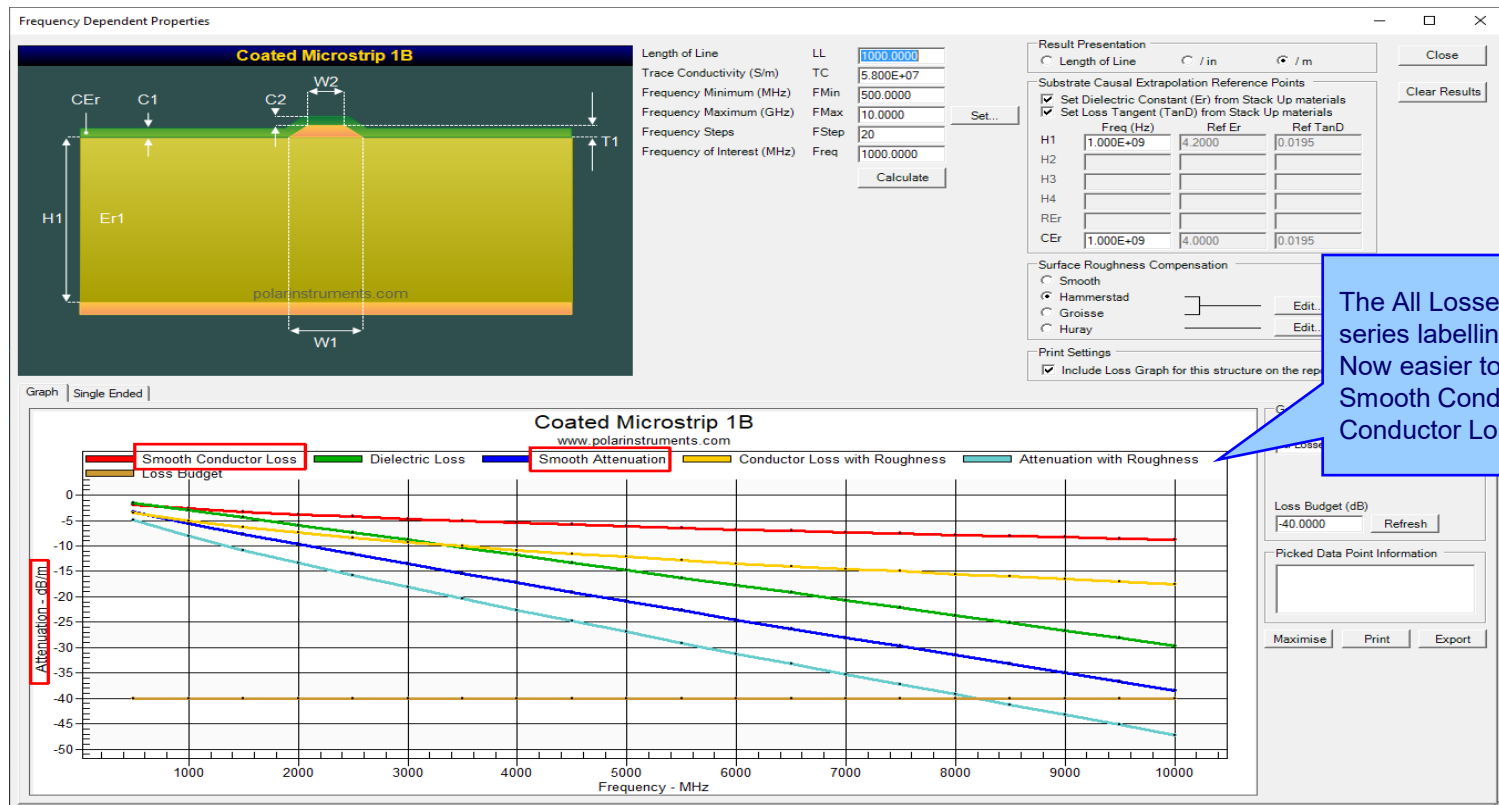
Import / Export enhancements

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

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

Speedstack v21.04.00 (April 2021)

All Losses plot - clearer labelling



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

Other enhancements

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

Speedstack v21.03.09 (March 2021)

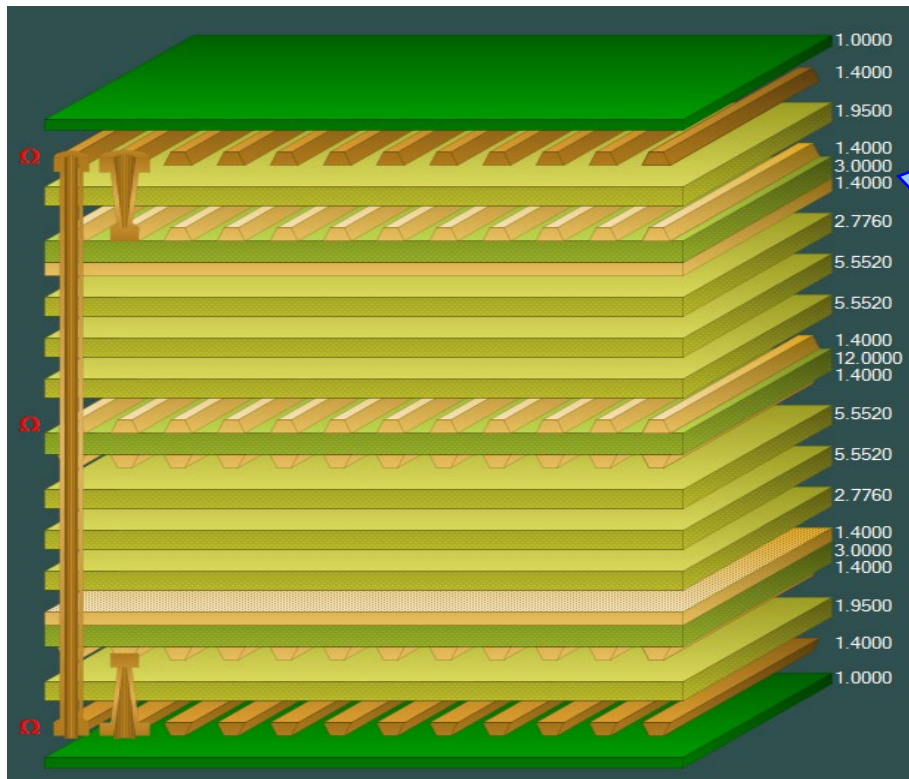
New Apply Plating Colours toolbar option

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

New Apply Plating Colours toolbar option



Plated Copper Layers

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

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

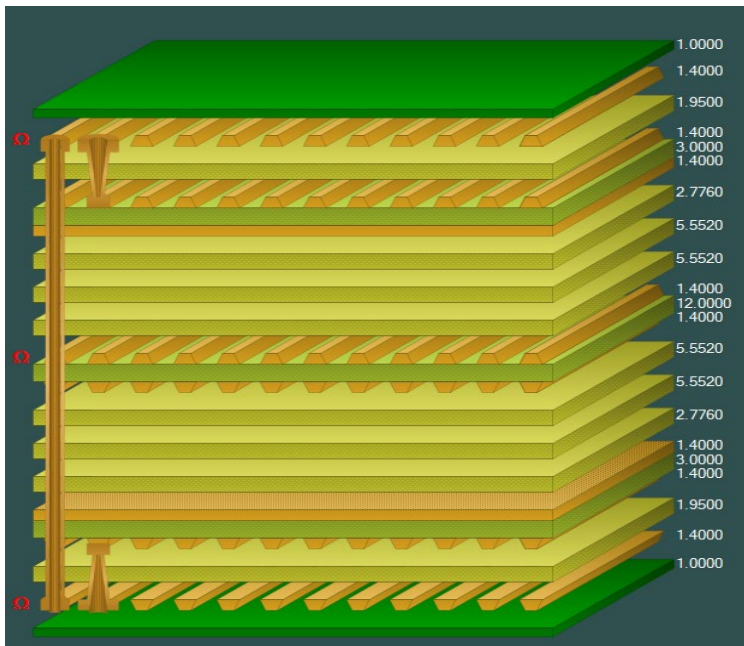
It is important to account for this additional plated copper thickness when calculating the overall stack up thickness and controlled impedance / insertion loss structures.

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

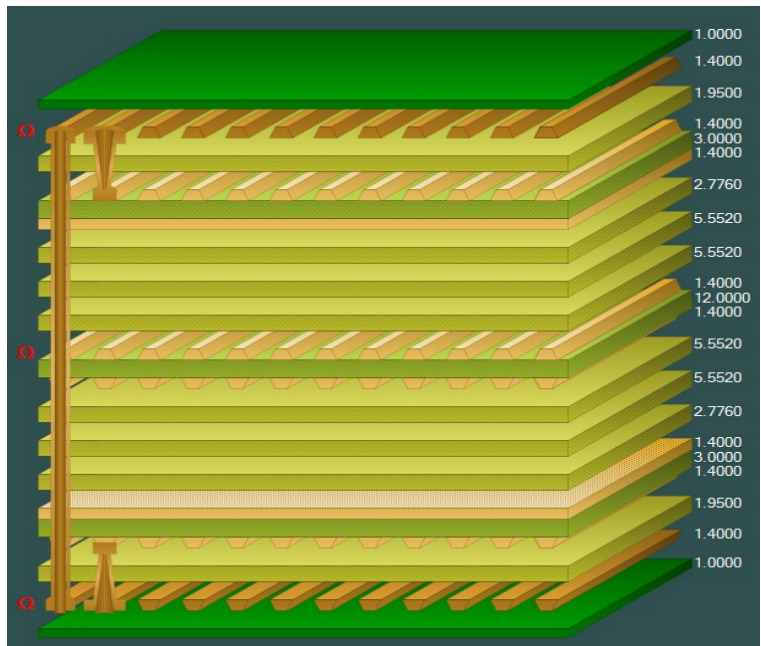
New Apply Plating Colours toolbar option



Standard Colours



Apply Plating Colours



New Apply Plating Colours toolbar option

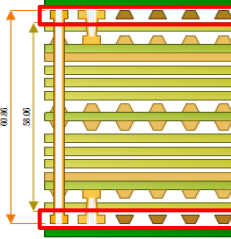
Speedstack Report Printer

File Options

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




Display Page 1

Stack up

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

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

Notes

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

StackName: Master
Date: _____
Author: _____
Department: _____
Title: _____

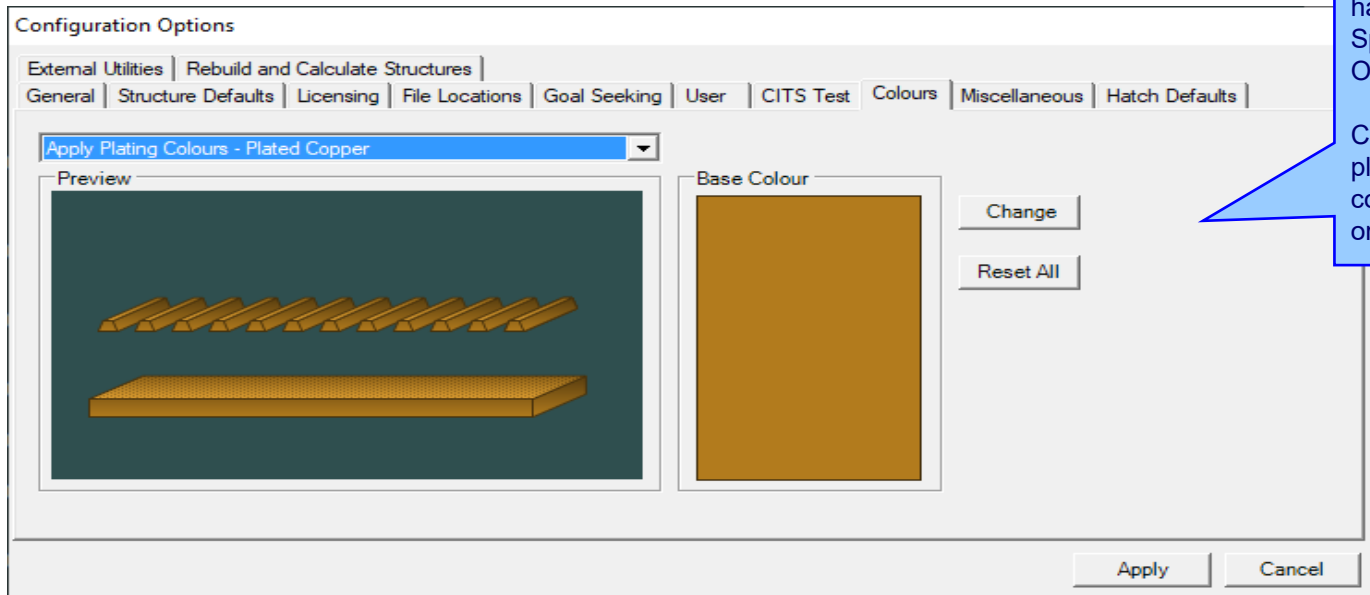
Version: _____
Associated Documents: _____
Revision: _____
Modification: _____
Date of Revision: _____
Editor: _____

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

New Apply Plating Colours toolbar option



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

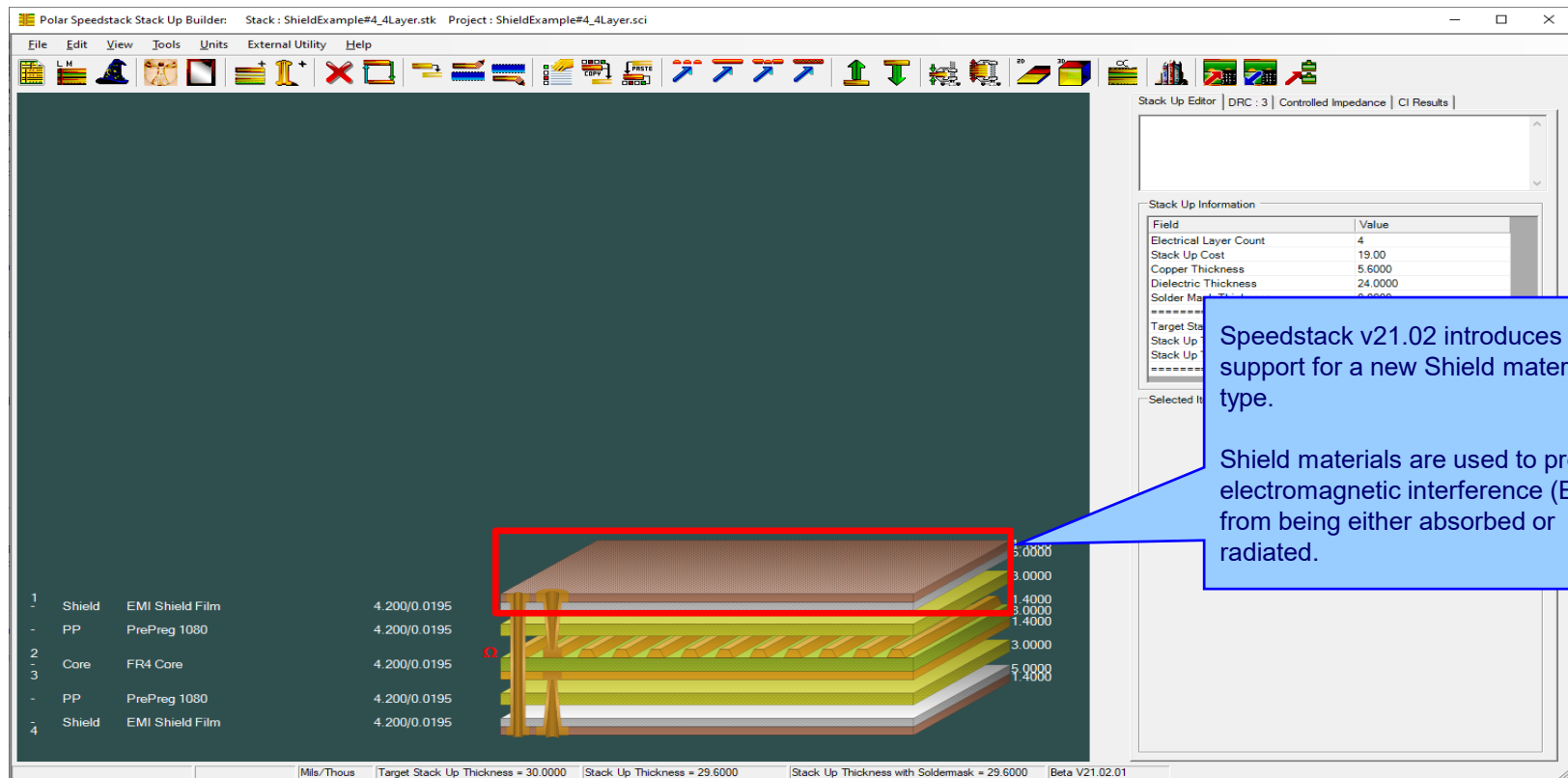
Customise the Plated and Un-plated colours to suit existing colour schemes adopted by your organisation

Online Library enhancements

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

Speedstack v21.02.01 (February 2021)

New Shield material



The screenshot shows the Polar Speedstack Stack Up Builder interface. The main window displays a 3D stack of materials. A red box highlights the top layer, which is a new Shield material. The material list on the left shows the following layers:

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

The 3D stack shows the following layers from top to bottom:

- Shield EMI Shield Film (4.200/0.0195)
- PP PrePreg 1080 (4.200/0.0195)
- Core FR4 Core (4.200/0.0195)
- PP PrePreg 1080 (4.200/0.0195)
- Shield EMI Shield Film (4.200/0.0195)

The status bar at the bottom shows the following information:

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

A callout box points to the new Shield material, stating:

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

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

New Shield material

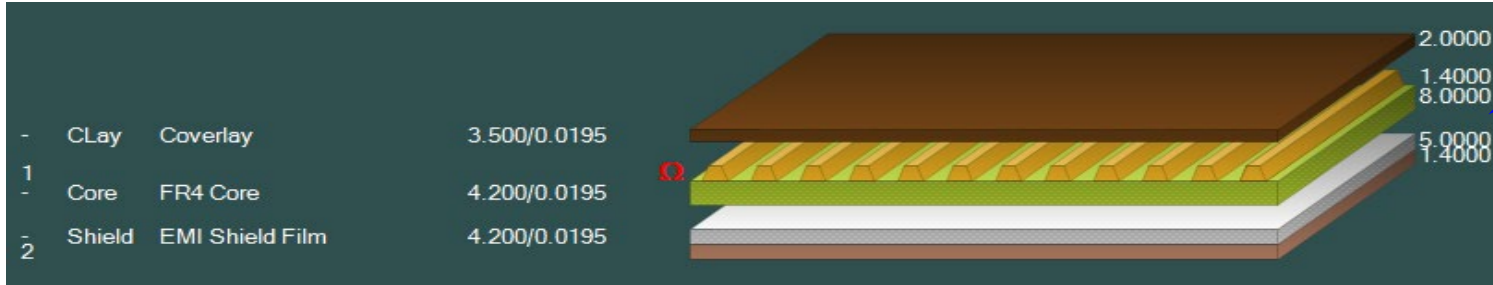
Shields are typically applied to the outer layer(s) of the stack up

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

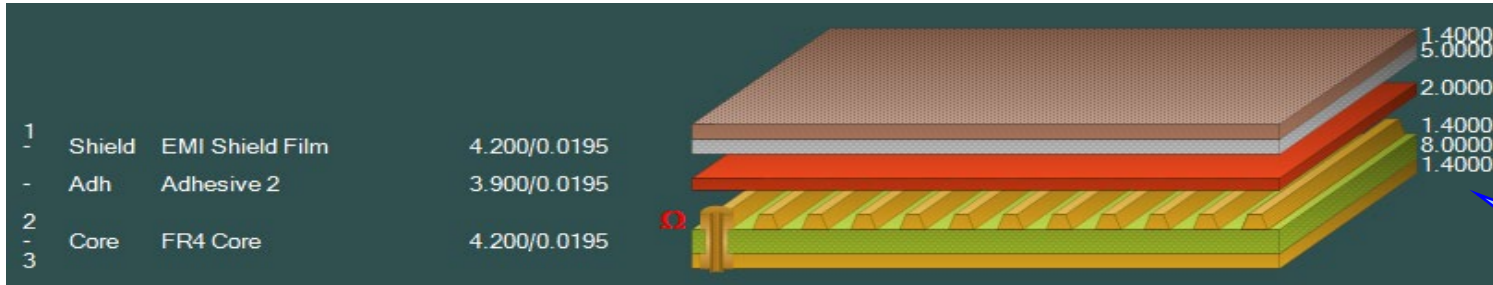


They consist of a shield layer (brown) and dielectric adhesive (silver)

Shield material examples

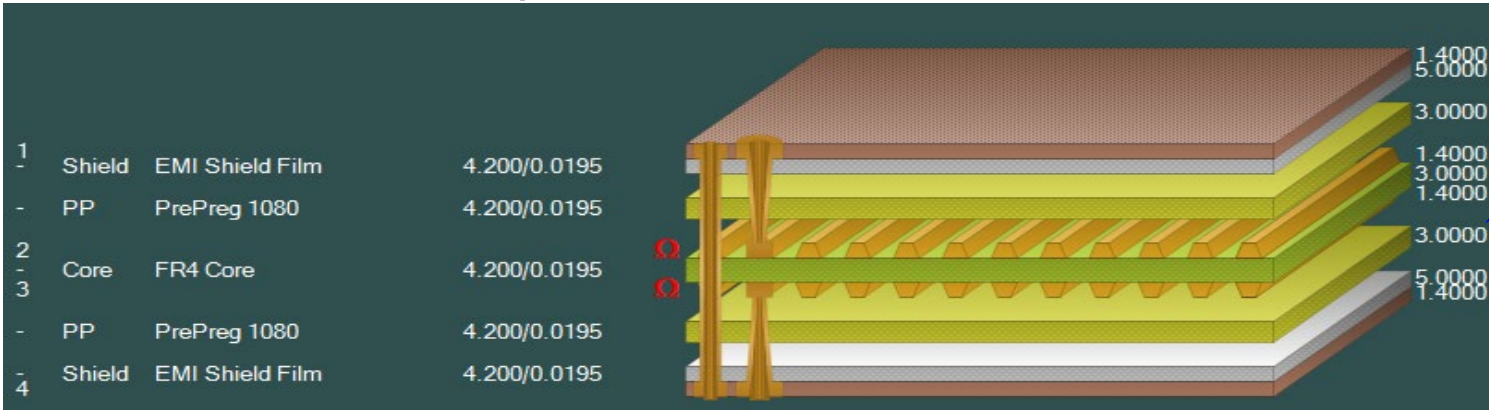


Example #1
Single-sided core,
coverlay above trace,
shield below

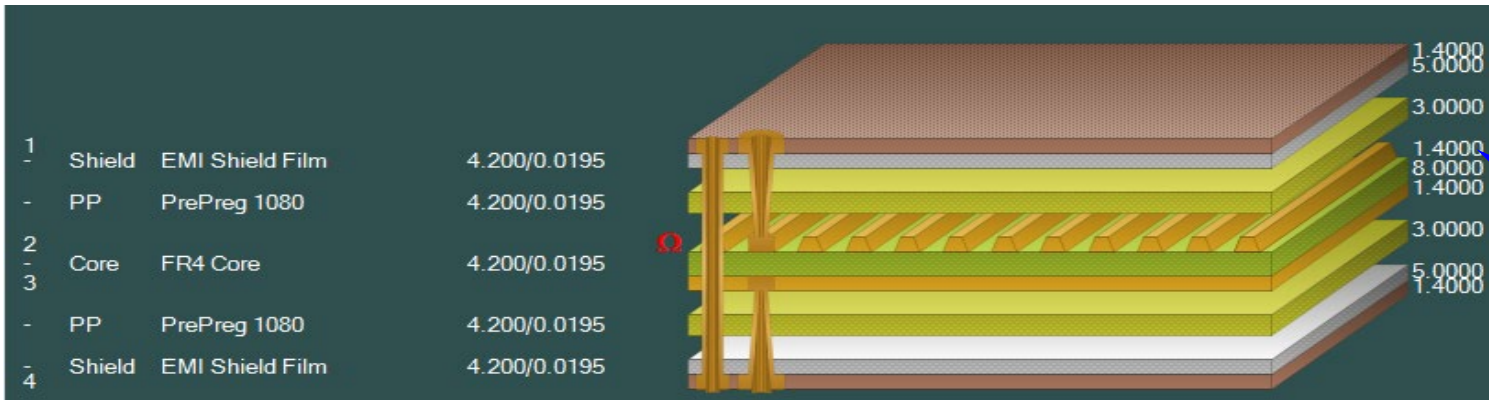


Example #2
Double-sided core,
adhesive and shield
above

Shield material examples

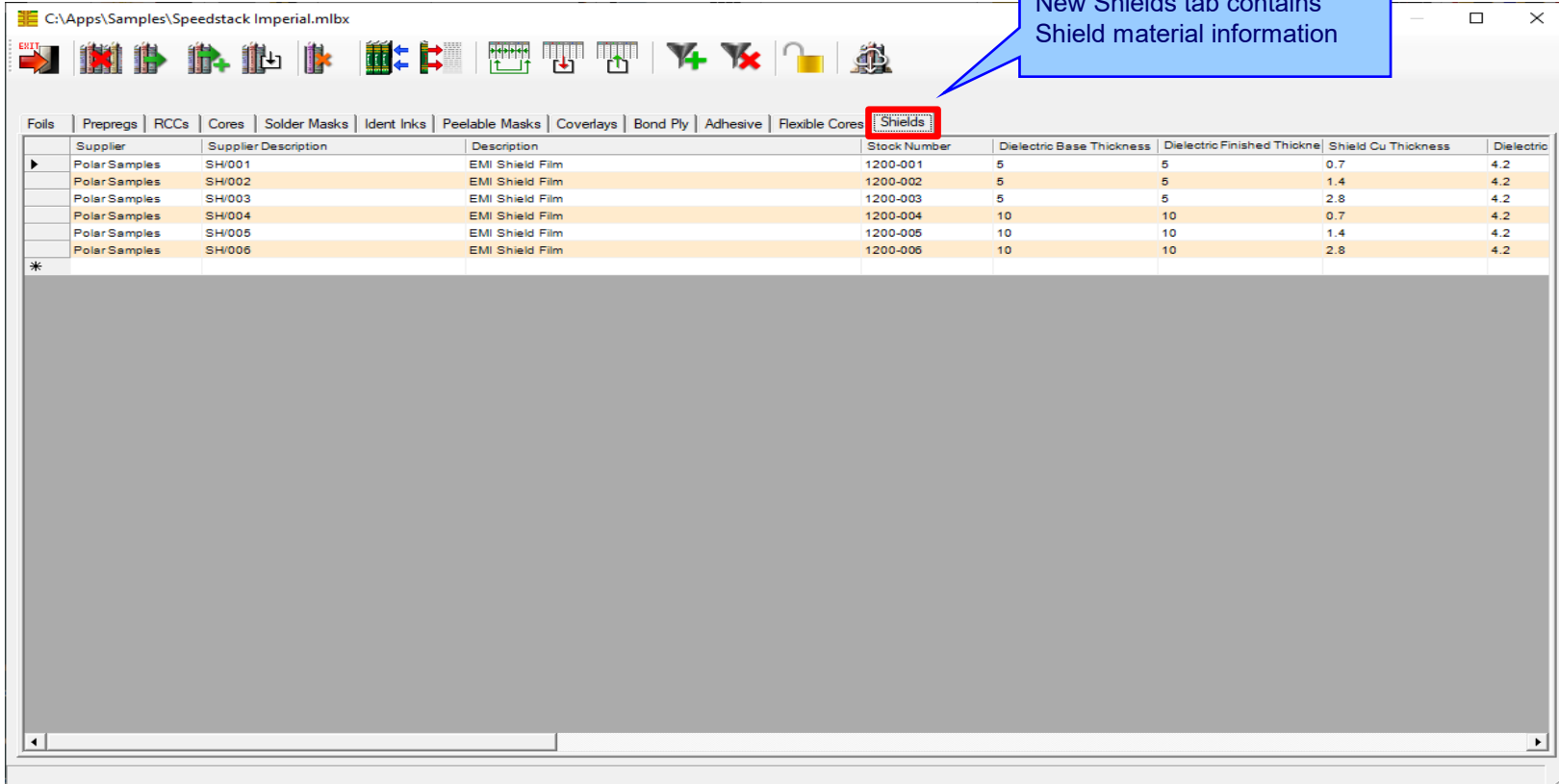


Example #3
Double-sided core with two signal trace layers with shield above and below trace layers



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

Material library enhancements



The screenshot shows the Speedstack Imperial.mlbx software interface. The 'Shields' tab is highlighted in the material library, and a callout box indicates that this tab contains shield material information. The table below lists the available shield materials.

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

Material library enhancements

Review/Edit Shield


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

Material library Edit Shield dialog

Online Library enhanced to support Shield materials

Online Library

Filter by Supplier



File Type

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

Library Files Available : All

- Polar_Shield_21_02.mlbx
- Tatsuta_SF_PC3000_Series_1GHz_21_02_BETA.mlbx

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

New Shields file type has been introduced.

Existing Data Table

☐ Clear

☒ Append

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

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

Download

Close

Library Files Downloaded during this session

- Polar_Shield_21_02.mlbx

File Access Mode

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

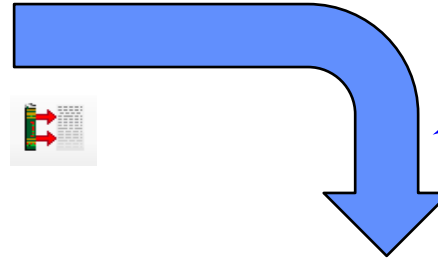
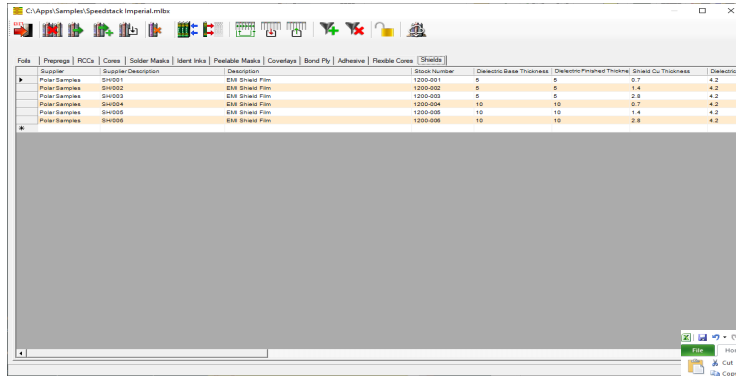
☐ On-Premise Mode

S:\Software\Speedstack\MaterialLibrary_v20_11

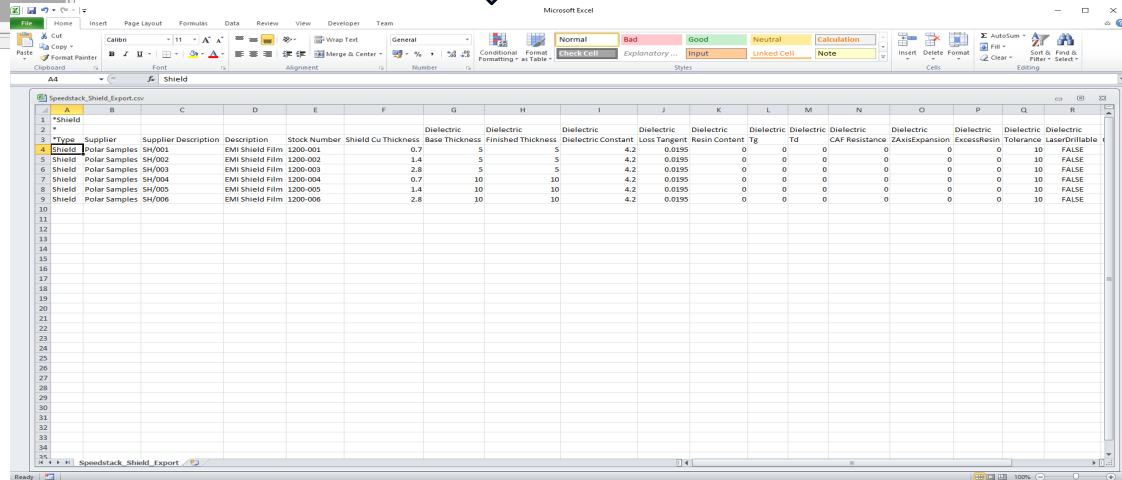
Browse...

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

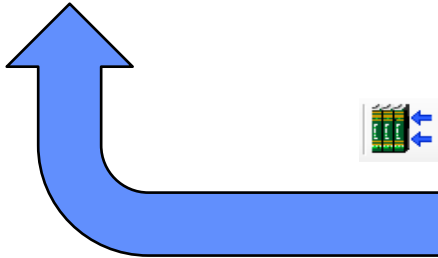
Export / Import Shield library to Excel



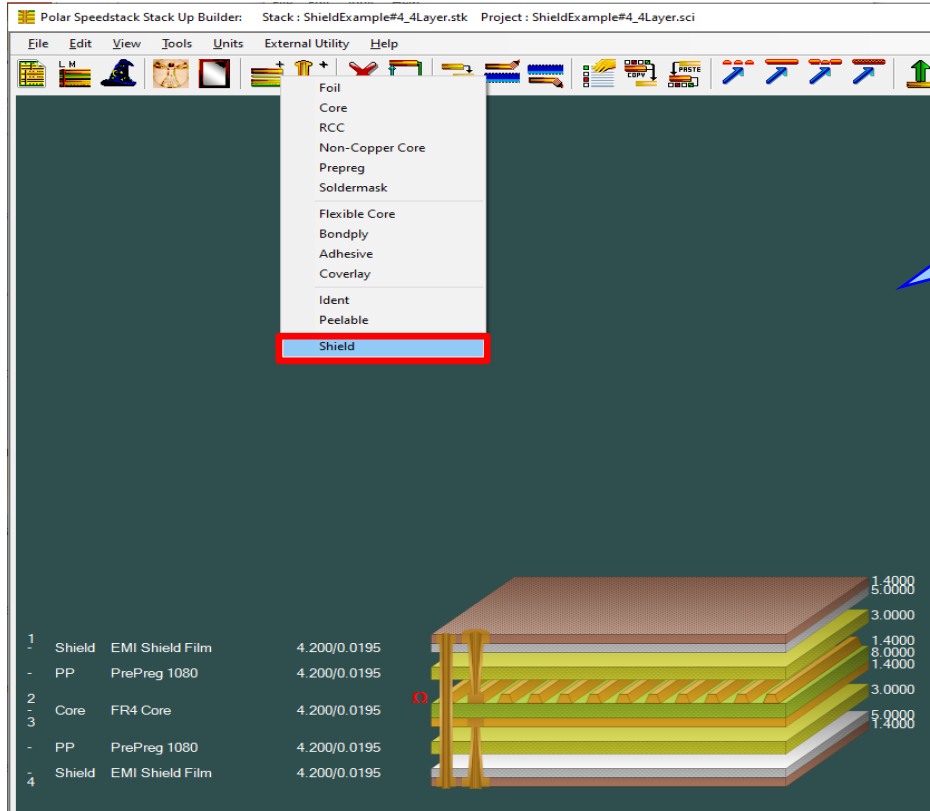
It is possible to export / import Shield library data with 3rd part tools like Excel



Sample	Supplier	Supplier Description	Description	Stock Number	Shield Cu Thickness	Dielectric Base Thickness	Dielectric Finished Thickness	Dielectric Constant	Dielectric Loss Tangent	Dielectric Resin Content	Dielectric Tg	Dielectric Td	Dielectric CAF Resistance	Dielectric Z-axis Expansion	Dielectric Excess Resin	Dielectric Tolerance	Dielectric Laser Drillable
1	Shield	Polar Samples SH/001	EMI Shield Film	1200-001	0.7	5	5	4.2	0.0195	0	0	0	0	0	0	10	FALSE
2	Shield	Polar Samples SH/002	EMI Shield Film	1200-002	1.4	5	5	4.2	0.0195	0	0	0	0	0	0	10	FALSE
3	Shield	Polar Samples SH/003	EMI Shield Film	1200-003	2.8	5	5	4.2	0.0195	0	0	0	0	0	0	10	FALSE
4	Shield	Polar Samples SH/004	EMI Shield Film	1200-004	0.7	10	10	4.2	0.0195	0	0	0	0	0	0	10	FALSE
5	Shield	Polar Samples SH/005	EMI Shield Film	1200-005	1.4	10	10	4.2	0.0195	0	0	0	0	0	0	10	FALSE
6	Shield	Polar Samples SH/006	EMI Shield Film	1200-006	2.8	10	10	4.2	0.0195	0	0	0	0	0	0	10	FALSE



Stack up editor enhancements



Stack Up editor enhancements:

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

Shield properties

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

File Edit View Tools Units External Utility Help

Shield Properties

Main Notes Attributes

General Information

Supplier: Polar Samples

Supplier Description: SH/002


Description: EMI Shield Film

Stock Number: 1200-002

Type: Shield

Shield Copper

Base Thickness: 1.4000 Copper Coverage %: 0.00

Finished Thickness: 1.4000 Graphical Colour: 

Data Filename:

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

Finishing Applied: ☐

Shield Dielectric


Base Thickness: 5.0000 Td: 0.0

Finished Thickness: 5.0000 CAF Resistance: 0.0

Dielectric Constant: 4.2000 Z Axis Expansion: 0.0

Loss Tangent: 0.0195 Excess Resin: 0.0000

Resin Content %: 0.00 Isolation Distance: 5.0000

Tg: 0.0 Graphical Colour: 

Data Filenames

Dielectric Base Thickness: 5.0000

Dielectric Finished Thickness: 5.0000

Dielectric Constant: 4.2

Loss Tangent: 0.0195

Resin Content: 0

Tg: 0

Td: 0

CAF Resistance: 0

Z Axis Expansion: 0

Excess Resin: 0.0000

1 Shield EMI Shield Film 4.200/0.0195 1.4000 5.0000

2 PP PrePreg 1080 4.200/0.0195 3.0000

3 Core FR4 Core 4.200/0.0195 1.4000 8.0000 1.4000

4 PP PrePreg 1080 4.200/0.0195 3.0000

5 Shield EMI Shield Film 4.200/0.0195 5.0000 1.4000

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

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

Controlled impedance and insertion loss calculations

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

File Edit View Tools Units External Utility Help

Stack Up Editor DRC : 3 Controlled Impedance CI Results

All 1 < 1 of 2 > 1

Offet Stripline 102A

Shield material in stack up

Shield material region of structure.

Shield adhesive height / thickness dimension and dielectric constant.

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

1 - Shield EMI Shield Film 3.500/0.0180 1.4000 5.0000 3.0000 1.4000 8.0000 1.4000

2 - PP PrePreg 1080 4.200/0.0195 3.0000 5.0000 1.4000

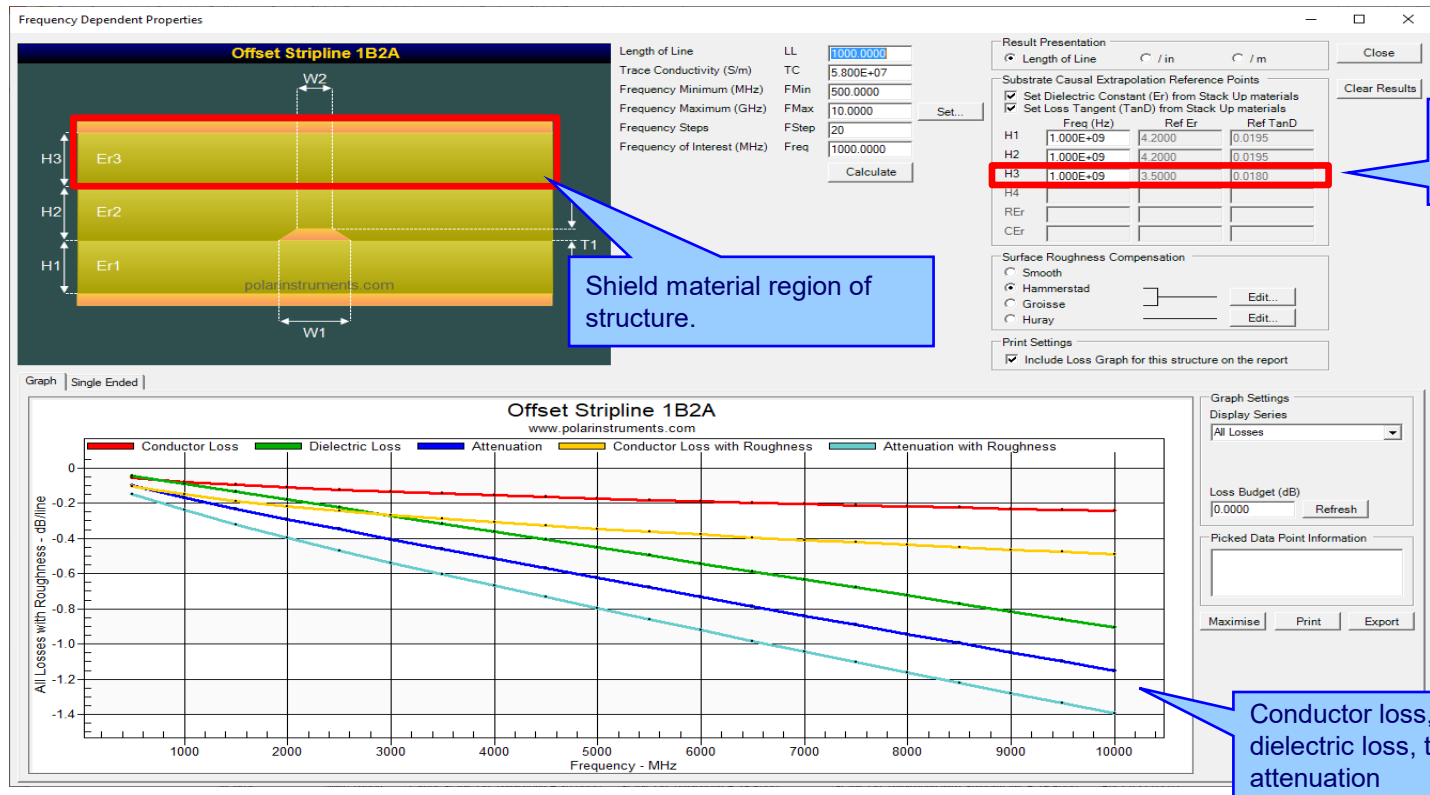
3 - Core FR4 Core 4.200/0.0195

4 - PP PrePreg 1080 4.200/0.0195

5 - Shield EMI Shield Film 4.200/0.0195

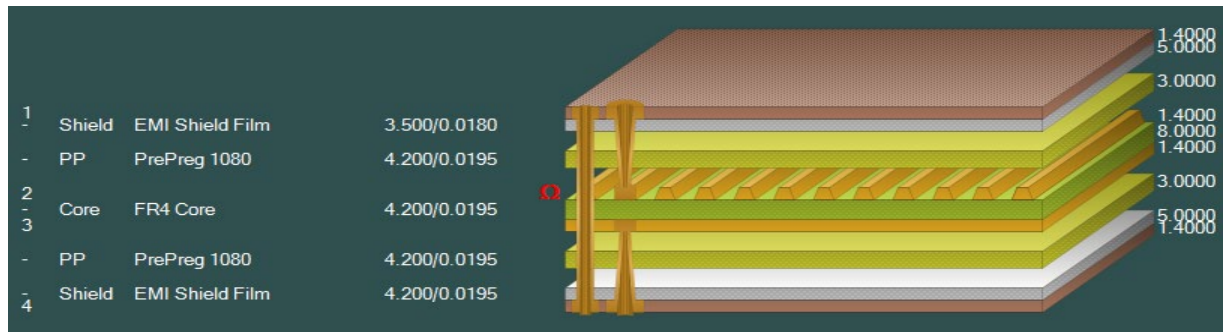
Master Mils/Thous Target Stack Up Thickness = 30.0000 Stack Up Thickness = 29.6000 Stack Up Thickness with Soldermask = 29.6000 Beta V21.02.01

Controlled impedance and insertion loss calculations



Controlled impedance and insertion loss calculations

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



Technical report enhancements

Technical report showing shield materials

Speedstack Report Printer

File Options

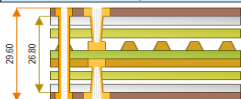


Display Page 11

C:\Apps\Samples\ShieldExample\F5_4layer.sci



Units: Mils






Layer	Stack up	Supplier	Description	Type	Processed Thickness	cr	Loss Tangent	Impedance ID
1		Polar Samples	EMI Shield Film	Shield	1.400			
		Polar Samples	PrePreg 1050	Dielectric	5.000	3.500	0.0180	
		Polar Samples	PrePreg 1050	Dielectric	3.000	4.200	0.0195	
2		Polar Samples	FR4 Core	FR4	1.400			1.2
3		Polar Samples	PrePreg 1050	Dielectric	8.000	4.200	0.0195	
4		Polar Samples	PrePreg 1050	Dielectric	1.400			
		Polar Samples	PrePreg 1050	Dielectric	3.000	4.200	0.0195	
		Polar Samples	EMI Shield Film	Shield	5.000	4.200	0.0195	
		Polar Samples	EMI Shield Film	Shield	1.400			

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

Notes

Impedance ID	Structure Image	Structure Name	Impedance Signal Layer	Ref. Plane 1 in Layer	Ref. Plane 2 in Layer	Lower Trace Width (W1)	Upper Trace Width (W2)	Trace Separation (S1)	Target Impedance	Tol (+/- %)	Calculated Impedance
1		Offset Stripline 1B2A	2	1	3	8.400	5.400	0.000	50.000	10.000	50.460
2		Edge Coupled Offset Stripline 1B2A	2	1	3	5.000	4.000	8.800	100.000	10.000	100.010

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

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

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Technical report enhancements

Insertion loss report supporting shield materials

Speedstack Report Printer



C:\Apps\Samples\ShieldExample\5_4_layer.sci

Units: Mds



Offset Snipline 1B2A



Length of Line: 1000
Trace Conductivity: $5.8E+07$ Sim
Frequency Minimum: 500 MHz
Frequency Maximum: 10 GHz
Frequency Steps: 20

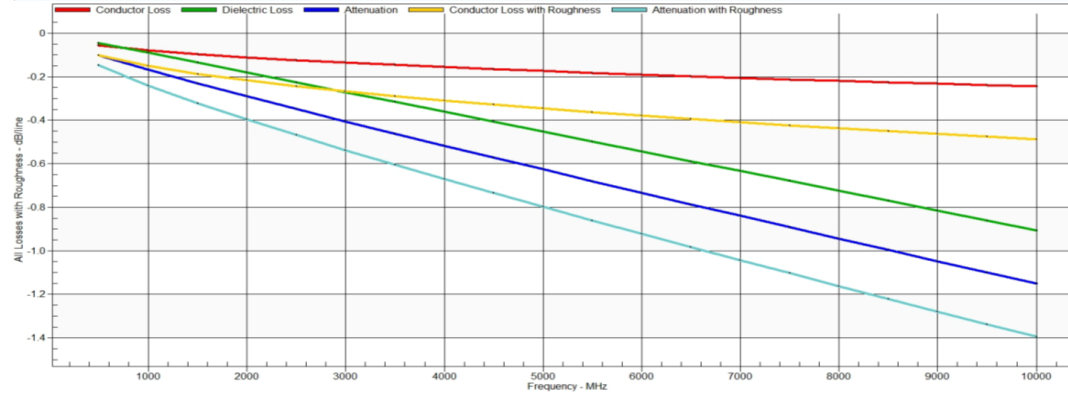
Substrate Causal Extrapolation Reference Points

	Freq (Hz)	Ref Ex	Ref TanD
H1	$1.000E+09$	4.2000	0.0195
H2	$1.000E+09$	4.2000	0.0195
H3	$1.000E+09$	3.5000	0.0190
H4			
REF			
REF			

Surface Roughness Compensation: Hammerstad

Surface 1 Roughness (RMS) R1: 0.2
Surface 2 Roughness (RMS) R2: 0.2
Surface 3 Roughness (RMS) R3: 0.2
Surface 4 Roughness (RMS) R4: 0.2

Frequency of Interest: 1000 MHz
Conductor Loss: $-7.861E-02$ dB/line
Dielectric Loss: $-8.992E-02$ dB/line
Attenuation: $-1.655E-01$ dB/line
Conductor Loss with Roughness: $-1.507E-01$ dB/line
Attenuation with Roughness: $-2.406E-01$ dB/line



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

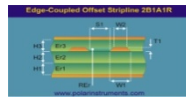
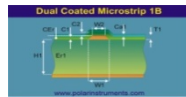
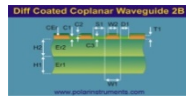
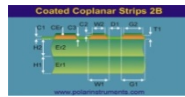
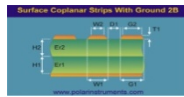
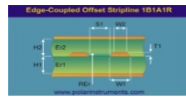
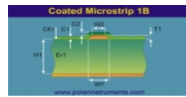
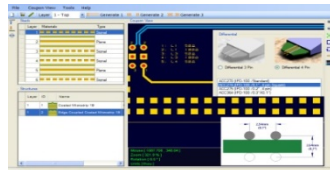
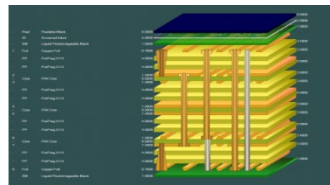
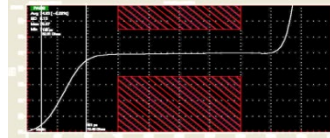
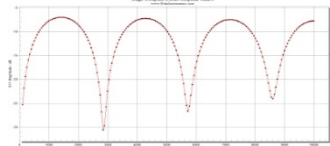
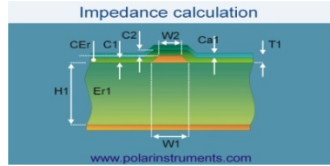
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Import / Export enhancements

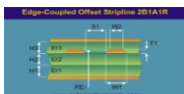
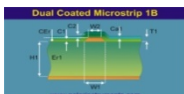
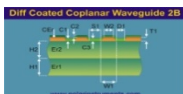
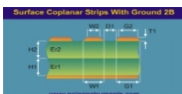
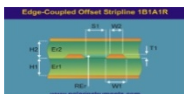
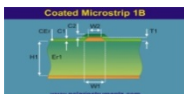
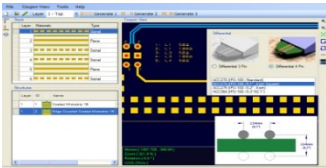
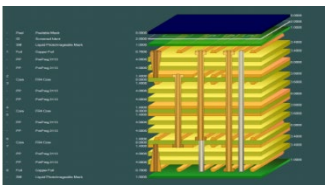
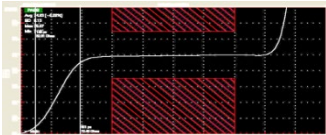
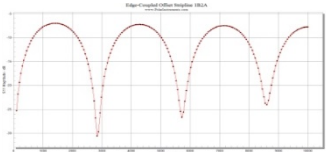
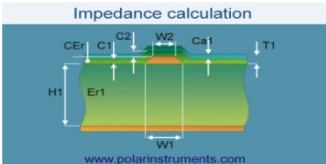
The following Import / Export options have been updated to support the new shield material introduced with Speedstack 2021:

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



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





**For more information:
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