

Your PCB proto right first time

Making boards in the eC-cloud

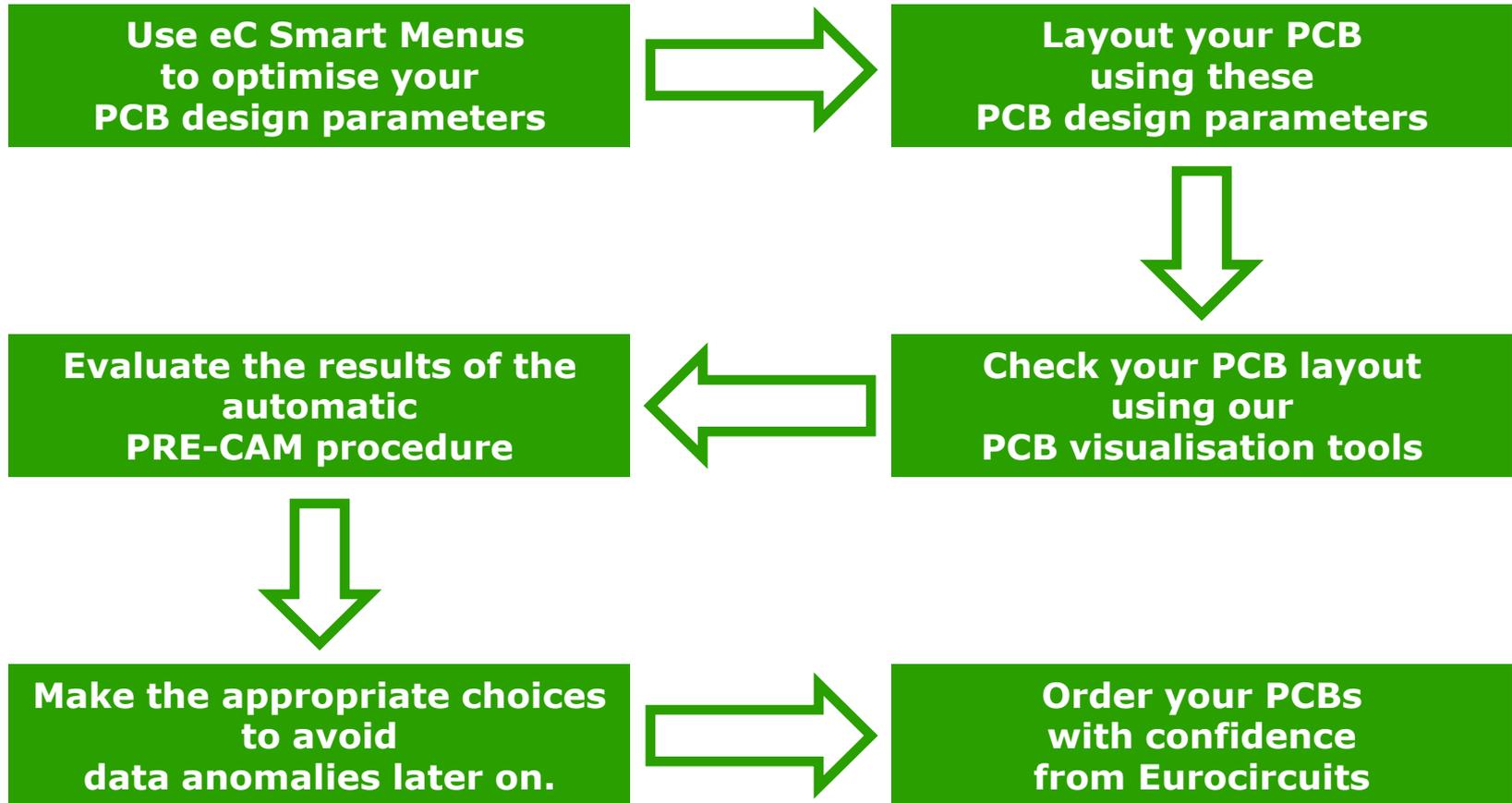
Electronics & Automation 2015

Virtual PCB production - Goals

- Help busy designers get boards “right first time”
 - on time
 - accurate to their intentions
 - at best total cost
- Two inter-related topics
 - Design for Manufacturability (DFM)
 - What are the features that increase board costs?
 - What makes my board harder or impossible to make?
 - Clear data presentation and clear order details
 - How can I be sure the data transfer is accurate?
 - Are there any data issues that will delay delivery?

“Wonderful, but I barely have time to design the circuitry, let alone sort out fabrication.”

Virtual PCB production – How?



What you should know before you start to layout your board?

- What are the PCB cost drivers
 - Board size
 - Base material
 - Number of layers
 - Copper thickness
 - Special multilayer build
 - Blind and buried vias
 - Smallest hole size
 - Minimum track and gap
 - Surface finish
 - Soldermask colour
 - Legend colour
 -
- What makes a PCB harder/impossible to make?
 - Heavy copper + narrow tracks/gaps
 - Too small holes in too thick boards (aspect ratio)
 - Incompatible surface finishes
 - Blind/buried via combinations

“Stop! How can I take all this on board?”

Which tools are available?

- Eurocircuits offers DFM:
 - smart menus that:
 - Are specific to the base material of your choice
 - Help you select the most effective build-up (+700 builds)
 - Help you select the technical classification of the board
 - Validate all chosen technical parameters (+300 rules)
 - Validate blind and buried via builds
 - Give price guidance on all chosen options
 - online help at any point in the flow

=> Help define the smartest design parameters for your PCB
- Eurocircuits guarantees:
 - technology standards that any volume fabricator can make
 - Base materials that guarantee high reliability during assembly and afterwards during field operation

Which tools are available?

Price calculator Shopping basket Checkout items

Visual guidance even without PCB data

STANDARD pool

Top view

Delivery format: Single PCB

PCB quantity: 2

Delivery term: 7 working days

Number of layers: 4

PCB width (X) (mm): 100.00

PCB height (Y) (mm): 80.00

eC-registration compatible PCB:

Summary

Service: STANDARD pool

Delivery term: 7 working days

Estimated shipment date: 08-06-2015

Quantity: 2 PCBs

Board surface / Order surface: 0.80 dm² / 1.60 dm²

Prices

Single PCB	Net	€ 71.40
Total boards		€ 142.80
Express transport		€ 0.00
VAT 21.00%		€ 29.99
Total gross		€ 172.79

[Add to basket](#)

Material

Board thickness: 1.55 mm

Outer layer copper foil: 18 µm (end +/-35 µm)

Reversed buildup:

Inner layer core thickness: Standard

Extra press cycles: 0

Material Tg: 145-150 °C

Inner layer copper foil: 35 µm

Special buildup:

Blind/Buried via runs: 0

[Buildup](#)

Alternatives

Customized matrix

2 PCBs 7 working days Net € 71.40 € 142.80 Select	5 PCBs 7 working days Net € 36.70 € 183.50 Select	10 PCBs 7 working days Net € 25.10 € 251.04 Select
2 PCBs 6 working days Net € 87.01 € 174.02 Select	5 PCBs 6 working days Net € 43.84 € 219.21 Select	10 PCBs 6 working days Net € 31.43 € 314.30 Select

The transport costs and total price are calculated and shown in the summary according to the selection.

Technology

PCB definition

Top soldermask: Green

Top legend: White

Surface finish: Che Ni/Au selectif

Bare Board Testing:

Bottom soldermask: Green

Bottom legend: None

Milling:

[Classification](#)

Price guidance in function of delivery terms and quantity

Online chat support

Contact support

EURO CIRCUIITS

Democompany

demo

-- Select department --

[Start chat](#)

Useful documents

[PCB Calculator user guide](#) [Read more...](#)

[PCB design guidelines](#) [Read more...](#)



Which tools are available?

Buildup selector - (STANDARDpool)

Material

Number of layers: 4
 Reversed buildup:
 Extra press cycles: 0
 Top soldermask: Green
 Top legend: White
 Peelable mask: No
 Viafill: No
 Bottom heatsink paste: No

Board thickness: 1.55 mm
 Blind/Buried via runs: 0
 Special buildup:
 Bottom soldermask: Green
 Bottom legend: None
 Carbon contacts: No
 Top heatsink paste: No

Buildup

Total material thickness: 1.50 mm

Top legend
 Top soldermask
 Top copper
 Prepreg - PR7628 - 0.18mm
 Prepreg - PR7628 - 0.18mm
 Inner copper 1
 Core - FR4-Improved - 0.71mm
 Inner copper 2
 Prepreg - PR7628 - 0.18mm
 Prepreg - PR7628 - 0.18mm
 Bottom copper
 Bottom soldermask
 Plated drill
 Ion Plated Through Hole (NPTH)

Core thickness	Outer layer copper foil	Inner layer copper
0.710 mm	12 µm (end 30 µm)	12 µm
0.710 mm	12 µm (end 30 µm)	18 µm
0.710 mm	18 µm (end 35 µm)	18 µm
0.710 mm	18 µm (end 35 µm)	35 µm
0.710 mm	35 µm (end 60 µm)	35 µm
0.710 mm	35 µm (end 60 µm)	70 µm
0.710 mm	70 µm (end 95 µm)	70 µm

Classification editor - (STANDARDpool)

Pattern class

determine the right DRC values for your design

Design values	3	4	5	6	7	8	9
Outer layer trackwidth (OL-TW)	0.150	≥ 0.250 mm	≥ 0.200 mm	≥ 0.175 mm	≥ 0.150 mm	≥ 0.125 mm	≥ 0.100 mm
Outer layer isolation distance (OL-TT-TP-PP)	0.150	≥ 0.250 mm	≥ 0.200 mm	≥ 0.175 mm	≥ 0.150 mm	⚠ ≥ 0.125 mm	⚠ ≥ 0.125 mm
Outer layer annular ring (OAR)	0.125	≥ 0.200 mm	≥ 0.150 mm	≥ 0.150 mm	≥ 0.125 mm	≥ 0.125 mm	≥ 0.100 mm
Inner layer trackwidth (IL-TV)	0.150	≥ 0.250 mm	≥ 0.200 mm	≥ 0.175 mm	≥ 0.150 mm	⚠ ≥ 0.125 mm	⚠ ≥ 0.125 mm
Inner layer isolation distance (IL-TT-TP-PP)	0.150	≥ 0.250 mm	≥ 0.200 mm	≥ 0.175 mm	≥ 0.150 mm	⚠ ≥ 0.125 mm	⚠ ≥ 0.125 mm
Inner layer annular ring (IAR)	0.125	≥ 0.200 mm	≥ 0.150 mm	≥ 0.150 mm	≥ 0.125 mm	≥ 0.125 mm	≥ 0.125 mm

continuous validation of choices

The selected outer copper foil thickness (18 µm) requires a minimum outer layer isolation of 0.125 mm.

The selected inner copper foil thickness (35 µm) requires a minimum inner layer isolation of 0.125 mm and a minimum inner layer trackwidth of 0.125 mm.

Drill class

Design values	A	B	C	D	E
Smallest final hole	0.25	≥ 0.50 mm	≥ 0.35 mm	≥ 0.25 mm	≥ 0.15 mm

Cancel Apply

+/- 700 pre-defined build ups

constant price guidance

continuous validation of choices

Remarks

- No image is assigned to Top legend.
- No image is assigned to Top soldermask.
- No image is assigned to Bottom soldermask.

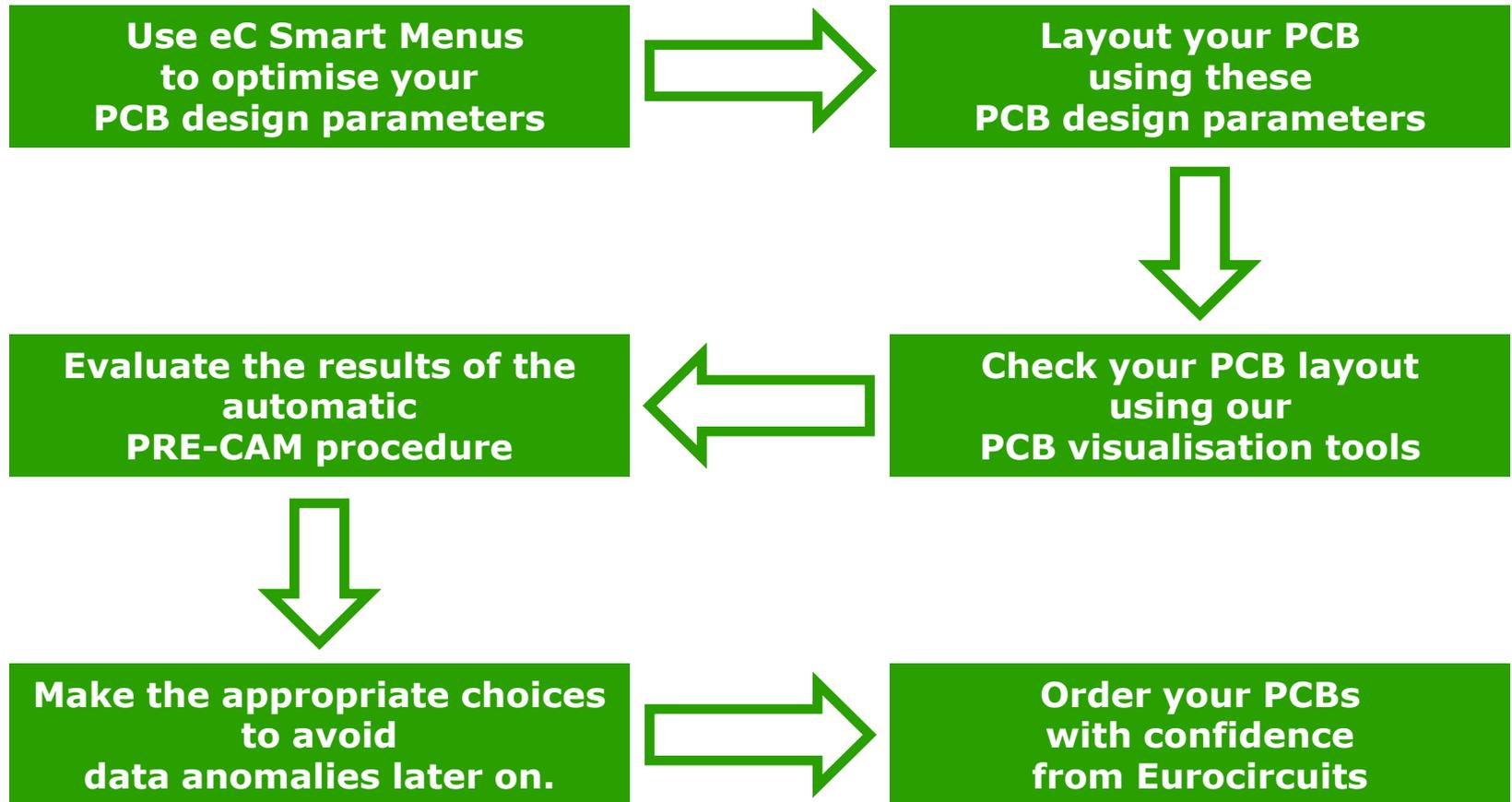
Click here for more information

Virtual PCB production – so far

- Your design parameters are defined
 - According to your technical expectations
 - You know how fast you can get your boards
 - At which cost that suits you
- Time to start working on your layout

“End of part 1”

Virtual PCB production – How?



Your PCB is ready for viewing.

The screenshot shows a web interface for a PCB manufacturer. At the top, there's a navigation bar with the 'EURO CIRCUITS' logo, user information 'Demouser pwr_user1 | Democompany', and a shopping cart icon showing '4 Total item(s)'. Below the navigation, there are tabs for 'Price calculator', 'Shopping basket', and 'Checkout items'. The main heading is 'Shopping basket - To start the manufacturing process, select an item(s) and "Proceed to checkout" !'. A green box with an arrow points to the 'Ask a question' button, stating 'Support is always just a click away.' Below this is a row of buttons: 'Proceed to checkout', 'Modify', 'View details', 'Files', 'Delete', 'History', 'Download PDF offer', 'Edit administrative details', and 'Ask a question'. A search bar is also present. The main content area is divided into sections: 'Items ready for checkout' and 'Items in analysis'. A green box with an arrow points to the 'PCB Visualizer' link in the first row of the 'Items ready for checkout' table, stating 'These 3 items can be viewed by clicking the link.' Another green box with an arrow points to the 'TEST-OK' button in the left sidebar, stating 'When inquiries are launched, they will appear here while in process.' The 'Items ready for checkout' table has columns: 'Number', 'Type', 'Status', 'Item name', 'Service', 'Quantity', 'Delivery days', 'Unit price', and 'Net price'. The 'Items in analysis' table has columns: 'Number', 'Type', 'Status', 'Item name', 'Service', 'Quantity', 'Delivery days', 'Unit price', 'Net price', and 'Stencils'. A yellow information box states: 'You can order all jobs with status 'Ready for Checkout' immediately, even when the PCB Visualizer process is still running or failed.'

Price calculator | **Shopping basket** | Checkout items

Shopping basket - To start the manufacturing process, select an item(s) and "Proceed to checkout" !

Factory closures: (1 day) in November - View

[Proceed to checkout](#) | [Modify](#) | [View details](#) | [Files](#) | [Delete](#) | [History](#) | [Download PDF offer](#) | [Edit administrative details](#) | [Ask a question](#)

Number | Item name | Service | Status | Created c | [Search](#)

Items ready for checkout

These 3 items can be viewed by clicking the link.

	PCB Visualizer®	Offer	Number	Type	Status	Item name	Service	Quantity	Delivery days	Unit price	Net price
<input type="checkbox"/>	✓ PCB Visualizer®		B0248448	PCB	Ready to checkout	LSA-TST-11topcu	IMS pool	5	7 Working days		
<input type="checkbox"/>	✓ PCB Visualizer®		B0247891	PCB	Ready to checkout	WDG perf	STANDARD pool	10	7 Working days		
<input type="checkbox"/>	✓ PCB Visualizer®		B0244135	PCB	Ready to checkout	Isa-TST	STANDARD pool	10	7 Working days		

You can order all jobs with status 'Ready for Checkout' immediately, even when the PCB Visualizer process is still running or failed.

Items in analysis

	PCB Visualizer®	Number	Type	Status	Item name	Service	Quantity	Delivery days	Unit price	Net price	Stencils
<input type="checkbox"/>	✓ PCB Visualizer®	B0247255	Inquiry	Awaiting quotation	Isa-TST	STANDARD pool	10	7 Working days	-	-	-

Visualizer link in [Visualizer] column lets you view PCB layers visually, during processing you will not be able to modify your data files. .

Customer R...
CALCULATE AND ORDER
Calculate a...
Order Stencils
Shopping b... 4
View runnin...
Order repe...
Pre-production a...
Exception o...
View shipm...
TEST-OK
OFF THE SHELF
FINANCIAL
MANAGE PROFILE

When inquiries are launched, they will appear here while in process.

(All prices in EUR)

(All prices in EUR)

Your data interpreted & visualized

PCBConfigurator PCBChecker Board name: isa-tst (B0161432) Data set: Customer Data

Customer data Buildup

Imported 9 layers

STANDARD pool

Delivery format: Single PCB

PCB quantity: 10

Delivery term: 7 working days

Number of layers: 4

PCB width (X) (mm): 109.14
Measured: 109.14 mm

PCB height (Y) (mm): 69.34
Measured: 69.34 mm

eC-registration compatible PCB:

Board name: isa-tst

Stencils

Material Buildup

Board thickness: 1.55 mm

Material Tg: 145-150 °C

Outer layer copper foil: 18 µm (end +/-35 µm)

Inner layer copper foil: 35 µm

Reversed buildup:

Special buildup:

Inner layer core thickness: Standard

Blind/Buried via runs: 0
Measured: 0

Extra press cycles: 0

Technology Classification

PCB definition

Buildup

Top view

- Top soldermask
- Top copper
- Inner copper 1
- Inner copper 2
- Bottom copper
- Bottom soldermask
- Plated drill
- Non Plated Through Hole
- Rout
- Bottom view

Bird's Eye View

Detailed View - Top

Price

Summary

Service	STANDARD pool
Delivery term	7 working days
Estimated shipment date	19-05-2014
Quantity	10 PCBs
Board surface / Order surface	0.76 dm² / 7.57 dm²
Prices	Net
Single PCB	€ 25.81
Total boards	€ 258.14
Express transport	€ 13.68
Economy transport	€ 7.28
VAT 21.00%	€ 57.08
Total gross	€ 328.91

[Save changes](#)

Click the 'Launch inquiry' button in case you are having troubles configuring your PCB. Our sales team will review your input and generate an offer.

[Launch inquiry](#)

Alternatives Customized matrix

10 PCBs 7 working days Net	20 PCBs 7 working days Net	30 PCBs 7 working days Net
€ 25.81	€ 16.33	€ 12.99
€ 258.14	€ 326.64	€ 389.78
Select	Select	Select
10 PCBs 6 working days Net	20 PCBs 6 working days Net	30 PCBs 6 working days Net
€ 32.14	€ 20.50	€ 16.31
€ 321.36	€ 409.97	€ 489.22
Select	Select	Select

The transport costs and total price are calculated and shown in the summary according to the selection.



Remove data ambiguities online

Buildup wizard

Material

Number of layers: 4
Board thickness: 1.55 mm
Reversed buildup:
Blind/Buried via runs: 0
Extra press cycles: 0
Special buildup:
Top soldermask: Green
Bottom soldermask: Green
Top legend: None
Bottom legend: None
Peelable mask: No
Carbon contacts: No
Viafill: No
Top heatsink paste: No
Bottom heatsink paste: No

Buildup

Top view
Top soldermask (DA050100A_GTS)
Top copper (DA050100A_GTL)
Inner copper 1 (DA050100A_GP1)
Inner copper 2 (DA050100A_GP2)
Bottom copper (DA050100A_GBL)
Bottom soldermask (DA050100A_GBS)
Plated drill (DA050100A-RoundHoles_TXT_plated)
Non Plated Through Hole (NPTH) (DA050100A-RoundHoles_TXT_unplated)
Rout (DA050100A-SlotHoles_TXT)
Bottom view

Imported Layers

File name	Function
DA050100A-RoundHoles_TXT_plated	Plated drill
DA050100A-RoundHoles_TXT_unplated	Non Plated Through Hole (NPTH)
DA050100A-SlotHoles_TXT	Rout
DA050100A_GBL	Bottom copper
DA050100A_GBS	Bottom soldermask
DA050100A_GM4	Non-assigned
DA050100A_GP1	Inner copper 1
DA050100A_GP2	Inner copper 2
DA050100A_GTL	Top copper
DA050100A_GTS	Non-assigned

Layer image

Layer image showing the PCB layout with various layers visible.

Core thickness **Outer layer copper foil** **Inner layer copper foil**

0.710 mm	12 µm (end 30 µm)	12 µm
0.710 mm	12 µm (end 30 µm)	18 µm
0.710 mm	18 µm (end 35 µm)	18 µm
0.710 mm	18 µm (end 35 µm)	35 µm
0.710 mm	35 µm (end 60 µm)	35 µm
0.710 mm	35 µm (end 60 µm)	70 µm
0.710 mm	70 µm (end 95 µm)	70 µm
0.360 mm	12 µm (end 30 µm)	12 µm
0.360 mm	12 µm (end 30 µm)	18 µm
0.360 mm	18 µm (end 35 µm)	18 µm
0.360 mm	18 µm (end 35 µm)	35 µm

"Layer editor" allows you to assign any loaded data file to any functional layer of the board. The result of the link is shown in the build up.

On the right side of the screen the layer image of the selected data file is shown.

Cancel Apply

Evaluate possible DRC issues

PCB Configurator | PCB Checker | Board name: lsa-tst (B0161432) | Data set: Customer Data

DRC information	DFM information
Outer layer trackwidth (OL-TW)	
Top copper	Required: 0.200 mm, Measured: 0.200 mm
Bottom copper	Required: 0.200 mm, Measured: 0.200 mm
Outer layer isolation distance (OL-TT-TP-PP)	
Top copper	Required: 0.150 mm, Measured: 0.125 mm ✖ 4
Bottom copper	Required: 0.150 mm, Measured: 0.200 mm
Outer layer annular ring (OAR)	
Top copper	Required: 0.200 mm, Measured: 0.200 mm
Bottom copper	Required: 0.200 mm, Measured: 0.200 mm
Inner layer trackwidth (IL-TW)	
Inner copper 1	Required: 0.250 mm, Measured: 0.250 mm
Inner copper 2	Required: 0.250 mm, Measured: 0.250 mm
Inner layer isolation distance (IL-TT-TP-PP)	
Inner copper 1	Required: 0.250 mm, Measured: +
Inner copper 2	Required: 0.250 mm, Measured: 0.600 mm
Inner layer annular ring (IAR)	
Inner copper 1	Required: 0.200 mm, Measured: 0.250 mm
Inner copper 2	Required: 0.200 mm, Measured: 0.299 mm
Smallest final hole	
Plated drill	Required: 0.25 mm, Measured: 0.30 mm
Non Plated Through Hole (NPTH)	Required: 0.25 mm, Measured: 3.20 mm

Buildup

- Top view
- Top soldermask
- Top copper**
- Inner copper 1
- Inner copper 2
- Bottom copper
- Bottom soldermask
- Plated drill
- Non Plated Through Hole
- Rout
- Bottom view

Detailed View - Top copper

Price

Summary	
Service	STANDARD pool
Delivery term	7 working days
Estimated shipment date	19-05-2014
Quantity	10 PCBs
Board surface / Order surface	0.76 dm ² / 7.57 dm ²
Prices	Net
Single PCB	€ 23.55
Total boards	€ 235.54
Express transport	€ 13.68
Economy transport	€ 7.28
VAT 21.00%	€ 52.34
Total gross	€ 301.56

Remarks

⚠ Some of the measured values do not match the required values. Select the required value to ignore the measured value or select the measured value to accept the measured value. Then press Apply to save the selections.

	Required	Measured
Outer layer isolation distance (OL-TT-TP-PP)	<input type="radio"/> 0.150 mm	<input type="radio"/> 0.125 mm

Apply

Alternatives | Customized matrix

10 PCBs	20 PCBs	30 PCBs
7 working days	7 working days	7 working days
Net	Net	Net
€ 23.55	€ 15.38	€ 12.28
€ 235.54	€ 307.53	€ 368.50
Select	Select	Select

Current issue

Measured isolation : 0.125 mm
Required isolation : 0.150 mm

Bird's Eye View

Outer layer isolation distance (OL-TT-TP-PP) - Top copper

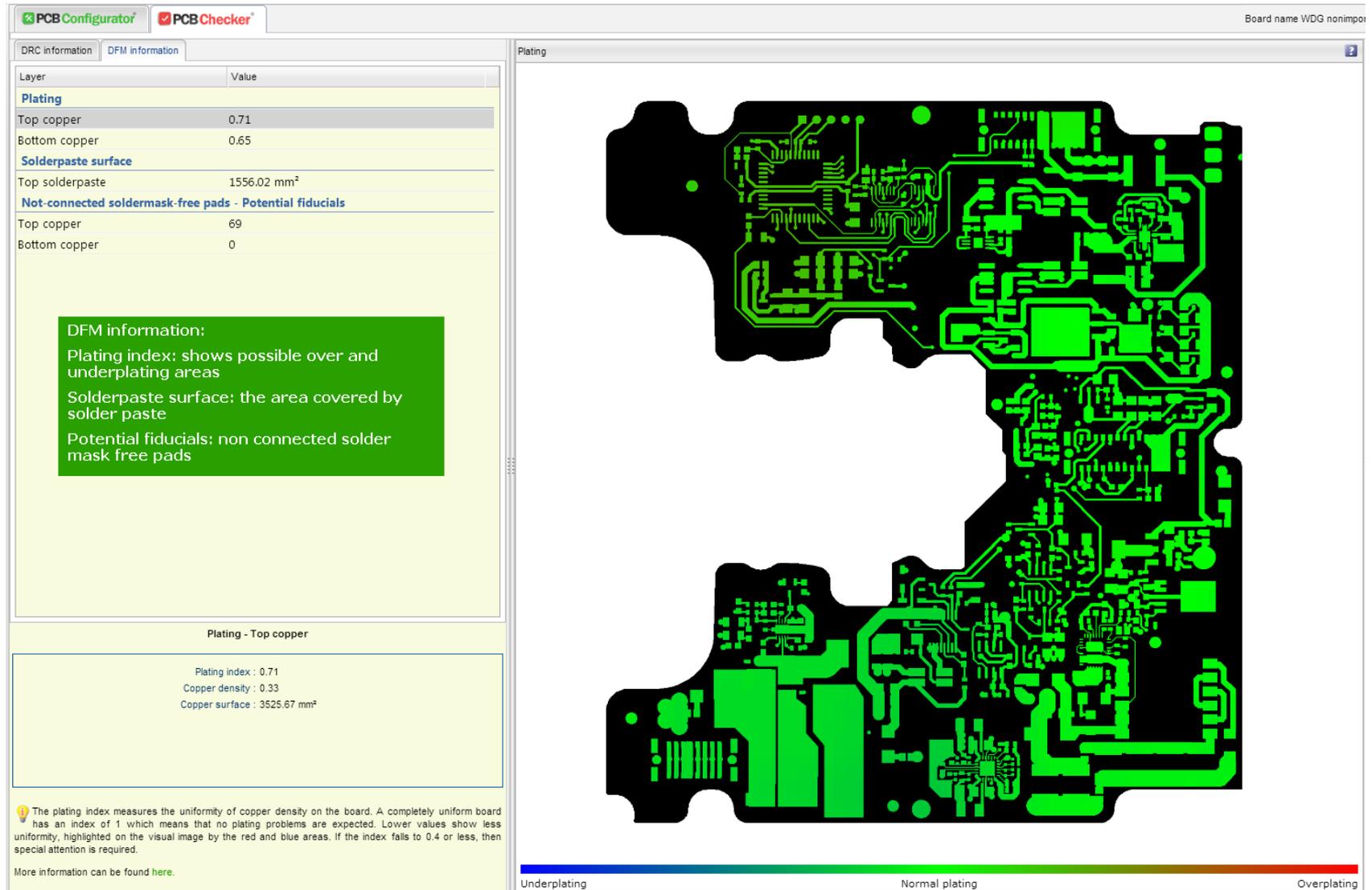
Current issue: 4 0

Navigation: 1/4

DRC violations can be viewed in detail one by one.
In case there is a simple solution, like changing an order detail, this will be suggested in the remark box.



Evaluate possible DFM issues



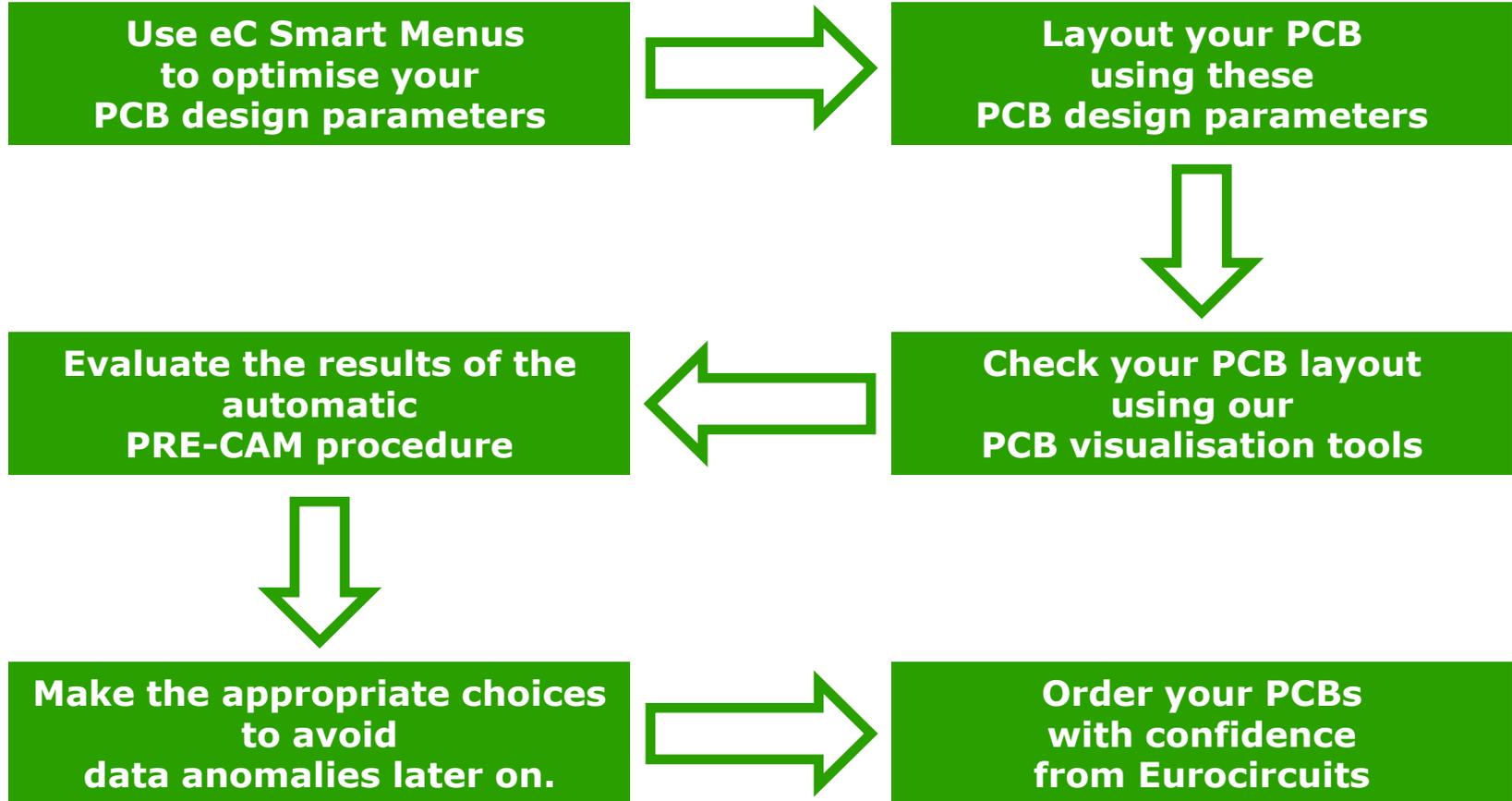
Fine-tune your data for individual orders

- Marking editor
 - Move the eC order number, UL-logo,
 - Add QR-code, production date code, text, custom logo
- Panel editor
 - Build a custom delivery panel to suit your particular assembly requirements
- PCB PIXture editor
 - Make your PCBs stand out from the crowd
 - Put a photograph or graphic on your PCB: Gold PIXture, Mask PIXture, Gold Logo
- => all choice are validated on the fly

Your PCB in the eC-cloud so far.

- So far we have helped you to:
 - Define your optimum design parameters
 - Specify all non-Gerber PCB parameters
 - Check if your data is:
 - Readable
 - Complete
 - Understood
 - Visualize your data
 - Check for any DRC issues
 - Check for any DFM issues
- Throughout the whole flow you were in control of:
 - Costs
 - Timings
- Next we need to show you what we will do with your data to make them production ready.

Virtual PCB production – How?

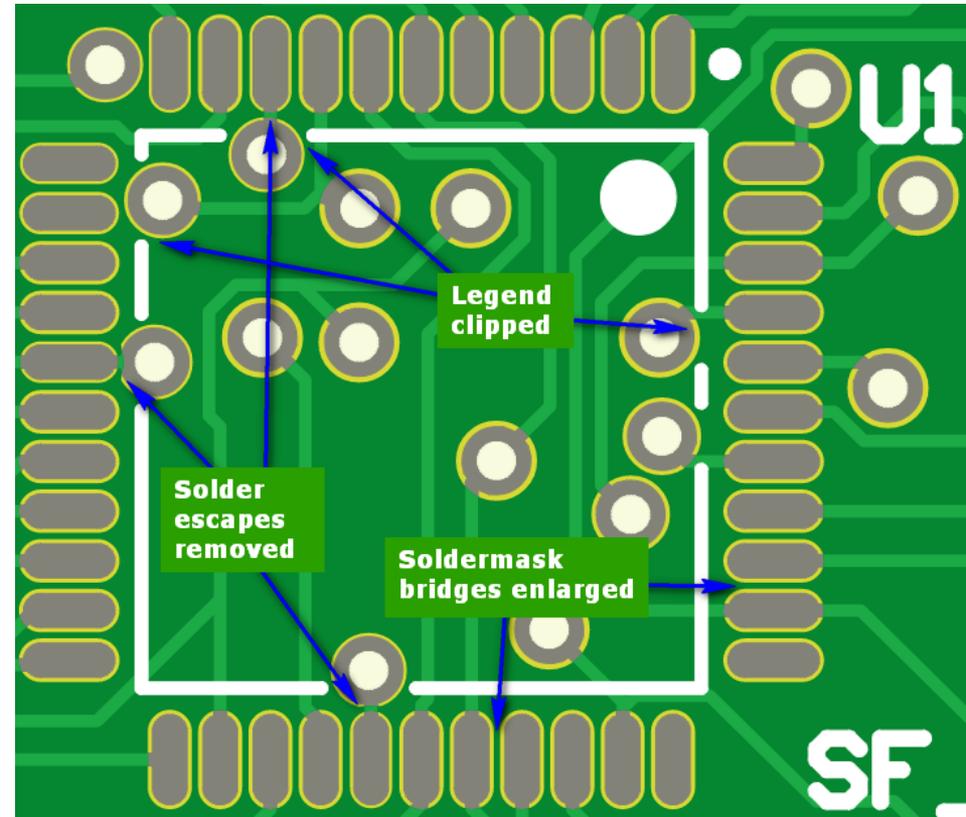
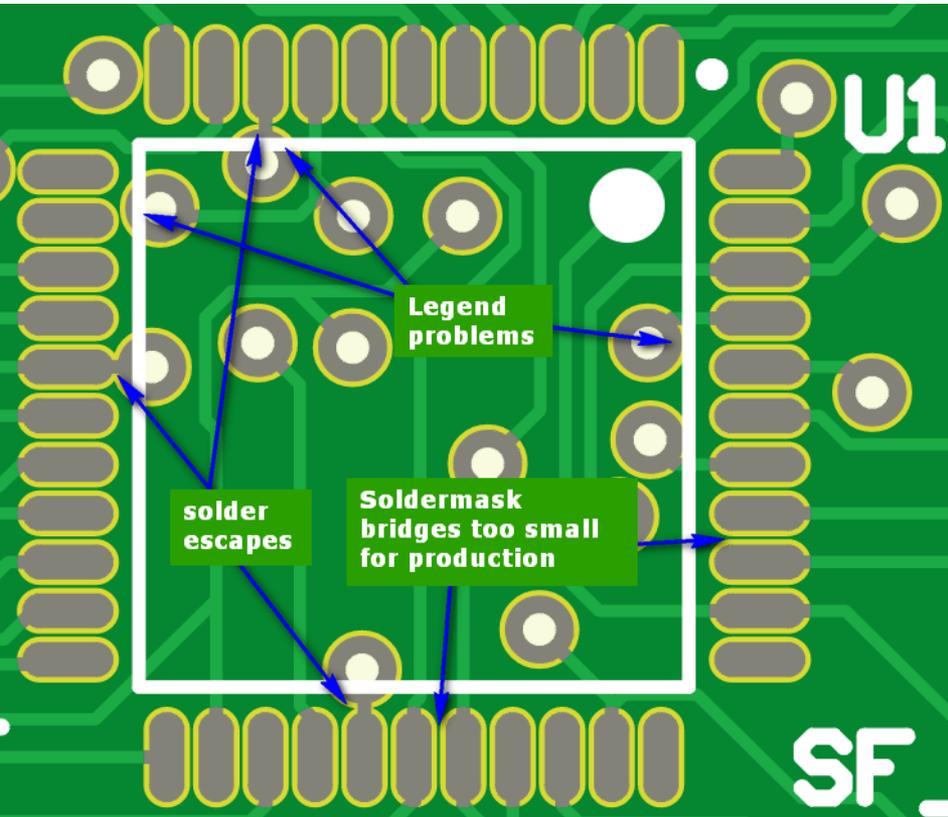


Making your PCB data ready for production, all in the eC-cloud

- Process the customer data through our automated CAM routines and present the result as a second set of data:
 - Analyse all drill holes and adapt the production hole diameters
 - Clean and repair all copper layers
 - Adjust the solder mask to production values
 - Legend layer clipping and text width adjustment
 - Prepare a drill drawing indicating all slots and holes
 - Prepare the profiling layer for Single PCB and Customer Panel
 - Prepare the solder paste-layers
 - Prepare all additional layers
 - Gold fingers
 - Peel-off
 - Via-fill
 - Carbon contacts
 - Heat sink paste
- => Show PRE-CAM results and present any anomalies and possible solutions, all in the eC-cloud

More information at
www.eurocircuits.com

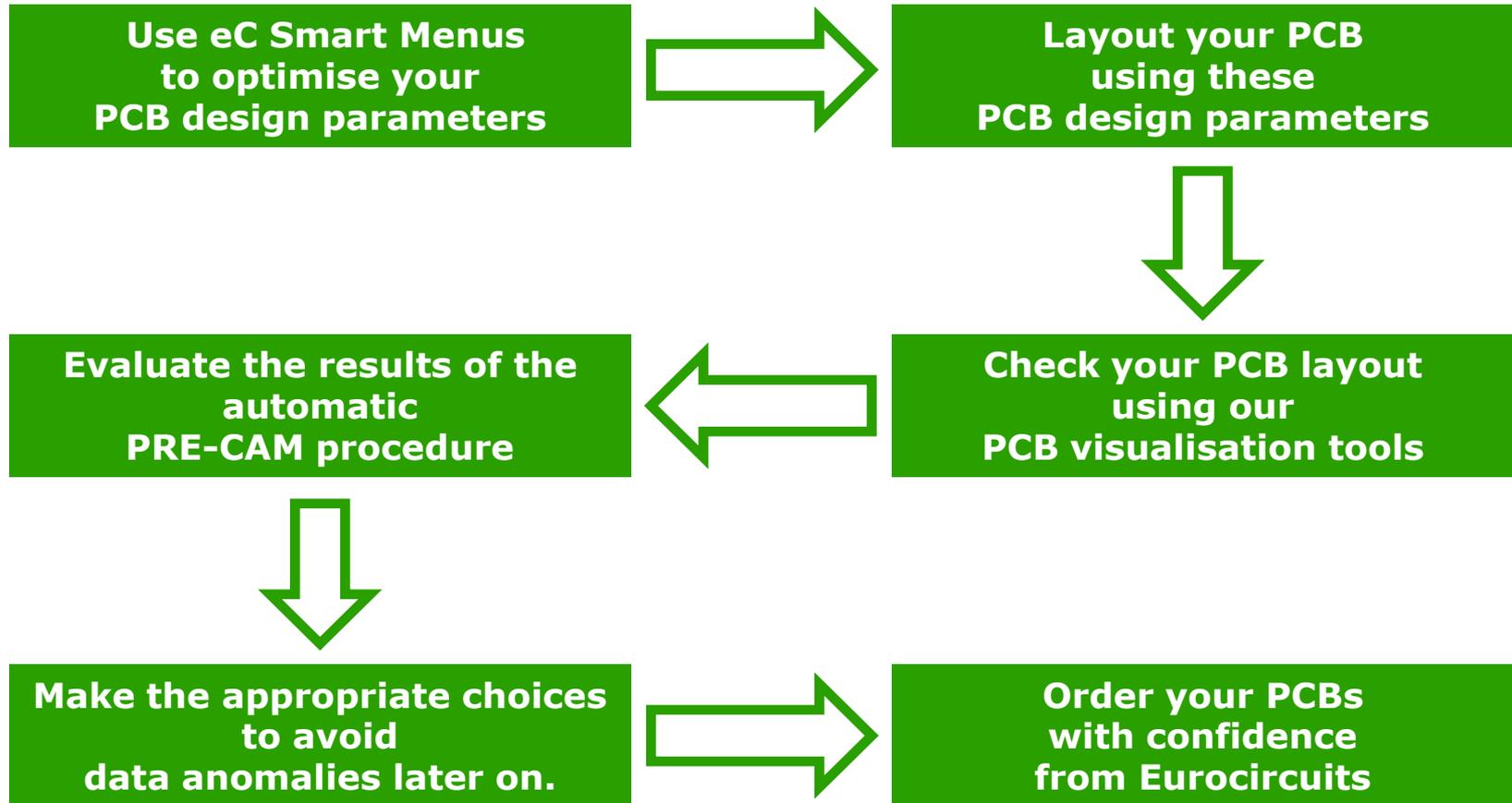
PRE-CAM in the eC-cloud: some examples



PRE-ORDER solver in the eC-cloud: tomorrow's reality

- Repair DRC issues
 - Order details
 - Classification issues
- Repair DFM issues - Make decisions based upon PRE-CAM results
 - Examples:
 - Choose small solder mask webs at higher cost or no webs
 - Legend or not based on viewing the clipping result

eC - Virtual PCB production



eC - Virtual PCB production

- In the eC-cloud you were in control of:
 - Technical choices
 - Costs
 - Timings
- Your stay in the eC-cloud was free of charge
- By using our tools in the eC-cloud you have avoided:
 - PCB data issues
 - Manufacturing iteration
 - Loss of valuable time
 - Extra costs
 - Disappointments