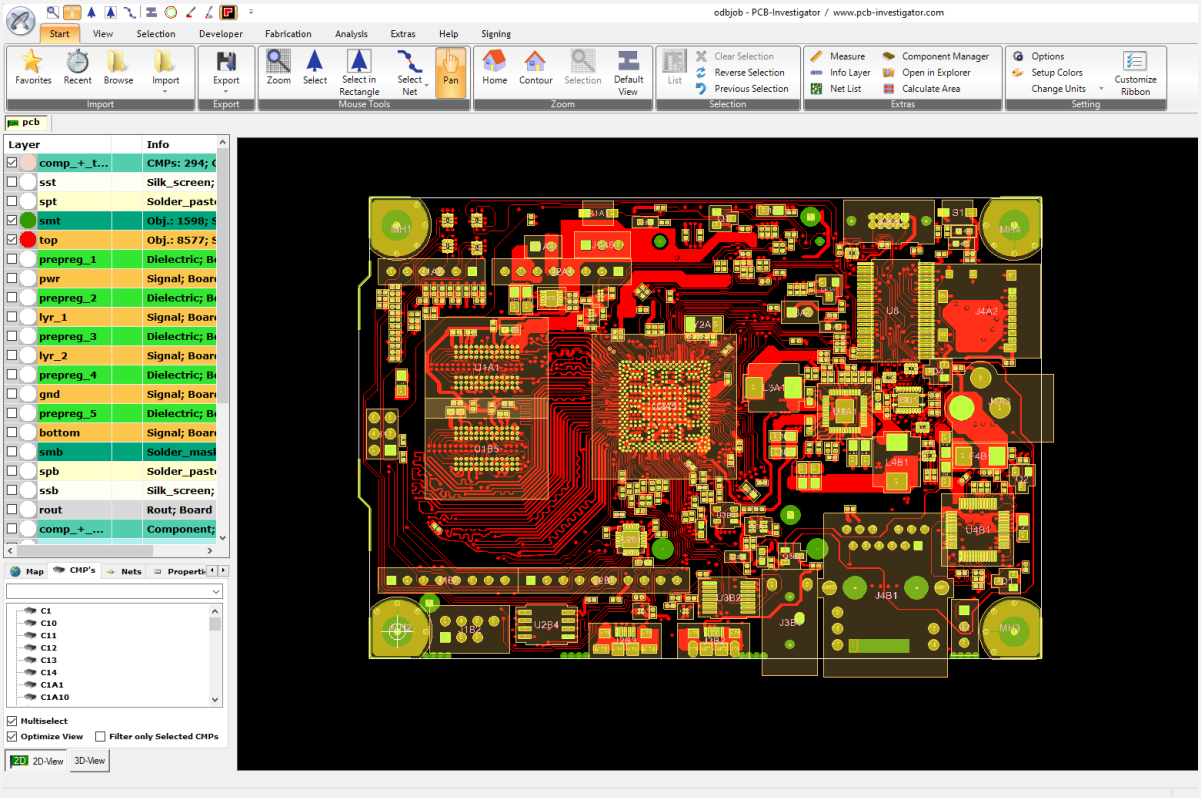
EASYLOGIX.DE

PCB – Investigator Documentation

EASYLOGIX.DE

Table of contents

1. Introduction



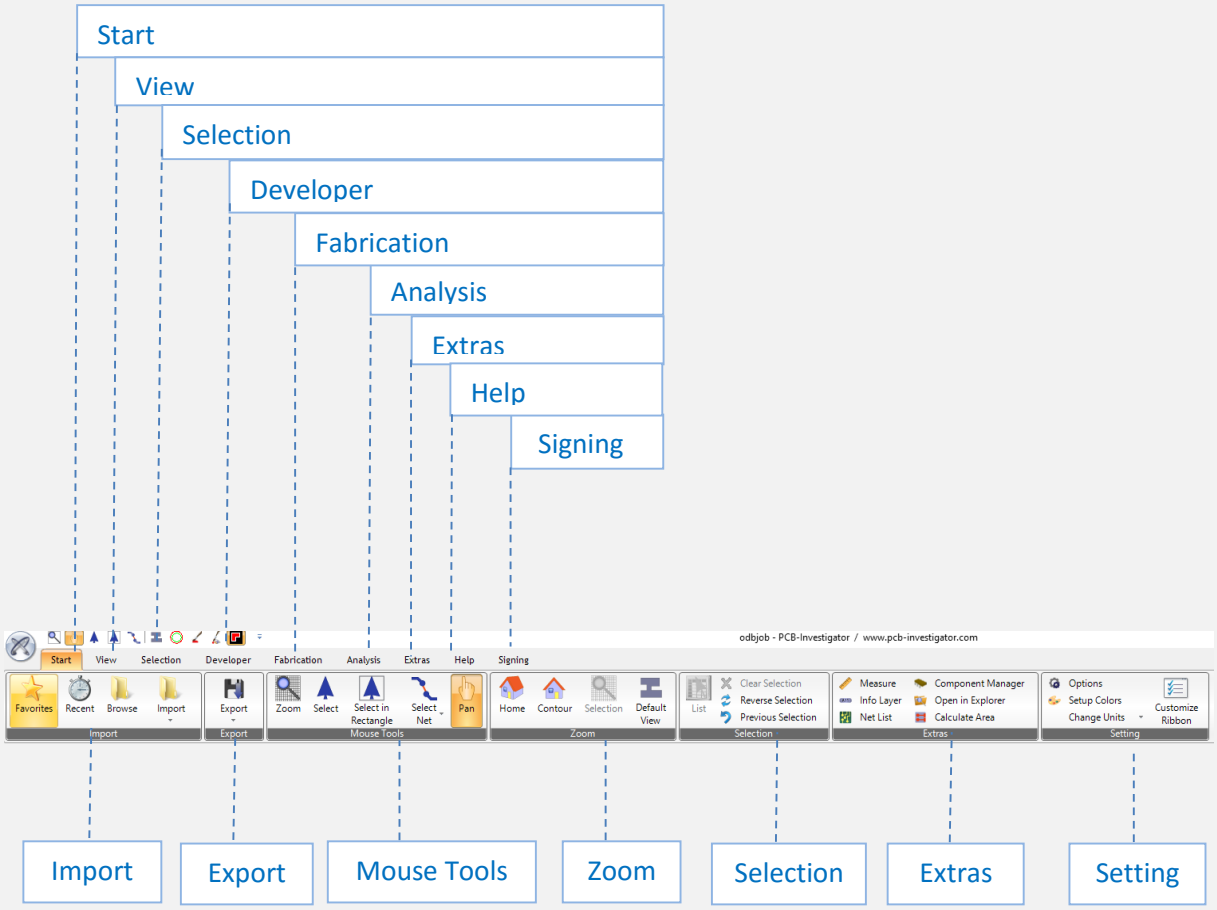
PCB-Investigator is a tool to view and edit PCB data on your computer. It helps you in the whole development process. From the start on, you can track your changes with different methods. There is also a possibility to pass notes and change requests easily to your customers with Embedded PCB-Investigator.

1.1 Formats

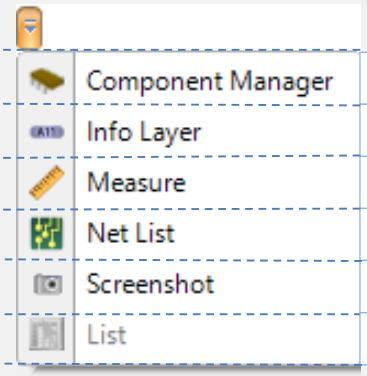
Input: ODB++, Gerber274x, Excellon 1, Excellon 2, Sieb & Meyer

Output: ODB++, Jpg, PNG, TIF, DXF, CatiaScript, IPCD356

1.2 Menu



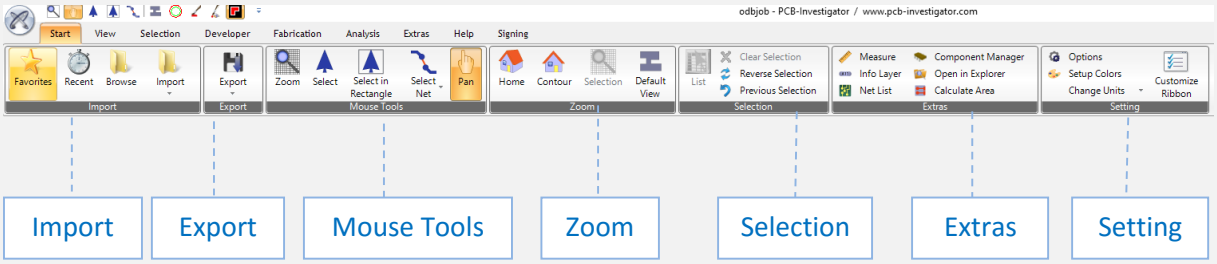
- In draw mode only selected the surfaces are hidden
- Only selected Objects are drawn competely all other componets become transparent
- Only selected Objects are drawn competely all of the elements become transparent
- Change drawing mode
- Default View
- Select typ by sub items
- Select all Objects in or touching rectangle
- Select Object
- Pan visible area
- Zoom Window



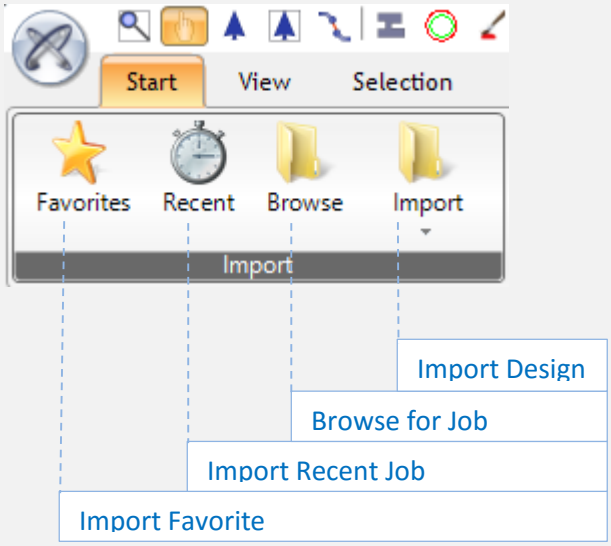
Component Manager	Component Manager
Info Layer	Info Layer shows some details for each element
Measure	Measure Dialog
Net List	Net List dialog lists all in the Design included nets.
Screenshot	Make a image of the screen
List	List

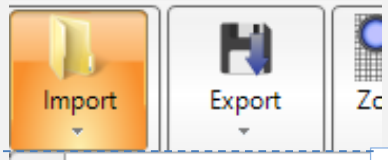
2. Menus

2.1 Start Menu



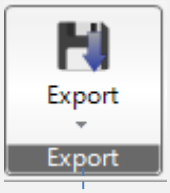
Import



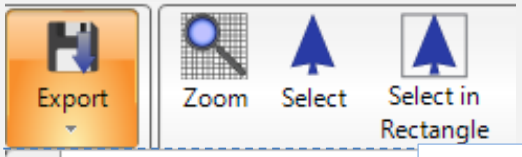


Create empty Design	Create empty project with one emty layer
Cam Input	Open simple file import like gerber, excellon, etc.
Add Image	Add a image layer to current Design
Add Layer from ODB++	Add a extra layer from a other ODB++ design to the current design
IDF Import	Import IDF files
Import AVL Attribute-List	Import AVL data
Import DPF (Barco)	Import DPF files
Import PDF	Import schematics from PDF
CMP Attribute Import	Import excel data and creat objects from the data
Import GenCad	Import GenCad 1.4 files
Import DXF	Import DXF files
IPC2581 Import	Import IPC2581 files to the PCB-Investigator
Import IPC356	Import IPC356 nets data
Import Components	Import data from CSV and edit the imported components

Export

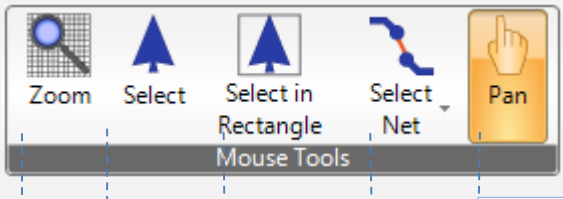


Export Current Design

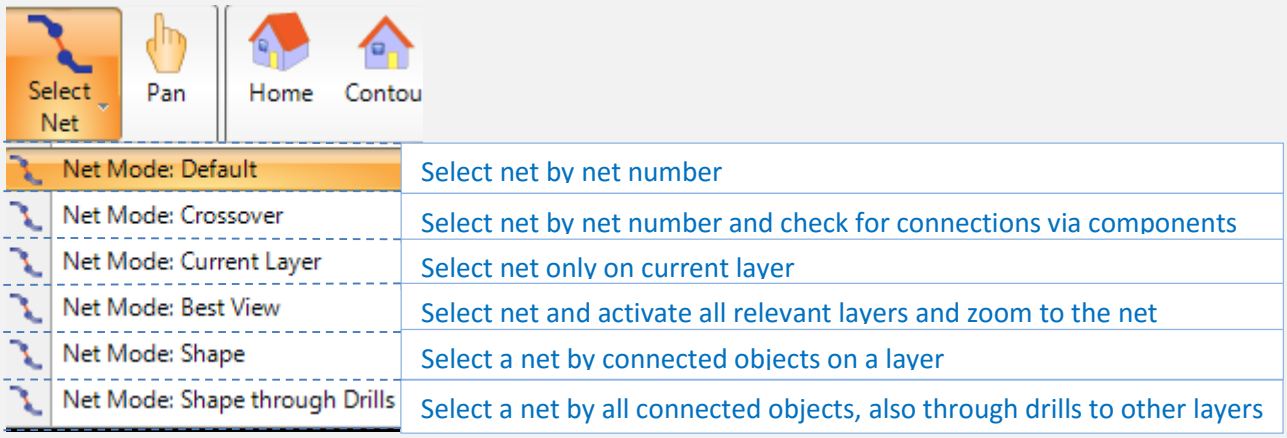


Save	Save Design
Save As ODB++	Save as ODB++
Export Embedded	Save PCB-Investigator Enbedded Design
Export Embedded Zip	Save PCB-Investigator Embedded Design in Zip directory
Export DXF	Export layer or selection to DXF
Export High Resolution Picture	Save high resolution picture (PNG, JPG, BMP,...)
Export IPC356	Save IPC356 netlist
Export BOM	Save BOM as CSV File
Export Component List	Save Components list as CSV File
Export Pick and Place	Save Pick and Place list as CSV File
Export Gerber	Save Gerber File(s) from aktive project
Export IDF	Export IDF files
Export Google SketchUp	Export a google sketch up file oft he current design
AOI	Export a very high resolution image, e.g. for AOI machines
Export GenCad	Export GenCad files

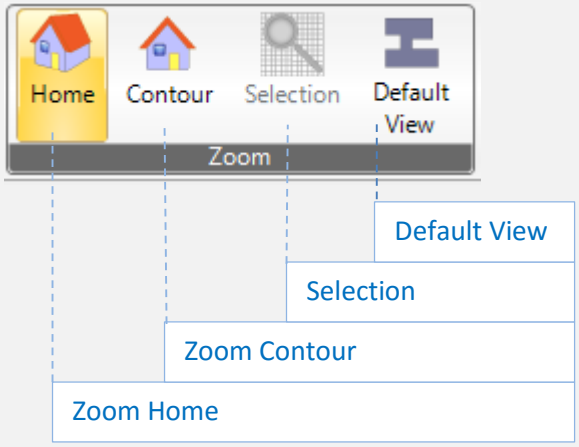
Mouse Tools



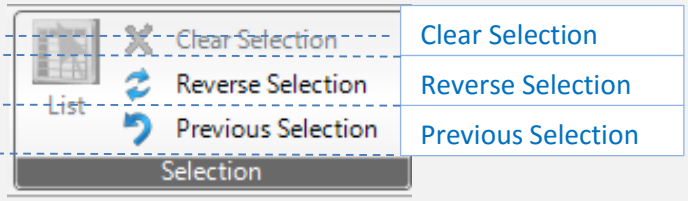
Pan visible area
Select type by sub items
Select all Objects in or touching rectangle
Select Object
Zoom Window



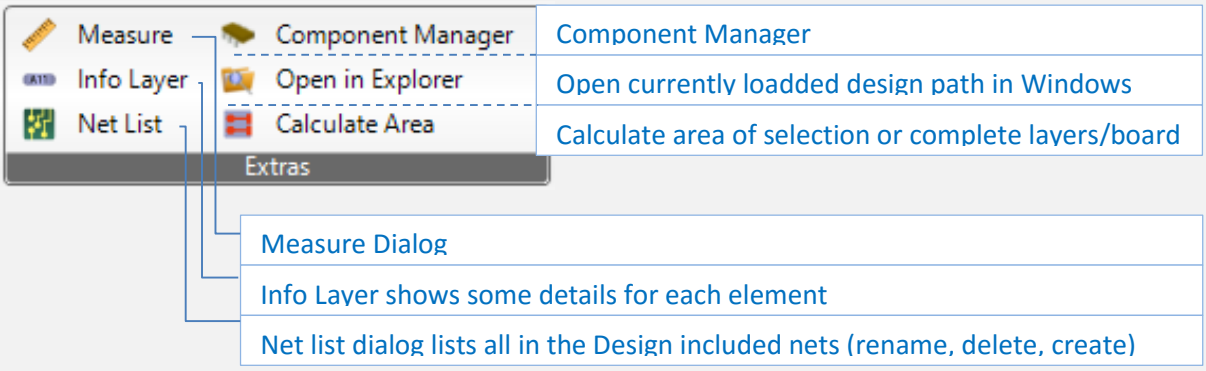
Zoom



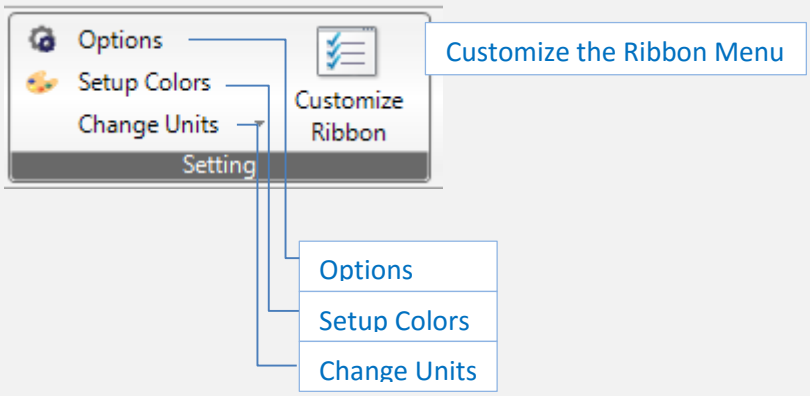
Selection

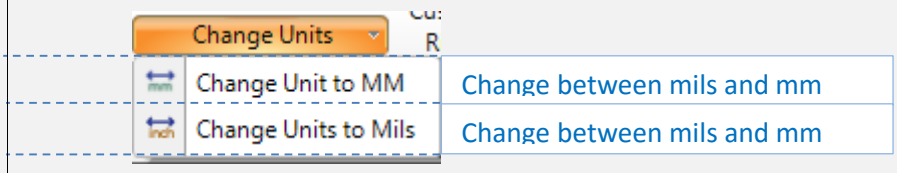


Extras

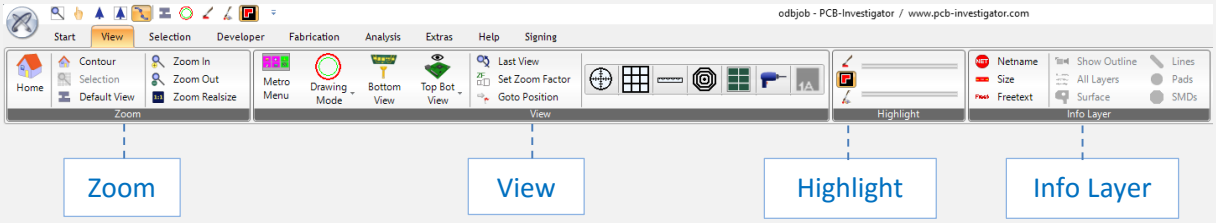


Setting

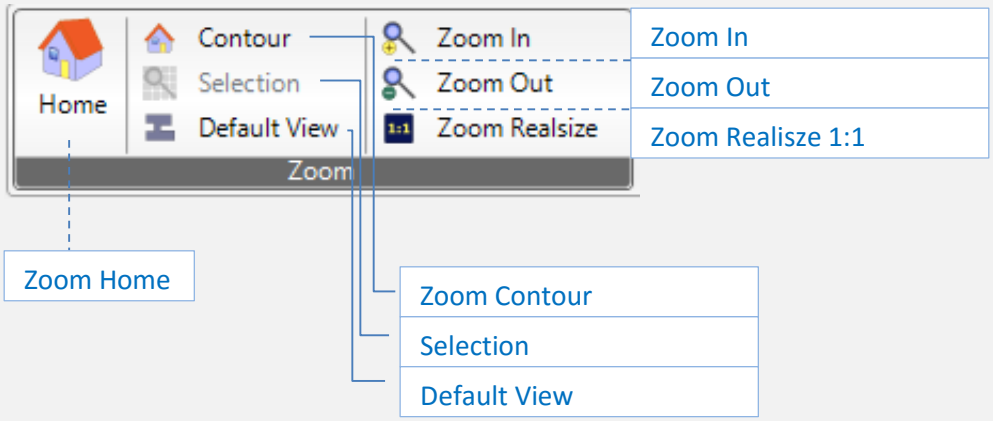




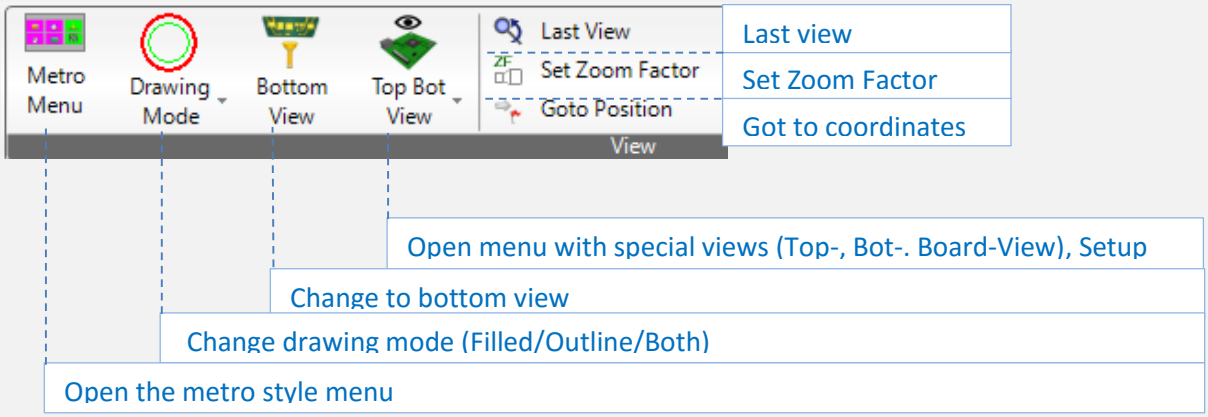
2.2 View Menu

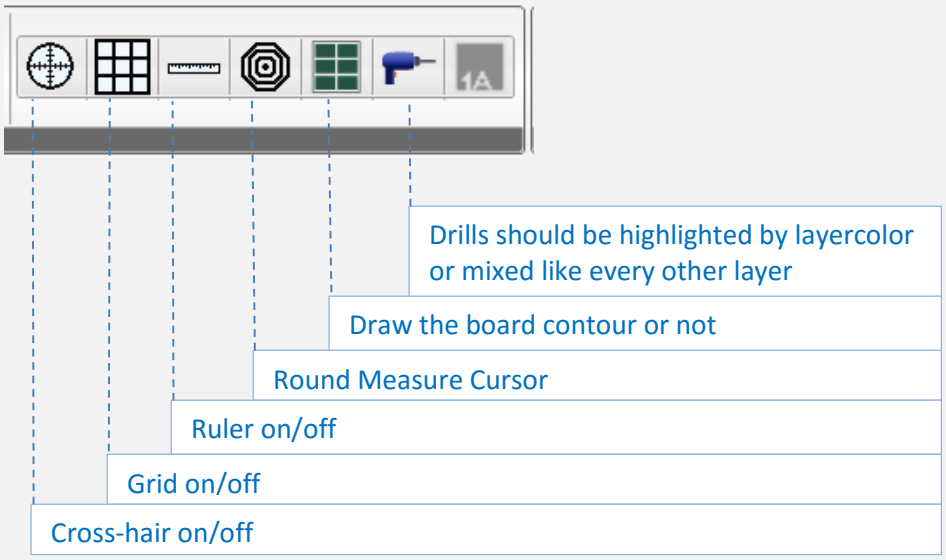


Zoom

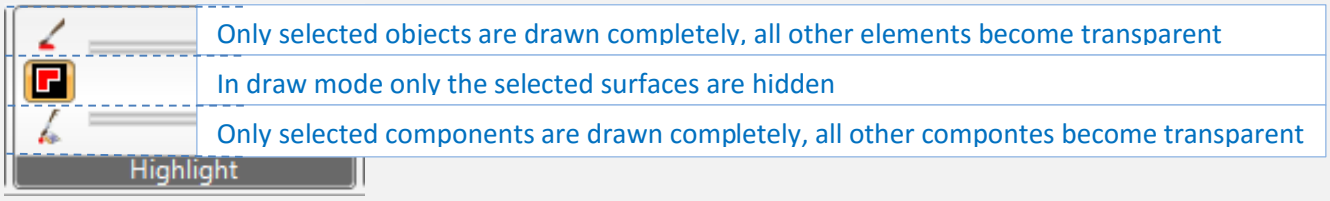


View

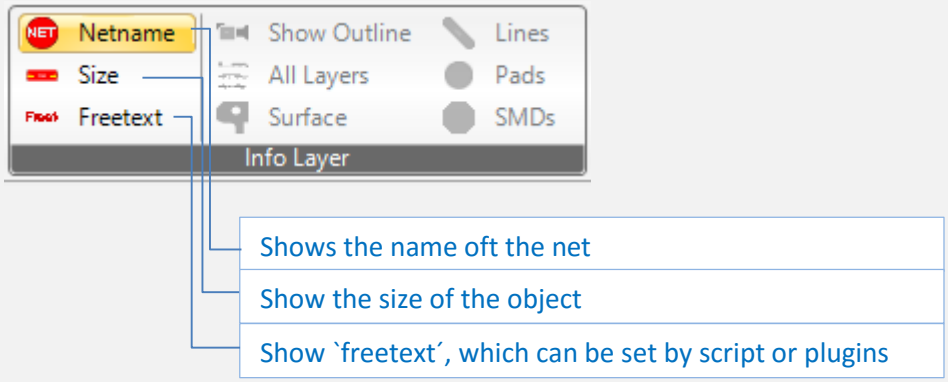




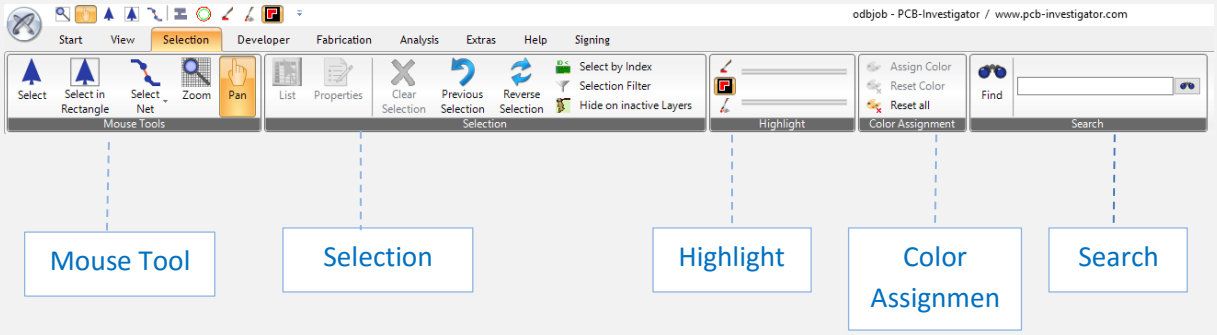
Highlight



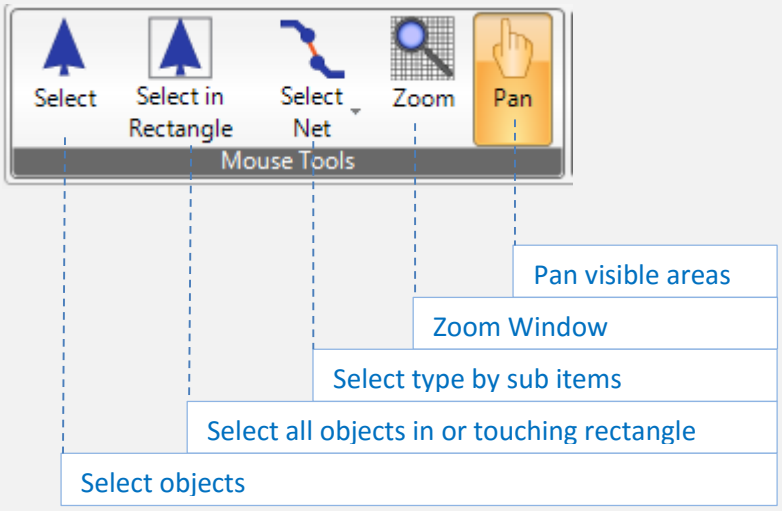
Info Layer

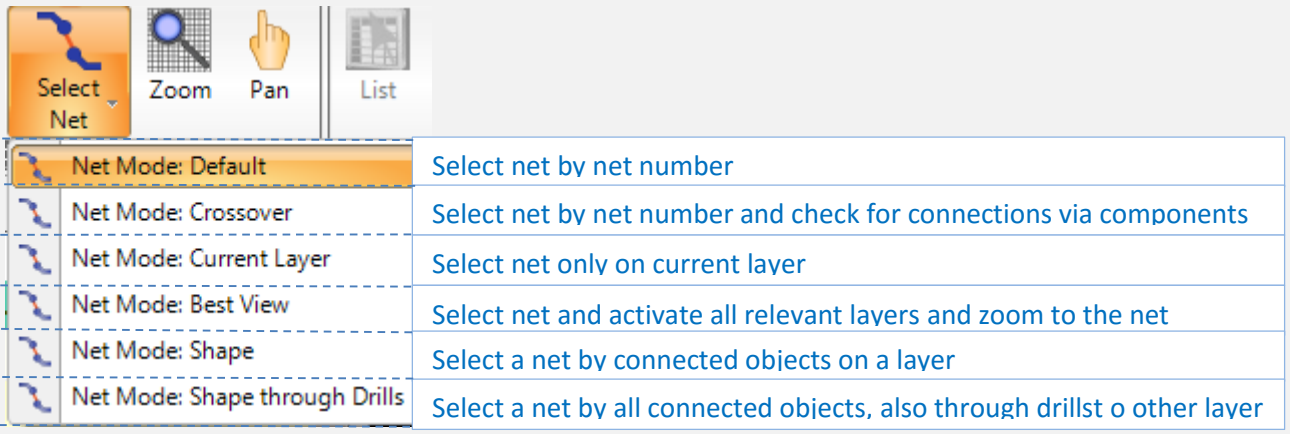


2.3 Selection Menu

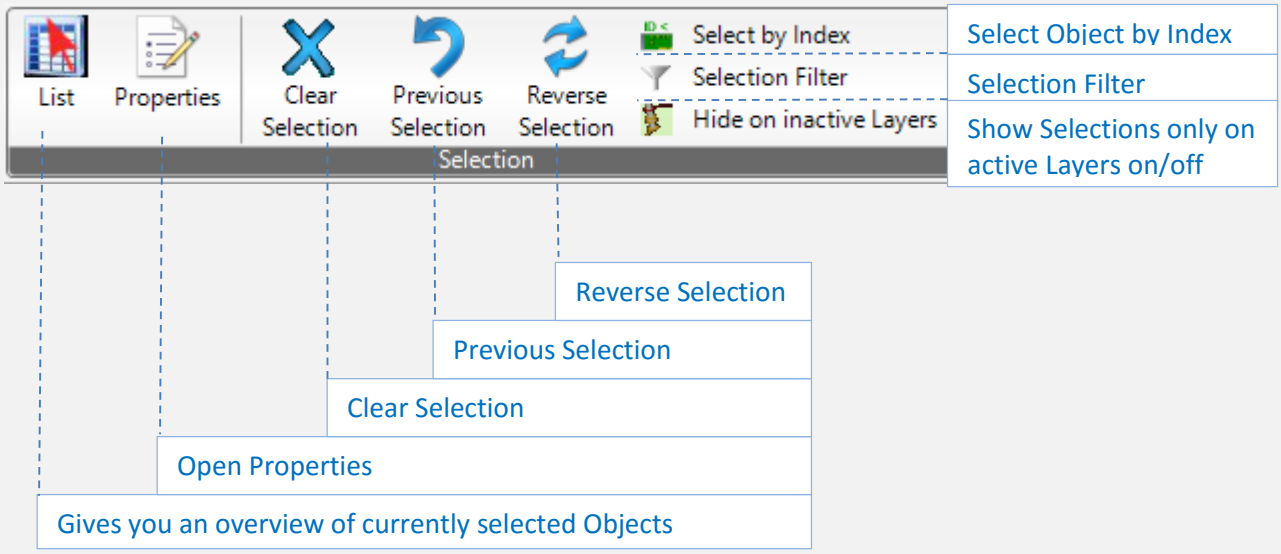


Mouse Tool

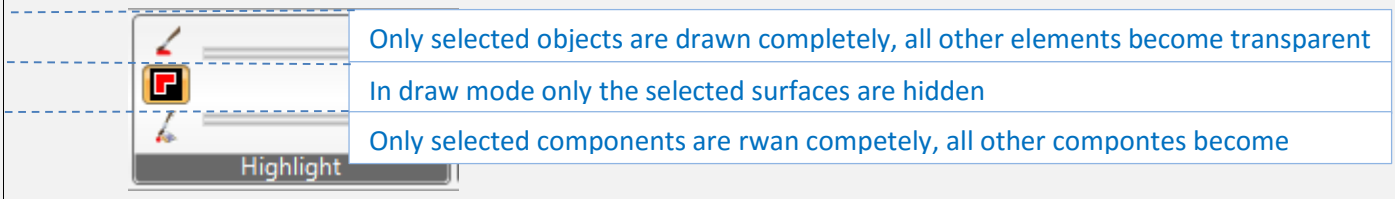




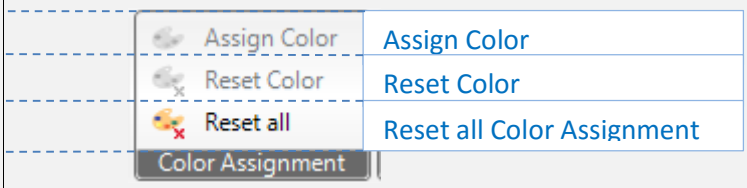
Selection



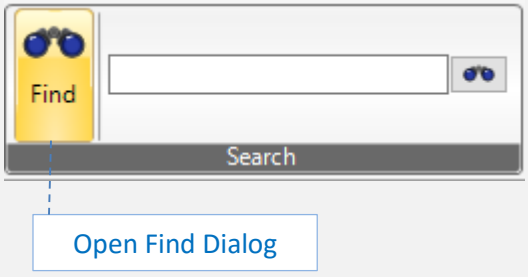
Highlight



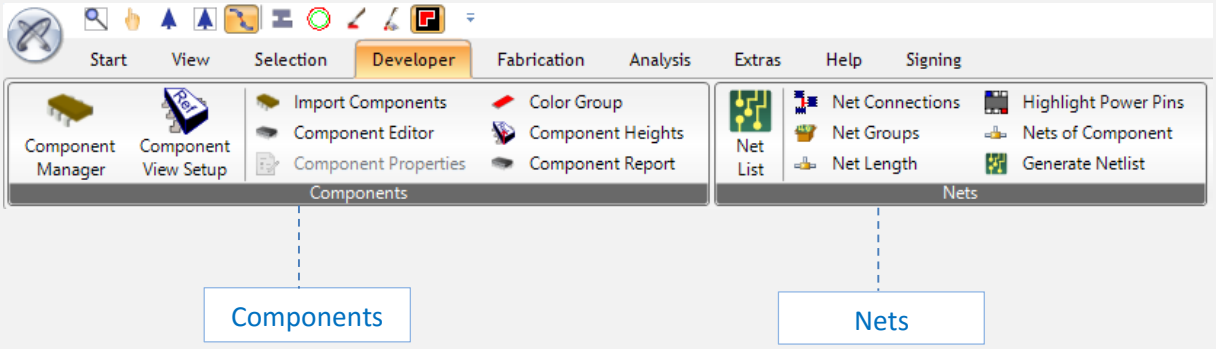
Color Assignment



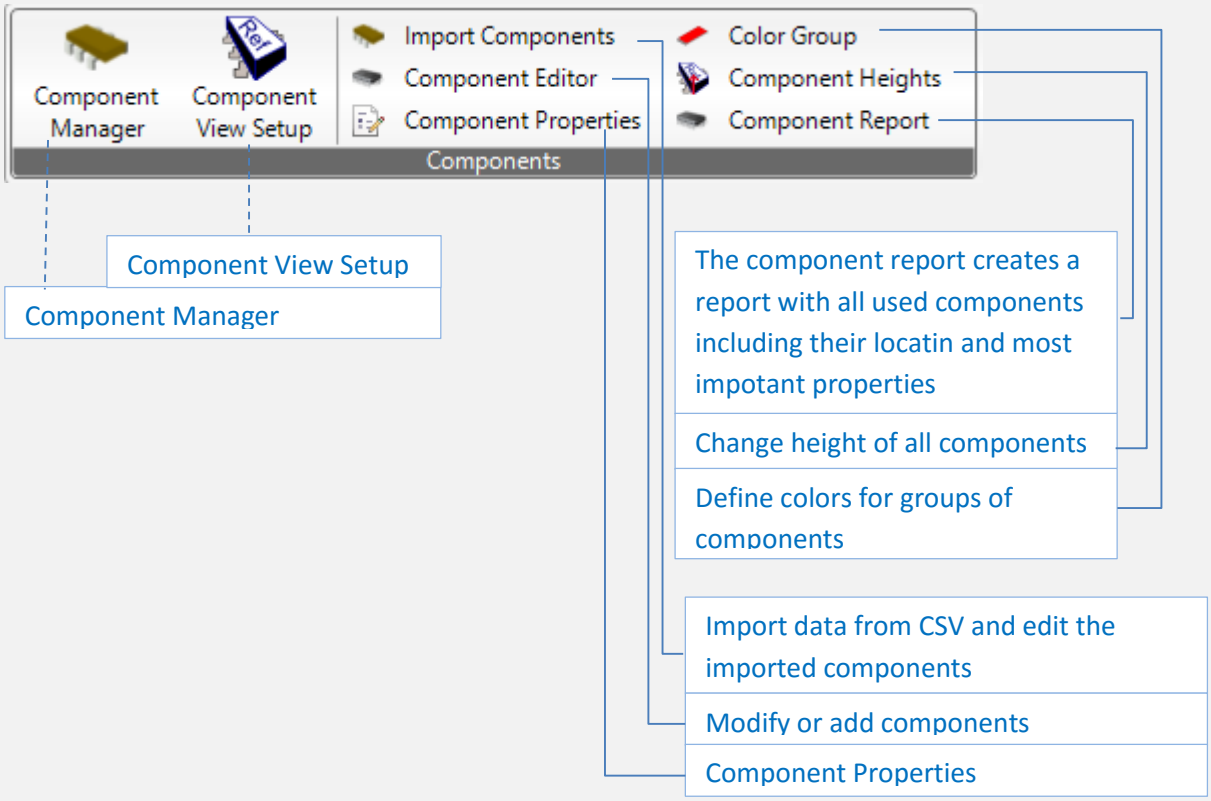
Search



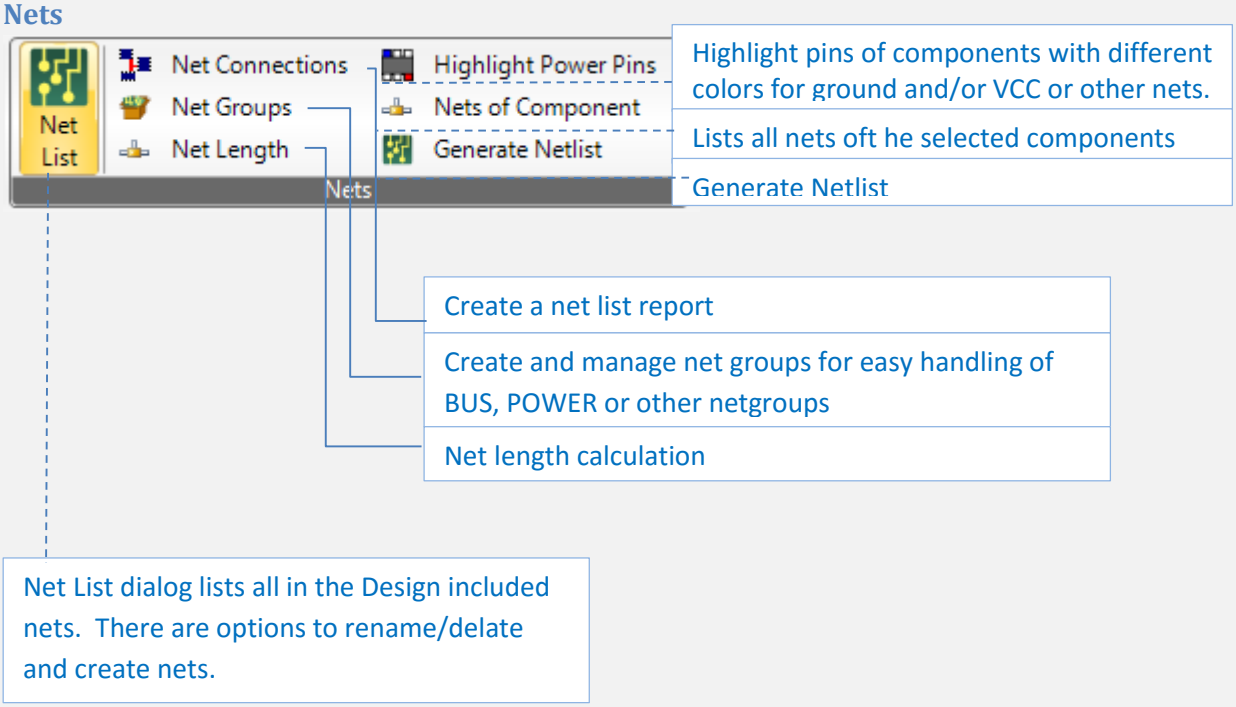
2.4 Developer Menu



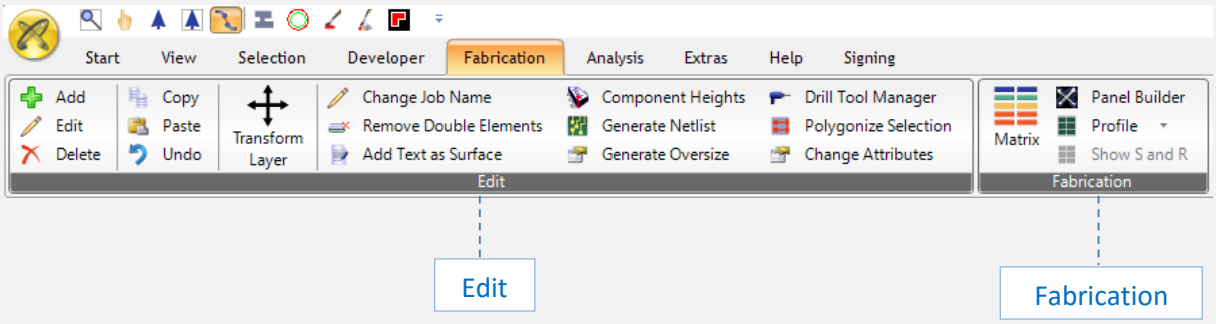
Components



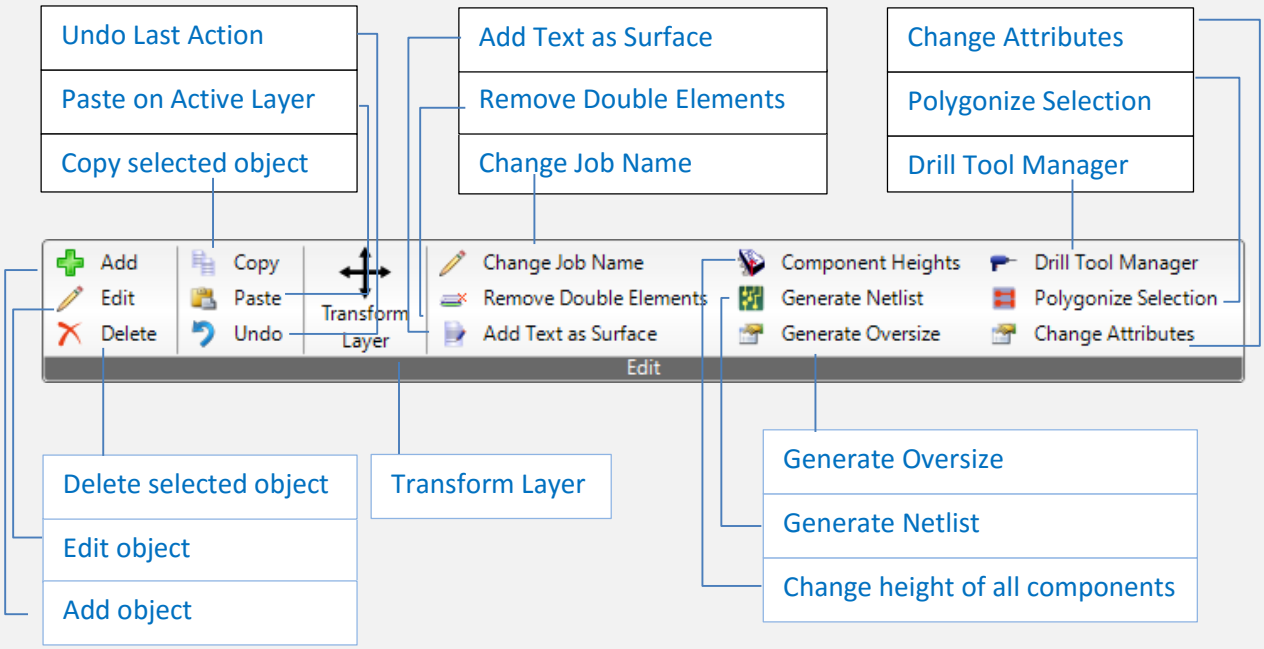
Nets



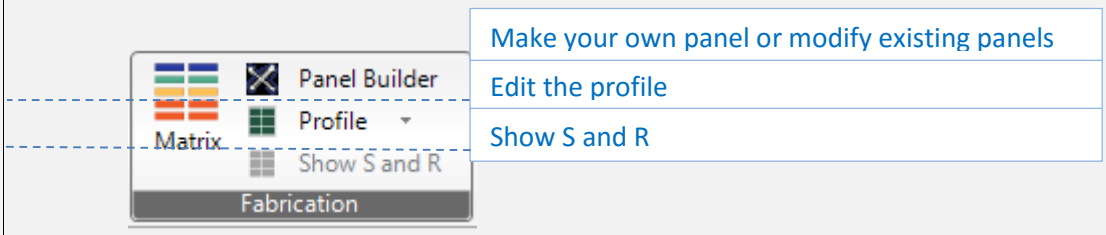
2.5 Fabrication Menu

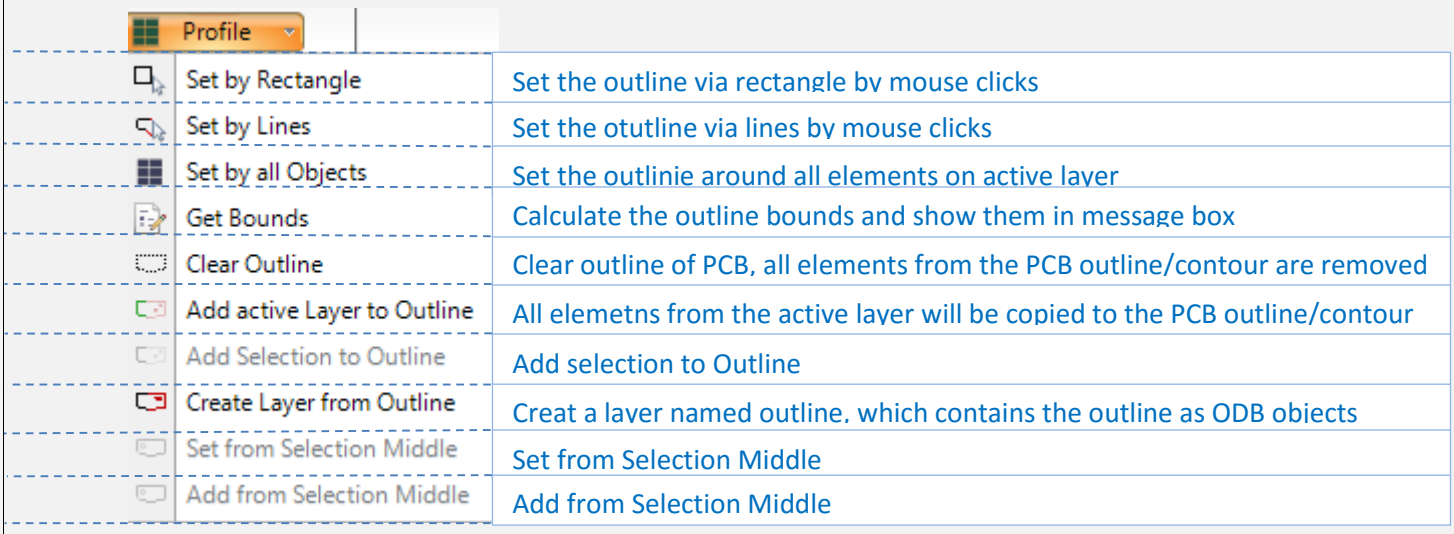


Edit

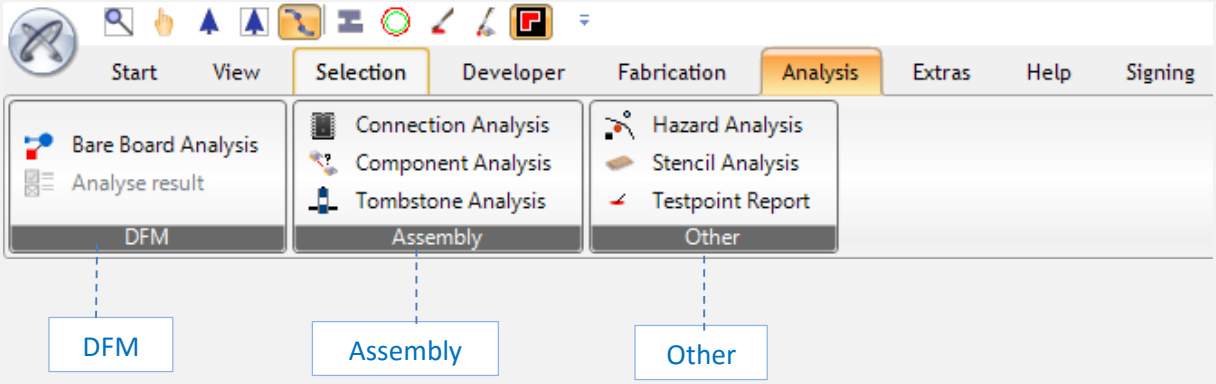


Fabrication

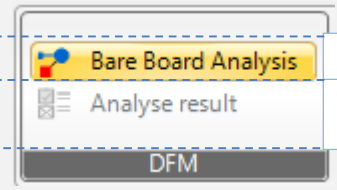




2.6 Analysis Menu

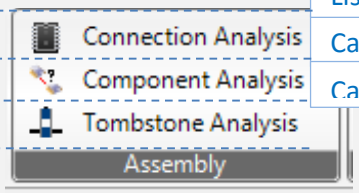


DFM



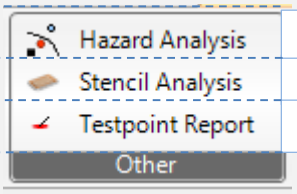
Bare Board Analysis	Copper space and trace checks, as well as annular ring checks
Analyse result	Analyse result

Assembly



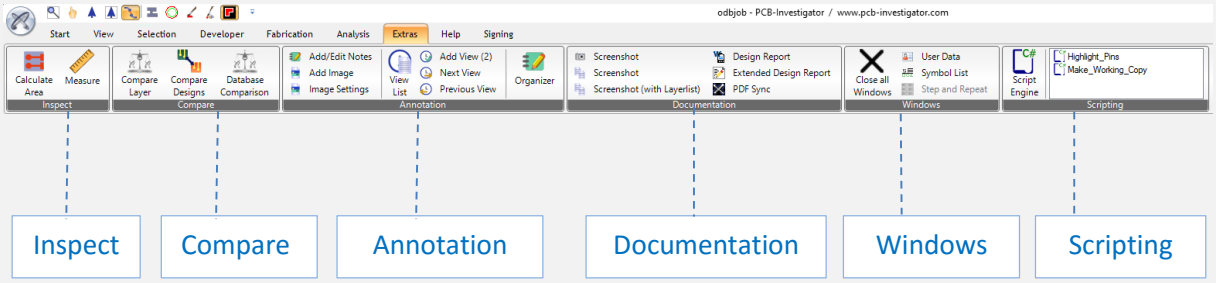
Connection Analysis	Lists all Nets of a selected component and reports if each Pin has e.g. a capacitor
Component Analysis	Calculate distances between Components for placing/soldering rules or emv risk
Tombstone Analysis	Calculate risk for fast cooling effects

Other

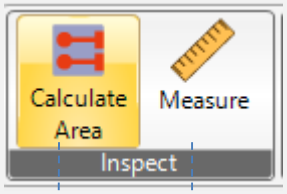


Hazard Analysis	Allows you to check distances for short risks
Stencil Analysis	Reports too small solder pastes depending on the stencil thickness
Testpoint Report	Lists the amount of testpoints for each net

2.7 Extras Menu



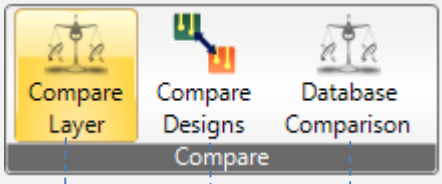
Inspect



Measure Dialog

Calculate area of selection or complete layer/board

Compare

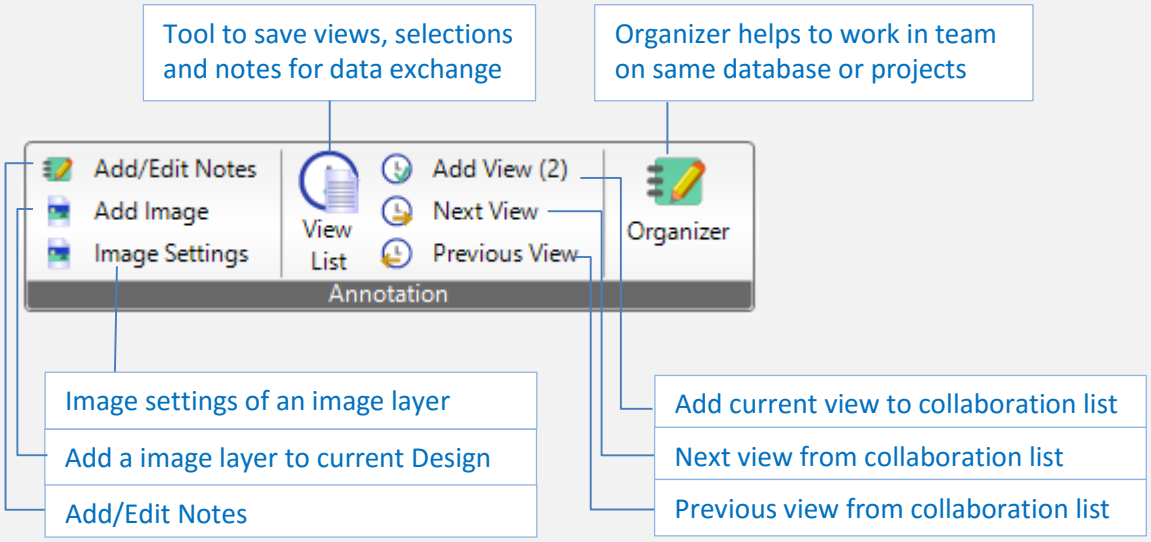


Compare all components and nets oft wo development steps

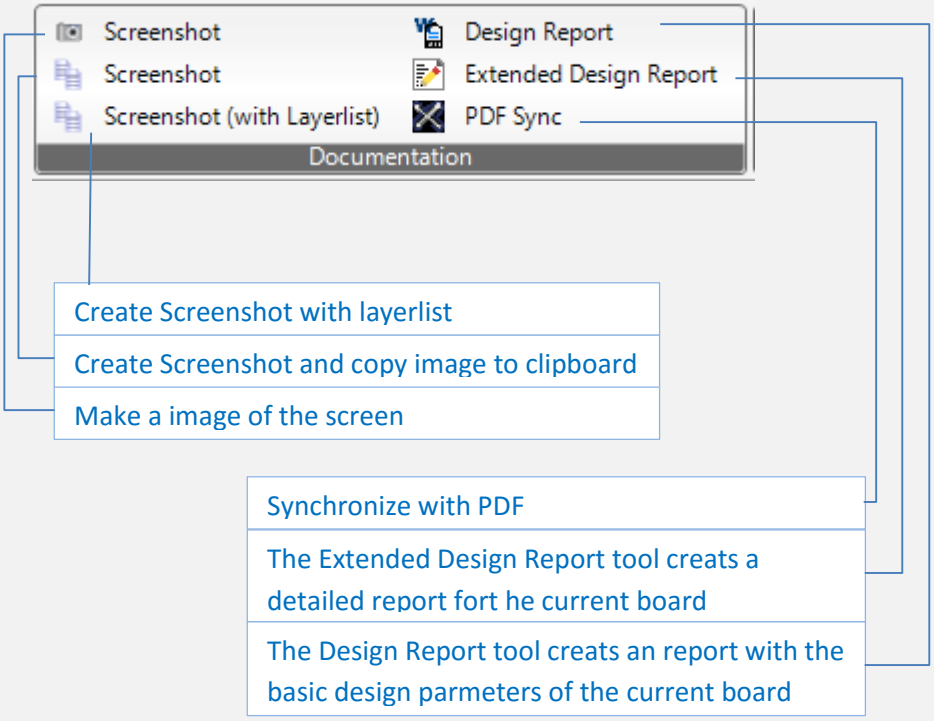
Compare two versions of one board

Compare Layer Graphical

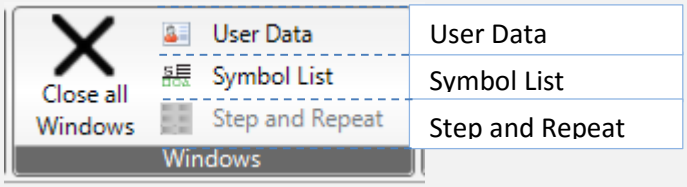
Annotation



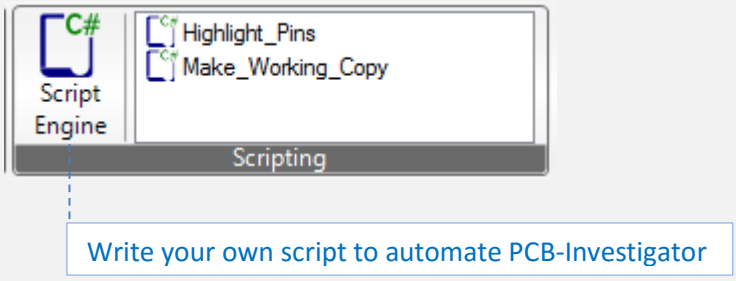
Documentation



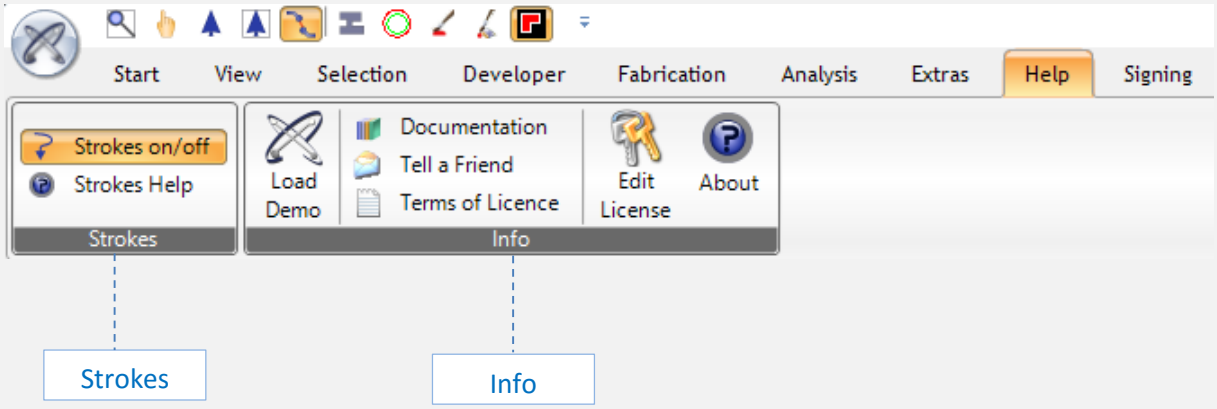
Windows



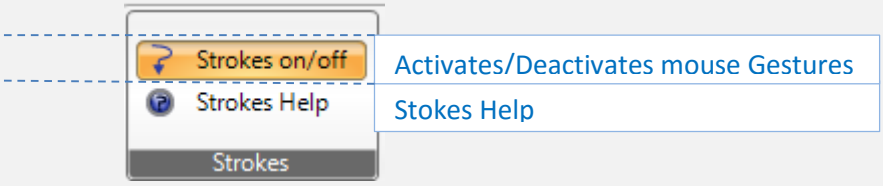
Scripting



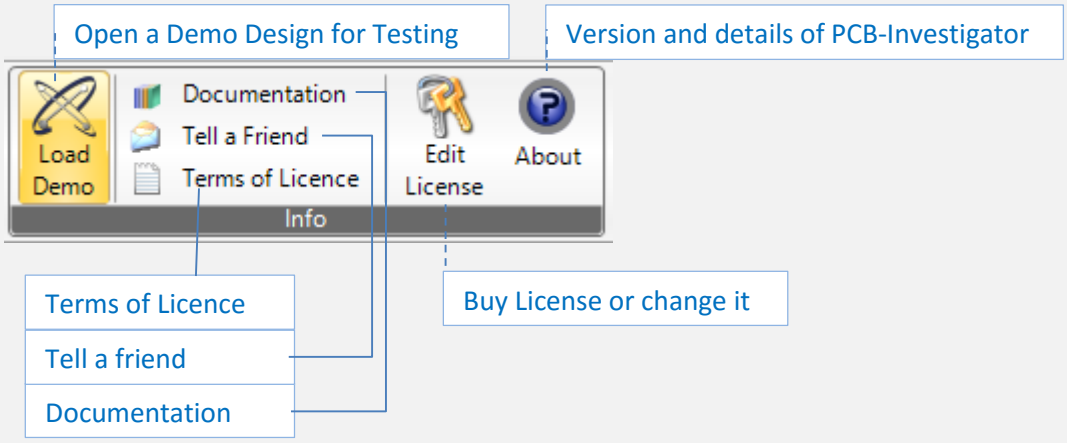
2.8 Help Menu



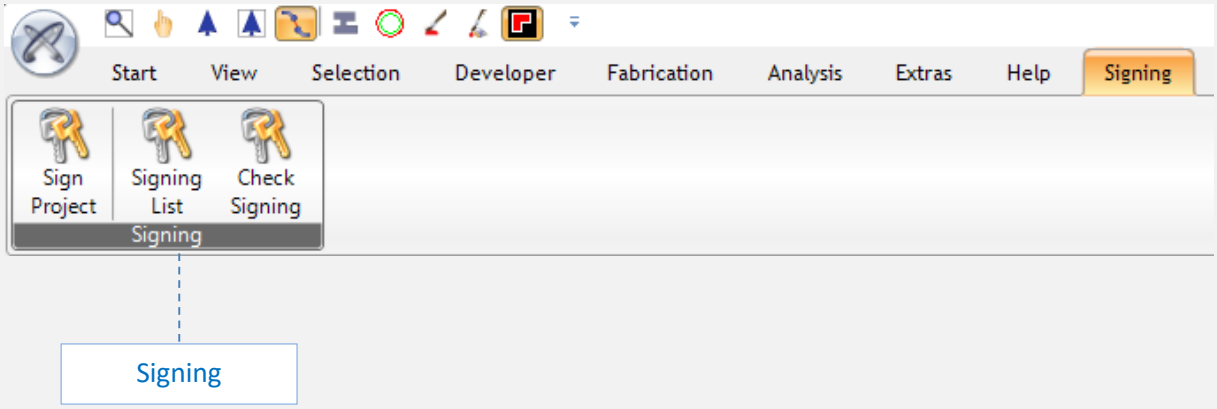
Strokes



Info



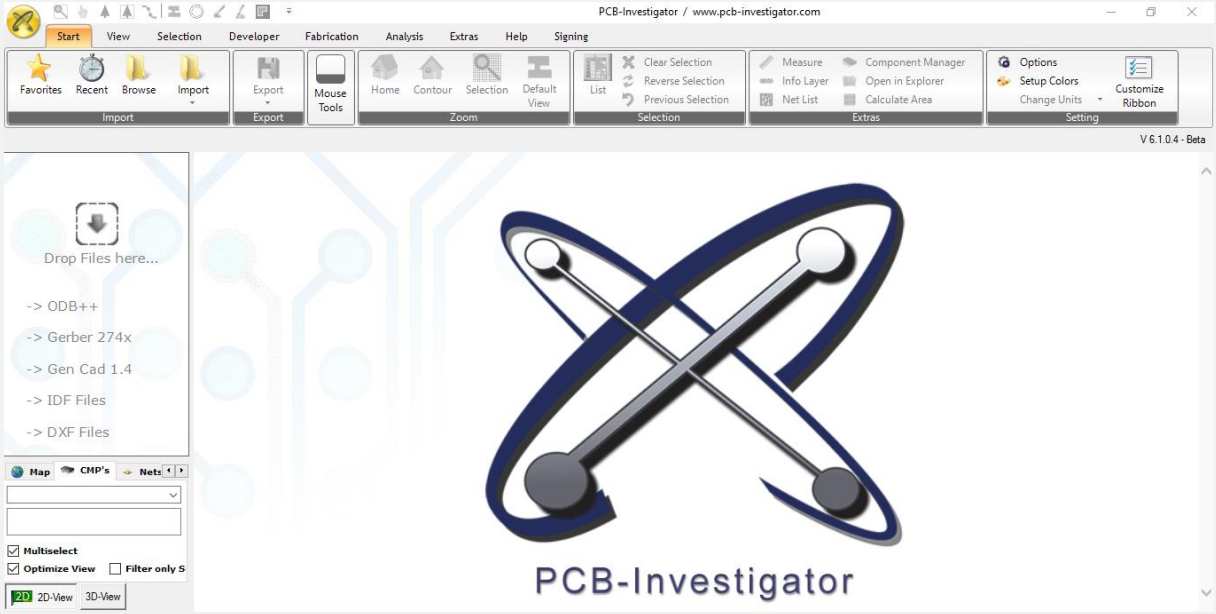
2.9 Signing Menu



Signing

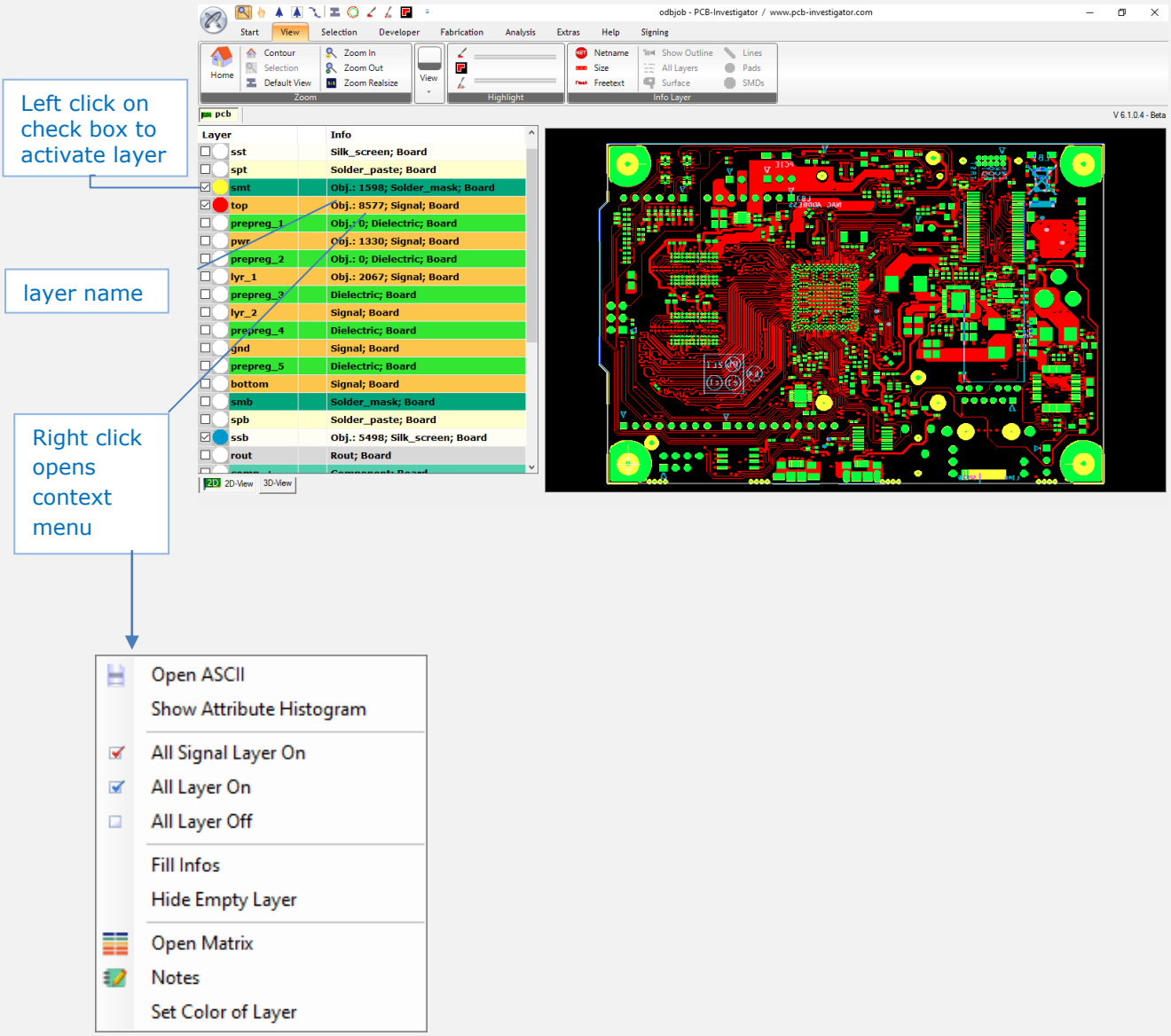
3. Functions

3.1 Opening a job

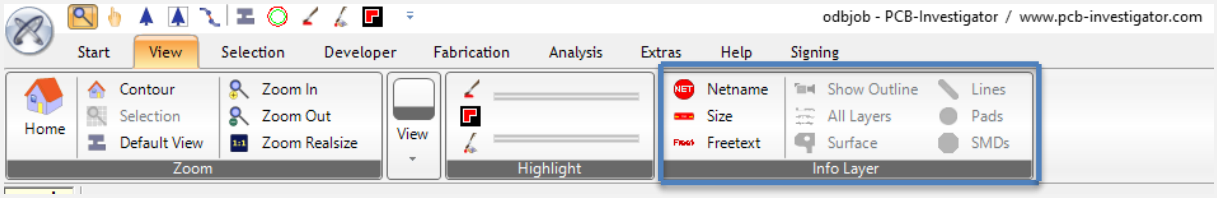


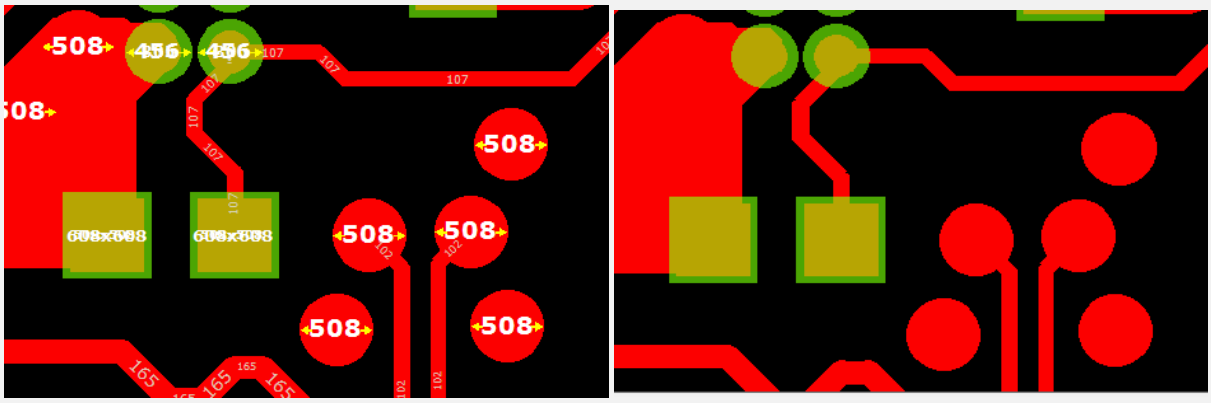
3.2 View Data

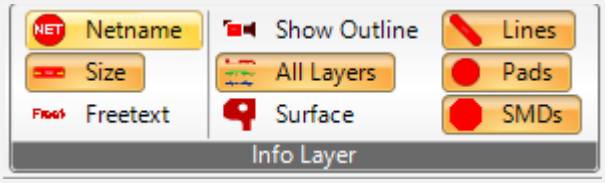
Select easily layers to view or set active. Active means that these layers are editable while the others are protected. Different background colors indicate different kinds of layers. Board layers have an orange background, document layers are light blue highlighted, drill layers are gray highlighted and the background color of mask layers is green.



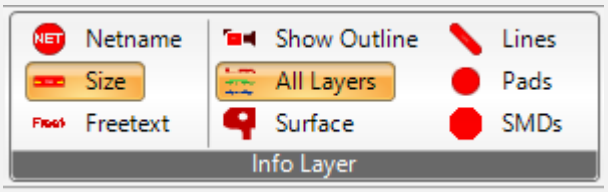
There is an easy way to get information about sizes of objects. Use the Info layer dialog to get dimensioning of each object on your screen.



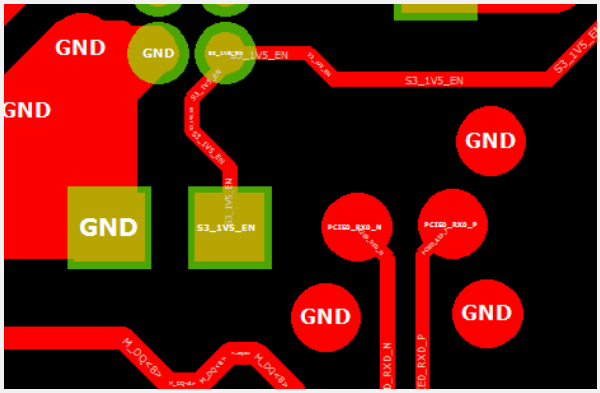


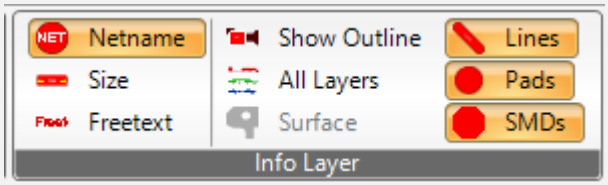


Example 1 displays the dimensioning of all objects.



Example 2 displays dimensioning without pads and lines.

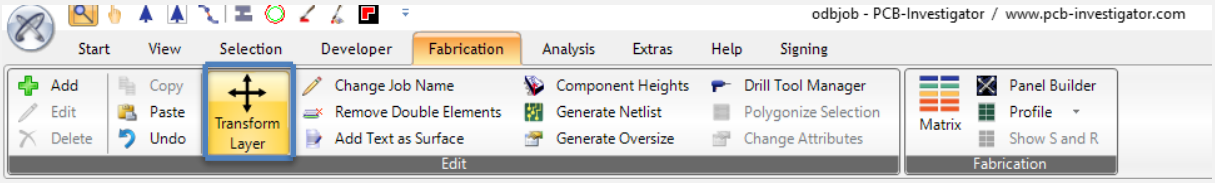


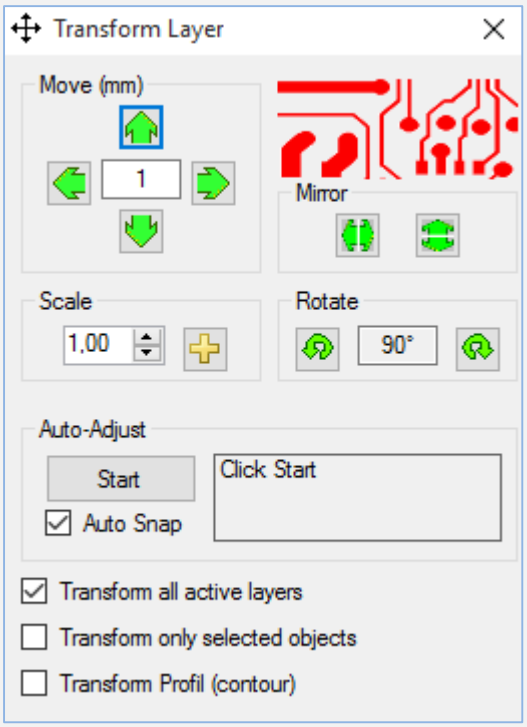


Example 3 displays the Netname labeling

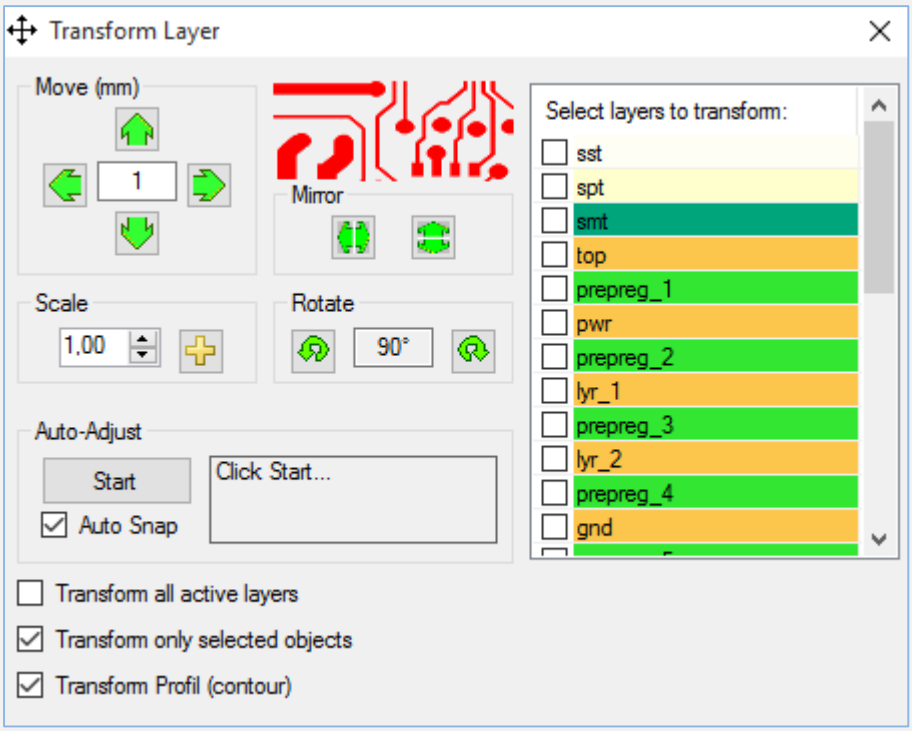
3.3 Move and Rotate Objects

Maybe you have imported layers from ODB++, Gerber274x or Excellon you may have different origins. With Transform Layer you can move the layer in any direction till all layers fit together.





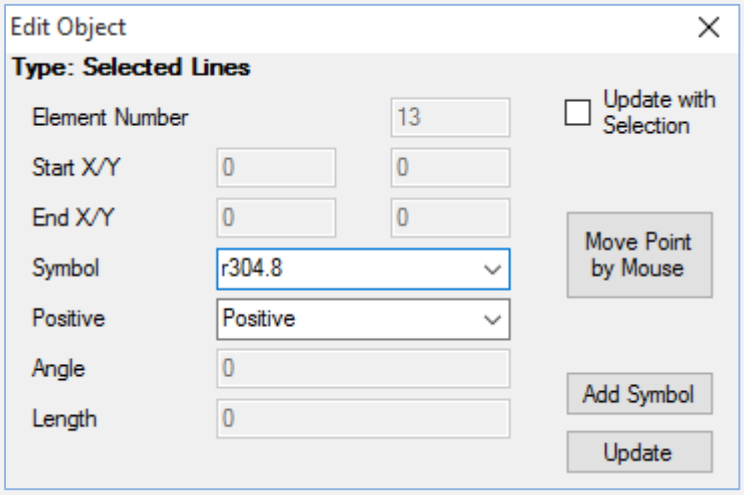
Transform each active layer



Deactivate the check box to get a selection of layers you want to transform

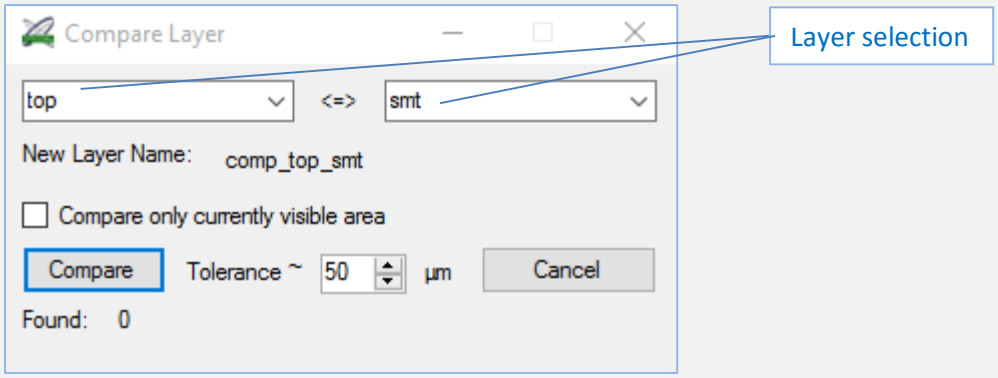
3.4 Edit Objects

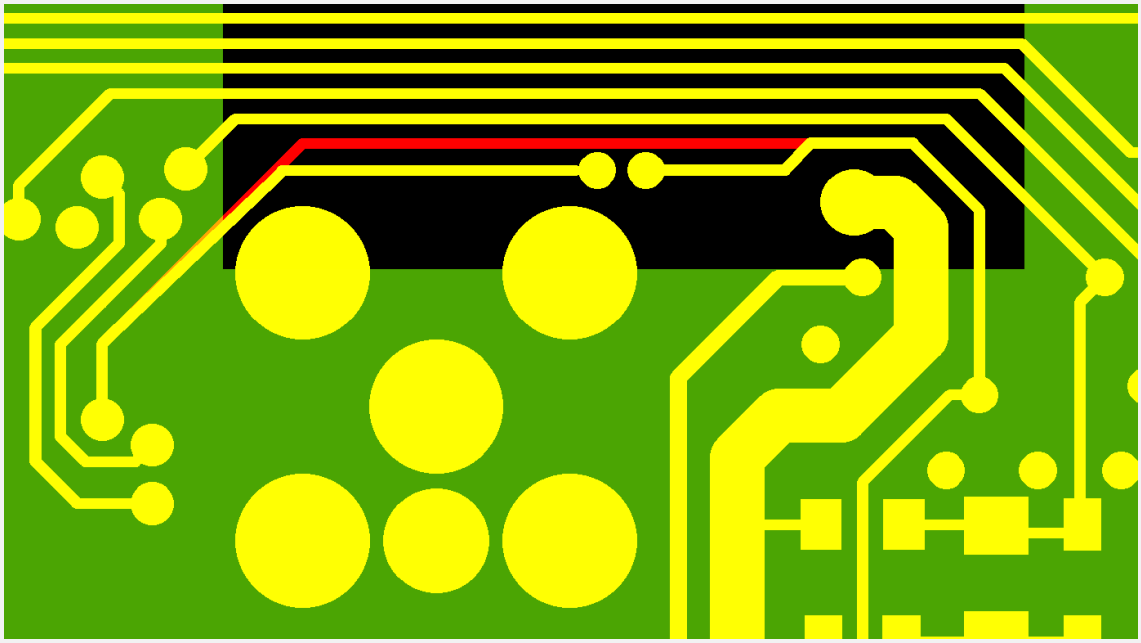
'Edit Object' provides all information about a selected object. The properties of this object can be changed. Use the 'Update' button to verify your changes. By using ‚Add Symbol' additional kinds of objects can be created.



3.5 Compare Layers

After selecting two different layers and pressing the ‚Compare' button a new layer is created which contains the matches of both selected layers. Thereby you can easily check for accordance and differences.

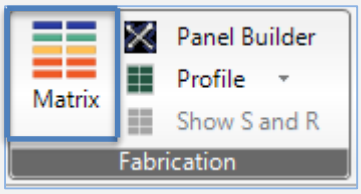


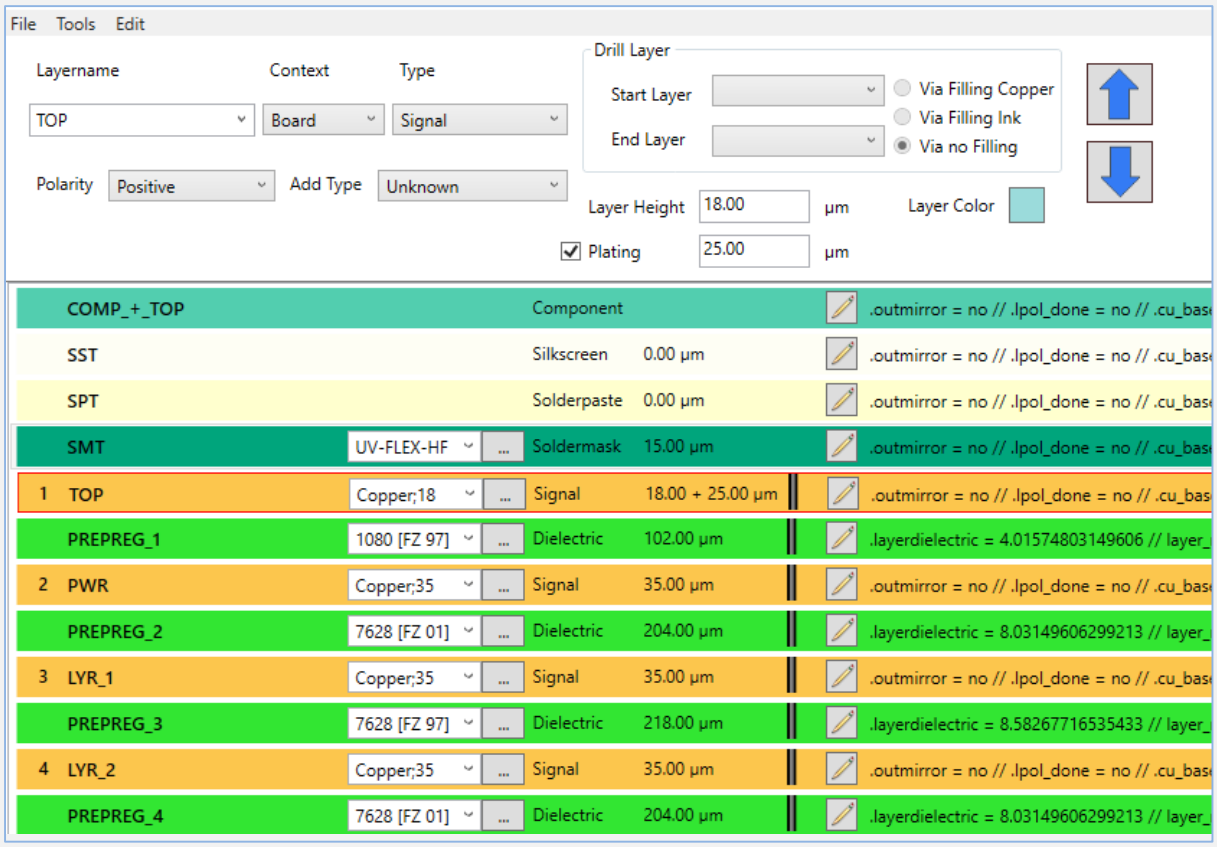


The figure above displays the result of comparing two layers. The green highlighted area indicates that there are no differences, whereas the black space refers to a region where changes were detected.

3.6 Show and Edit Matrix

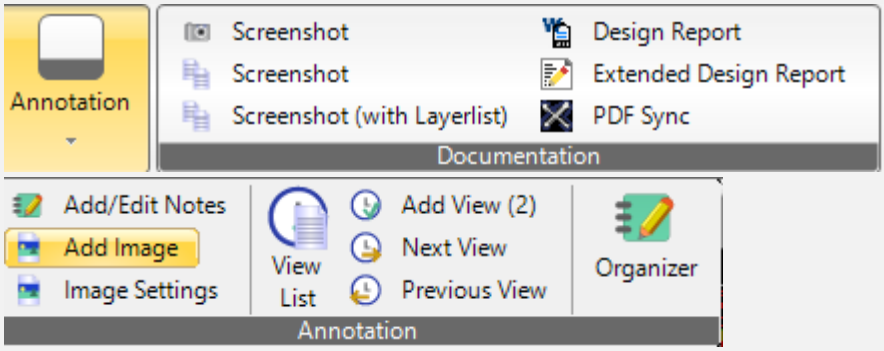
The Matrix provides an overview about layers in your project. It offers the chance to copy, move and edit layer data in a convenient way.





3.7 Add Bitmap Data

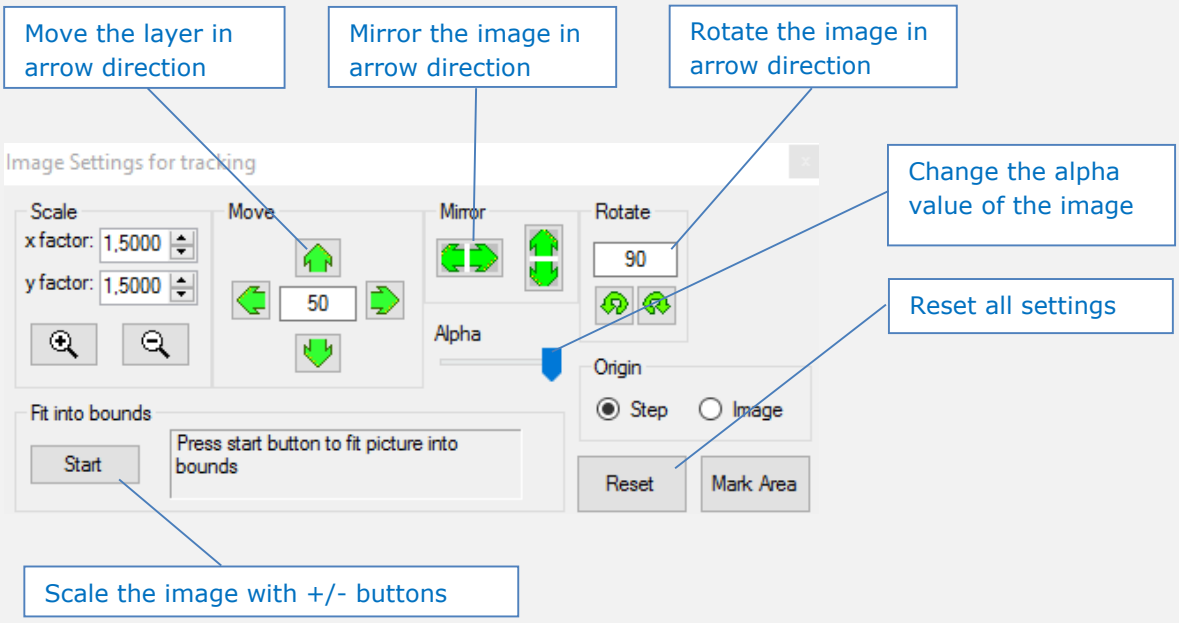
PCB - Investigator can add Bitmap Data to the CAD vector data to compare production result with the CAD data. You can import pictures created with a digital/infrared camera or a scanner. Use 'Extras' → 'Annotation' → 'Add Image' to do so.



3.8 Transform Image Layer

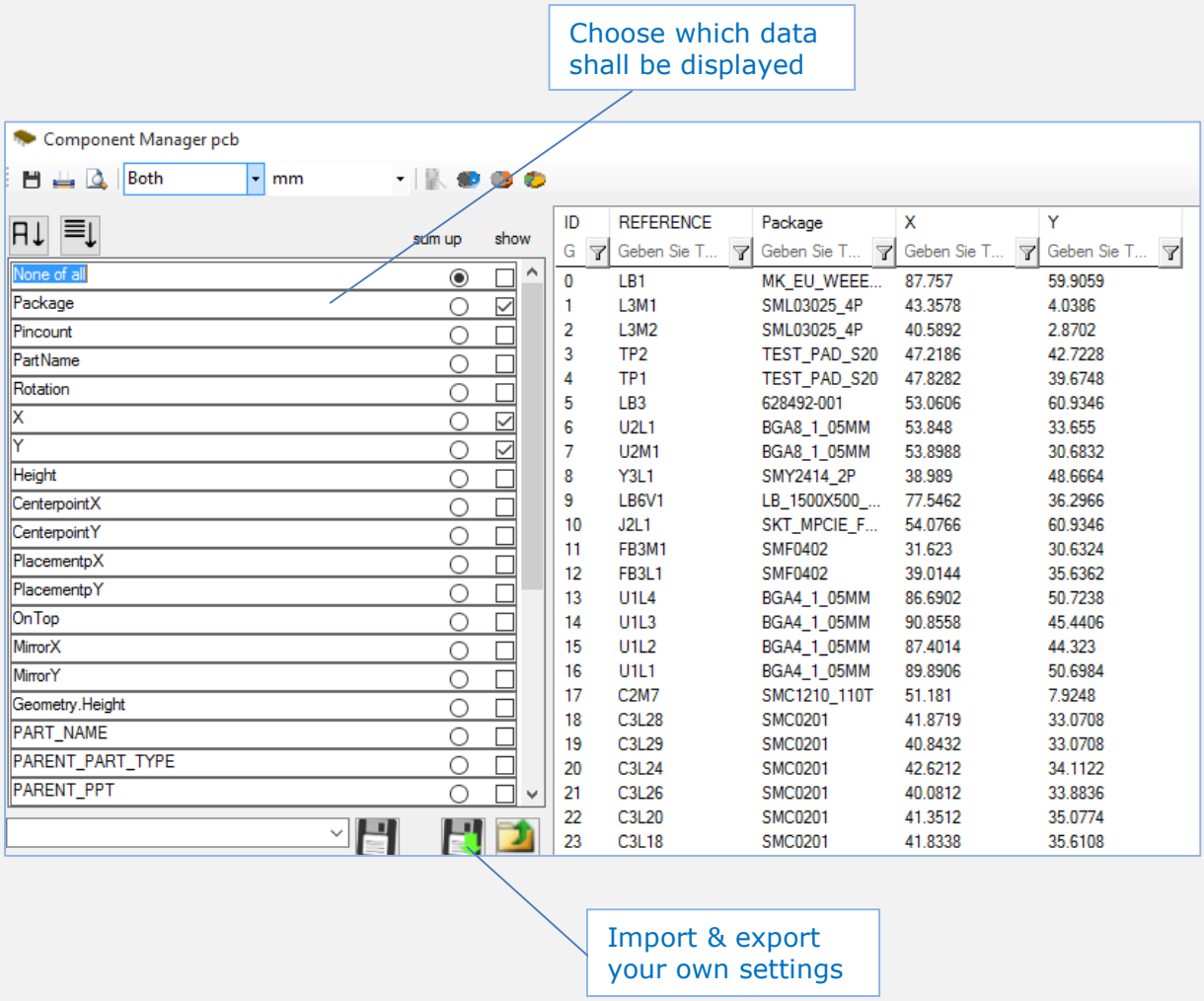
The transform image layer dialog is over the layer List context menu accessible. Or after adding an image layer (Add Bitmap Data).

Choose a image file and then opens the Picture Layer Dialog to set position and size of the new layer.



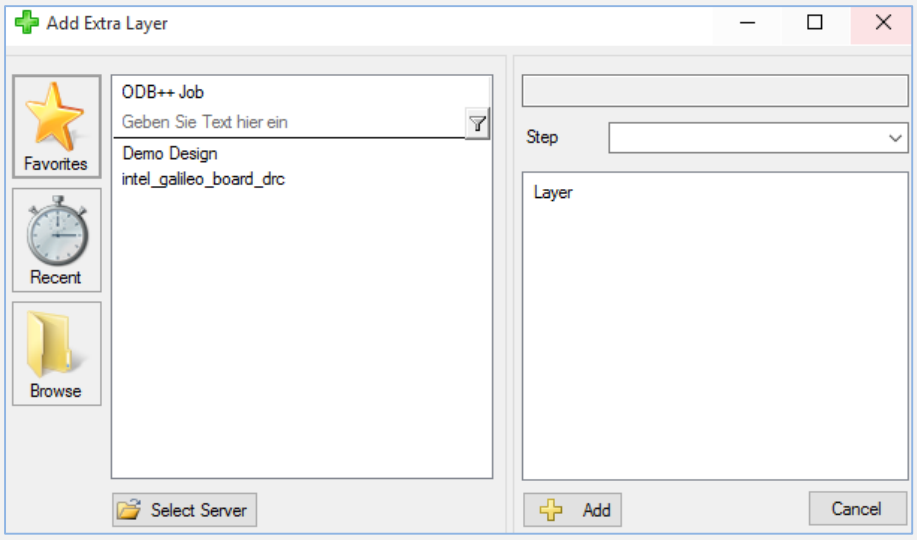
3.9 View Component Manager

'Component Manager' provides a list of each component on the according component layers. This list can be customized according to your wishes. Items can be summed up by e.g. Part-Name to get a BOM. There is also a possibility to save the listed data as .csv or .xml file and to print the data.



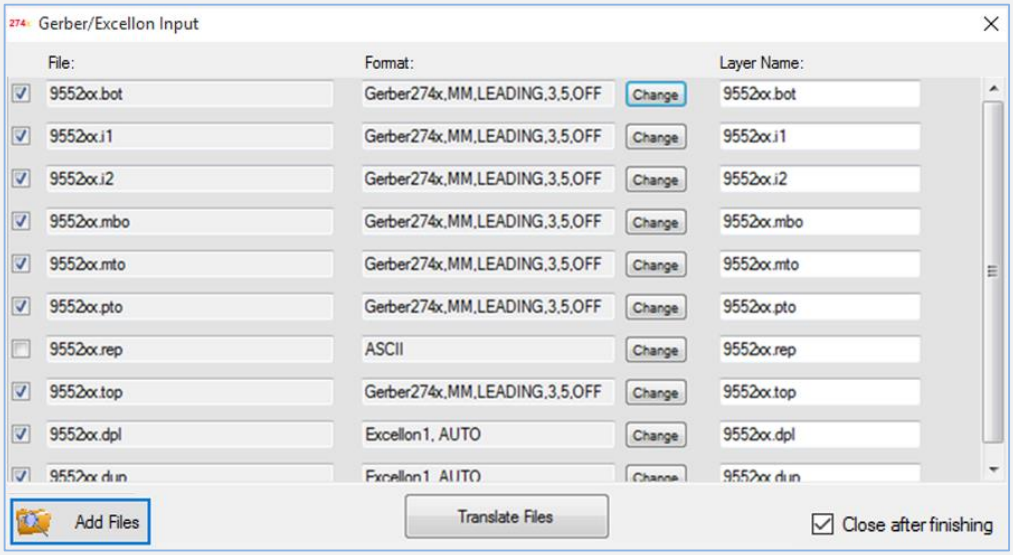
3.10 Add ODB++ data

Use 'Start' → 'Import' → 'Add Layer from ODB++'. Afterwards you can use the 'Compare Layers' option (see section 3.4) to detect alterations to former versions of layers.



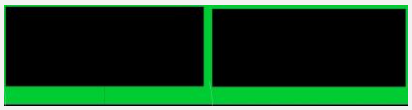
3.11 Add Gerber274x, Excellon and Sieb & Meyer data

Use the add CAM input menu to add Gerber274x, Sieb & Meyer and Excellon data with an automated recognition of the format. It is also possible to change it manually.



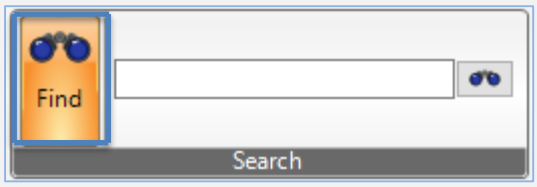
Gerber274x, Sieb & Meyer and Excellon

Improve Area Fills means

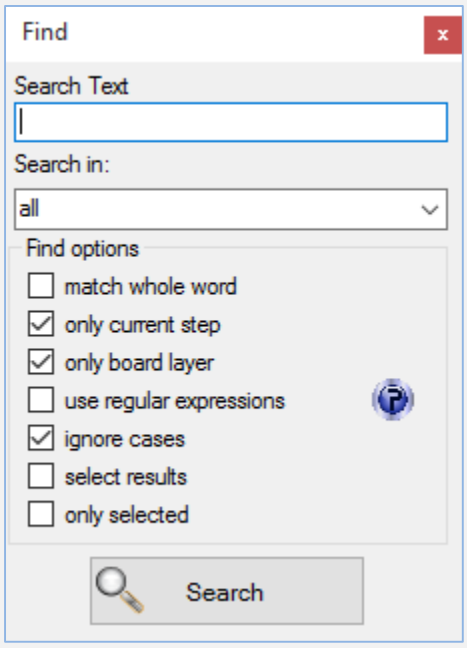


Double lines removing

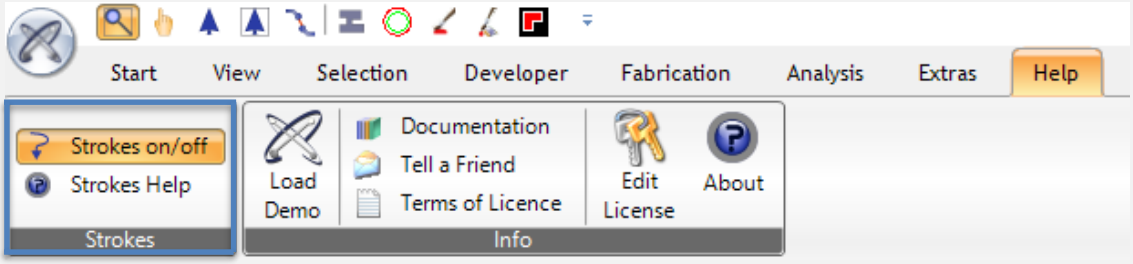
3.12 Find



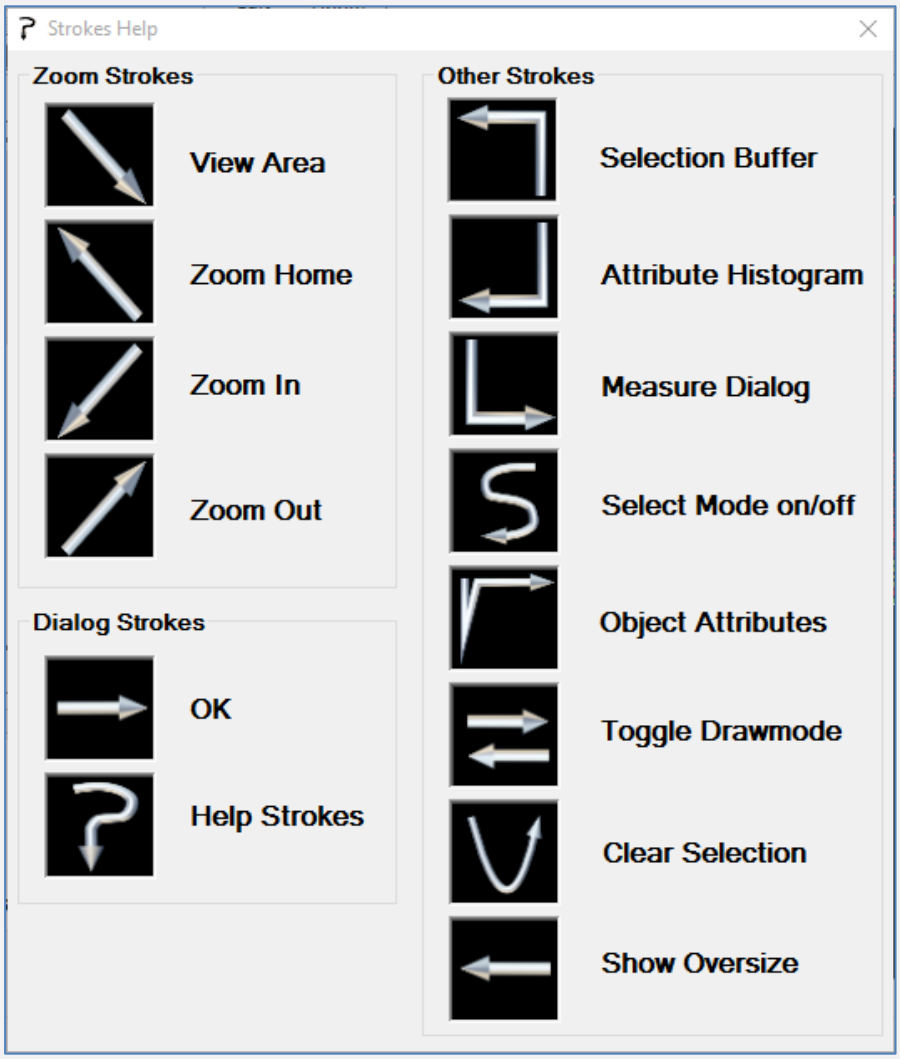
Use the Find dialog to search for objects, components, properties, nets or geometries.



3.13 Strokes



There is a short access to a lot of menus available. Push the middle button or the mouse wheel of your mouse and draw one of the gestures shown below.



4. Terms and definitions

4.1 ODB++

All modern layout tools have options to write ODB++. You can use the option write to directory or the option to write it to .Tgz file. The advantage is to get detailed information within the job. So it can be used during developing process.

4.2 Gerber274x

Gerber274x is ASCII vector graphic format. This format includes also the definition of the apertures which will be used for drawing.

4.3 Excellon

Excellon is used for drill data.

4.4 DXF

DXF is a 2D and 3D Data Exchange Format.

4.5 Sieb & Meyer

Sieb & Meyer data is used for describing CNC manufacturing.

4.6 IPC356

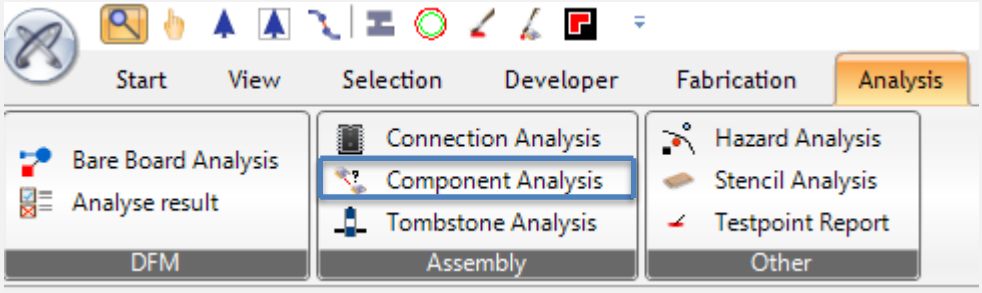
A special definition of netlist data.

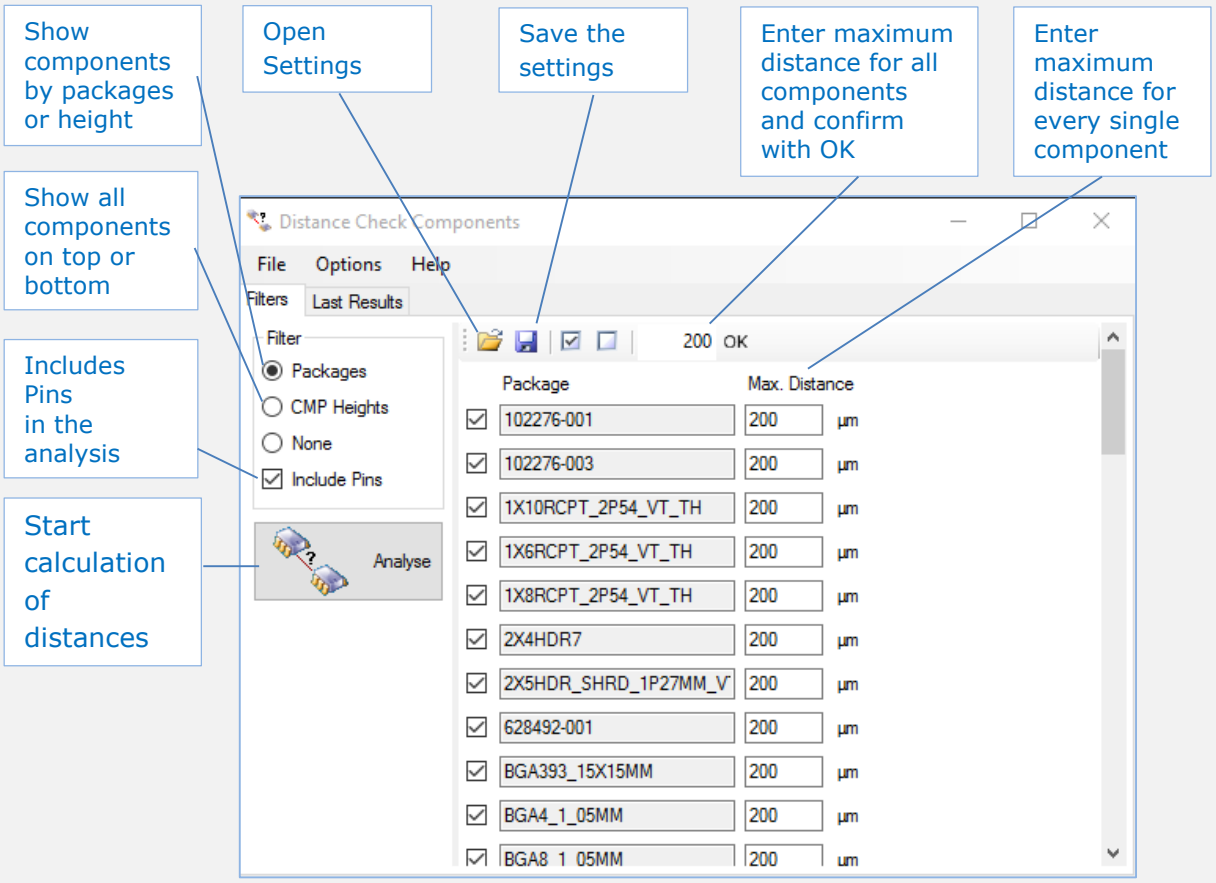
5. Shortcuts

funktion	shortcut
ID_COPY_INCLUDE_LAYERLIST	P, Shift
ID_DELETE	Delete
ID_ZOOM_IN	PageUp
ID_ZOOM_OUT	Next
ID_ZOOM_PROFILE	Home, Control
ID_ZOOM_HOME	Home
ID_GRID	G, Control
ID_LAST_VIEW	Back
ID_FIND	F, Control
ID_CLEAR_SELECTION	C, Control
ID_PREVIOUS_SELECTION	P, Control
ID_MATRIX	M, Control
ID_MEASURE	M
ID_STEP_AND_REPEAT	S, Control
ID_MOUSE_TOOL_ZOOM	Z
ID_MOUSE_TOOL_SELECT	S
ID_FLATTEN_PANEL	Q, Control
ID_CHANGE_DRAWING_MODE	W, Control
ID_SHOW_SELECTION_ONLY_ON_ACTIVE_LAYERS	O, Alt
ID_UNDO_LAST_ACTION	Z, Control
ID_CREATE_EMPTY_PROJECT	N, Control
ID_IMPORT_FAVORITES	F, Shift
ID_IMPORT_RECENT	R, Shift
ID_IMPORT_BROWSE	B, Shift

6. Plug-Ins

6.1 Component Analysis





Find bottlenecks between components with the „Component Analysis" Plug-In and guarantee a smooth production. First set a filter to sort components by packages or heights or no filter for showing all components of one layer. Enter the maximum distance either simultaneously for all components or for every single one.

List of results after the analysis:

Filter the list by using the drop-down menu or by manual input

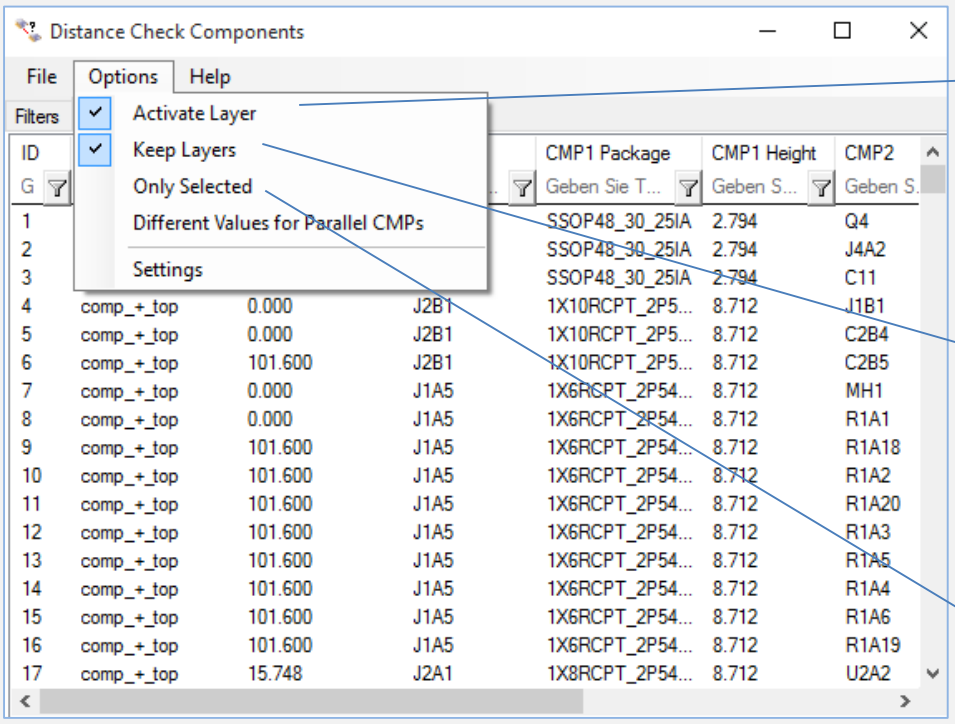
Distance Check Components

File Options Help

Filters | Results for CMP-Packages 1

ID	Layer Name	Distance in mm	CMP1	CMP1 Package	CMP1 Height	CMP2	CMP2 Package	CMP2 Height	CMPs Parallel
G	Geben Sie T...	Geben Sie T...	Geben S...	Geben Sie T...	Geben S...	Geben S...	Geben Sie T...	Geben S...	Geben Sie T...
1	comp_+_top	0.000	U8	SSOP48_30_25IA	2.794	Q4	SOT23	1.270	True
2	comp_+_top	0.000	U8	SSOP48_30_25IA	2.794	J4A2	CONN_SDCAR...	1.778	False
3	comp_+_top	165.100	U8	SSOP48_30_25IA	2.794	C11	SMC0402A	0.610	True
4	comp_+_top	0.000	J2B1	1X10RCPT_2P5...	8.712	J1B1	1X8RCPT_2P54...	8.712	True
5	comp_+_top	0.000	J2B1	1X10RCPT_2P5...	8.712	C2B4	SMC0603	0.889	False
6	comp_+_top	101.600	J2B1	1X10RCPT_2P5...	8.712	C2B5	SMC0402A	0.610	False
7	comp_+_top	0.000	J1A5	1X6RCPT_2P54...	8.712	MH1	SPOKE_N156_...	0.025	False
8	comp_+_top	0.000	J1A5	1X6RCPT_2P54...	8.712	R1A1	SMR0402A	0.610	False
9	comp_+_top	101.600	J1A5	1X6RCPT_2P54...	8.712	R1A18	SMR0402A	0.610	True
10	comp_+_top	101.600	J1A5	1X6RCPT_2P54...	8.712	R1A2	SMR0402A	0.610	True
11	comp_+_top	101.600	J1A5	1X6RCPT_2P54...	8.712	R1A20	SMR0402A	0.610	True
12	comp_+_top	101.600	J1A5	1X6RCPT_2P54...	8.712	R1A3	SMR0402A	0.610	True
13	comp_+_top	101.600	J1A5	1X6RCPT_2P54...	8.712	R1A5	SMR0402A	0.610	True
14	comp_+_top	101.600	J1A5	1X6RCPT_2P54...	8.712	R1A4	SMR0402A	0.610	True
15	comp_+_top	101.600	J1A5	1X6RCPT_2P54...	8.712	R1A6	SMR0402A	0.610	True
16	comp_+_top	101.600	J1A5	1X6RCPT_2P54...	8.712	R1A19	SMR0402A	0.610	True
17	comp_+_top	15.748	J2A1	1X8RCPT_2P54...	8.712	U2A2	BGA8_1_05MM	0.508	True
18	comp_+_top	50.800	J2A1	1X8RCPT_2P54...	8.712	J1A6	102276-003	8.636	False
19	comp_+_top	139.700	J2A1	1X8RCPT_2P54...	8.712	C1A1	SMC0805	1.346	True
20	comp_+_top	139.700	J2A1	1X8RCPT_2P54...	8.712	C1A2	SMC0805	1.346	True
21	comp_+_top	101.600	J2A1	1X8RCPT_2P54...	8.712	J1A4	102276-001	10.439	False
22	comp_+_top	0.000	U2A2	BGA8_1_05MM	0.508	U2A4	BGA8_1_05MM	0.508	True
23	comp_+_top	7.620	U2A2	BGA8_1_05MM	0.508	C2A2	SMC0402A	0.610	False

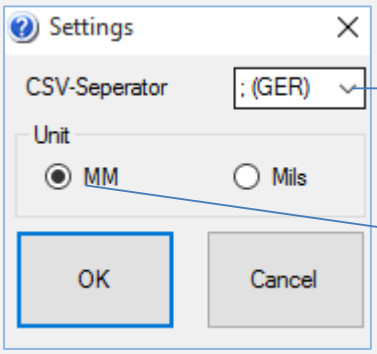
Select and Zoom	Visualize selected component in the pcb
Print Print Preview Page Setup	Print the list with Print Preview and Page Setup
Export List Copy	Export the list as CSV and copy
Remove Filter	Show the list without filter



Activate a by double-click selected layer in the layer list

Keep activated layers activate when selecting another layer

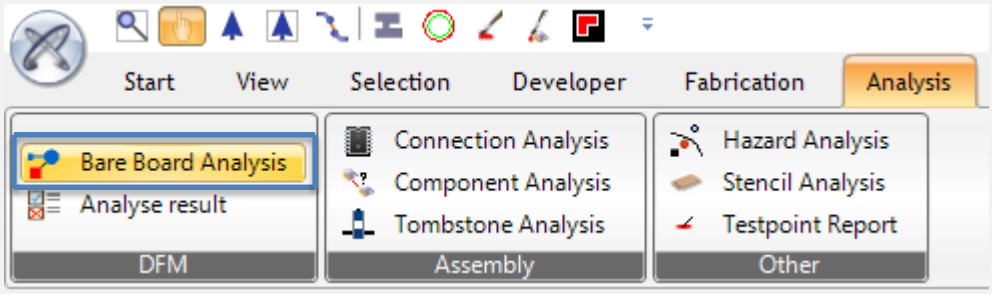
Include only selected components in the analysis



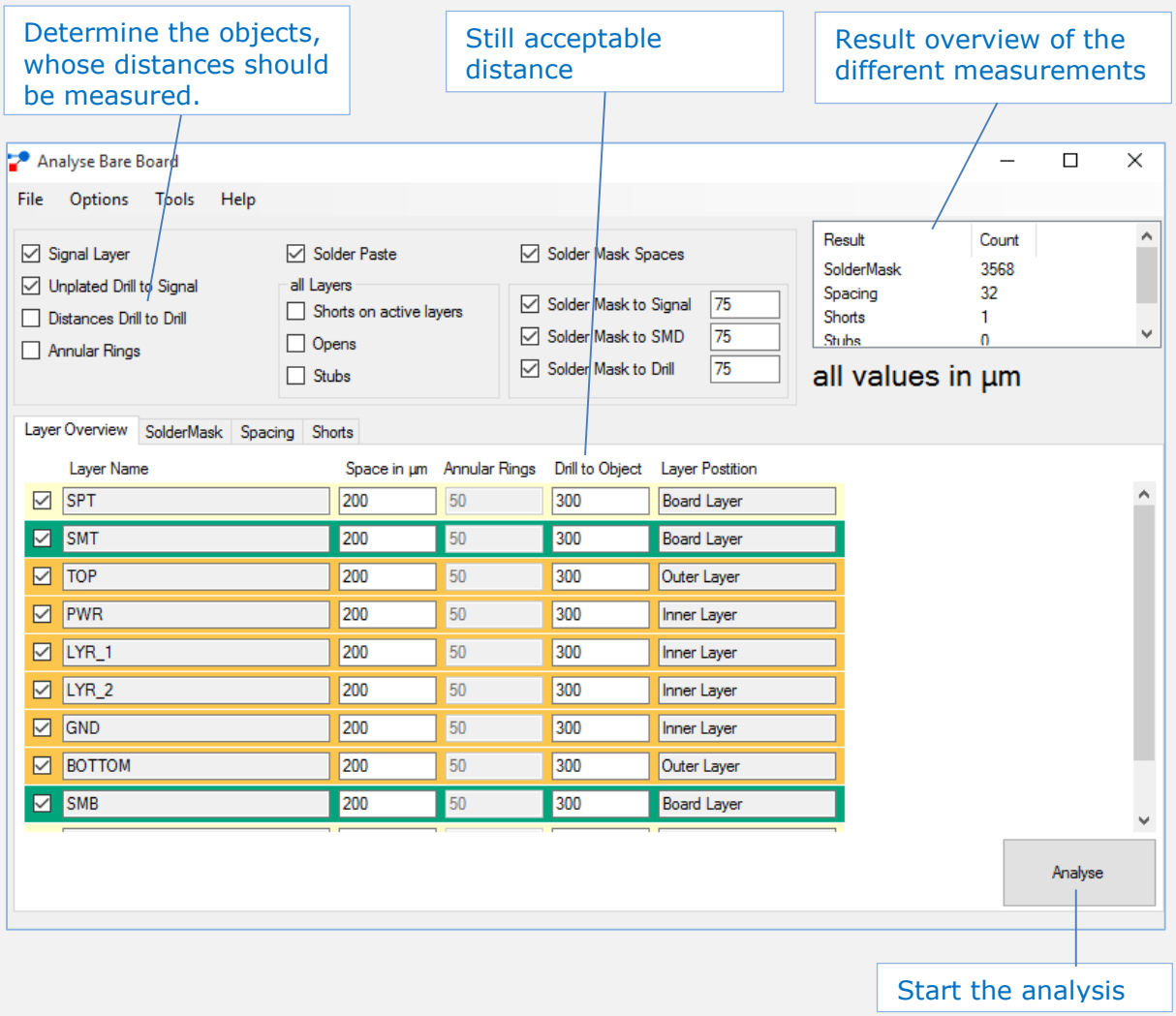
Specify the country setting for the export as CSV

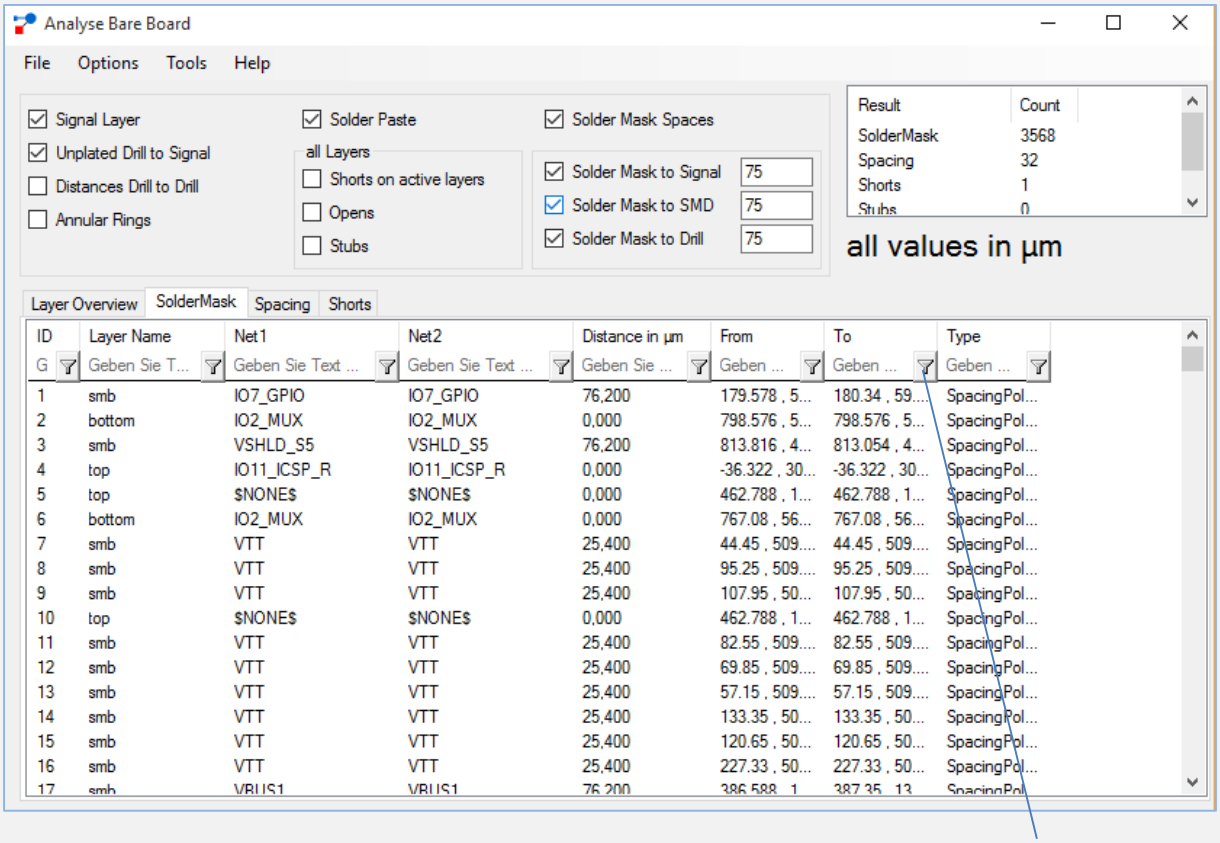
Set the unit

6.2 Bare Board Analysis



The „Bare Board Analysis"Plug-In finds bottlenecks between signal layers, drills, annular rings and nets.



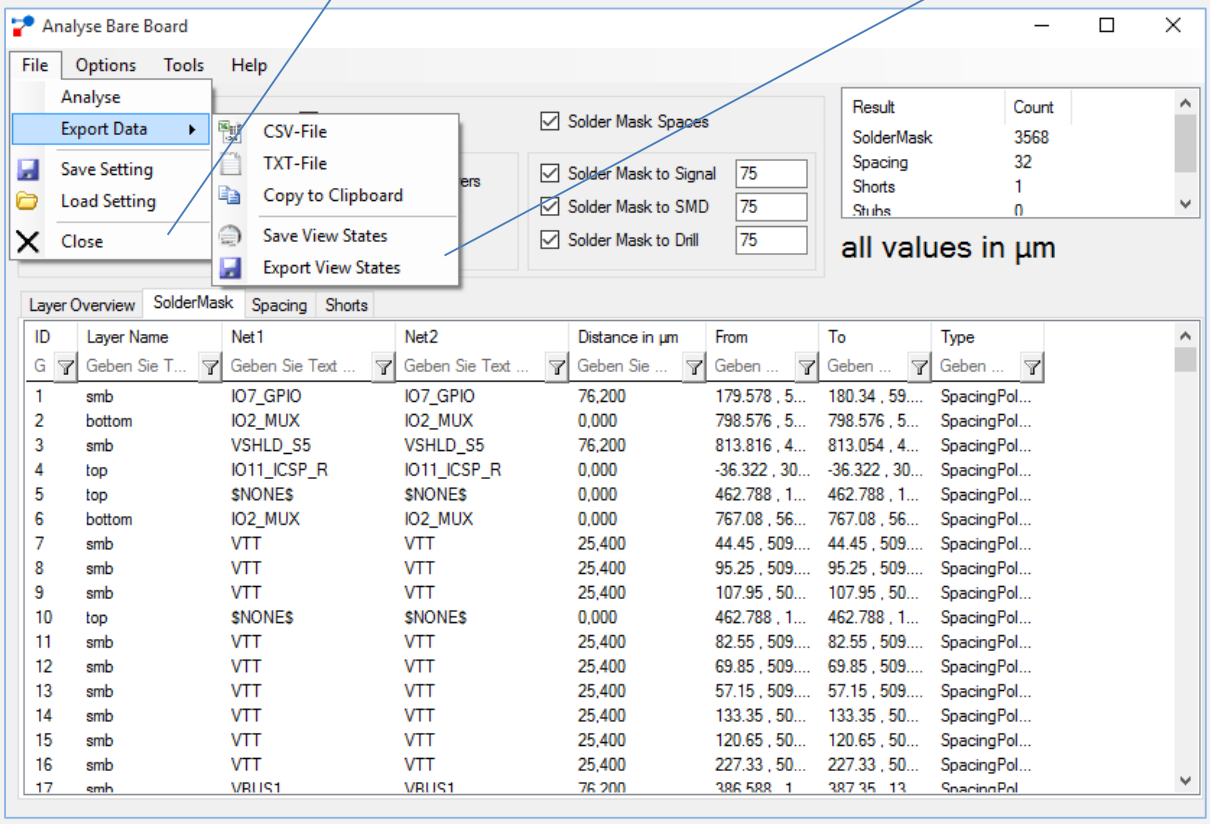


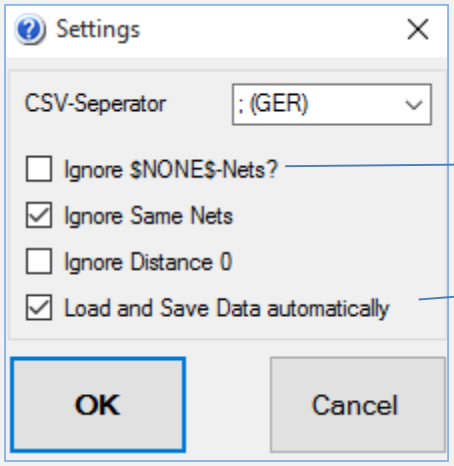
Select and Zoom Remove Selection	Visualize and remove selected component in the pcb
Print Print Preview Page Setup	Print the list with Print Preview and Page Setup
Export List Copy	Export the list as CSV and copy data to clipboard
Remove Filter	Show the list without filter

Filter the list by using the dropdown menu or by manual input

Save the distance settings and open them the next time working with the Plug-In

Export the results as text or CSV or copy them to the clipboard

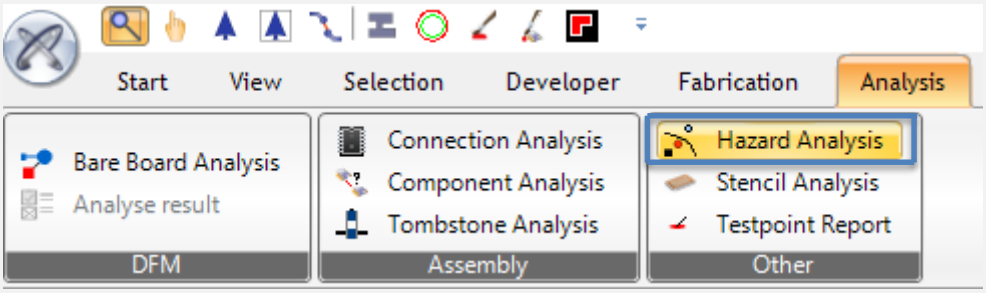




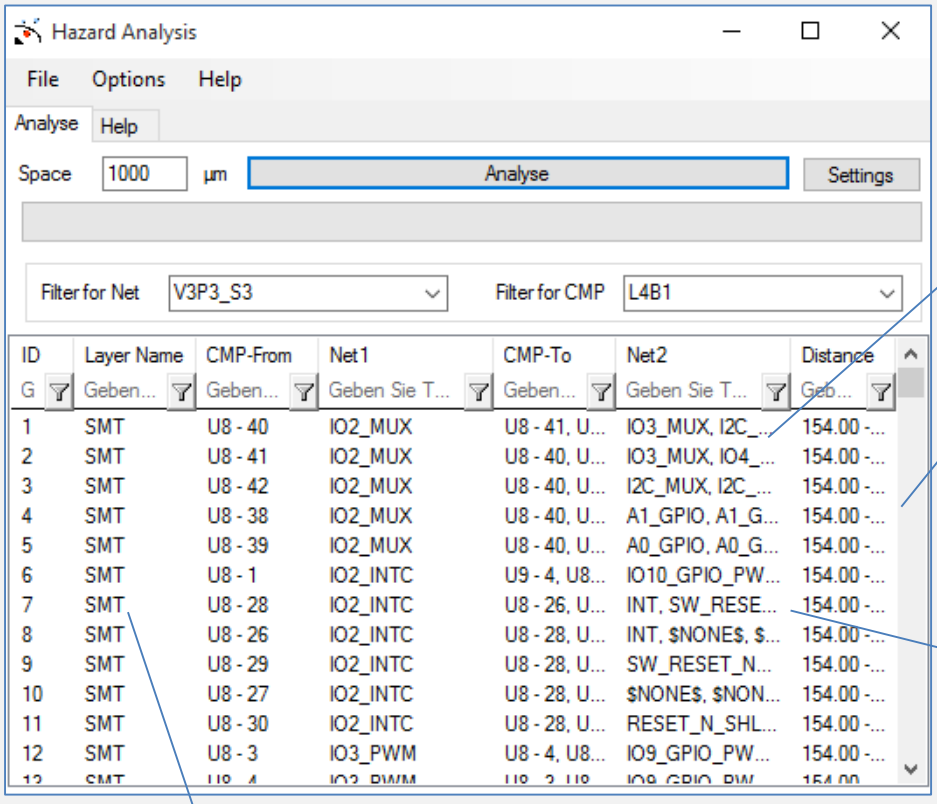
Don't include $NONE$-nets, same nets or objects lying on top of each other in the analysis

Save the distance settings and load them automatically the next time working with the Plug-In

6.3 Hazard Analysis



„Hazard Analysis" finds all possible shorts created from conductive material. The list of possible shorts helps to predict effects on the production.



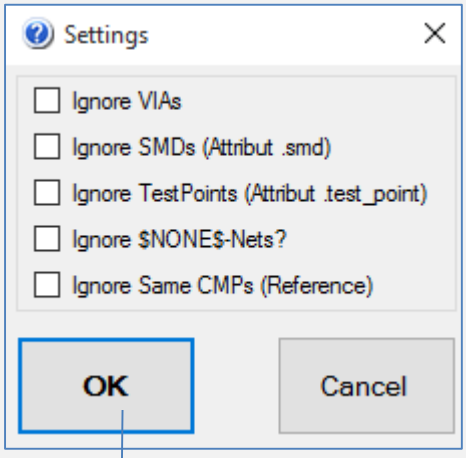
Start the Analysis

Analyse only certain nets or components

Filter the results, either by manual input or with the drop-down menu

This value defines the area taken into the calculation

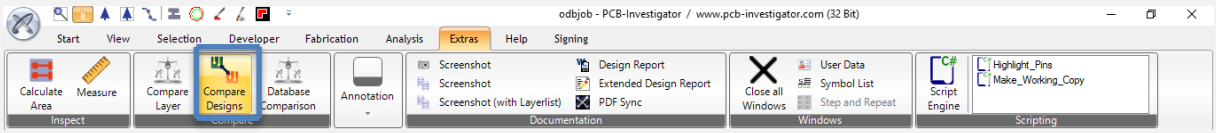
Select CMPs Select Objects	Show components or objects color marked in the pcb
Copy Export as CSV	Copy, export or print the results
Print Print Preview Page Setup	Print the list with Print Preview and Page Setup
Remove Filter	See the results without the filter



Analyse without these parts

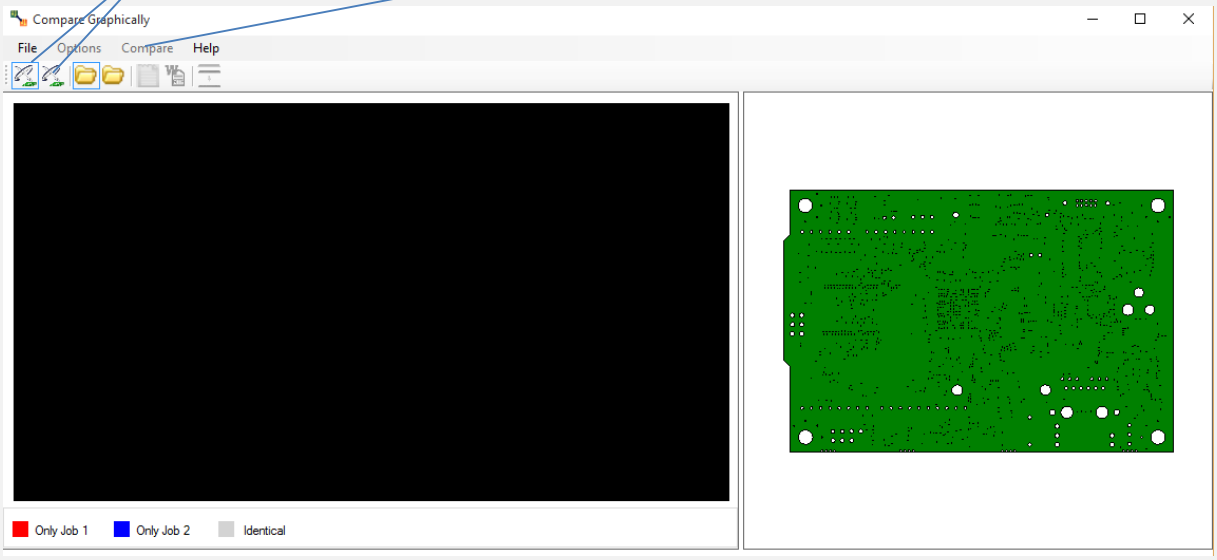
6.4 Graphic Board Compare

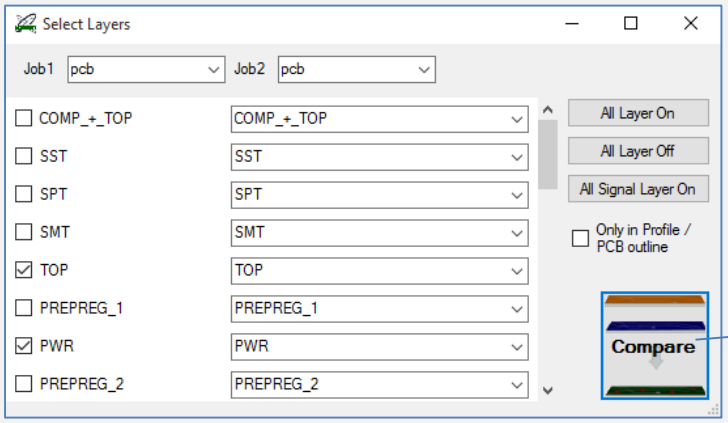
The Graphic Board Compare Plug-In shows differences between two process steps of one job by comparing the board graphically.



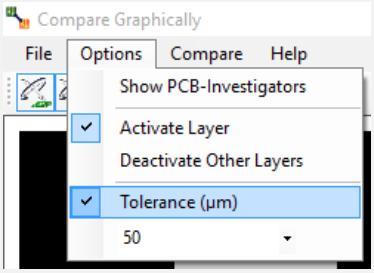
Load the two jobs.

Click Compare to select the layers



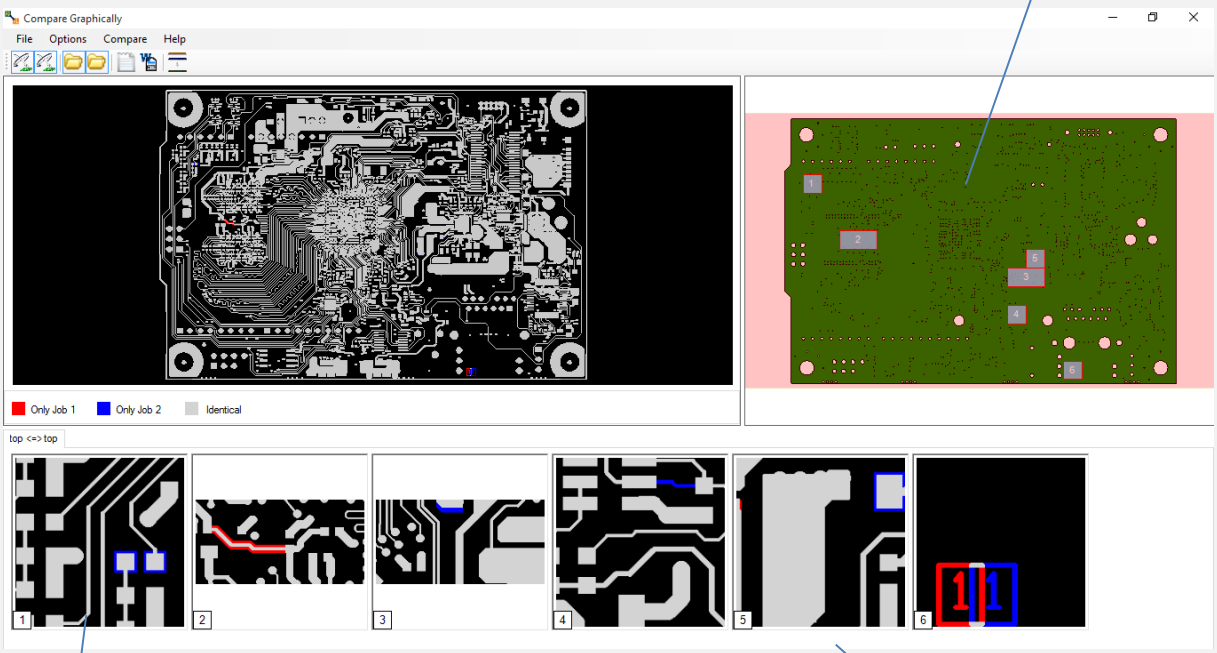


Start the comparison



- Open a new PCBI for both Job1 and Job2 (see slide #4)
- See the drills on the board
- Get explanation about the color marking
- Activate the layer in the two new PCBIs by clicking on the according clip in the overview
- Deactivate every other layer when activating a new one
- Exclude differences smaller than 5µ from the analysis

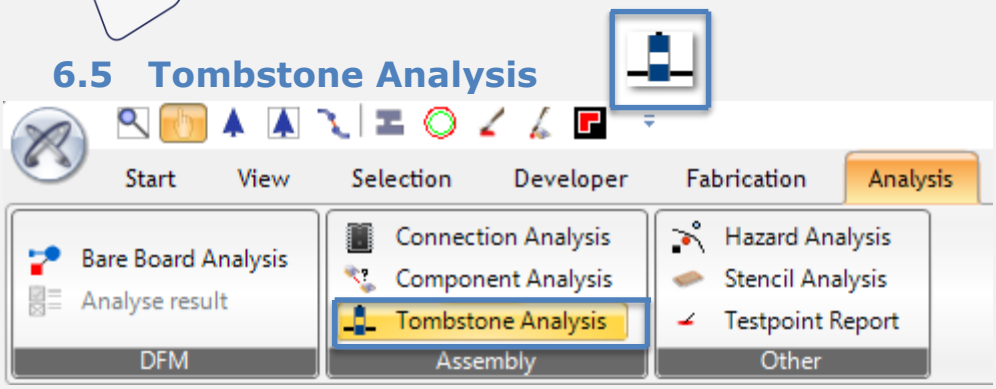
The whole board.



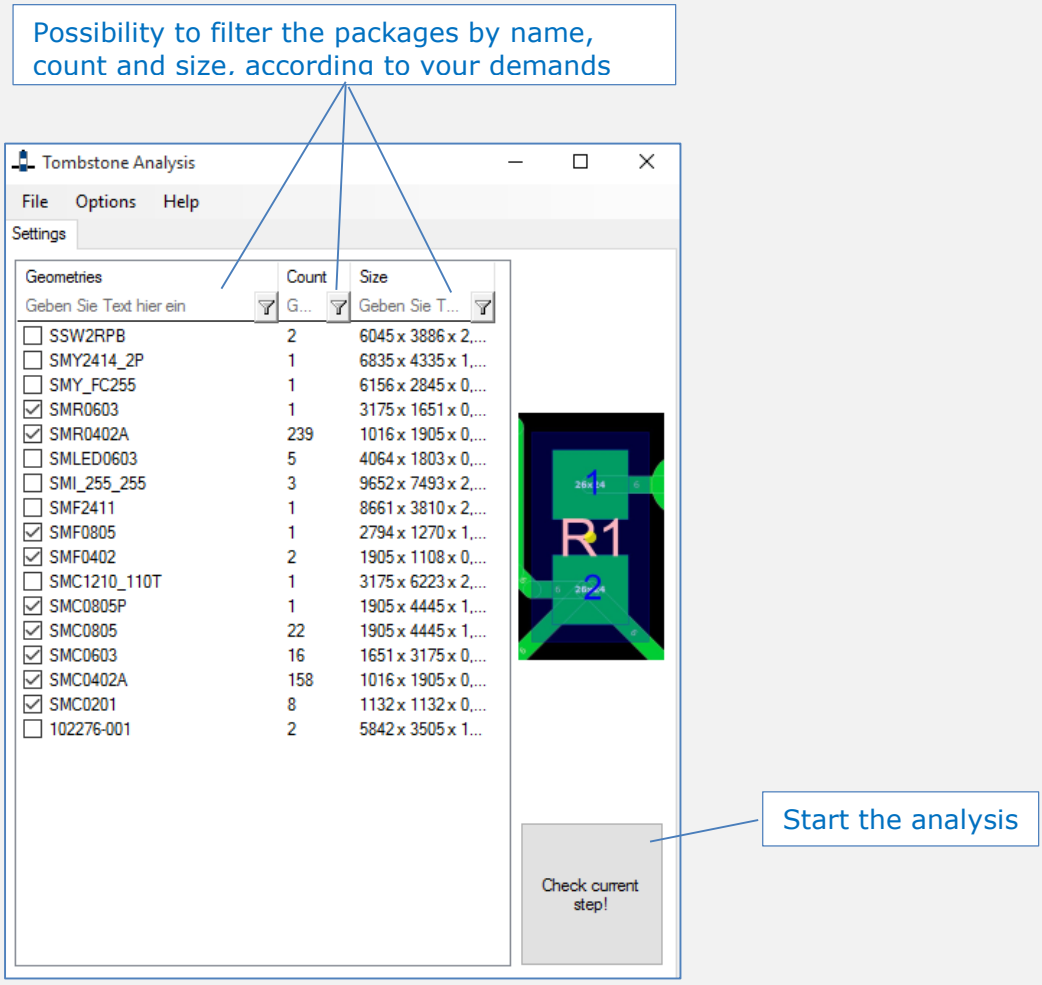
Click on a clip in the list to see it zoomed in in the left handed part of the window and red marked on the whole board

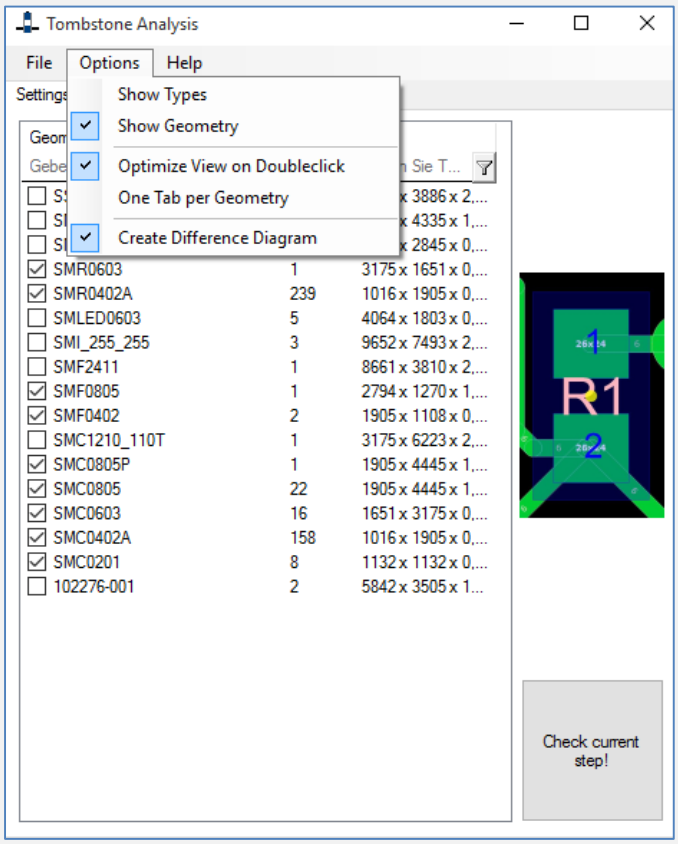
List of the clips that show differences

6.5 Tombstone Analysis

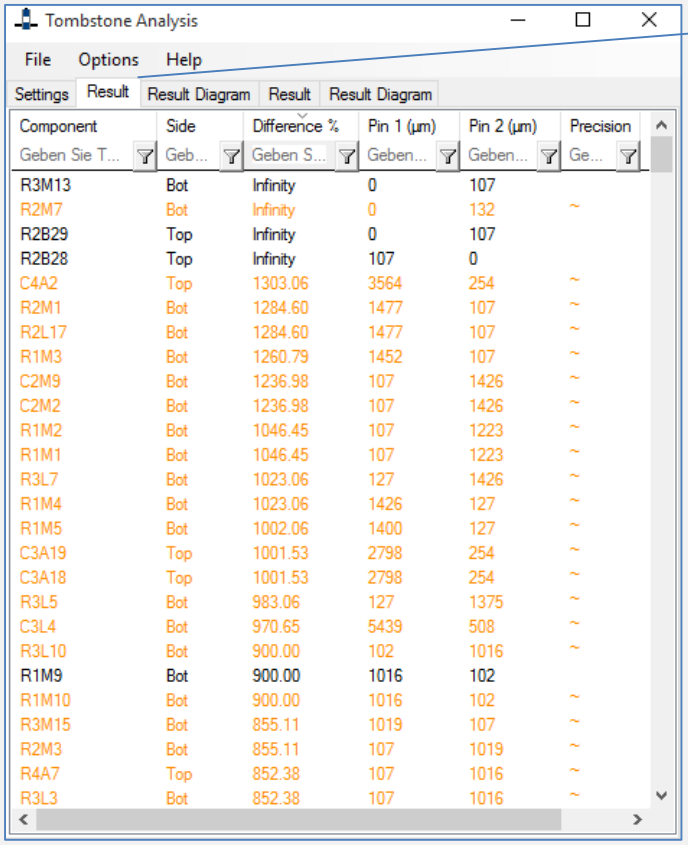


The „Tombstone Analysis" Plug-In finds components with two pins, which have different sizes. Problems in the production will arise, if the difference in size is too big.

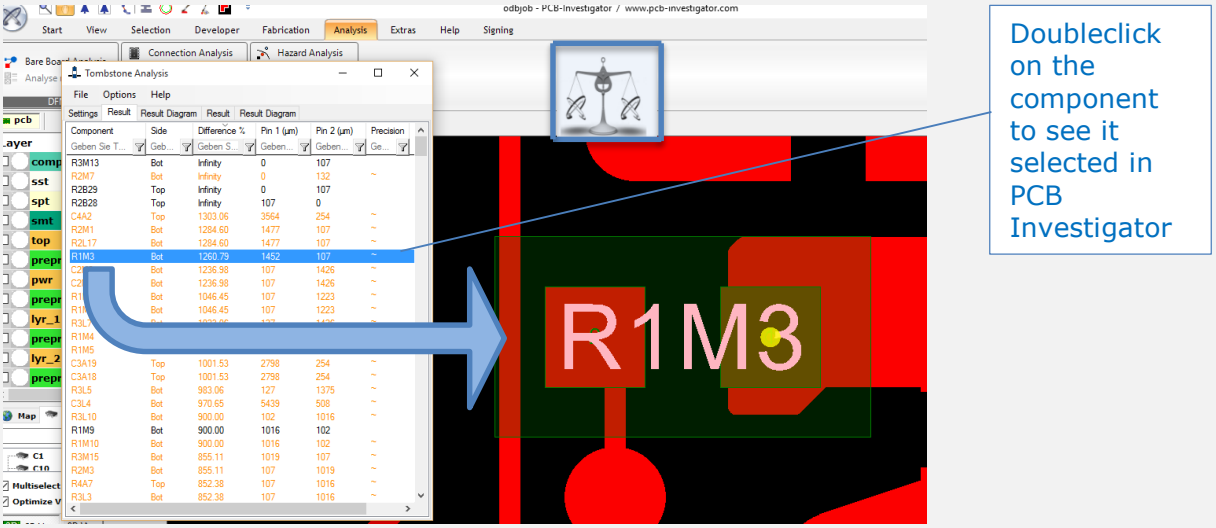




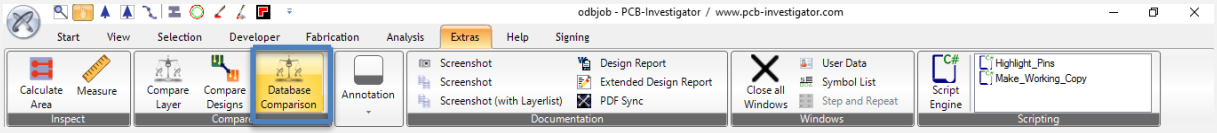
Check the boxes to
→see the different widths of the single conductive paths
→see the belonging package
→zoom in the component with double click



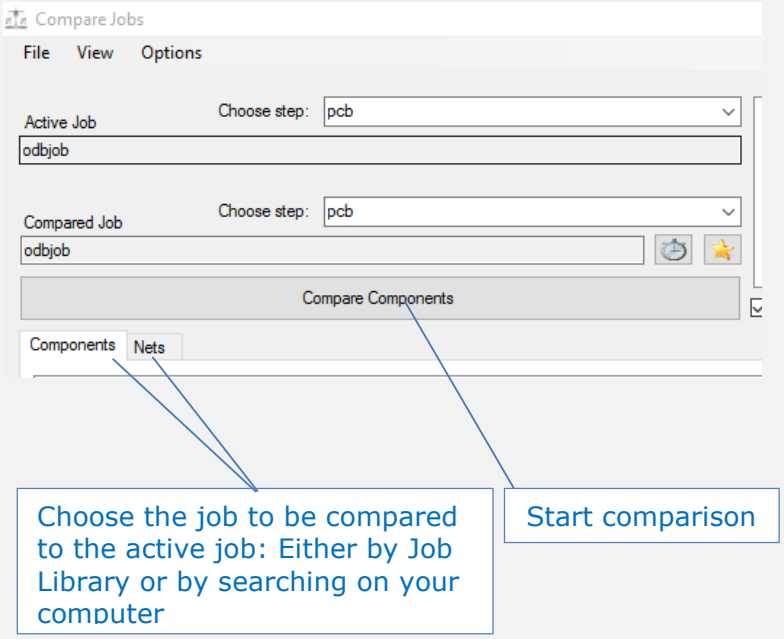
List of results



6.6 Database Compare

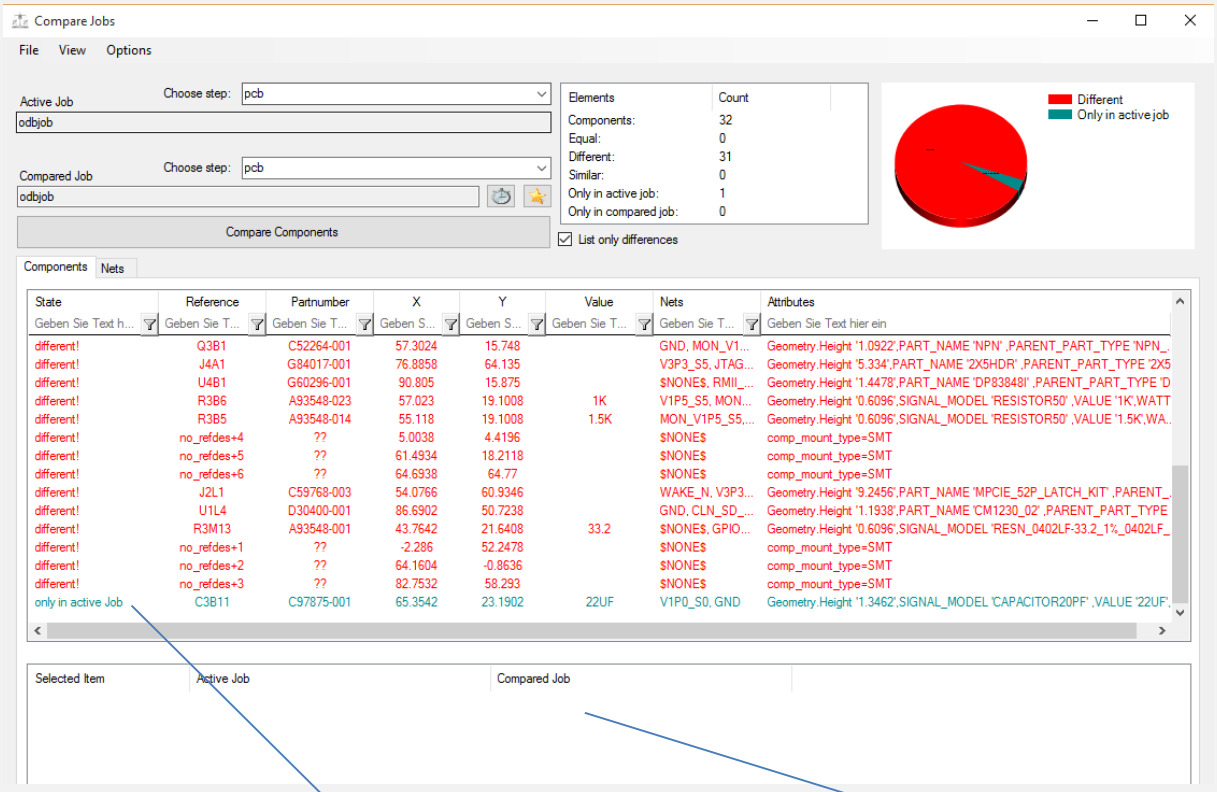


Compare PCB Data shows changes in component and net information of two jobs on one view



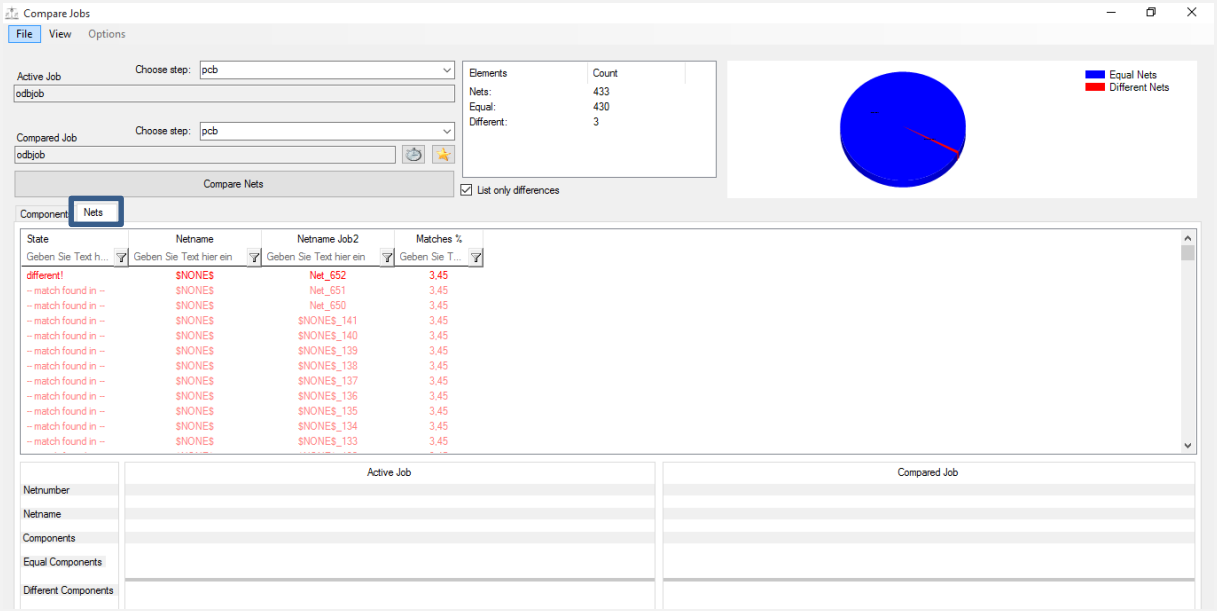
Overview

Filter the display either by manual input or with the drop-down menu

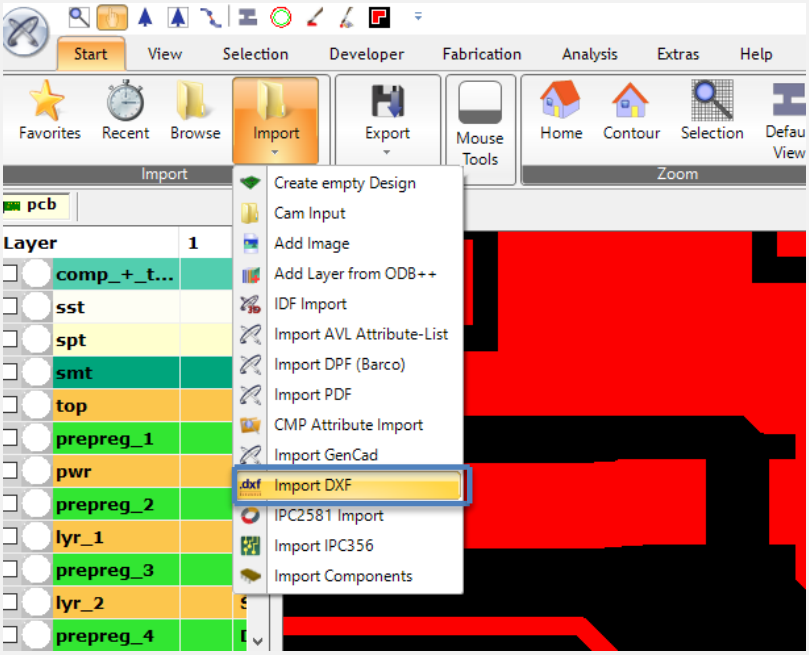


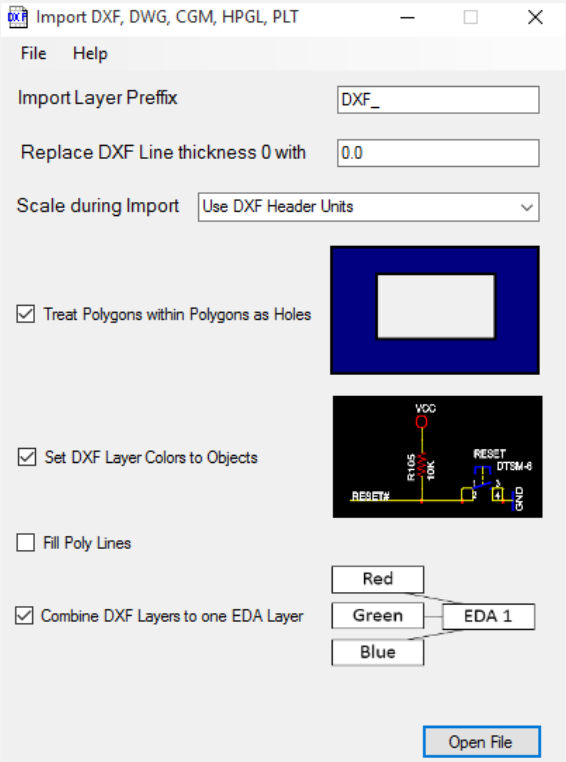
All components with reference, partnumber, coordinates, value and attributes. Listed by existance in one or both jobs and by matches.

Click on one component to see the changes in the box below



6.7 DFX-Import

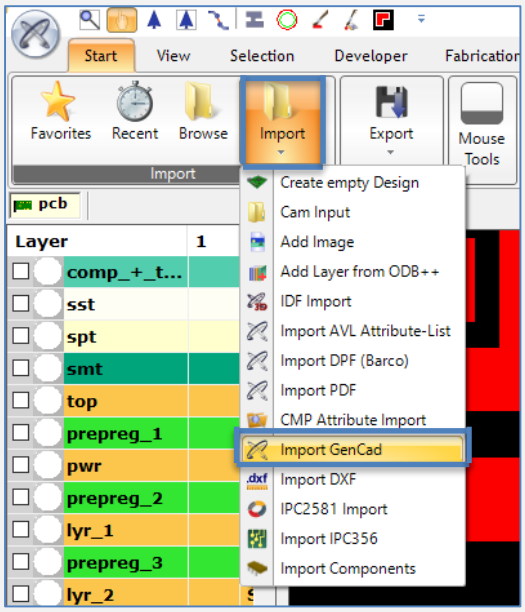


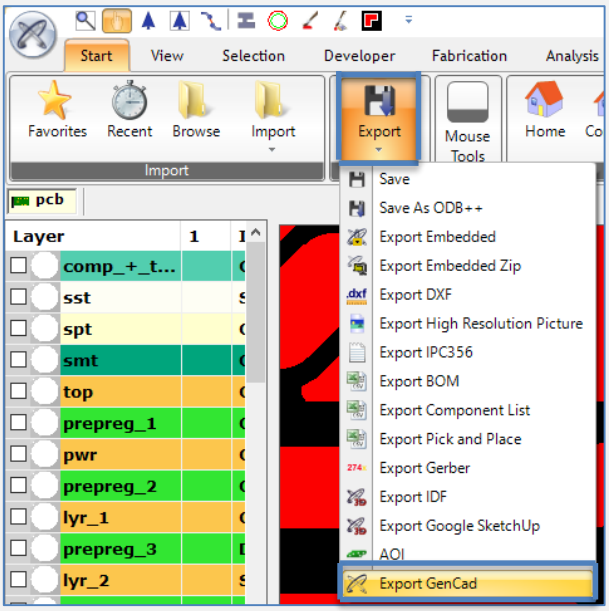


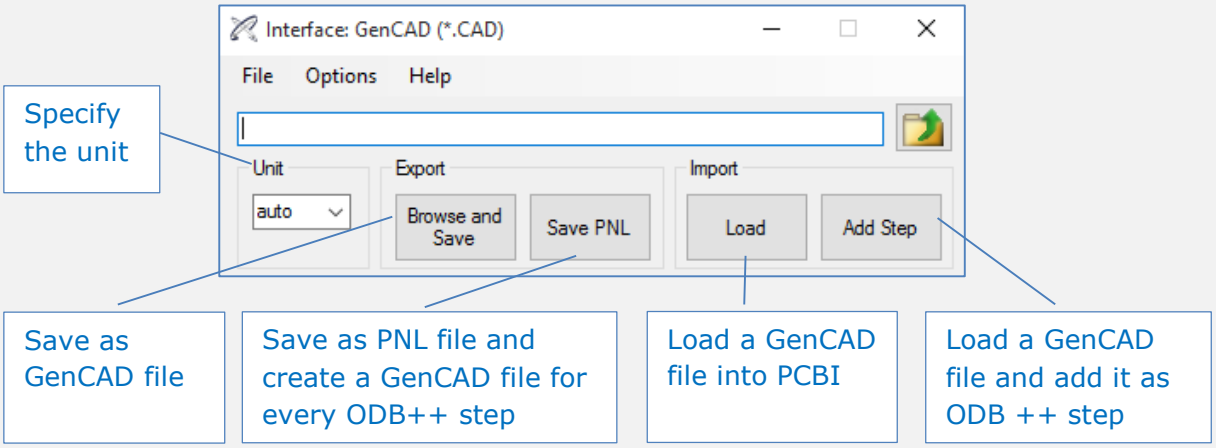
6.8 GenCad

The GenCAD Plug-In provides a GenCAD interface based on 4.1. version.

There are different ways to work with GenCAD files and PCB-Investigator.

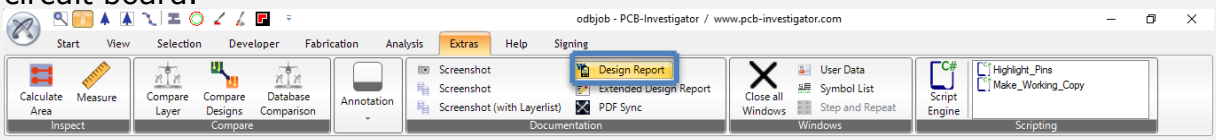


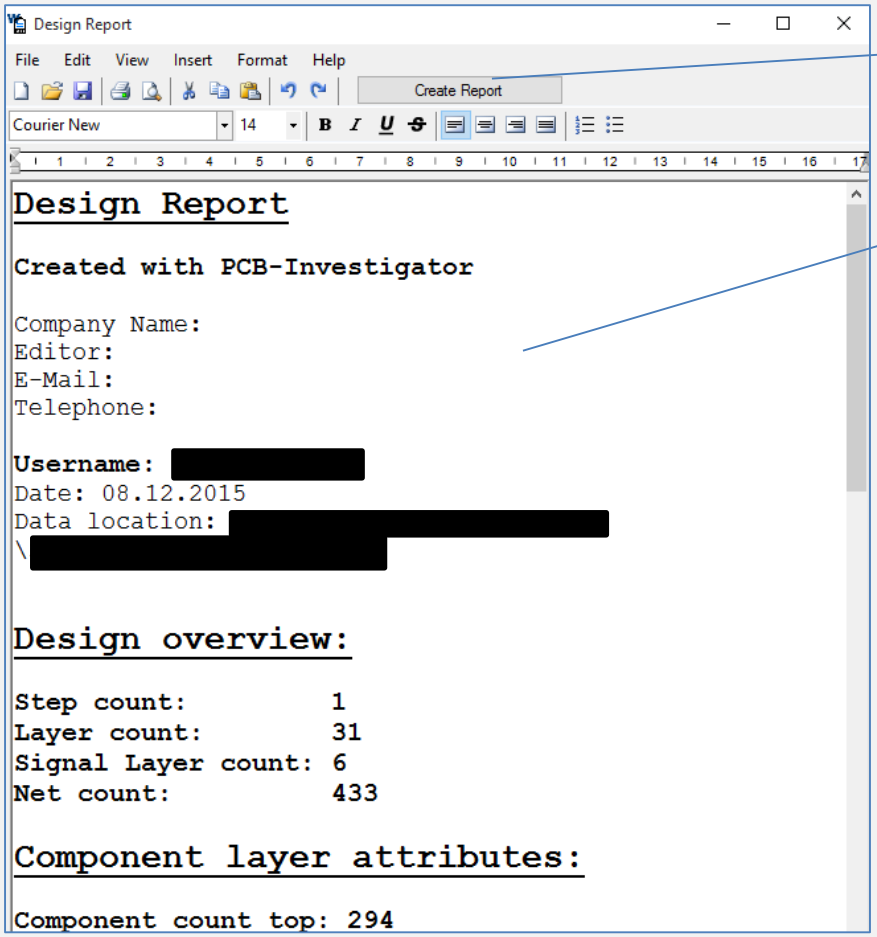




6.9 Design Report

„Design Report" provides an overview with all relevant data of your printed circuit board.





Generates the report

Enter these data by yourself

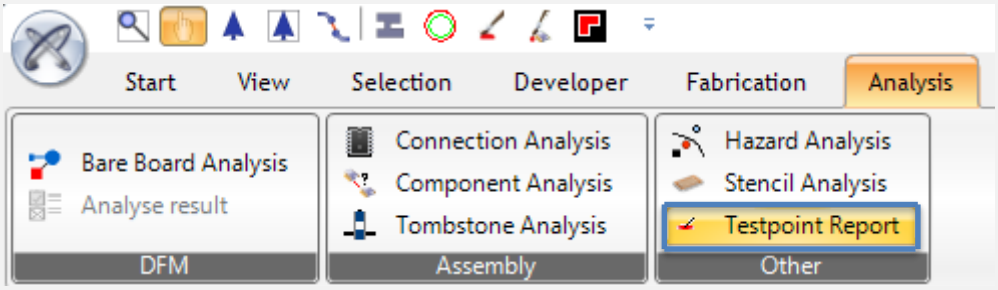
Pin count top: 1535
Component count bot: 246
Pin count bot: 564

Layer Matrix:

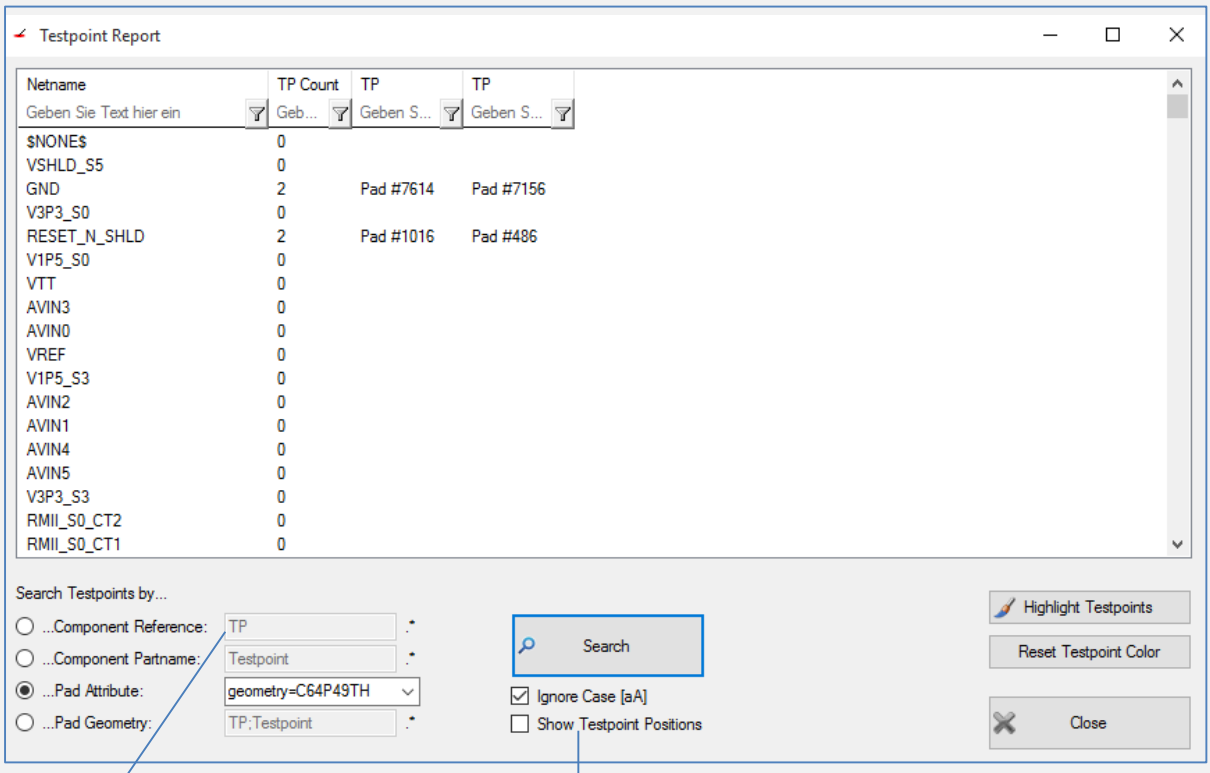
Step name	PCB count	PCB Size	
pcb	1	10,67816 x 7,198587 cm	

Layer name	Layer type	Layer feature count	Smallest Object (cm)
COMP_+_TOP	Component	294	0,559
SPT	Silk_screen	2915	0,152
SPT	Solder_paste	1429	0,254
SMT	Solder_mask	1598	0,354
TOP	Signal	8577	0,102
PREPREG_1	Dielectric	0	
PWR	Signal	1330	0,152
PREPREG_2	Dielectric	0	
LYR_1	Signal	2067	0,152
PREPREG_3	Dielectric	0	
LYR_2	Signal	1873	0,152
PREPREG_4	Dielectric	0	
GND	Signal	1423	0,152
PREPREG_5	Dielectric	0	
BOTTOM	Signal	7875	0,101
SMB	Solder_mask	1862	0,303
SPB	Solder_paste	574	0,203
SSB	Silk_screen	5498	0,152
ROUT	Rout	10	0,000
COMP_+_BOT	Component	246	0,533
ASSEMBLY-TOP	Document	44125	0,025
FAB	Document	77744	0,025
HEIGHT_TOP	Document	3	15,770
HEIGHT_BOT	Document	1	31,524
SQA_AREAS	Document	6	0,737
DRC_ROUTE	Document	452	0,203
DRC_TP_TOP	Document	13	2,718
DRILL	Drill	1279	0,254
INTELGALILEO_FABD_BACK	Document	0	
INTELGALILEO_FABD_FRONT	Document	0	
comp_top_amt	Document	66	5,080

6.10 Testpoint Report



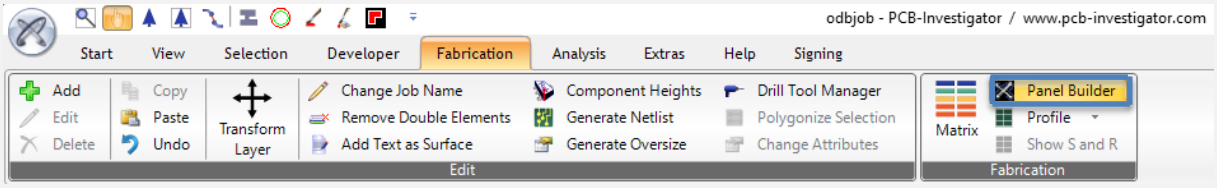
The „Testpoint Report" Plug-In creates a list of all nets of a pcb with testpoints.

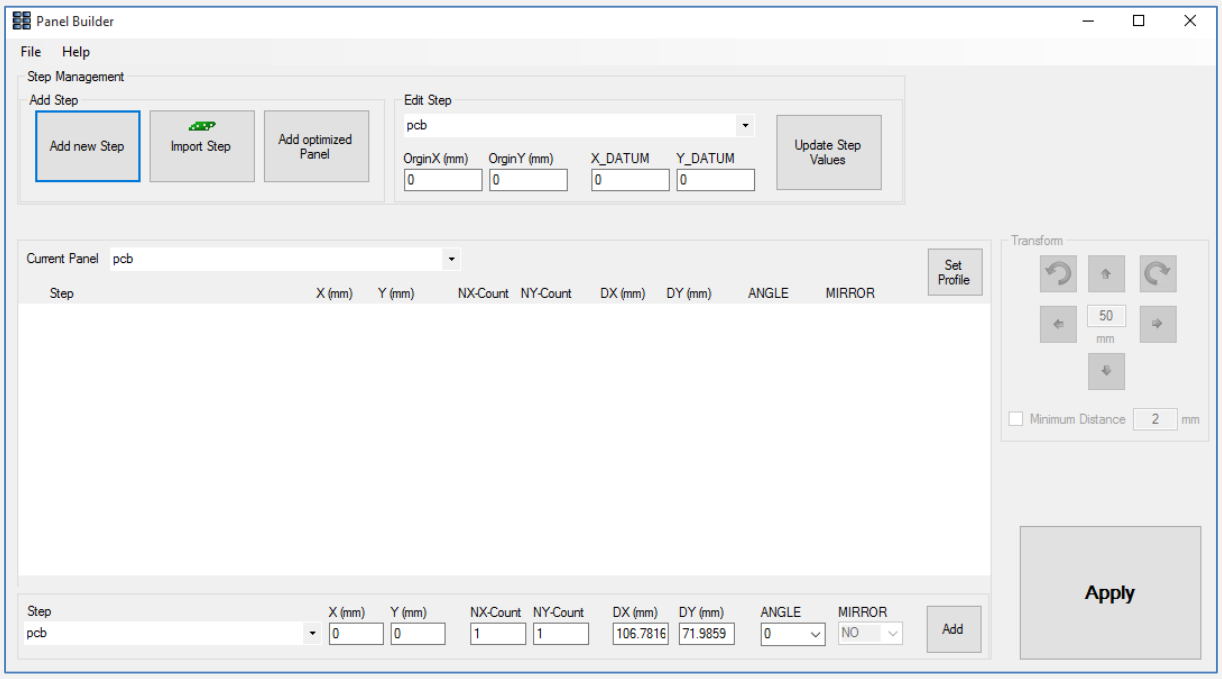


Enter the name, you want the Plug-In to search for

Show coordinates of the testpoints in the list of results

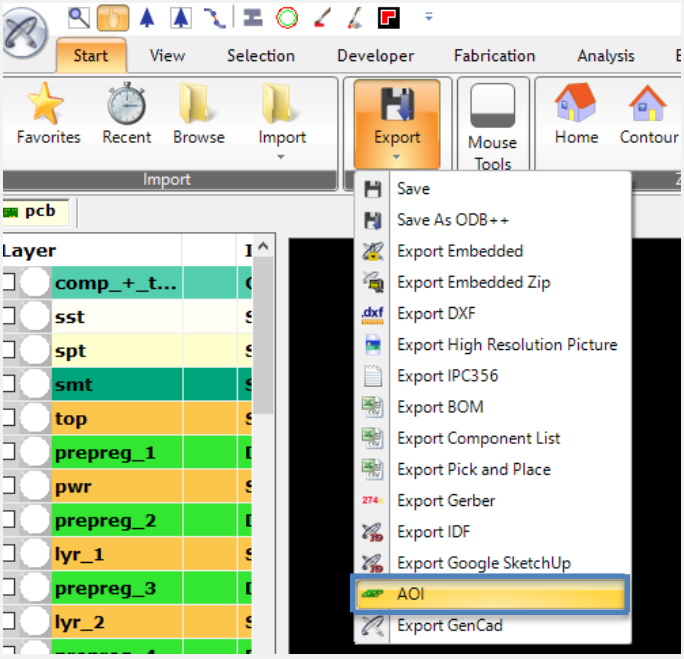
6.11 Panel Builder





6.12 AOI Import/Export

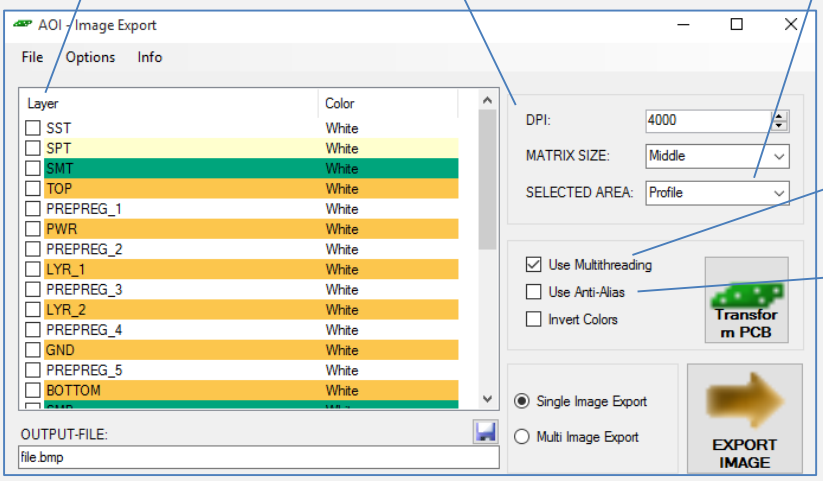
„AOI" creates high resolution BMP graphics as 1 BPP format from PCB data (with Anti-Alias: 8 BPP).



Select the exported layers

Set the internal calculation quantity for the matrix

Export the complete board or only the visible area

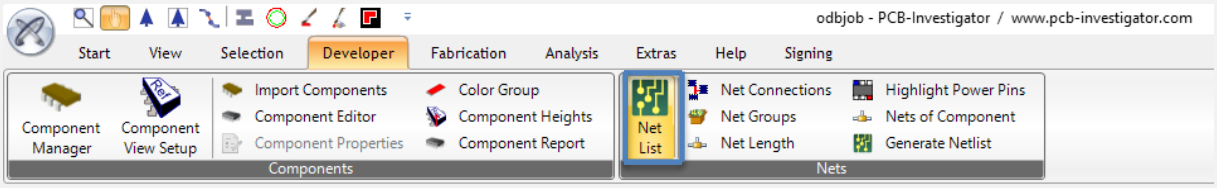


Multithreading for a faster processing

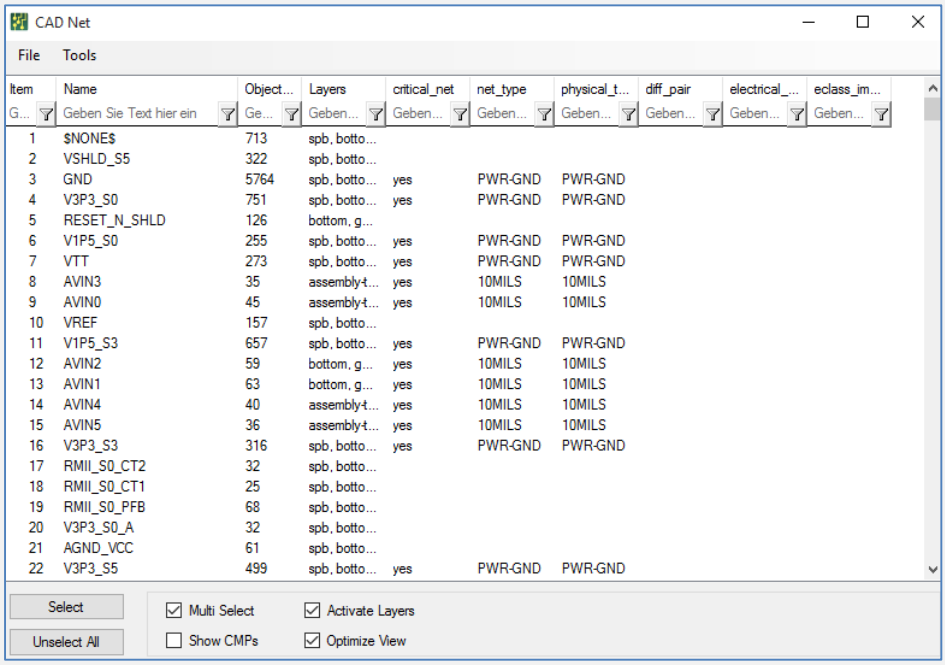
Change black-white color assignment

Change Color	Change black-white color assignment for each layer
Move Up Move Down	Change order of the layers
Select All Unselect All	Select/unselect all layers

6.13 Net List

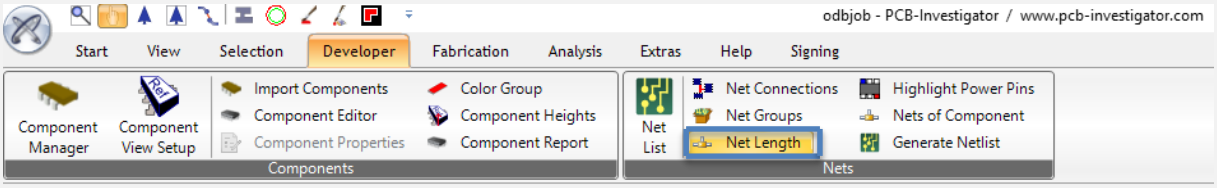


„Export Net List" enables you to export a list with all nets as Excel CSV or text.



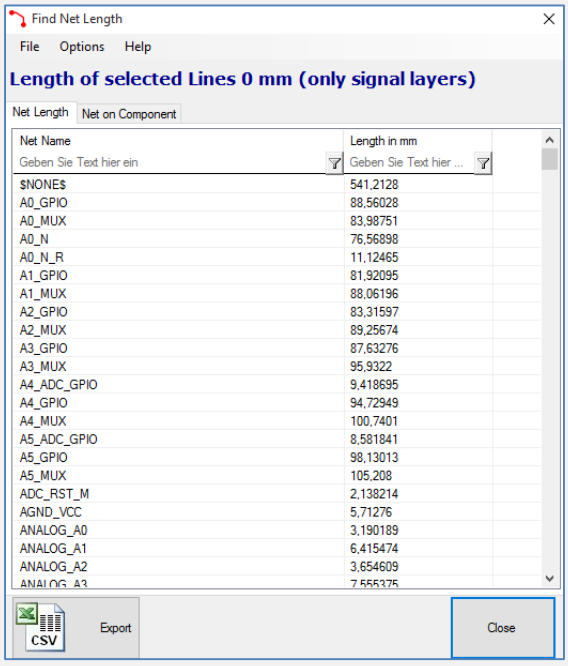
Item	Name	Object...	Layers	critical_net	net_type	physical_t...	diff_pair	electrical_...	eclass_im...
1	$NONE$	713	spb, botto...						
2	VSHLD_S5	322	spb, botto...						
3	GND	5764	spb, botto...	yes	PWR-GND	PWR-GND			
4	V3P3_S0	751	spb, botto...	yes	PWR-GND	PWR-GND			
5	RESET_N_SHLD	126	bottom, g...						
6	V1P5_S0	255	spb, botto...	yes	PWR-GND	PWR-GND			
7	VTT	273	spb, botto...	yes	PWR-GND	PWR-GND			
8	AVIN3	35	assembly-t...	yes	10MILS	10MILS			
9	AVIN0	45	assembly-t...	yes	10MILS	10MILS			
10	VREF	157	spb, botto...						
11	V1P5_S3	657	spb, botto...	yes	PWR-GND	PWR-GND			
12	AVIN2	59	bottom, g...	yes	10MILS	10MILS			
13	AVIN1	63	bottom, g...	yes	10MILS	10MILS			
14	AVIN4	40	assembly-t...	yes	10MILS	10MILS			
15	AVIN5	36	assembly-t...	yes	10MILS	10MILS			
16	V3P3_S3	316	spb, botto...	yes	PWR-GND	PWR-GND			
17	RMII_S0_CT2	32	spb, botto...						
18	RMII_S0_CT1	25	spb, botto...						
19	RMII_S0_PFB	68	spb, botto...						
20	V3P3_S0_A	32	spb, botto...						
21	AGND_VCC	61	spb, botto...						
22	V3P3_S5	499	spb, botto...	yes	PWR-GND	PWR-GND			

6.14 Net Length

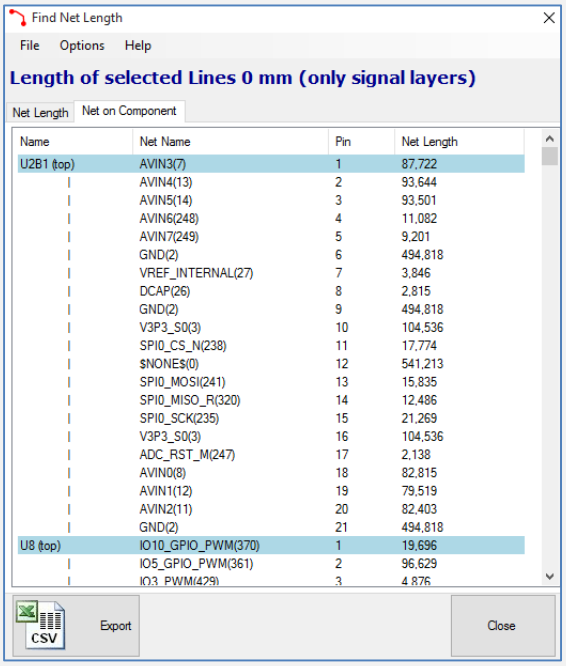


„Net Length" calculates the lenghtsof all nets of a printed circuit board with the following presettings:

- ➔ Lines are added up
- ➔ Surfaces are not taken into account
- ➔ Intersections are plurallycounted

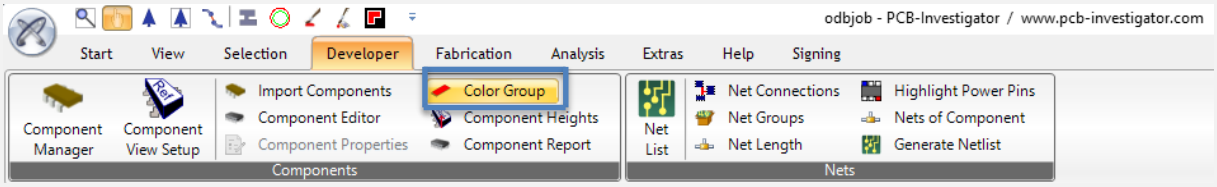


Display for the nets and their lengths

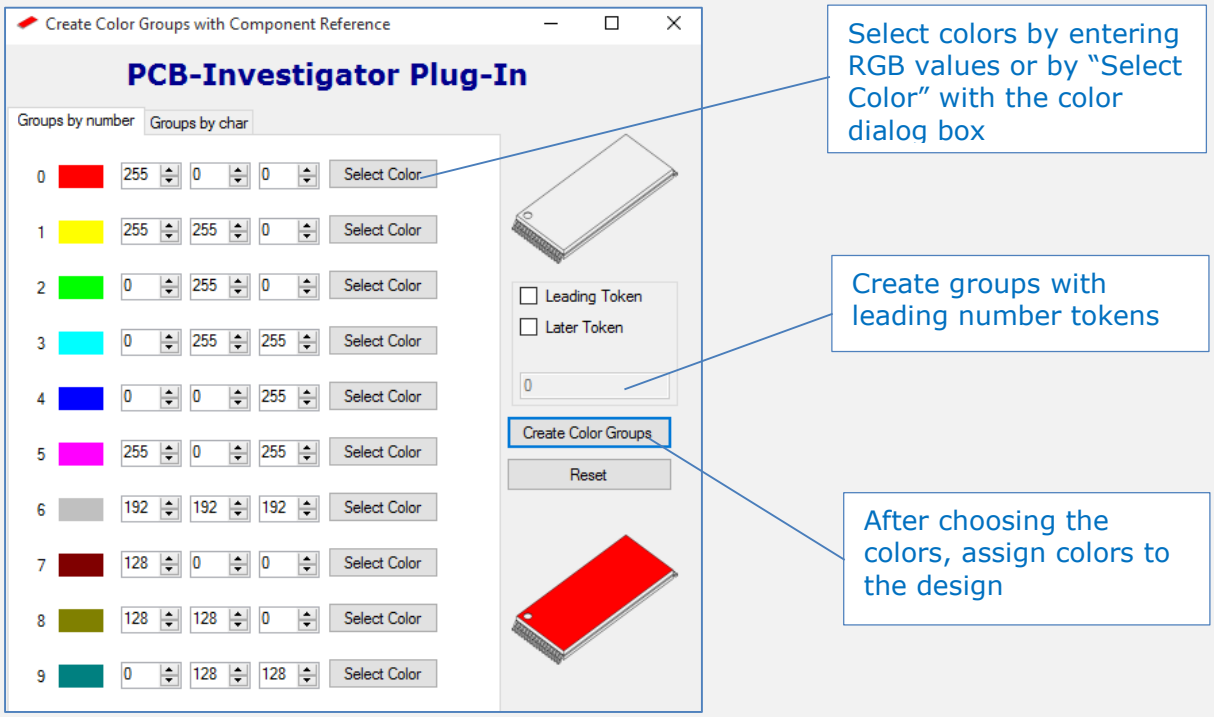


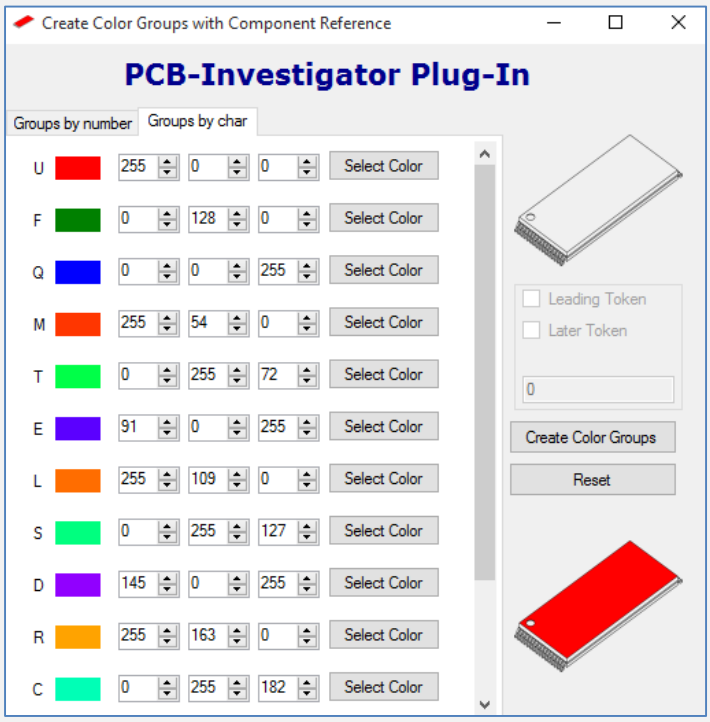
Display for all nets which are connected to a certain component.

6.15 Color Group



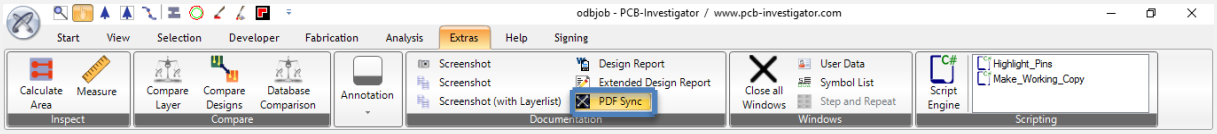
„Color Group" assigns certain colors to certain components. The color selection allows all windows colors.



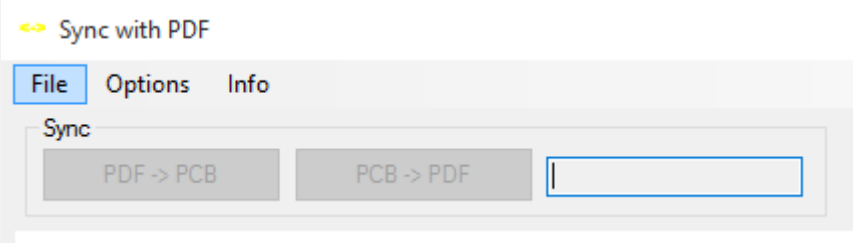


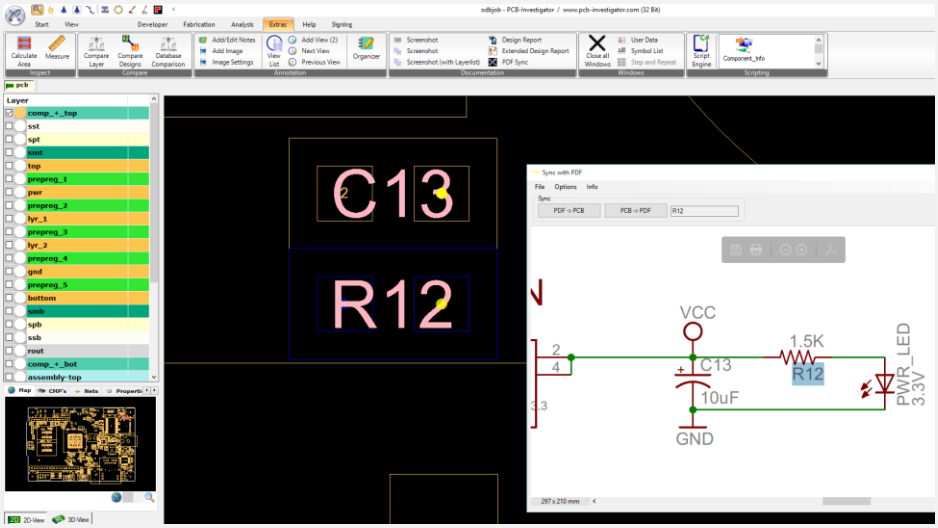
According to the same principle you can use the first letter of a component to assign colors.

6.16 PDF Sync



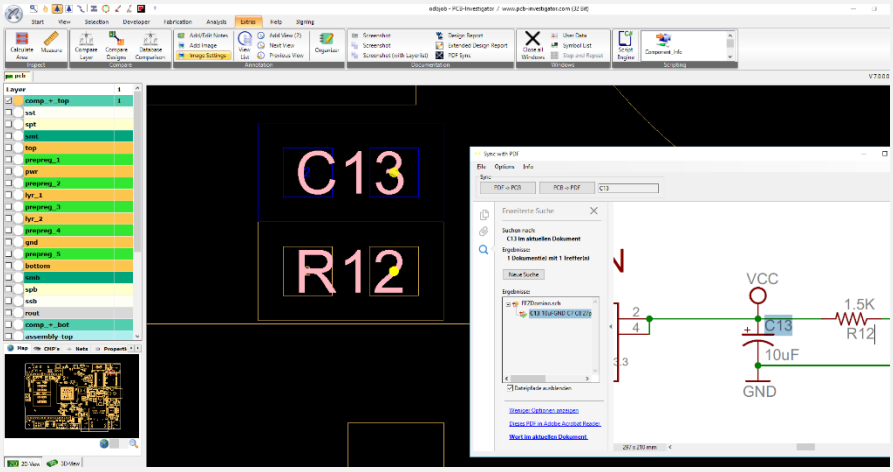
The „PDF Sync" Plug-In shows PCBI information in the according pdf circuit diagram and backwards information of the circuit diagram in the pcb.





Mark a net or component in your pdf file

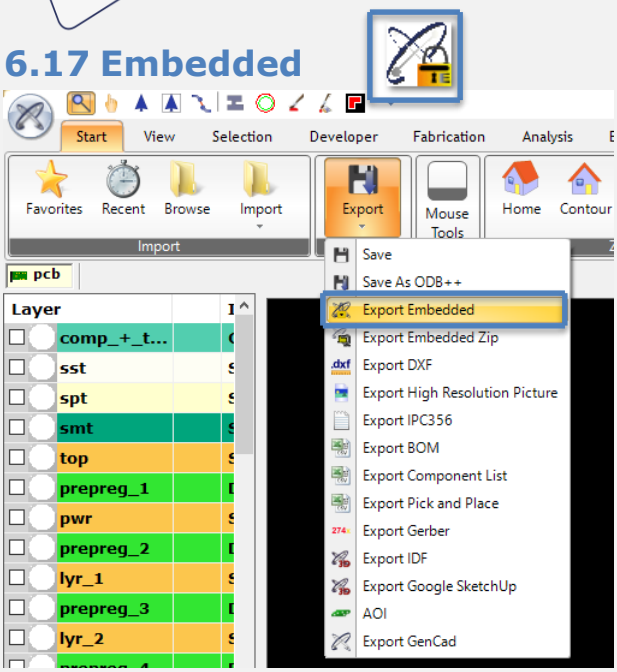
Press „PDF -> PCB“ To see the net/component you selected in PCBInvestigator



Select a net or component in PCBI

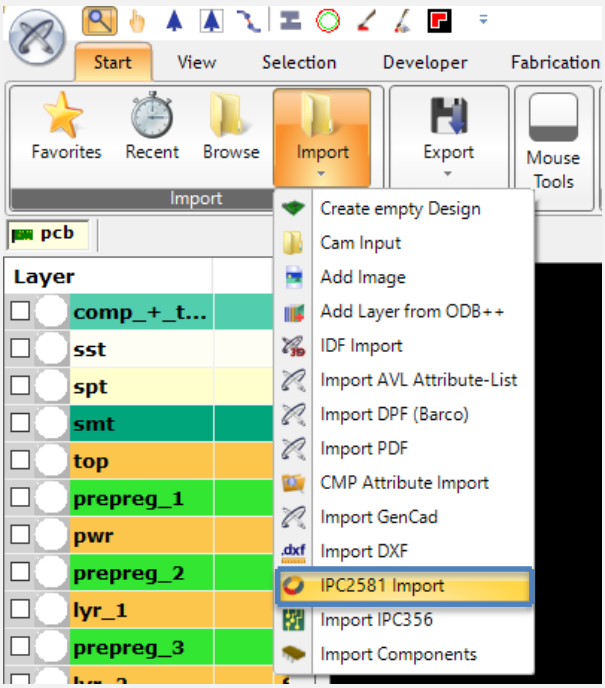
Press „PCB -> PDF“ To see the net/component you selected in your pdf file

6.17 Embedded

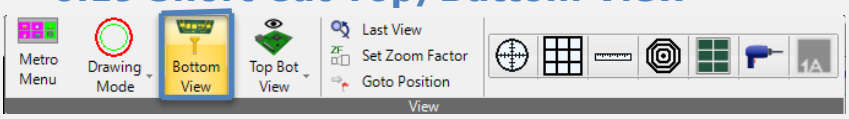


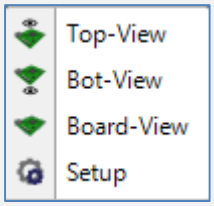
A printed circuit board runs through many different steps and departments from its development to its production. With PCB-Investigator Embedded, you enable every of these departments working with PCB-Investigator without buying more licenses or running more time-consuming installations.

6.18 IPC 2581



6.19 Short Cut Top/Buttom View





The Short Cut Top Bottom View Plug-In is a free Plug-In, that makes your workflow more effective. The two icons on the tool bar allow a one-click-switch from Top to Bottom view. As you can see in the setup-screenshot, key shortcuts for a quick switch are available as well. The setup offers different possibilities like defining the concerned layers or mirroring the layers by Bottom View