



Ucam

Basic Training Guide

Document:

UCAM Training Guide
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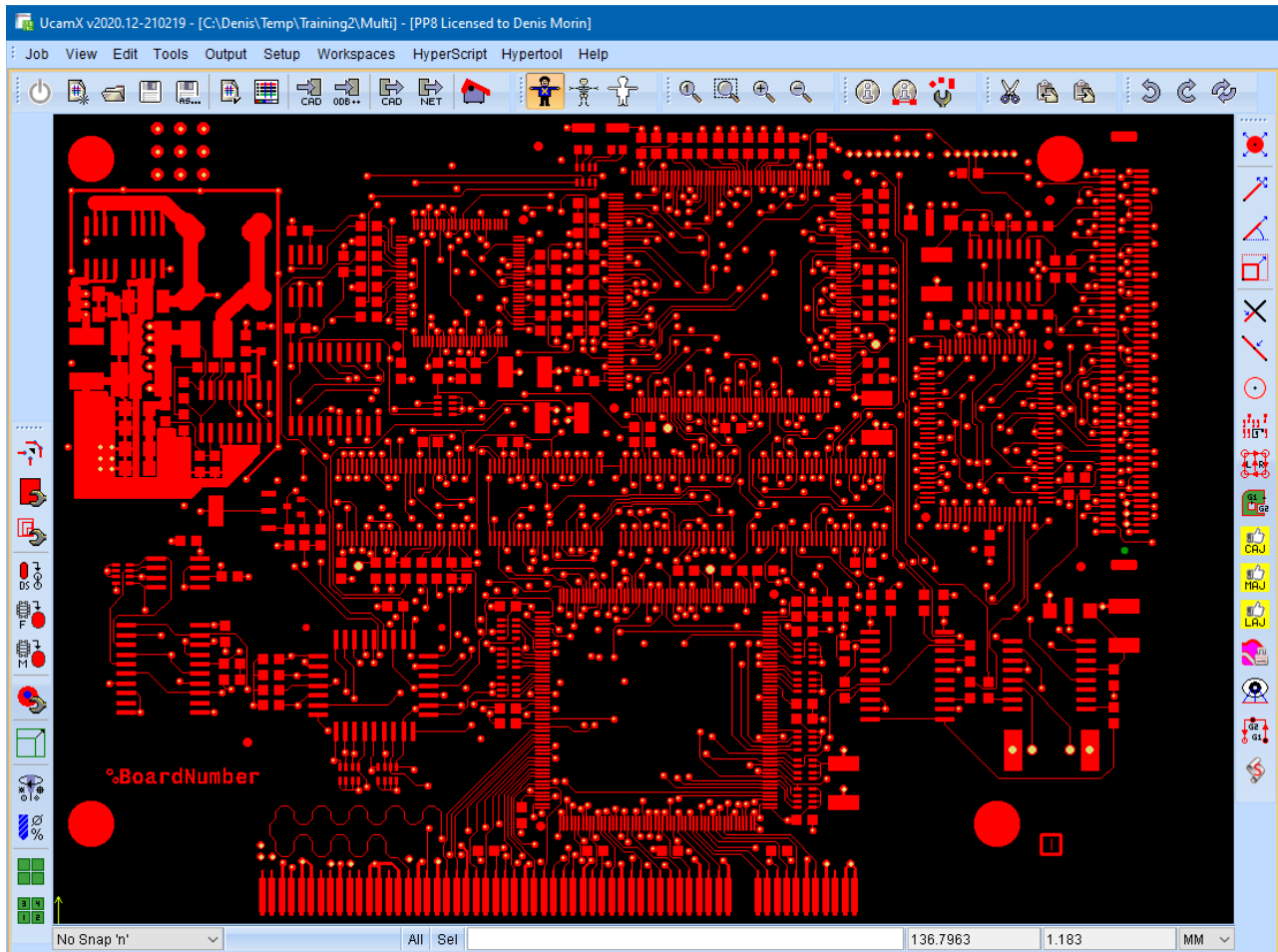
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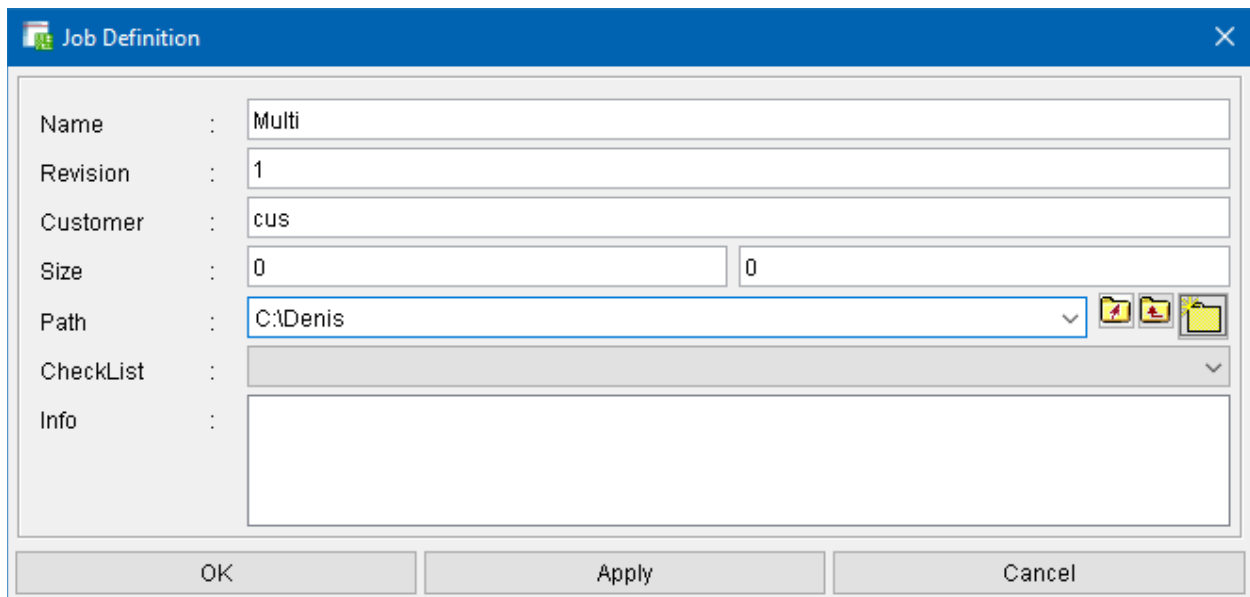
UCAM Main Window

When you start UCAM, the Main Window appears with an empty main drawing area. The title bar of this the main window displays the version and subversion number of UCAM that you are currently working with. The screenshot below displays the main drawing area with a loaded job.



Job menu

New...



The image shows a 'Job Definition' dialog box with the following fields and values:

Name	:	Multi	
Revision	:	1	
Customer	:	cus	
Size	:	0	0
Path	:	C:\Denis	
CheckList	:		
Info	:		

Buttons: OK, Apply, Cancel

Name

This is the Ucam job name.

Revision

Enter here the revision number of the PCB.

Customer

This is the name of the customer job.

Size

Displays the X and Y size of the PCB.

Path

Directory path where you want to save the Job file on the hard disk.

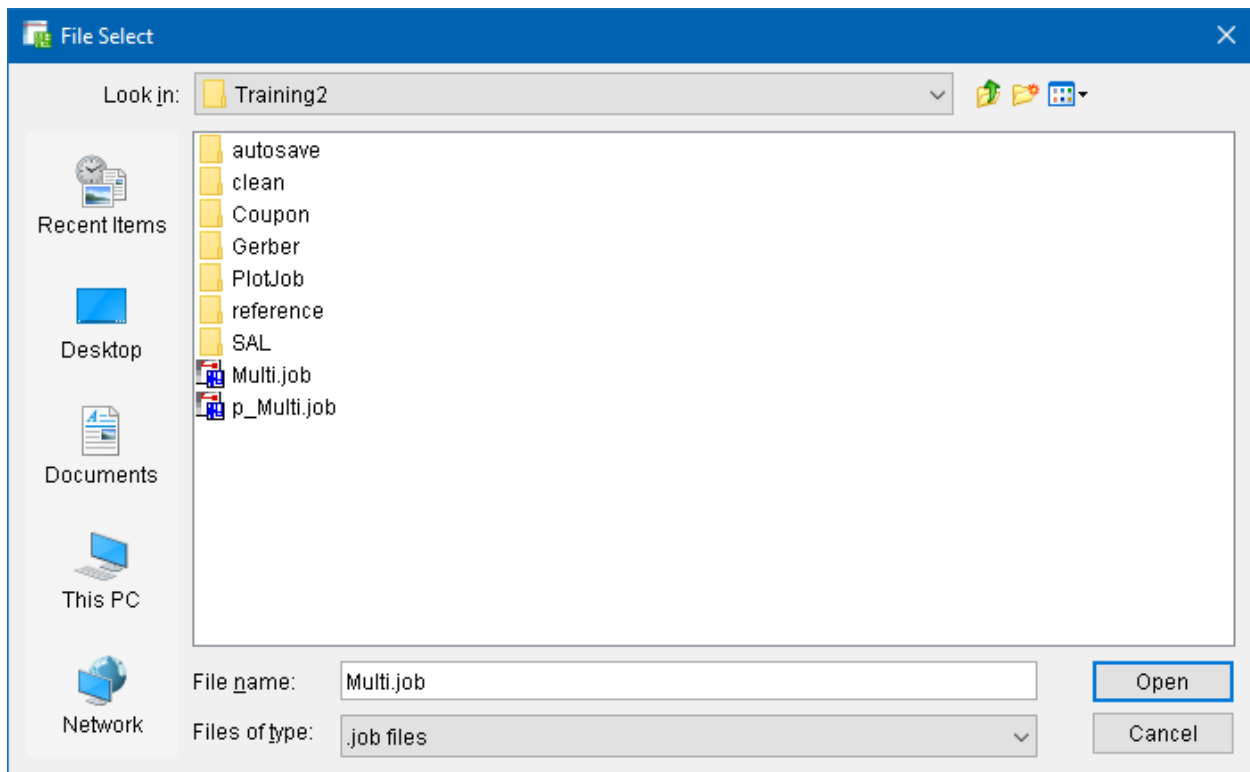
Checklist

Link checklist to the job.

Info

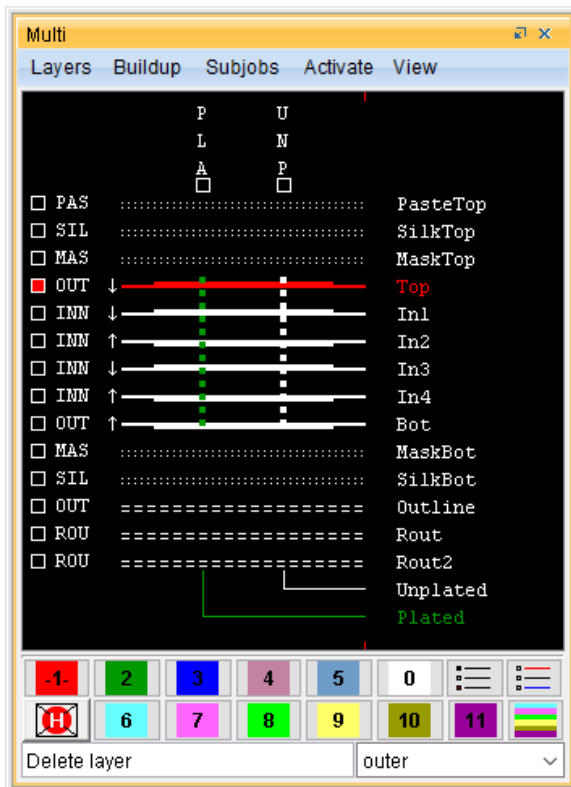
Displays information related to the job.

Open...

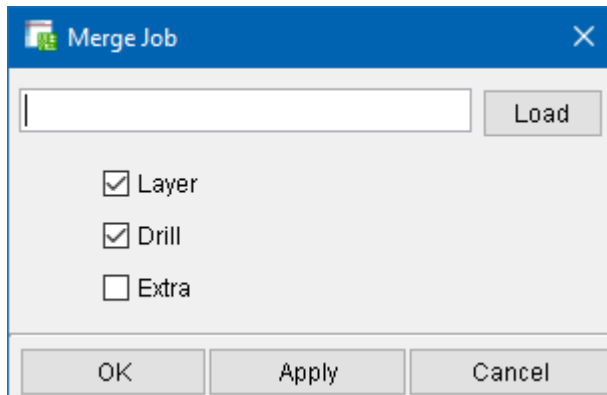


Open an existing Ucam job.

Edit...



Merge...



Use this dialog box to add the data of another existing job to the current job.

Layer

Merges the layers of class LAYER.

Drill

Merges the layers of class DRILL.

Extra

Merges the layers of class EXTRA.

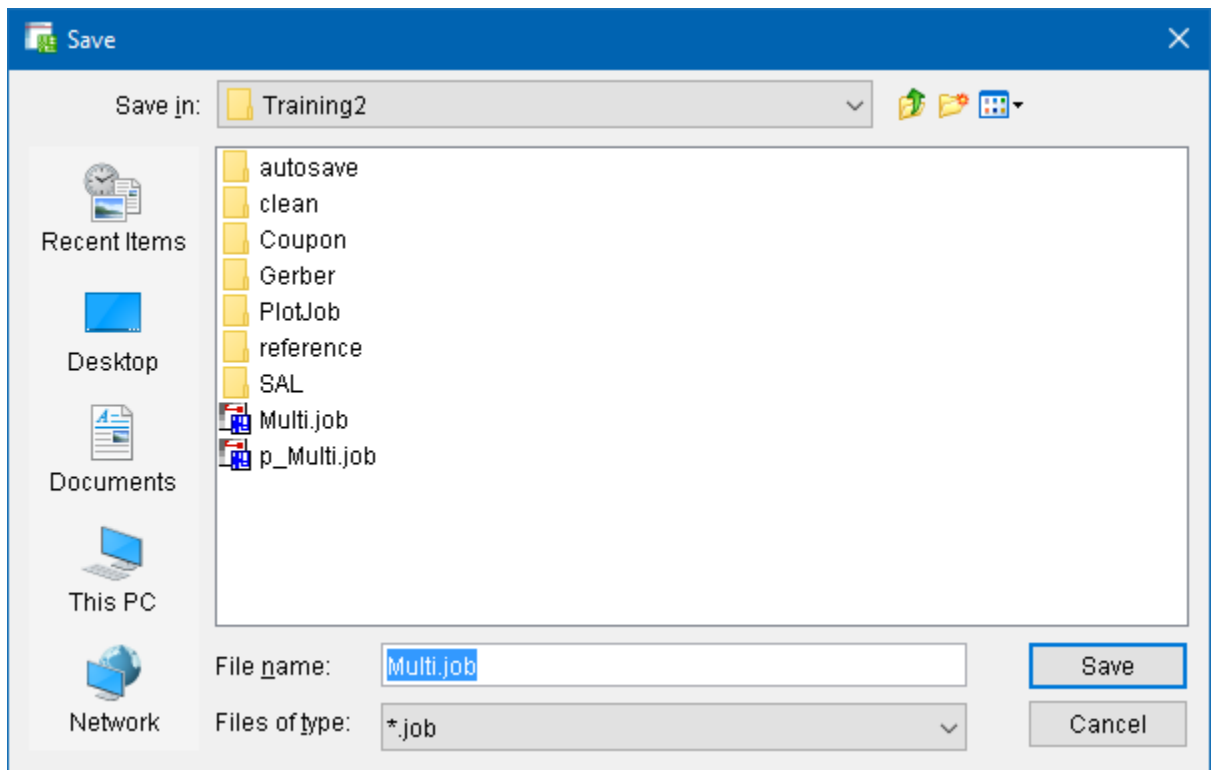
Parameters...

The Parameters dialog box is identical to the Job Definition dialog box displayed after choosing New... from the Job menu (See above).

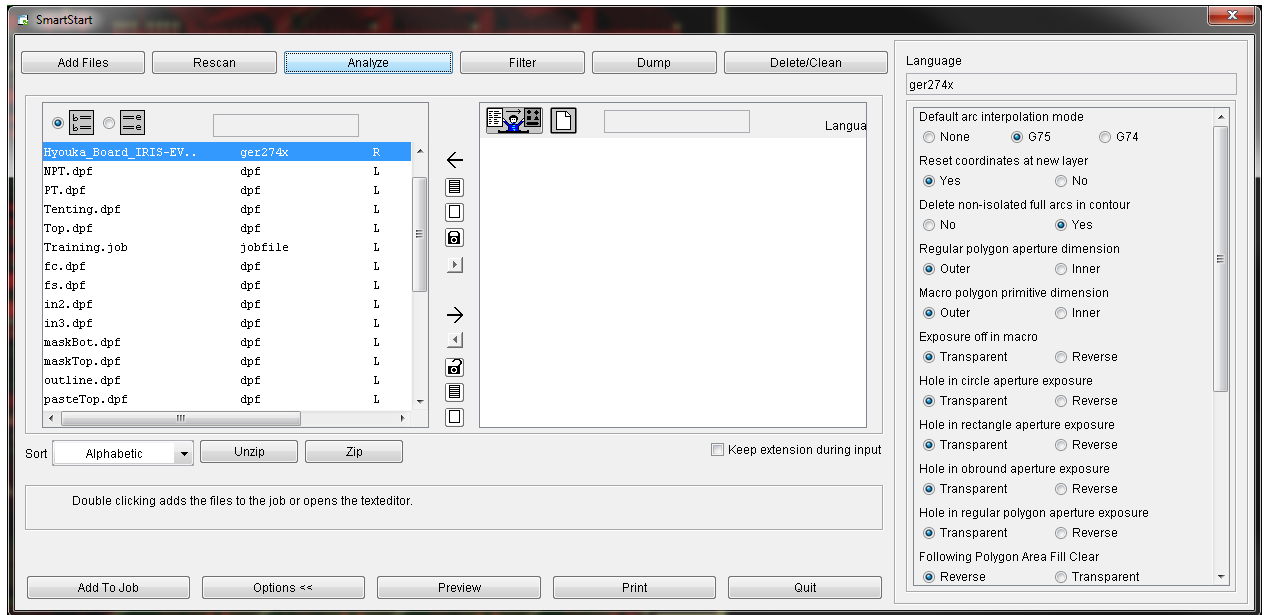
Save v3

Save the current job using DPF version 3 format.

Save As...

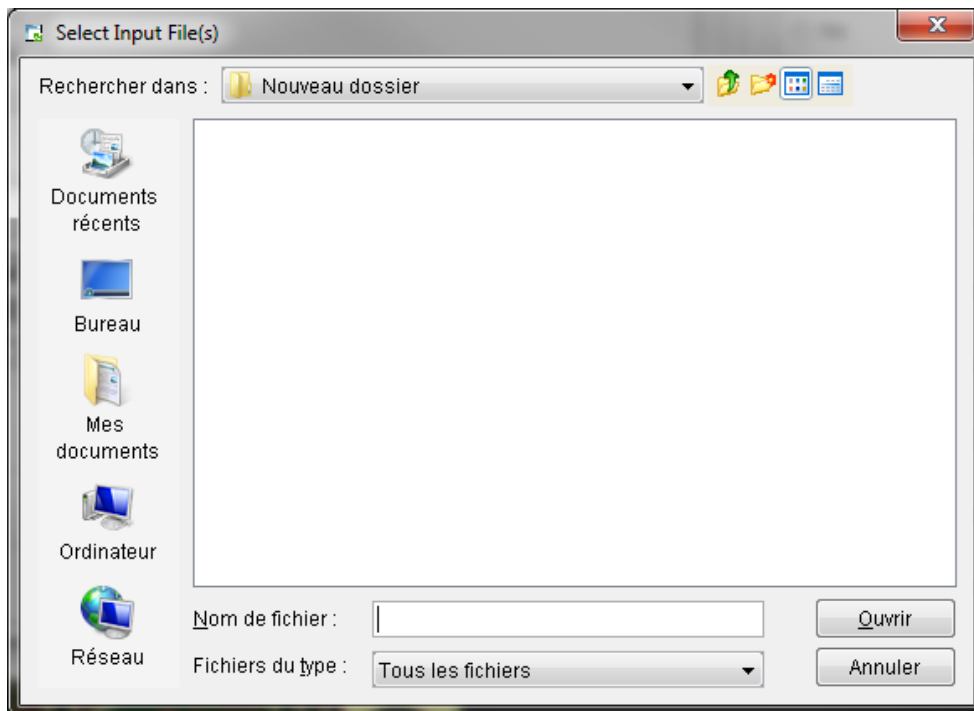


SmartStart...



Use this dialog box to add data files to the current job. The SmartStart dialog box contains a list of files in the job directory.

Add Files



Graphical Aperture Reader – Apertures (GAR)

Ucam WheelEditor : D:\Denis\Doc\ucam\Training\Ucam Basic Training\Day_1_Exercises\Exercise01\A1.ape

File List Setup Codes

Wheel Gar Loaded Setup : None

Convert Normal Modal

Parse Position Delimiter Scale

Mode Define Undefine Set Range

	UMD	Dcode	Shape	X-size	Y-size
1	UMD				
2	CIR	10	CIR	8	
3	CIR	11	CIR	10	
4	CIR	12	CIR	50	
5	CIR	13	CIR	32	
6	CIR	14	CIR	40	
7	CIR	15	CIR	56	
8	CIR	16	CIR	60	
9	CIR	17	CIR	226	
10	REC	18	REC	24	60
11	REC	19	REC	24	90
12	REC	20	REC	40	36
13	REC	21	REC	40	52
14	REC	22	REC	44	66
15	REC	23	REC	52	40
16	REC	24	REC	62	48
17	REC	25	REC	66	44
18	REC	26	REC	90	24
19	REC	27	REC	100	80
20	REC	28	REC	110	90
21	REC	29	REC	138	80
22	UMD	30	REC	160	90

Display CIR = dcode CIR outer : 8
 Reconvert REC = dcode REC xsize ysize : 13
 Remove

Graphical Aperture Reader – Parameters (GAR)

Ucam Wheeleditor : D:\Denis\Doc\ucam\Training\Ucam Basic Training\Day_1_Exercises\Exercise01\A1.ape

File List Setup Codes

Wheel Gar Loaded Setup : None

Convert Normal Modal

Parse Position Delimiter Mil Scale

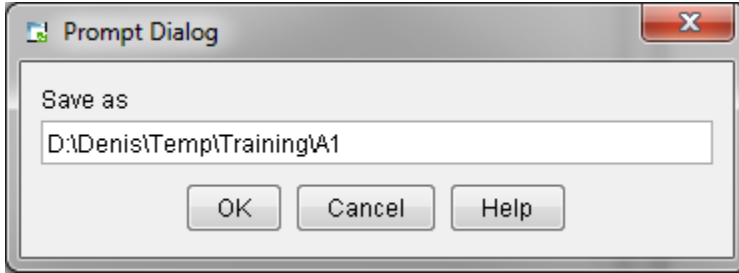
Mode Define Undefine Set Range

	UMD	Dcode	Shape	X-size	Y-size
1	UMD				
2	UMD	10	CIR	8	
3	UMD	11	CIR	10	
4	UMD	12	CIR	50	
5	UMD	13	CIR	32	
6	UMD	14	CIR	40	
7	UMD	15	CIR	56	
8	UMD	16	CIR	60	
9	UMD	17	CIR	226	
10	UMD	18	REC	24	60
11	UMD	19	REC	24	90
12	UMD	20	REC	40	36
13	UMD	21	REC	40	52
14	UMD	22	REC	44	66
15	UMD	23	REC	52	40
16	UMD	24	REC	62	48
17	UMD	25	REC	66	44
18	UMD	26	REC	90	24
19	UMD	27	REC	100	80
20	UMD	28	REC	110	90
21	UMD	29	REC	138	80
22	UMD	30	REC	160	90

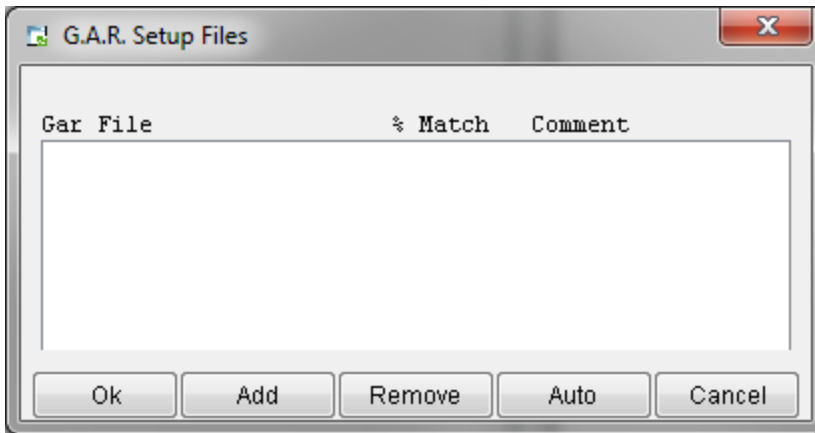
if

Display
 Reconvert
 Remove

Save .gar file



Load .gar file



Wheel Editor

Ucam Wheeleditor : D:\Denis\Doc\ucam\Training\Ucam Basic Training\Day_1_Exercises\Exercise01\A1.ape

File List Setup Codes

Wheel Gar

Gerber

Coor: MM MIL INCH

Code: ASCII EBCDIC EIA

Zero: LEADING TRAILING

Mode: ABSOLUTE INCREMENTAL

WHEEL

Format: 4.2

Flag: %

Skip:

End of block: *

End of job:










End of layer:

End of wheel:

Shrink text: 1.0:1.0

```

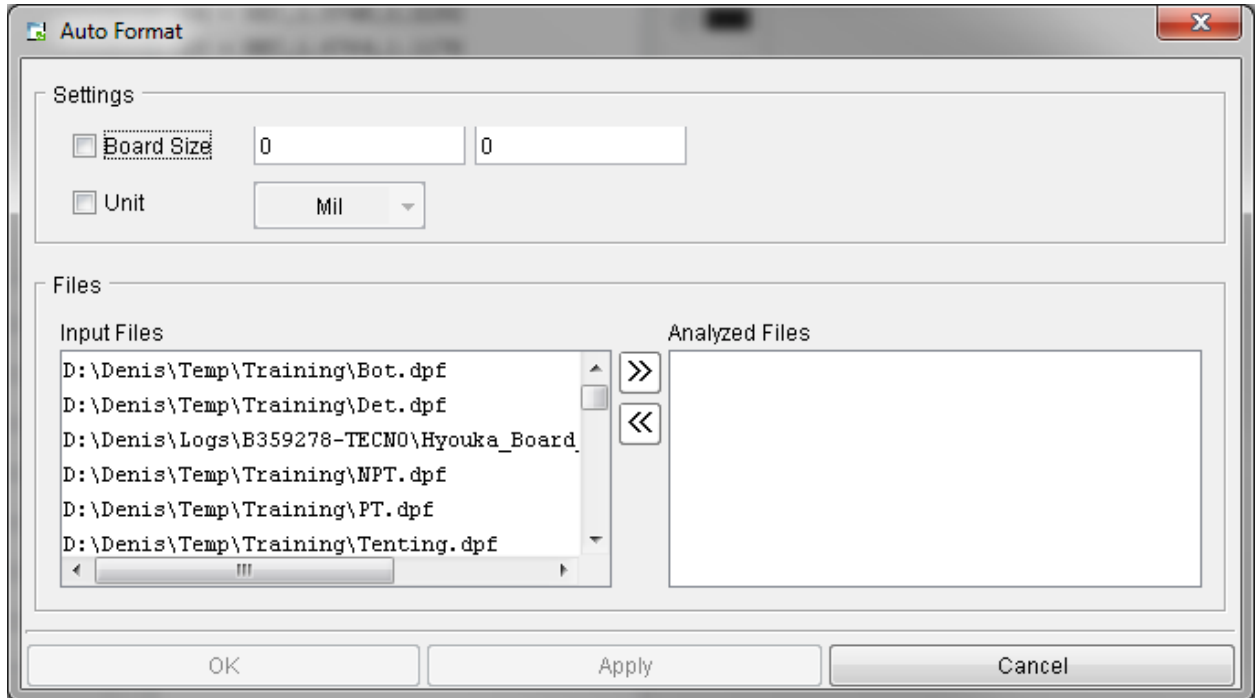
18 = REC,0.6096,1.524
19 = REC,0.6096,2.286
20 = REC,1.016,0.9144
21 = REC,1.016,1.3208
22 = REC,1.1176,1.6764
23 = REC,1.3208,1.016
24 = REC,1.5748,1.2192
25 = REC,1.6764,1.1176
26 = REC,2.286,0.6096
27 = REC,2.54,2.032
28 = REC,2.794,2.286
29 = REC,3.5052,2.032
30 = REC,4.064,2.286
    
```

Type:         

Parameters: Number: 1, Name: , Diameter: 0, Reverse

Add Insert Replace Delete

Auto Format



Import Job



Import a job from other CAM system.

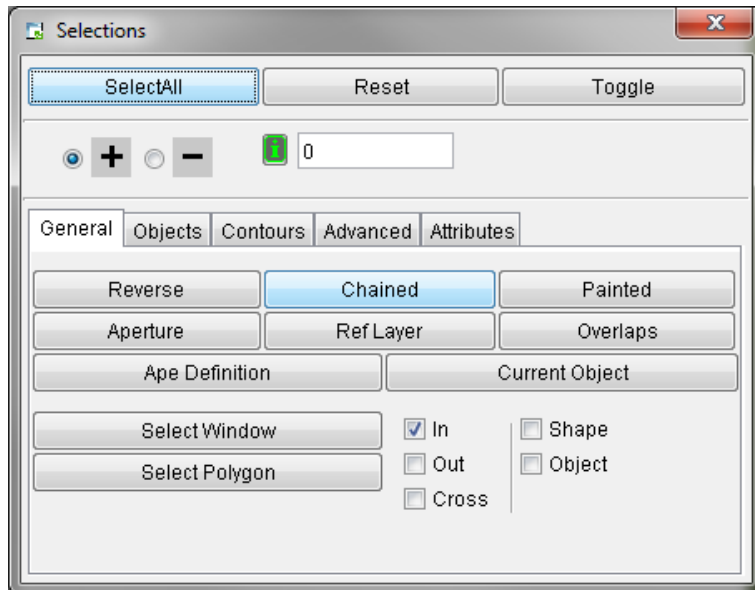
Quit

Quit Ucam.

View menu

Select...

General



Reverse

Select all reverse apertures

Chained

Selects all draws and arcs in plane 1 connected to the one you click

Painted

Selects all areas where a combination of flashes, draws and arcs touch or overlap, to describe a large (copper) surface.

Aperture

Selects the objects using the current aperture in the Aperture List.

Ref Layer

Click Ref (reference) Layer to use selections on another layer (Plane 2) as a selection criterion

Overlaps

Selects all objects in all active layers that overlap objects in the reference layer, i.e. plane 2.

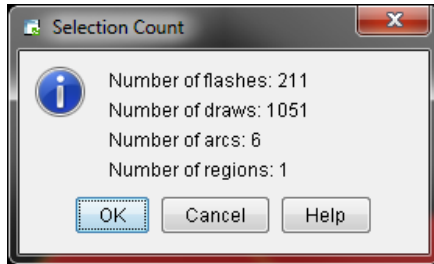
Ape Definition

Selects the objects using the current aperture and using an aperture definition identical to the current definition.

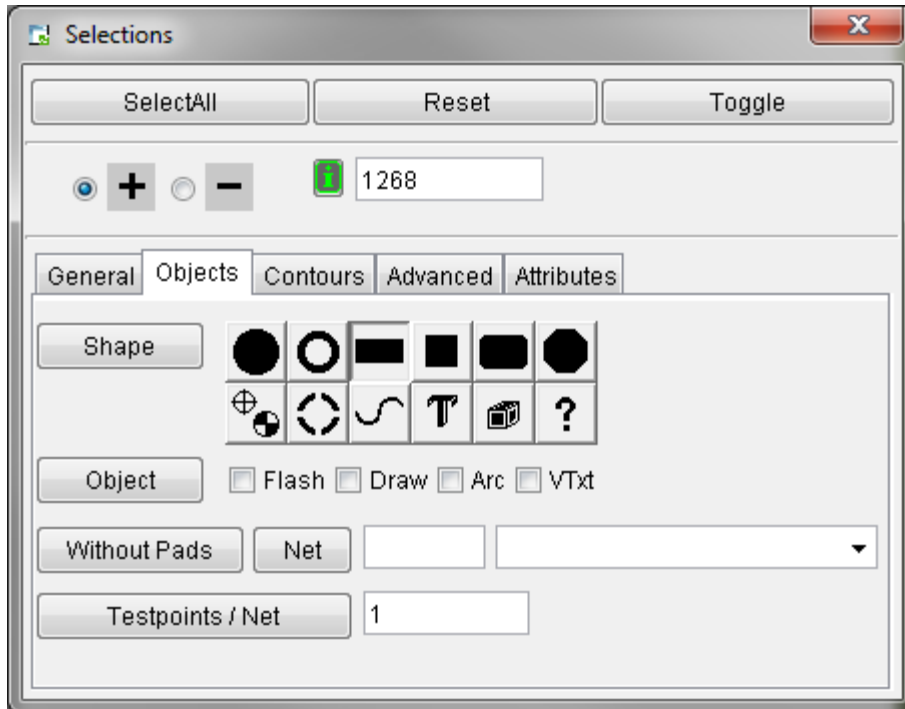
Current Object

The object being examined by Query Object is selected when you click Current Object.

Info



Objects



Shape

Select objects with specified object shape.

Object

Select objects with specified object type.

Without Pads

Enables you to select electrical nets without any flashes. Netlist information must be available.

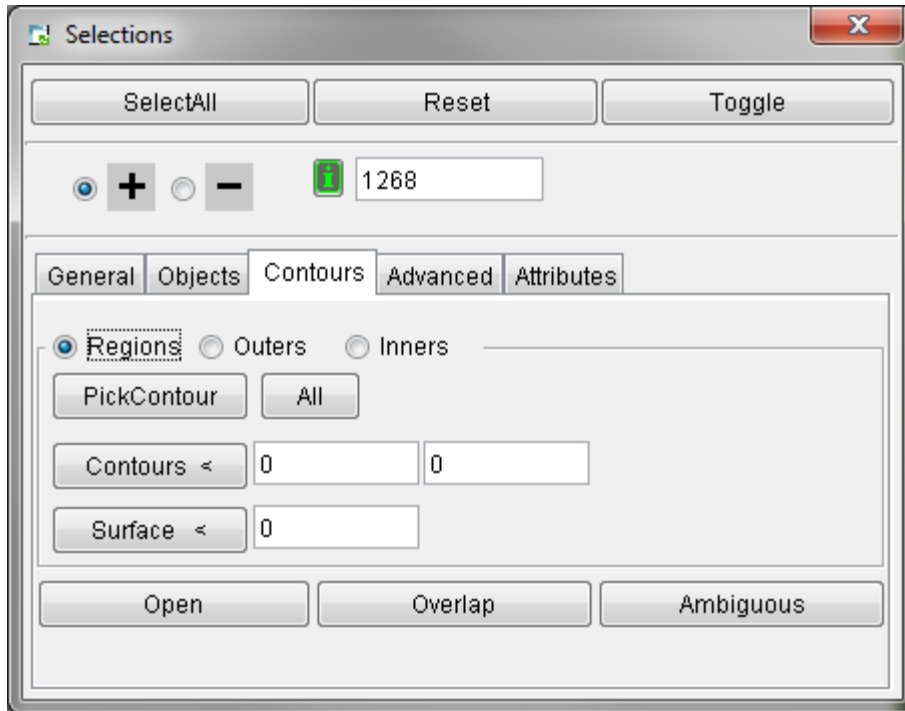
Net

Click on Net button and click on an object to select all objects belonging to the same electrical net.

Testpoints/Net

Select nets with a certain number of test points.

Contours



PickContour : Picks all regions, all outer or all inner contours.

All : Selects all regions, outers or inners in the active layers.

Contour < : For every contour area in all active layers, UCAM calculates the X and Y size of the area's enclosing rectangle. If these sizes are smaller than the values you entered in the Contour fields, the area is selected.

Surface < : Selects contours smaller than the specified area.

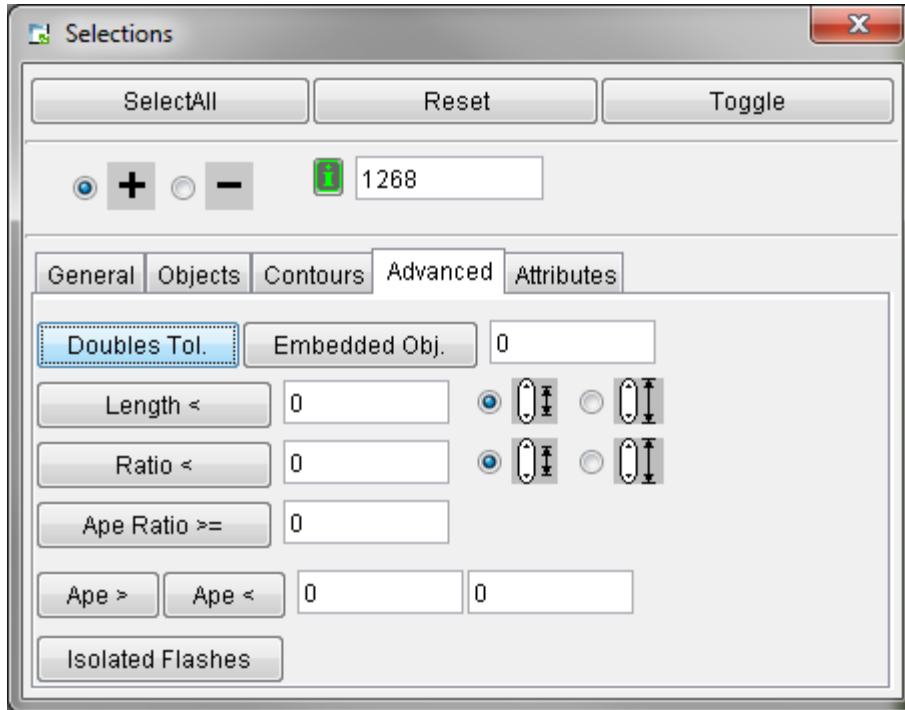
Open : Selects all open contours in all active layers.

Overlap : Selects all contours of the same aperture that overlap in all active layers.

Ambiguous : Selects all ambiguous contours in all active layers.

Rule	Error Message	Selected object(s)
1	Intersecting Shared Point	The contour which has the shared point is selected
2	Contour intersecting with contour of same aperture containing shared point	The contour which has the shared point is selected
3	Contour can be attributed to different intersecting parents of different polarity	The inner contour is selected
4	Contour can be attributed to different intersecting parents of same polarity and intersects with children of possible parents	The enclosing box of the offending contour is marked using a diagonal line
5	Small distance between Inner and Outer Small distance between 2 Contours	The (almost) touching contours are selected
6	Self-intersecting contour	The self-intersecting contour is selected

Advanced



Doubles Tol.

Selects all doubles which have a difference in coordinates less than the tolerance value. Doubles are objects with identical shape and position. If more than two objects have the same shape and coordinates Doubles Tol selects all objects but one.

Embedded Obj.

Selects objects which are embedded inside other objects. You can use this function to find redundant objects that can be deleted without modifying the image.

Length <

Selects all draws which have a smaller length than the length indicated in the Length field.

Ratio <

Enter the ratio for the draw(s) to be selected. Ratio = draw length / aperture width.

Ape >

Select apertures with X and Y sizes larger than the specified X and Y values.

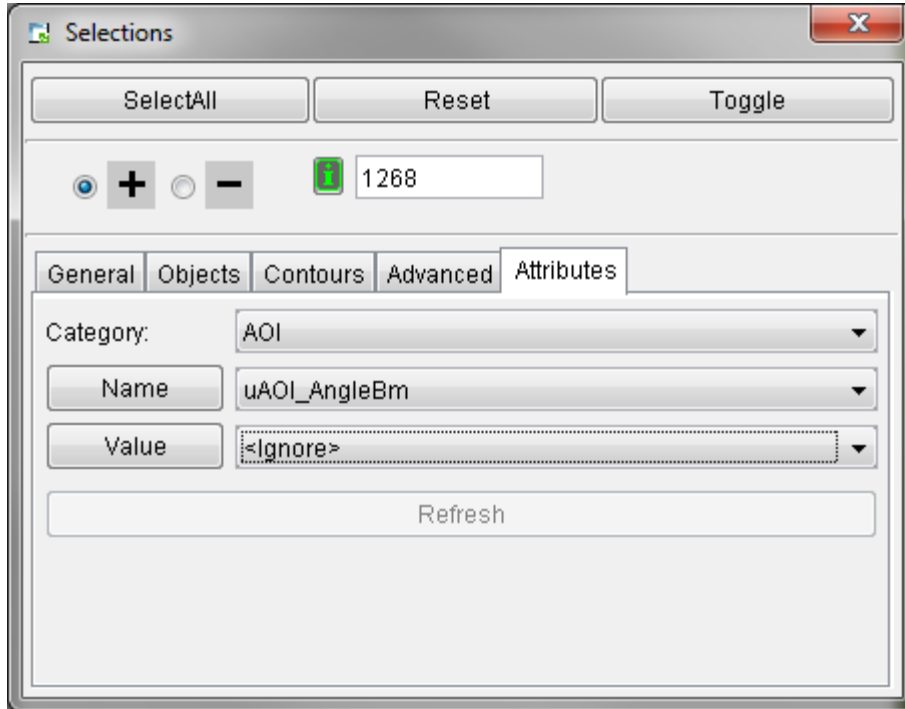
Ape <

Select apertures with X and Y sizes smaller or equal than the specified X and Y values.

Isolated Flashes

Select all flashes that are not connected to any other objects on the same layer.

Attributes



History

Choose History from the view menu to redisplay any of the last five views. Click repeatedly to scroll through the different views.

Pan

Choose Pan from the View Menu to view data adjacent to the current viewport. Repaint

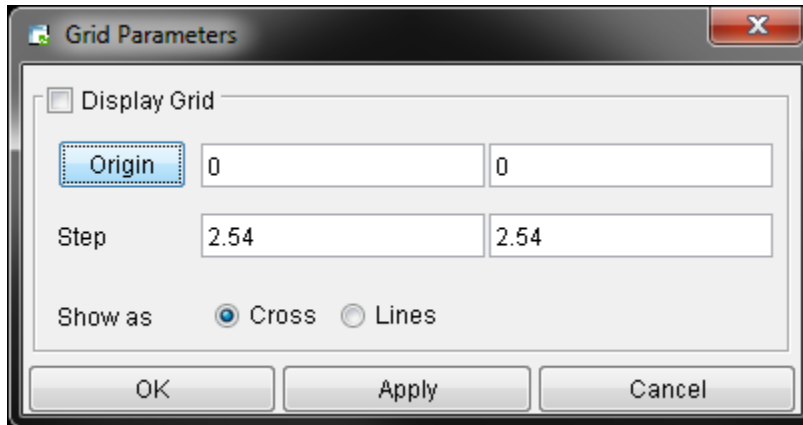
Zoom

The Zoom submenu contains options for setting the enlargement factor by which data is displayed.

Options

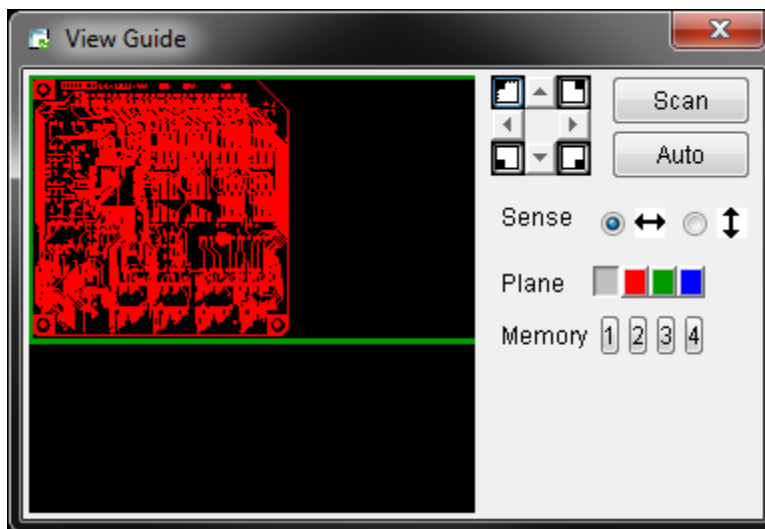
The Options submenu contains options for setting the visibility of data, reference and zero points.

Grid...



Select Grid from the **View** menu to define, display or hide a grid in the main drawing area.

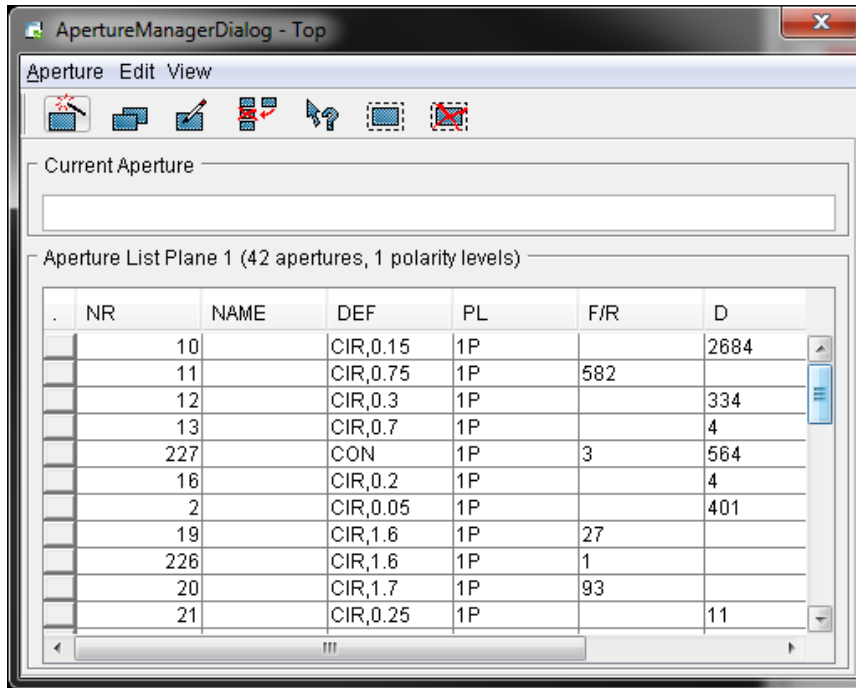
Guide...



Choose Guide from the **View** menu to display the View Guide-dialog box. Use this dialog box to change the view on the data in the main drawing area.

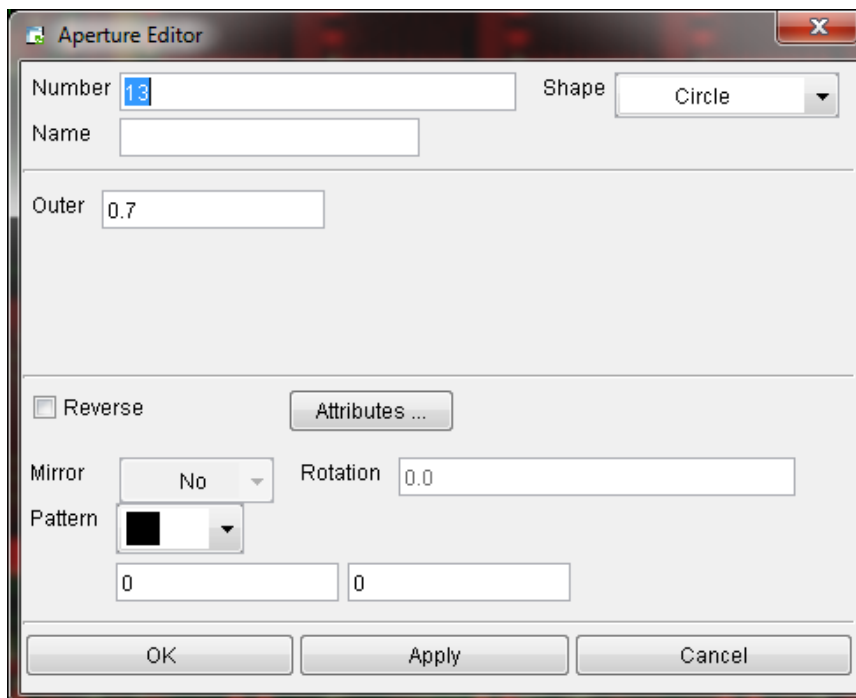
You can use the View Guide-dialog box to examine (specific parts of) the visible data to view for example the outcome of an action or to find selected objects.

Apertures Manager...

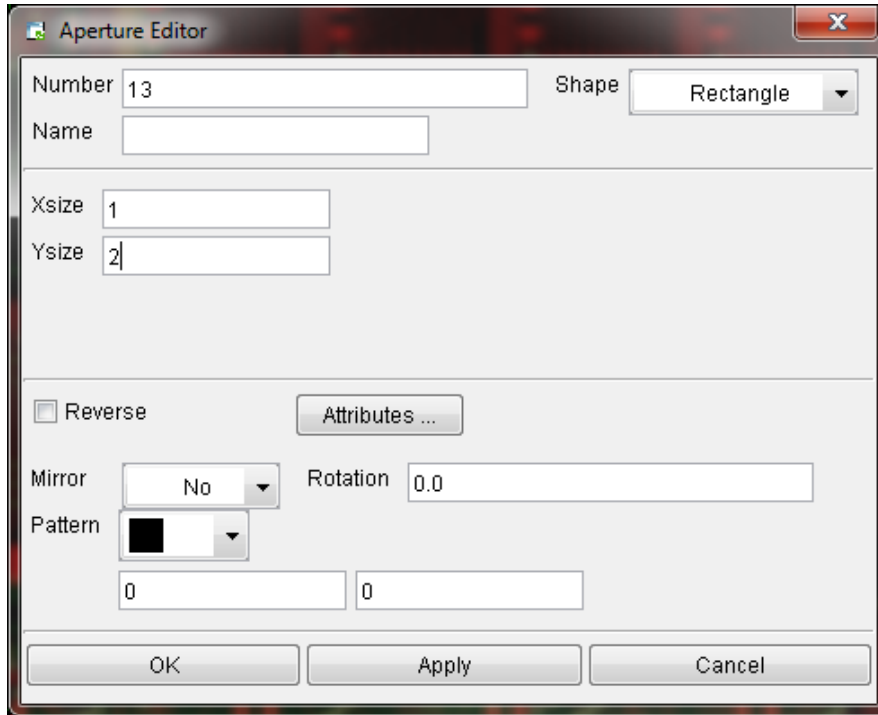


Aperture Manager allows you to view and manage all apertures for the layer currently loaded in Plane 1. The name of this layer is displayed in the title bar. Loading a different layer in Plane 1 will automatically refresh the information displayed in the Aperture Manager dialog.

Create Circle



Create Rectangle



Aperture Editor

Number Shape

Name

Xsize

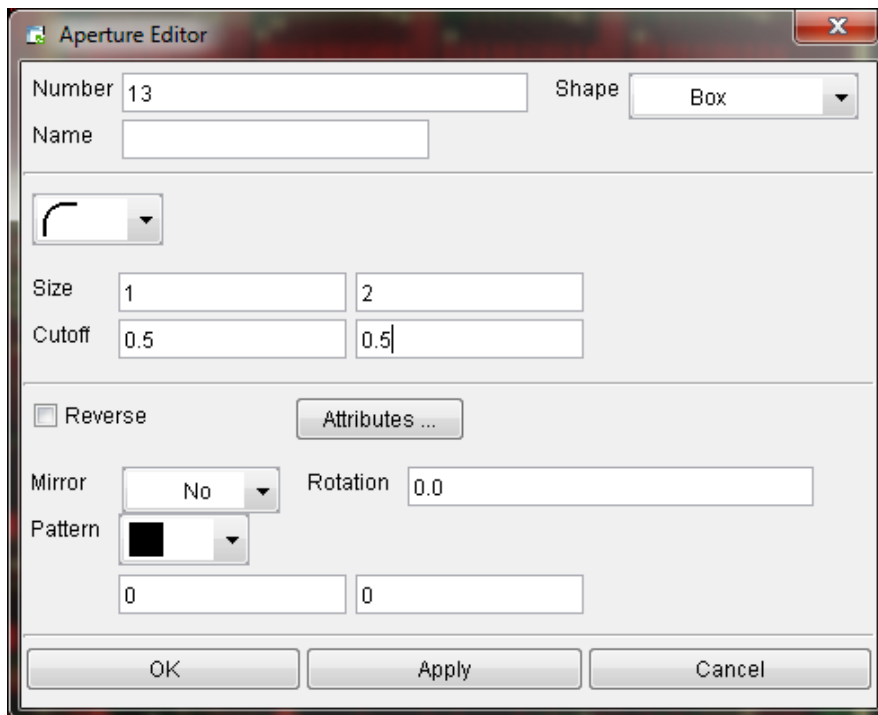
Ysize

Reverse

Mirror Rotation

Pattern

Create Box



Aperture Editor

Number Shape

Name

Size

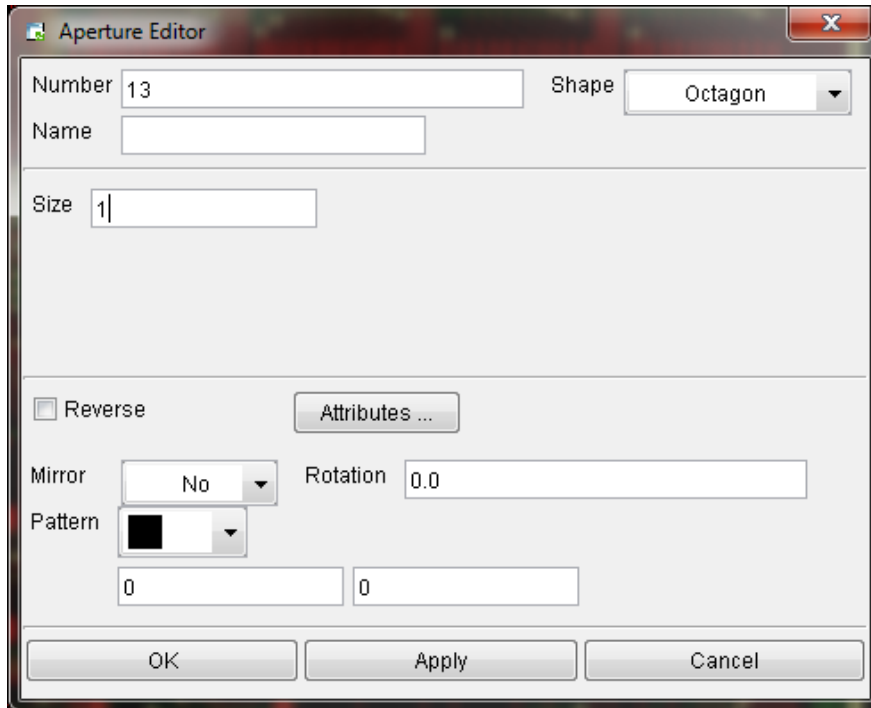
Cutoff

Reverse

Mirror Rotation

Pattern

Create Octagon



Aperture Editor

Number Shape

Name

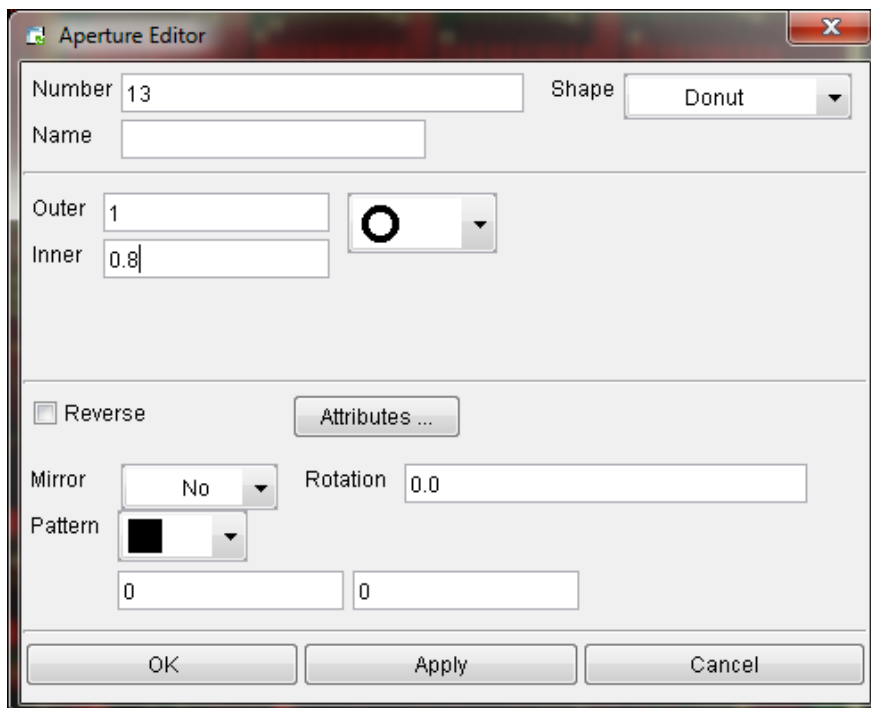
Size

Reverse

Mirror Rotation

Pattern

Create Donut



Aperture Editor

Number Shape

Name

Outer

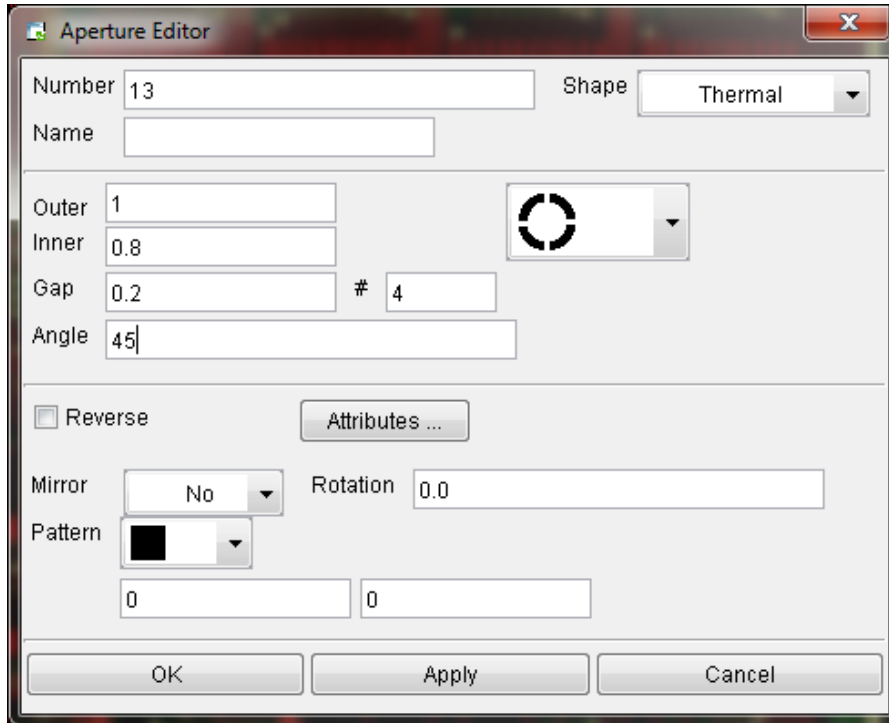
Inner

Reverse

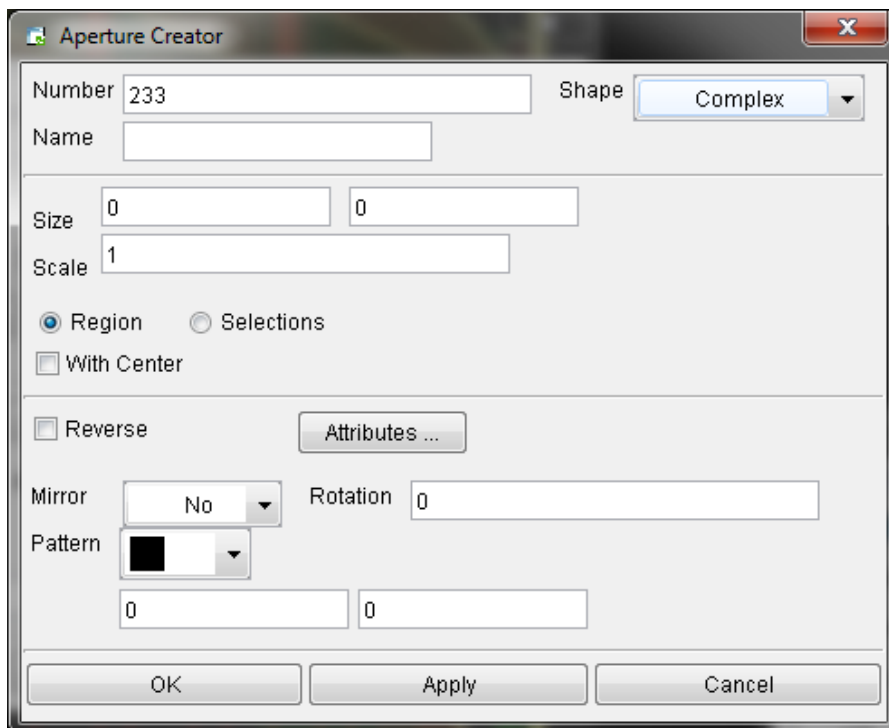
Mirror Rotation

Pattern

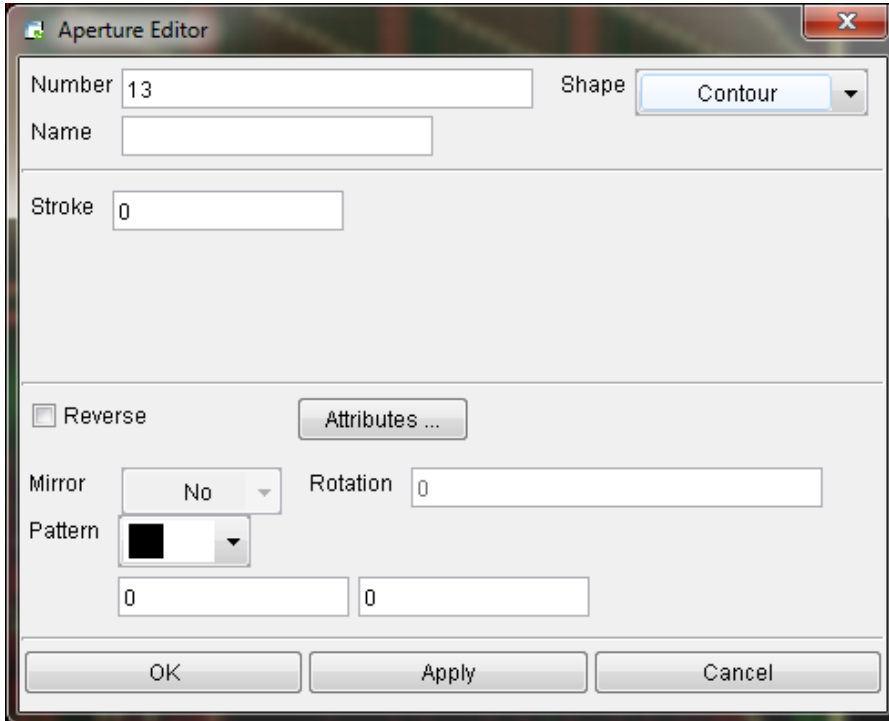
Create Thermal



Create Complex



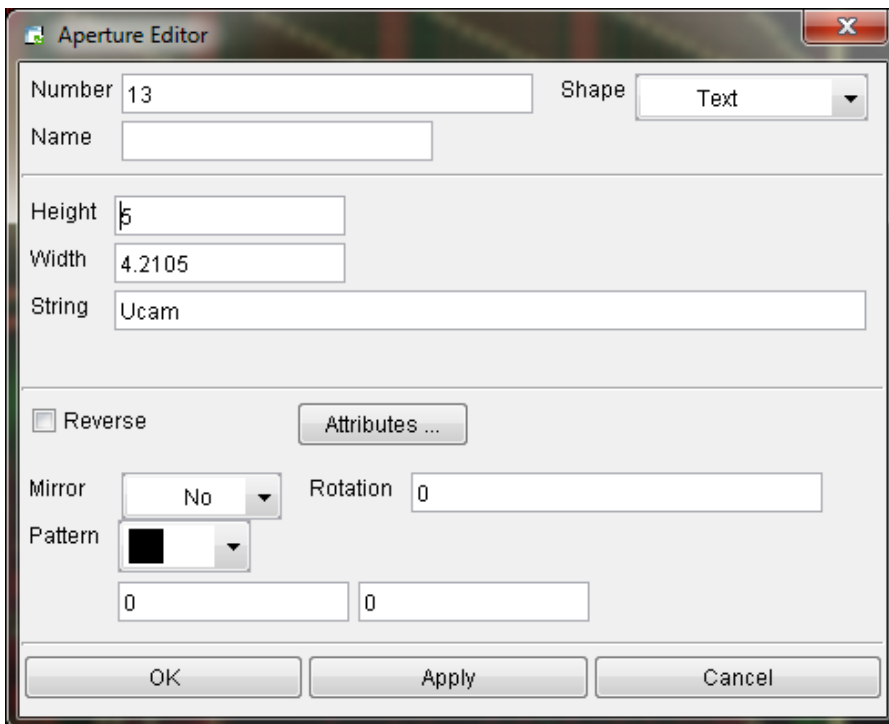
Create Contour



The Aperture Editor dialog box is shown with the following settings:

- Number: 13
- Shape: Contour
- Name: (empty)
- Stroke: 0
- Reverse:
- Attributes: (button)
- Mirror: No
- Rotation: 0
- Pattern: (black square icon)
- Pattern X: 0
- Pattern Y: 0
- Buttons: OK, Apply, Cancel

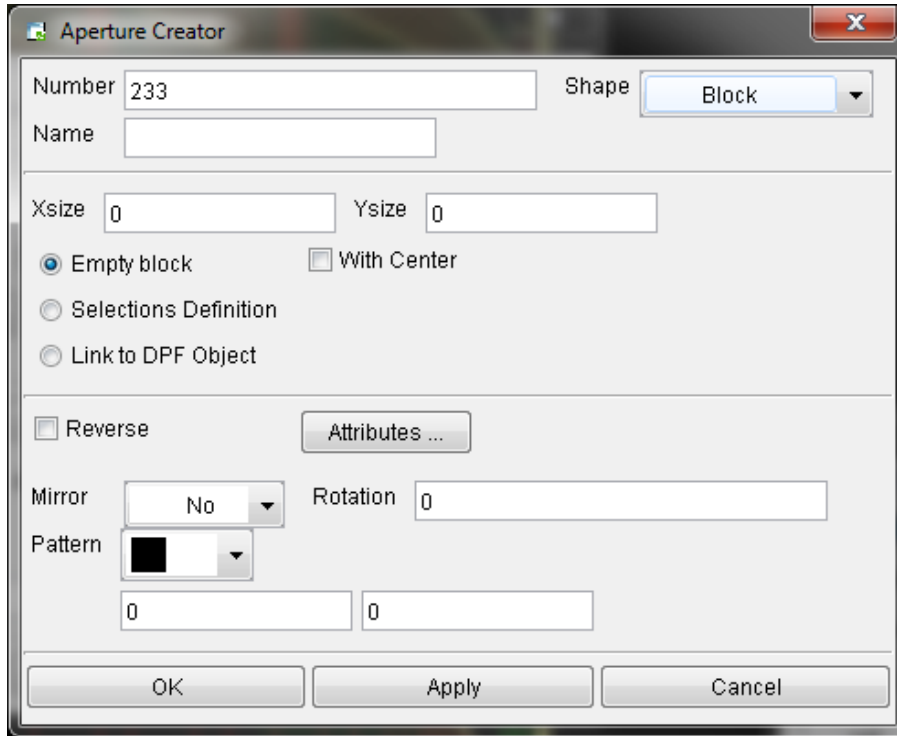
Create Text



The Aperture Editor dialog box is shown with the following settings:

- Number: 13
- Shape: Text
- Name: (empty)
- Height: 5
- Width: 4.2105
- String: Ucam
- Reverse:
- Attributes: (button)
- Mirror: No
- Rotation: 0
- Pattern: (black square icon)
- Pattern X: 0
- Pattern Y: 0
- Buttons: OK, Apply, Cancel

Create Block

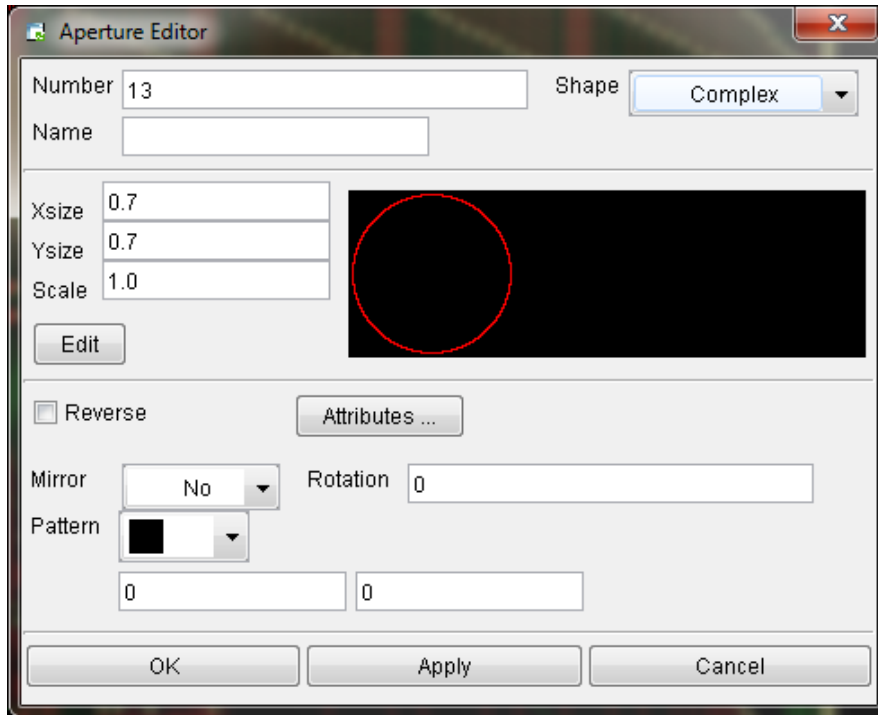


The screenshot shows the 'Aperture Creator' dialog box with the following settings:

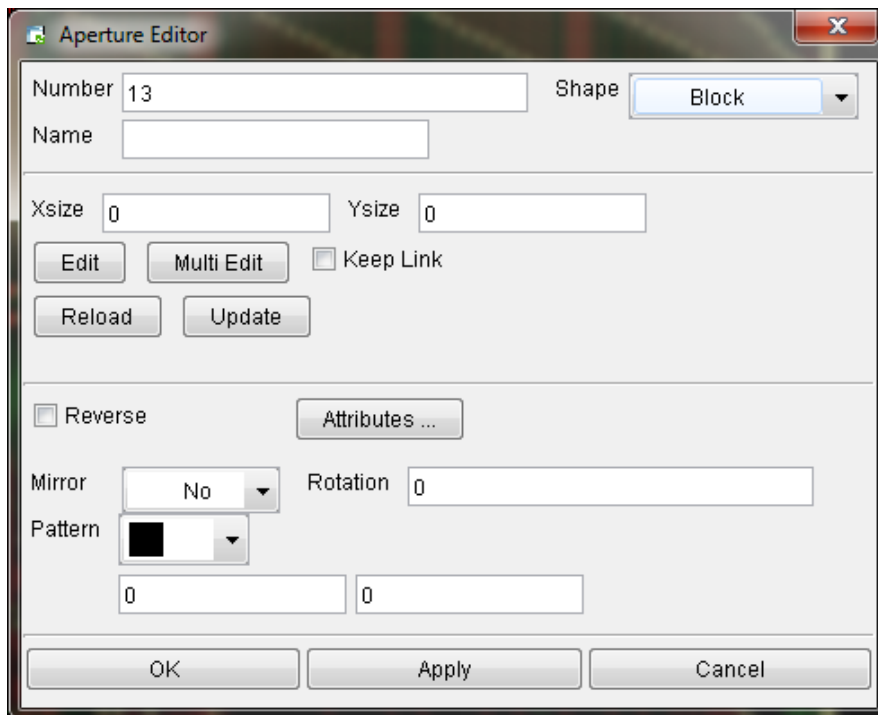
- Number: 233
- Shape: Block
- Name: (empty)
- Xsize: 0
- Ysize: 0
- Radio buttons: Empty block, With Center, Selections Definition, Link to DPF Object
- Reverse
- Attributes ... (button)
- Mirror: No
- Rotation: 0
- Pattern: (black square icon)
- Bottom row of input fields: 0, 0

Buttons at the bottom: OK, Apply, Cancel

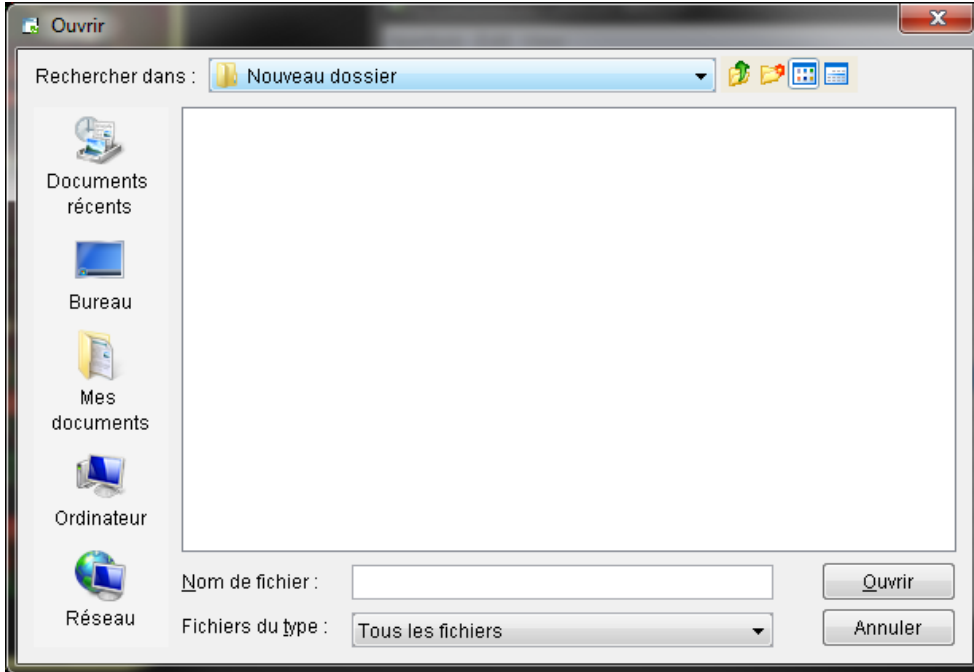
Edit Complex



Edit Block

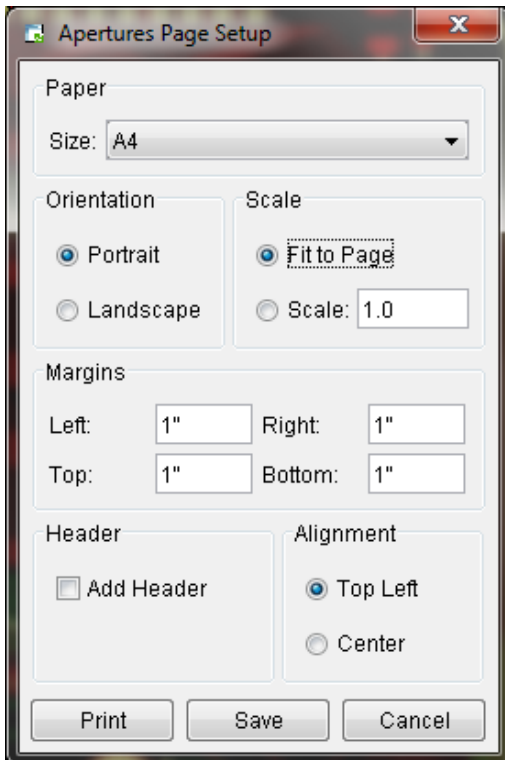


Load

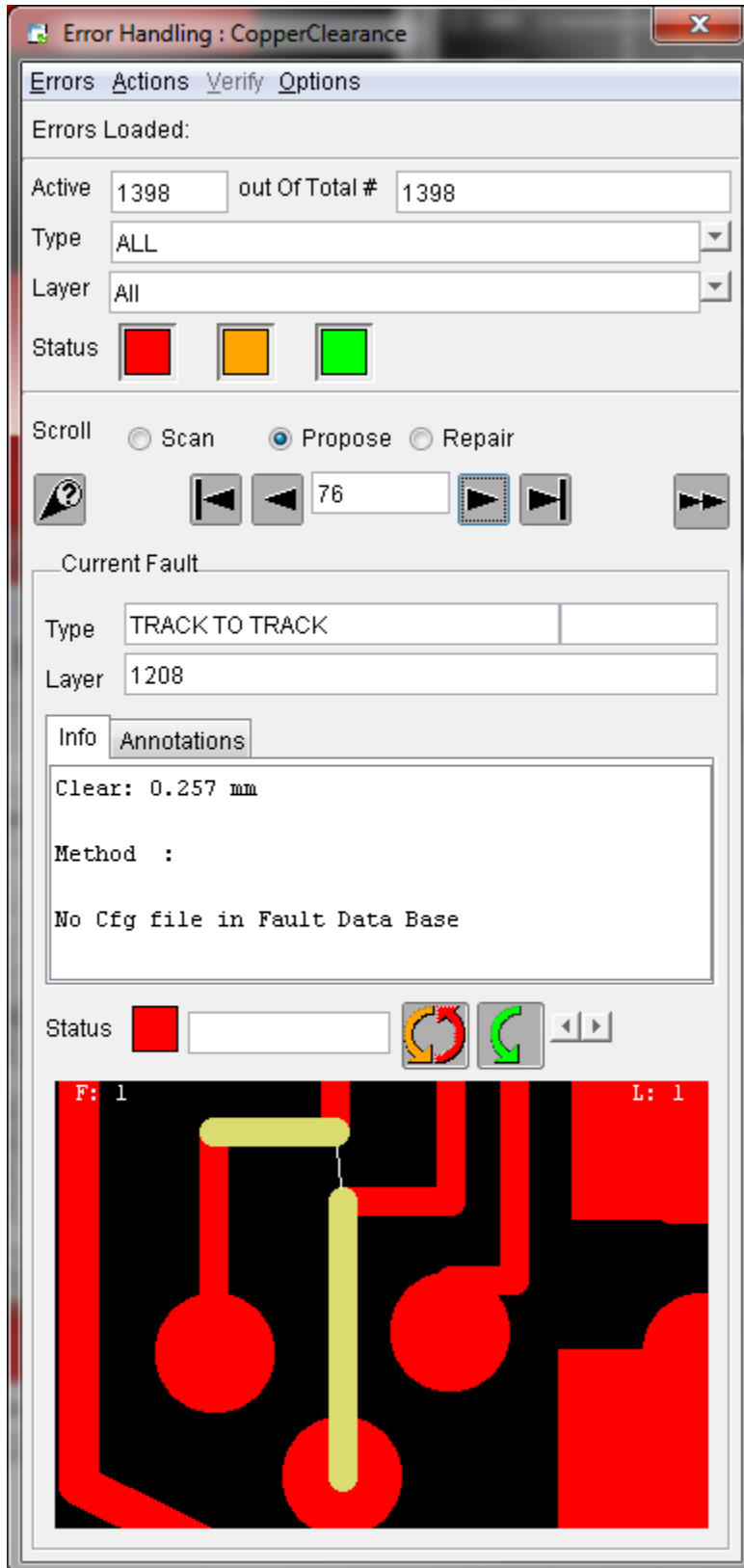


Load aperture from the selected DPF file and add them at the end of the aperture list

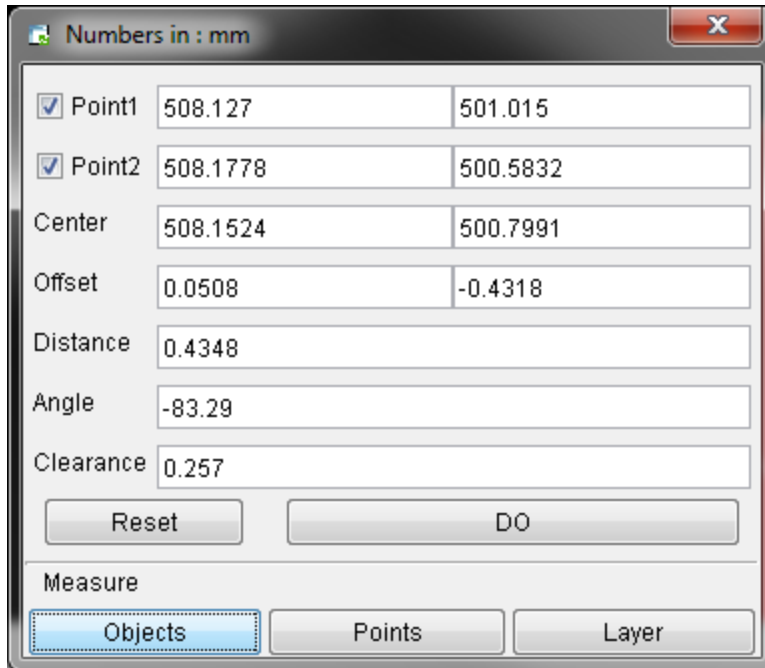
Print



Errors...



Numbers...



Field	Value 1	Value 2
Point1	508.127	501.015
Point2	508.1778	500.5832
Center	508.1524	500.7991
Offset	0.0508	-0.4318
Distance	0.4348	
Angle	-83.29	
Clearance	0.257	

Buttons: Reset, DO

Measure: Objects, Points, Layer

Point1

Displays the coordinates of the first point indicated by a small cross.

Point2

Displays the coordinates of the second point indicated by a small cross.

Center

Displays the center coordinates between Point1 and Point2.

Offset

Displays the X and Y size of the enclosing rectangle. This is also the size of the job. Negative values are indicated by a right to left or an up to down offset.

Distance

Displays the distance between Point1 and Point2.

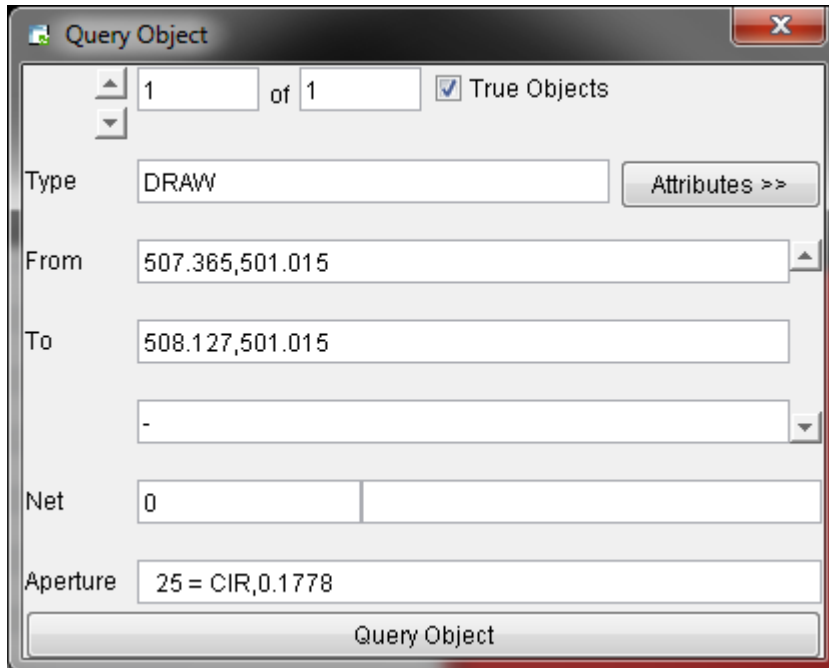
Angle

Displays the angle between the virtual line connecting Point1 and Point2. The angle is between -180 and 180 degrees. CCW is the positive orientation.

Clearance

Displays the minimal clearance detected between Point1 and Point2.

Query Object...



1 of 1 True Objects

Type: DRAW Attributes >>

From: 507.365,501.015

To: 508.127,501.015

-

Net: 0

Aperture: 25 = CIR,0.1778

Query Object

Edit menu

Cut

Choose Cut to remove objects from the layer in plane 1 and puts them in the clipboard.

Copy

Choose Copy to copy objects (and their netlist information) from the layer in plane 1 to the clipboard.

Paste

Choose Paste to place the clipboard's contents into all active layers, even when they are in plane 0 (hide).

Clear

Clear the clipboard.

Delete

Delete all selected objects on activated layers.

Apertures

Clean

Remove all unused apertures all aperture lists of all active layers

Group Definition

All objects that use a duplicate aperture definition are attached to the first aperture in the list which has this definition.

Group number

All objects that use a duplicate aperture definition and number are attached to the first aperture in the list which has this definition and number.

Group Pos/Neg

Minimize the number of polarity levels (i.e. positive and negative sections) in the Aperture List without changing the image.

Replace

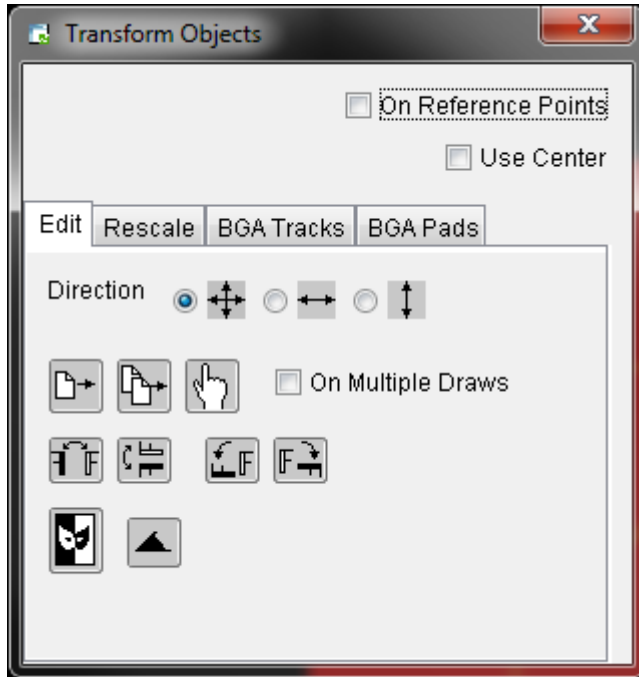
Replace an object's aperture definition with the current aperture definition of the layer in plane 1.

Transform...

On Reference Points : Enables reference points in the layer(s) to be shifted along with the objects.

Use Center : Select 'Use center' to Use the Center of the X and Y coordinates as specified in the Numbers dialog box.

Edit



Moves objects over relative distances to new positions in the same layer.

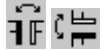


Copies objects within the same layer.



Drags vector starting or end points, to new locations.

On Multiple Draws : Lengthens or shortens a number of parallel draws. You can also use Multi drag when you want to work on multiple vector points, located on different chains of vectors.



Mirrors objects along the X and Y axis.



Rotates objects in a layer.

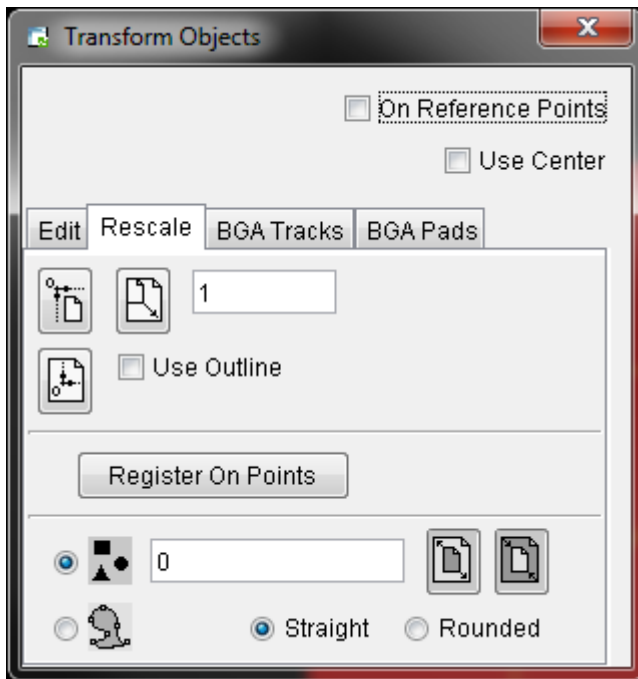



Reverses an objects polarity.





Rotates objects in a layer.

Rescale



 Click [Set Origin] to change the Origin (zero point) of the job's layers.

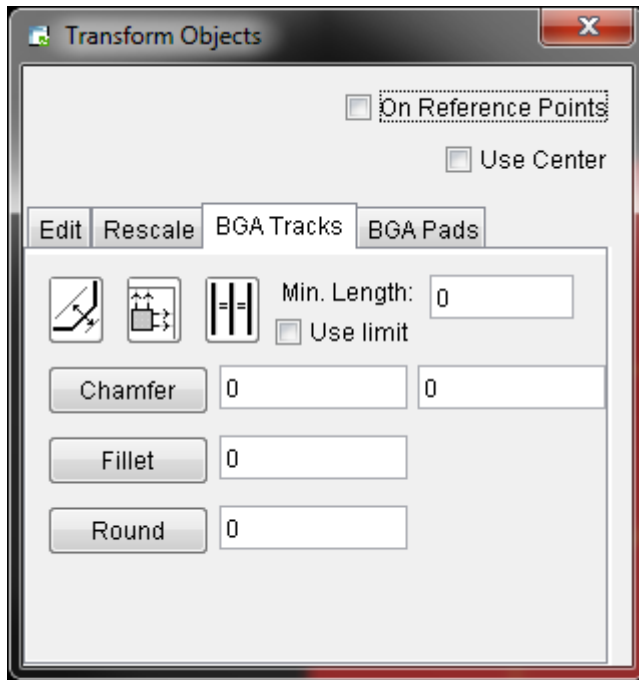
 Click [Set Origin Center] to set the Origin (zero point) of the job's layers to the centerpoint.

 Click [Scale] to apply a proportional Scale factor to the DPF data.

Register On Points : Click [Register On Points] to shrink, expand or distort a complete DPF layer.

[Thicken] & [Thin] : Click on [Thicken] or [Thin] to make shapes larger or smaller.

BGA Tracks



Drags a draw maintaining the angle of its connection with two other draws.

Min. Length : If during a Drag Constant Angle action one of the dragged lines becomes smaller than the specified length, dragging will not continue. Enter 0 if you do not want to specify a minimum length.

Use limit : If during a Drag Constant Angle action using numbers one of the dragged line becomes smaller than the specified minimum length, dragging will not continue.



Makes equal space between selected draws using the outer two draws as reference.



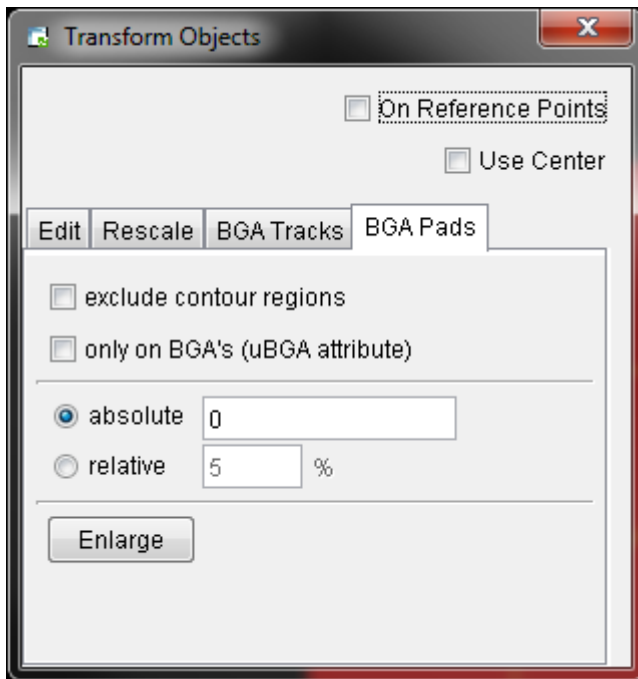
Connects the draws from a Ball Grid Array to a selected draw. Select the required draws from the BGA and select the required draw. Clicking Drag to Line will connect the BGA with the draw.

Chamfer : From to

Fillet : From to

Round : From to

BGA Pads



[Enlarge] : Starts the enlarge action

Absolute : The longest side of the BGA pad will be enlarged using the specified absolute value (current unit).

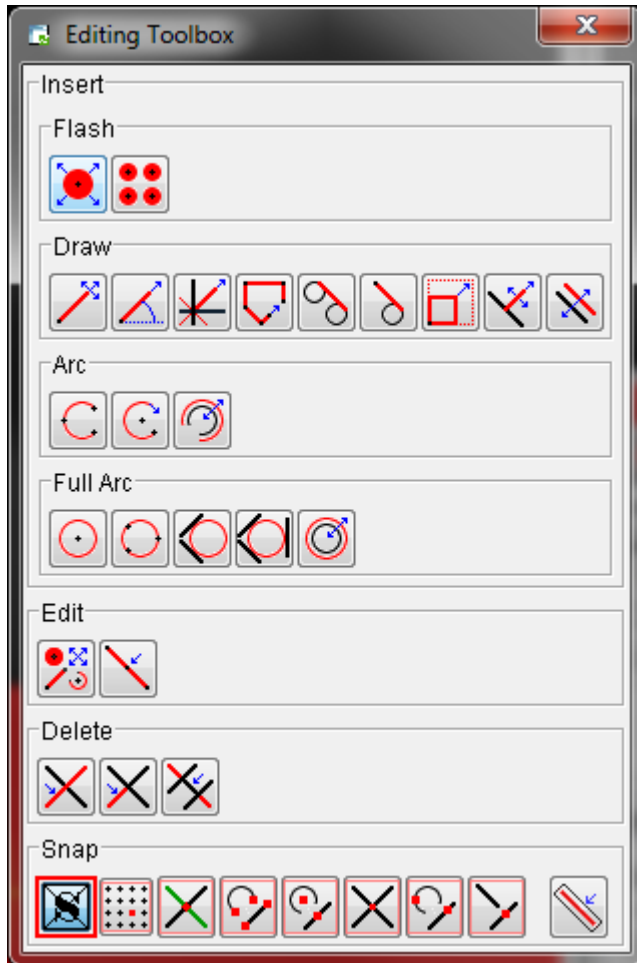
Relative : The longest side of the BGA pad will be enlarged using the specified relative value (%)

exclude contour regions : Disables enlarge action on contours.

only on BGA's (uBGA attribute) : Restricts enlarge action to objects that have the uBGA attribute set.

Insert

Toolbox



Insert > Flash



:To add a flash.



: To insert multiple flashes using step & repeat.

Insert > Draw



: To insert a draw.



: To insert a draw with a pre defined angle.



: To insert a draw which is a bisector of 2 selected draws.



: To insert a number of connected draws.



: To insert a draw as a tangent of 2 circles.



: To insert a draw as a tangent of an arc.



: To insert 4 connected draws in a rectangular shape (see Insert>Box)



: To insert a draw as an orthogonal draw with respect to a selected draw.



: To duplicate an existing draw as a parallel draw at a specified distance.

Insert>Arc



: To insert an arc which is defined by 3 points (start, end and intersection point)



: To insert an arc which is defined by 2 points (start and middle point)



: To insert similar arc with smaller/bigger diameter

Insert>Full Arc



: To insert a full arc. The radius of the arc can be set to a fixed value or can be set by dragging the mouse.



: To insert a full arc which is going through 3 specified points.



: To insert a full arc in between 2 selected tangent lines.



: To insert a full arc in between 3 selected tangent lines.



: To insert similar full arc with smaller/bigger diameter

Edit



: To modify the coordinates of an indicated object.



: To insert a break

Delete



: To delete selected objects.



: To delete an indicated object.



: To keep the indicated segment of an object.

Snap



: Deactivate any Snap mode or use hotkey x.

Entering 1,2 or 3 on numerical keyboard will set snap plane color (sets outline color of "No Snap" button)



: Activate/Deactivate Snap to Grid.



: Activate/Deactivate Snap to the endpoints of a line or arc.
Selecting this option will deactivate the "Snap to virtual point".
Activate the "Snap to Outline" toggle to snap to any corner of the outline.



: Activate/Deactivate Snap to the nearest object (arc or line).
Activate the "Snap to Outline" toggle to snap to any point of the outline.



: Activate/Deactivate Snap to the center of a line or arc.
Activate the "Snap to Outline" toggle to snap to any mid point of the outline.



: Activate/Deactivate Snap to the intersection of 2 or more objects.
Activate the "Snap to Outline" toggle to snap to any intersection point of the outlines.



: Activate/Deactivate Plane Intersect & Object Intersect.
Snap to any location where objects on a Data layer intersects with objects on a work layer.
The work layer should have the same plane color as the outline of the Snap button.
Activate the "Snap to Outline" toggle to snap to any intersection point of the outlines on Data and Work layer.



: Activate/Deactivate Snap to a virtual intersection point. Selecting this option will activate the "Snap to intersection" mode and deactivate the "Snap to Endpoints" mode.
Activate the "Snap to Outline" toggle to snap to any virtual intersection point of the outlines.



: Activate/Deactivate Snap to outline mode.

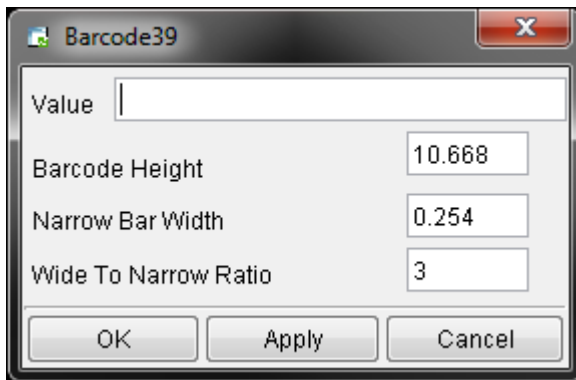
When deactivated, all snap actions apply to the skeleton view (default).
When activated, all snap actions apply to the outline view.

This toggle affects ALL snap modes (except snap to grid)

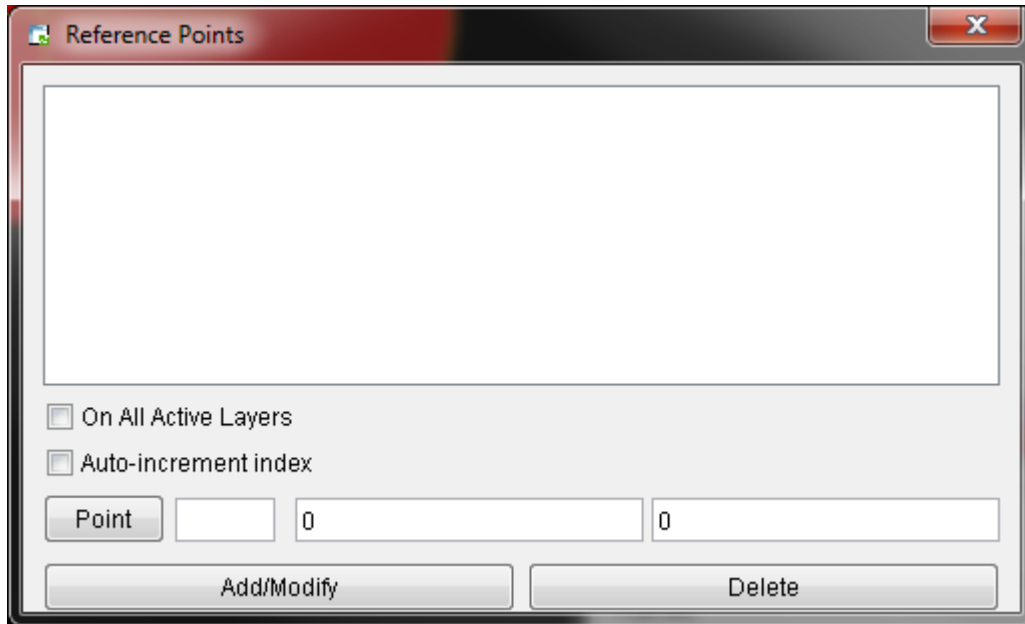
Vector Text...



Barcode 39...



Reference...



Reference is used to place a hot spot on a DPF, this point can be used later for outputting data. It is also used in combination of "Register On Points" for scanned data.

Undo menu

Undo

Choose Undo from the Edit menu to undo the last UCAM operation.

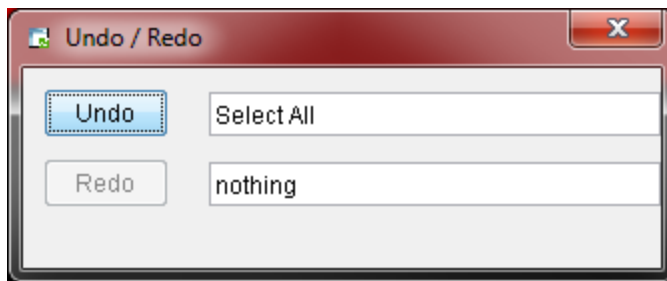
Redo

Choose Redo from the Edit menu to redo the operation which was last undone.

Clear

Choose Undo Clear from the Edit menu to clear the contents of the undo buffer.

Options...

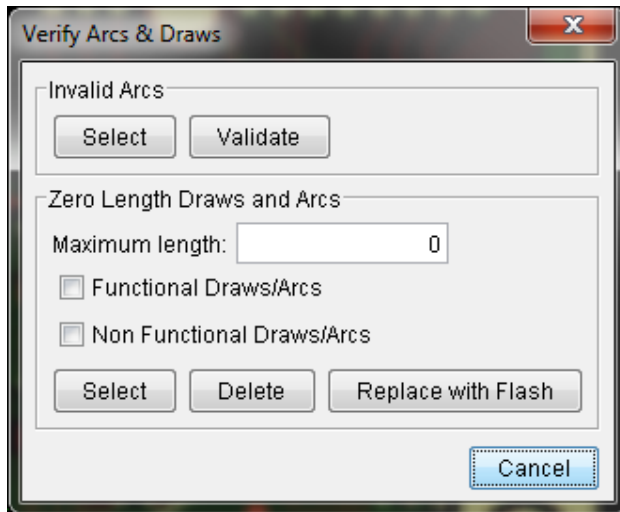


[Undo] : Click Undo to undo the last UCAM operation which is displayed in the Undo field.

[Redo] : Click Redo to redo the last UCAM operation which is displayed in the Redo field.

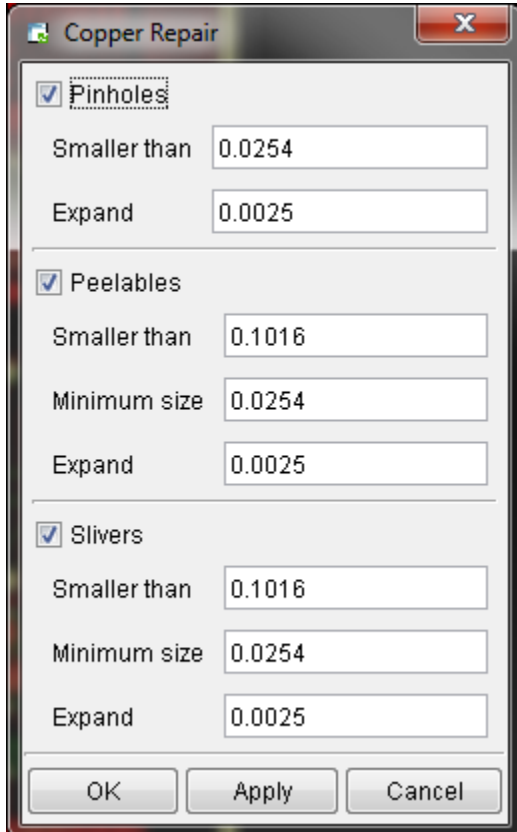
Verify submenu (Tools menu)

Arcs...



Use this dialog box to check all active layers for the presence of invalid arcs or (near) zero-length draws

Copper Repair...



SmartDRC...

Smart Design Rule Check

Setup Results

Configuration Classe4 Class All

Checks (All)

Active	Class	Check	Value	Tolerance
<input checked="" type="checkbox"/>	LAYER	PAD TO PAD	0.2	0
<input checked="" type="checkbox"/>	LAYER	PAD TO TRA...	0.2	0
<input checked="" type="checkbox"/>	LAYER	TRACK TO T...	0.2	0
<input checked="" type="checkbox"/>	LAYER	MIN TRACK	0.2	0
<input checked="" type="checkbox"/>	LAYER	COPPER C...	0.2	0
<input checked="" type="checkbox"/>	LAYER	SP		
<input checked="" type="checkbox"/>	LAYER	ST		
<input checked="" type="checkbox"/>	LAYER	ST	0	
<input checked="" type="checkbox"/>	LAYER.route	MIN RING LA...	0.254	0
<input checked="" type="checkbox"/>	LAYER.route	PARTIAL OV...		
<input checked="" type="checkbox"/>	LAYER.DRILL	PAD CLEAR...	0.3048	0
<input checked="" type="checkbox"/>	LAYER.DRILL	TRACK CLE...	0.3048	0
<input checked="" type="checkbox"/>	outer.DRILL	ISOLATED P...		
<input checked="" type="checkbox"/>	outer.DRILL	PARTIAL OV...		

Options

Tolerance %

Build netlist Layer Job

Use netlist

Select faults

Check

Smart Design Rule Check

Setup Results

Summary (All)

Class	Check	Value	Toler...	Min. found	Una...	Acce...	Rep...
LAYER	PAD T...	0.2	0	0,139	26	0	0
LAYER	PAD T...	0.2	0	0,134	262	0	0
LAYER	TRAC...	0.2	0	0,129	855	0	0






Filter

Number of errors: 262 0 0

Status: Unaccepted Accepted Repaired

Layer selection: all

Error navigation

  53    repair all

Scroll mode: Scan Propose Repair

Feedback: All errors Errors on plane1/2 Current error

Current fault

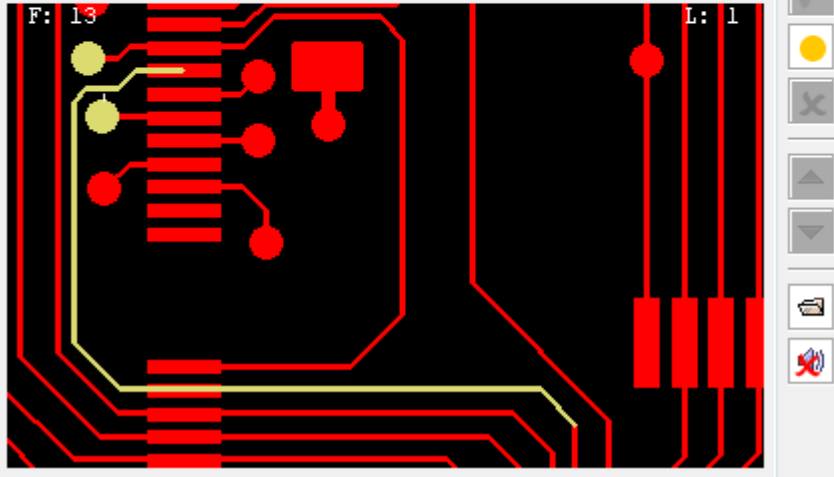
Layer: Top Type: PAD TO TRACK

Original status: ✘ unaccepted Current status: ✘ unaccepted

Info

Clear: 0.1596 mm

Error preview



Layer Rules

DRC Class Editor

LAYER

- outer
- inner
- mixed
- power
- ground
- DRILL
- drill
- buried
- blind
- plated
- unplated
- fixing
- nibble

LAYER

- outer
- inner
- mixed
- power
- ground
- DRILL
- drill
- buried
- blind
- plated
- unplated
- fixing
- nibble

Add Lay

Add Lay-Lay

Remove

class	label	in m...
outer	Outer Layer Check	<input checked="" type="checkbox"/>
LAYER.DRILL	Layer Drill check	<input checked="" type="checkbox"/>
LAYER.mask	Layer Mask Check	<input checked="" type="checkbox"/>
LAYER	Unused Pads	<input checked="" type="checkbox"/>
outer.DRILL		<input checked="" type="checkbox"/>

Tolerance: %

Use Netlist

Type	Value +/- Tol	Tolerance	Label
<input checked="" type="checkbox"/> Pad Pad	<input type="text" value="0.149"/>	<input type="text" value="0"/>	<input type="text"/>
<input checked="" type="checkbox"/> Pad Track	<input type="text" value="0.149"/>	<input type="text" value="0"/>	<input type="text"/>
<input checked="" type="checkbox"/> Track Track	<input type="text" value="0.149"/>	<input type="text" value="0"/>	<input type="text"/>
<input type="checkbox"/> Track Diff	<input type="text" value="0.254"/>	<input type="text" value="0"/>	<input type="text"/>
<input checked="" type="checkbox"/> Min Track	<input type="text" value="0.15"/>	<input type="text" value="0"/>	<input type="text"/>
<input type="checkbox"/> Min Pad Size	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text"/>
<input type="checkbox"/> Min Thermal Gap	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text"/>
<input type="checkbox"/> Min Character Thickness	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text"/>
<input checked="" type="checkbox"/> Peelable SMD	<input type="text" value="0.0762"/>	<input type="text" value="0"/>	<input type="text"/>
Min Size	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text"/>
<input type="checkbox"/> Peelable Round	<input type="text" value="0.0762"/>	<input type="text" value="0"/>	<input type="text"/>
Min Size	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text"/>
<input type="checkbox"/> Predrilled Hole	<input type="text" value="0.254"/>	<input type="text" value="0"/>	<input type="text"/>
<input type="checkbox"/> Center Center Overlap	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text"/>
<input type="checkbox"/> Center Center Distance	<input type="text" value="0.254"/>	<input type="text" value="0"/>	<input type="text"/>
<input type="checkbox"/> Copper Cut-in	<input type="text" value="0.254"/>	<input type="text" value="0"/>	<input type="text"/>
<input type="checkbox"/> Same Net Spacing	<input type="text" value="0.254"/>	<input type="text" value="0"/>	<input type="text"/>

Type	Label
<input type="checkbox"/> Single Pad	<input type="text"/>
<input type="checkbox"/> Single Track	<input type="text"/>
<input type="checkbox"/> Ignore Embedded Objects	
<input type="checkbox"/> Track Angle	<input type="text"/>
<input type="checkbox"/> Overlapping Pads	<input type="text"/>
<input type="checkbox"/> Thermal Gap	<input type="text"/>
<input type="checkbox"/> Non-plateable Holes	<input type="text"/>
<input type="checkbox"/> Exclude Text	<input type="text"/>

Check Save Save As ... Reset Cancel

Layer-Layer Rules

DRC Class Editor

class	label	in m...
outer	Outer Layer Check	<input checked="" type="checkbox"/>
LAYER.DRILL	Layer Drill check	<input checked="" type="checkbox"/>
LAYER.mask	Layer Mask Check	<input checked="" type="checkbox"/>
LAYER	Unused Pads	<input checked="" type="checkbox"/>
outer.DRILL		<input checked="" type="checkbox"/>

Tolerance: %

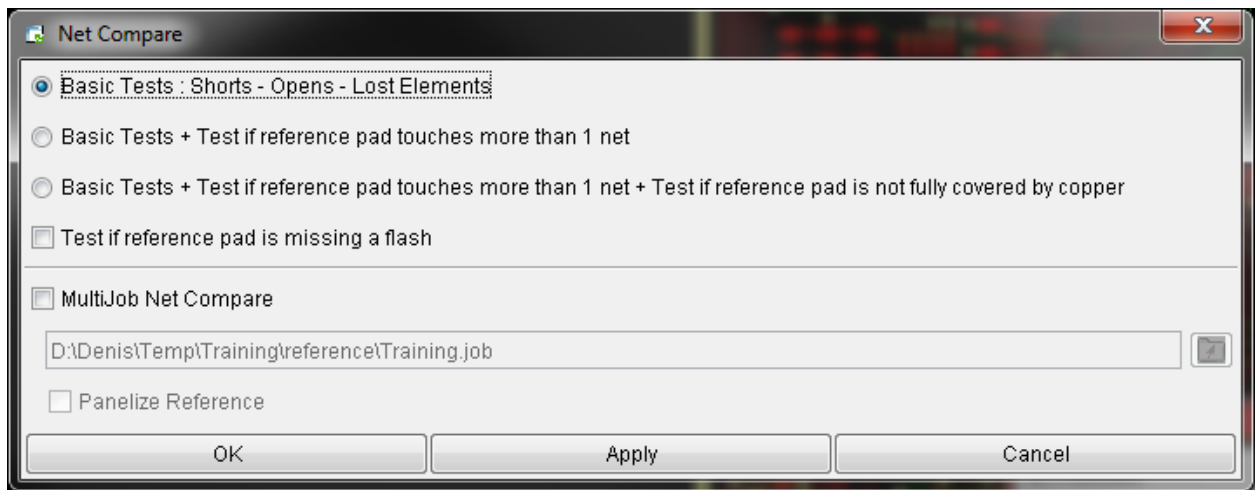
Use Netlist

Type	Value +/- Tol	Tolerance	Label
<input checked="" type="checkbox"/> Pad Clearance	<input type="text" value="0.8"/>	<input type="text" value="0"/>	<input type="text"/>
<input checked="" type="checkbox"/> Track Clearance	<input type="text" value="0.4"/>	<input type="text" value="0"/>	<input type="text"/>
<input checked="" type="checkbox"/> Ring Lay2->Lay1	<input type="text" value="0.16"/>	<input type="text" value="0"/>	<input type="text"/>
<input type="checkbox"/> Ring Lay1->Lay2	<input type="text" value="0.254"/>	<input type="text" value="0"/>	<input type="text"/>
<input type="checkbox"/> Exposed Tracks	<input type="text" value="0.254"/>	<input type="text" value="0"/>	<input type="text"/>
<input checked="" type="checkbox"/> Center Center	<input type="text" value="0.254"/>	<input type="text" value="0"/>	<input type="text"/>

Type	Label
<input type="checkbox"/> Isolated Pad Lay1	<input type="text"/>
<input type="checkbox"/> Isolated Pad Lay2	<input type="text"/>
<input type="checkbox"/> Partial Overlap	<input type="text"/>
<input type="checkbox"/> Power Ground Short	<input type="text"/>
<input type="checkbox"/> Clearance Of 0 Is Error	<input type="text"/>
<input type="checkbox"/> No Clearance on Embedded Pads	<input type="text"/>

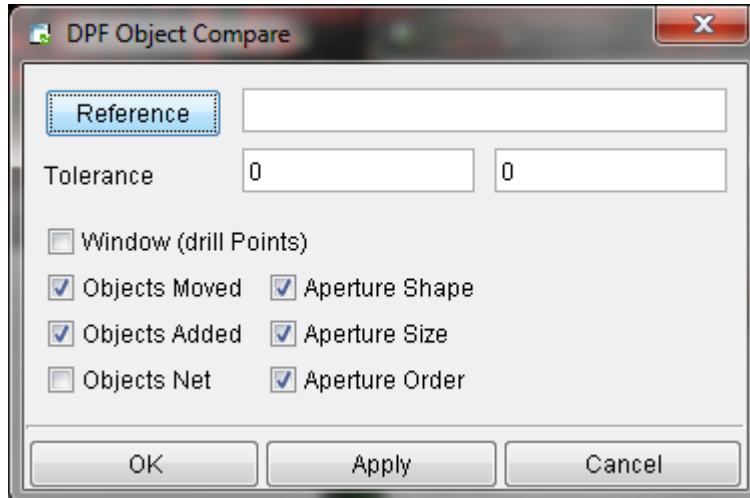
Buttons: Check, Save, Save As ..., Reset, Cancel

Net Compare



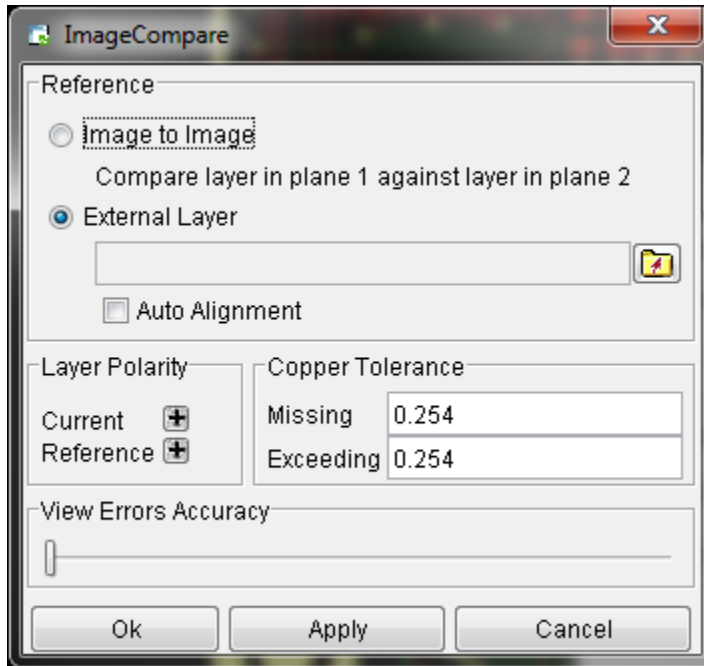
Choose Net Compare from the Verify submenu to compare a job's current netlist information for electrical changing (golden reference).

Object Compare...



Choose Object Compare from the Verify submenu to display the DPF Object Compare dialog box. Use this dialog box to check for changes to individual objects in the DPF data. Each object in the active layers of the current job is compared with the corresponding object on the same layer in a reference job. Depending on the checks you have activated, changes to the object's characteristics are reported as errors in the Error handling dialog box.

Image Compare...



Choose Image Compare from the Verify submenu to display the Image Compare dialog box. Use this dialog box to optically inspect a complete job against a reference job or one layer against a reference layer.

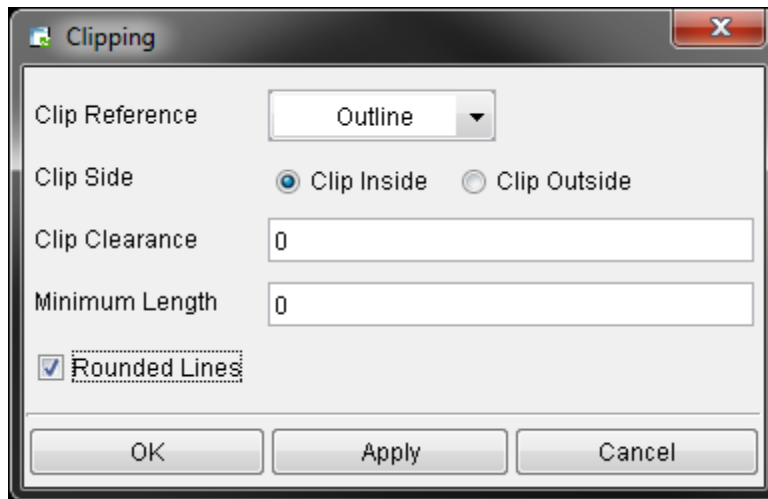
Image Compare can verify complete job against a reference job, or verify any kind of layer (copper, drill, rout paths, soldermasks, paste layers, silk screens,..) against a reference (dpf) layer.

The outcome of an Image Compare process is an error list. The errors in this list can be viewed with the functions in the Error Handling dialog box.

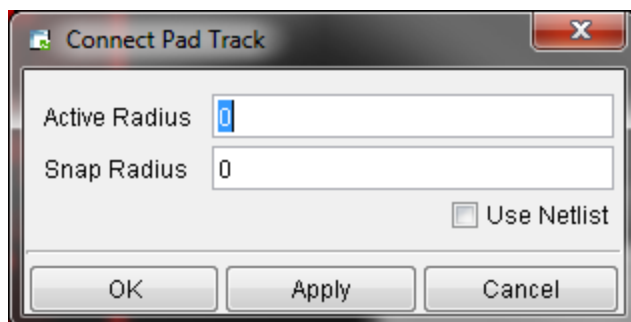
All differences can be saved as an *.ufd file and loaded again later.

Editing submenu (Tools menu)

Clipping...



Connect...



Choose Connect from the Editing submenu to display the Connect Pad Track dialog box. Use this dialog box to connect pads and tracks that are close enough to one another.

Active Radius : Defines which pads and tracks should be connected to each other. The connection takes place when the pads and tracks are closer to each other than the active radius.

The new track is drawn with the smallest aperture (of the two endpoints) or a new circular aperture (with the size of the smallest pad) is used if the two pads are non draw apertures.

Snap Radius

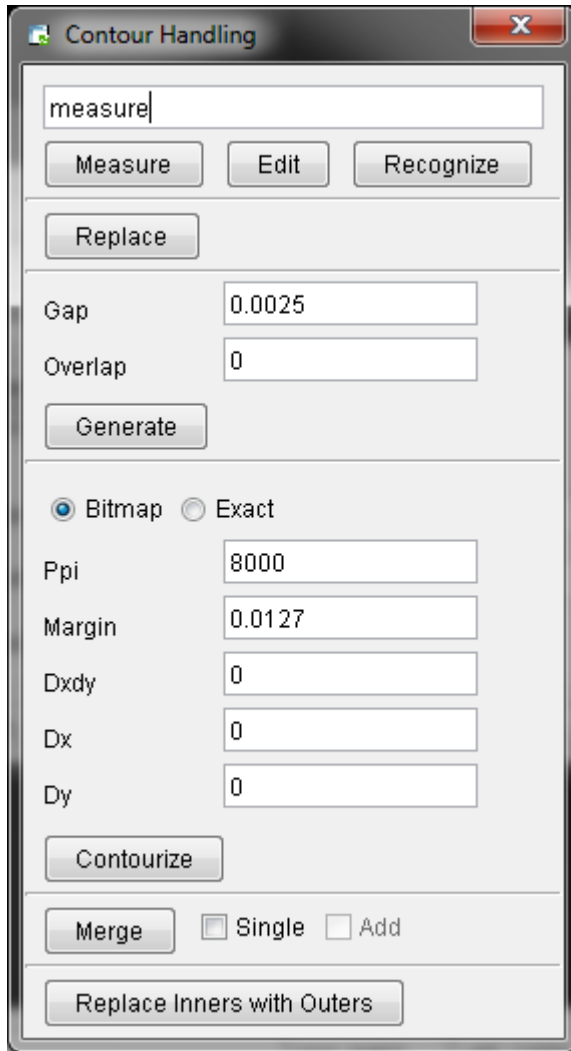
The snap radius defines **how** these pads and tracks should be connected. If the distance between the end points is smaller than the snap radius, one of the end points snaps to the other. If the distance between the end points is larger than the distance specified then a new vector is created to close the gap. Note that Snap radius is ignored when tracks are in a direct line with each other: in this case one of the two tracks is lengthened by dragging its end point to the end point of the other track (no connecting draw is added).

The Snap Radius should be smaller than the Active Radius.

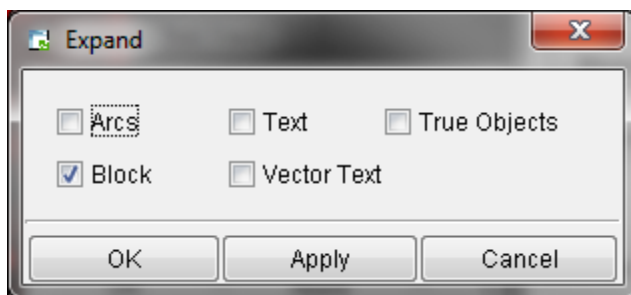
Use Netlist

When the toggle is activated, only objects which have identical and valid netlist numbers can be connected. Objects for which there is no valid netlist info available will provoke an error message and will be disregarded.

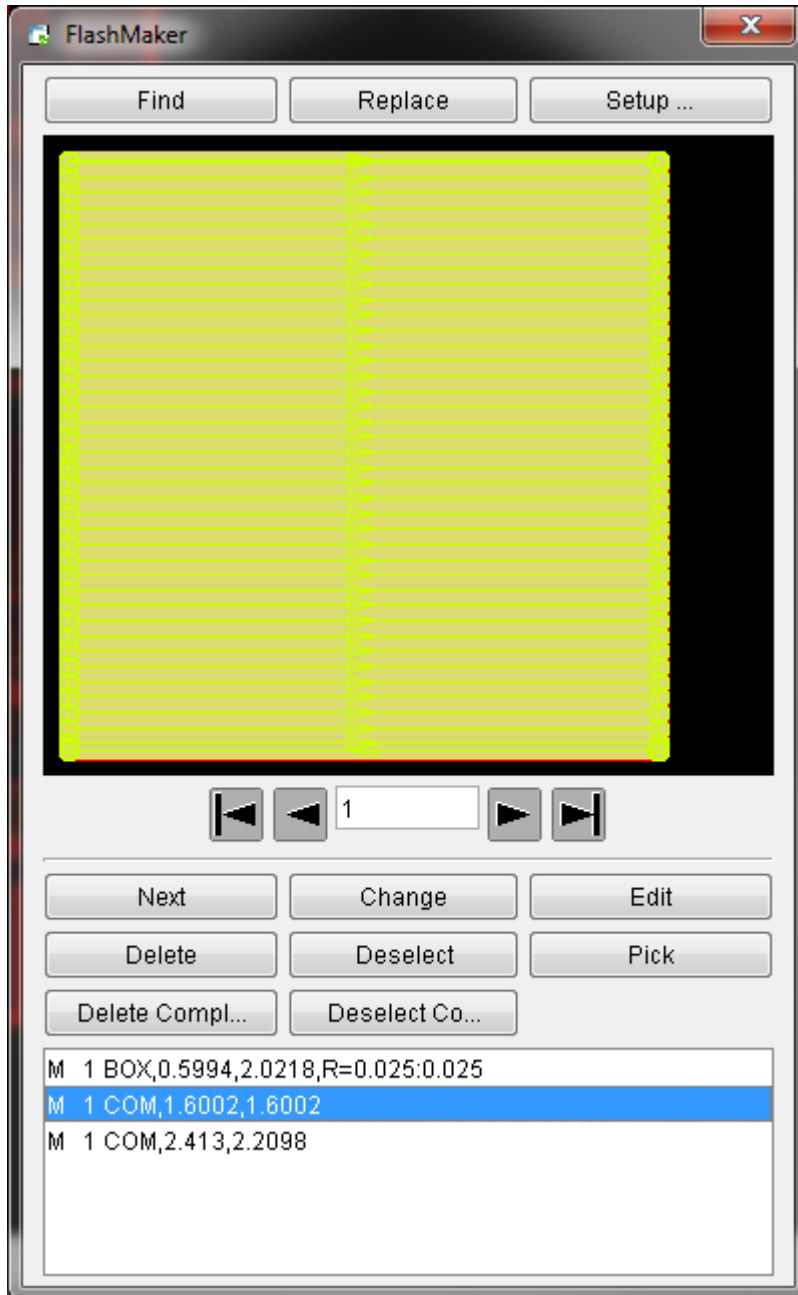
Contours...



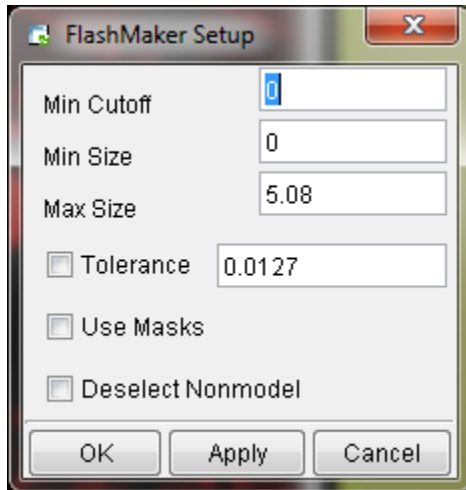
Expand...



FlashMaker...



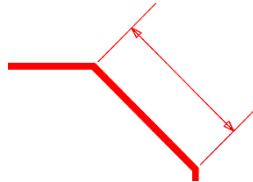
Setup



Min Cutoff field

Enter a value in the Min Cutoff field to define the minimum size of the cutoff corner of a model. A model with cutoff corners larger than Min Cutoff remains a box with rounded corners and a model with cutoff corners smaller or equal than Min Cutoff is converted into a rectangle.

A value of 0 means that only those painted models that are perfect rectangles are converted to rectangular apertures.



Min Size field

Enter a value in the Min Size field to define the minimum size of the enclosing rectangle of the models to be converted. Models eligible for replacement that are smaller (in the x-direction or in the y-direction) than the minimum size are not converted.

A value of 0 means that you should convert all (or selected) painted models smaller than the maximum size (see below).

Max Size field

Enter a value in the Max Size field to define the maximum size of the enclosing rectangle of the models to be converted. Models eligible for replacement that are larger (in the x-direction or in the y-direction) than the maximum size are not converted.

Example:

A value of 200 mils, means that anything over 200 mils is not considered by FlashMaker.

Tolerance

Deactivate Tolerance to use the best tolerance. This tolerance is determined based on the painted data. This is the default.

Activate Tolerance to use the tolerance value specified in the Tolerance field.

While converting, a small difference remains between the painted models and the flashed models. Only the conversions that have a difference smaller than the indicated tolerance are completed.

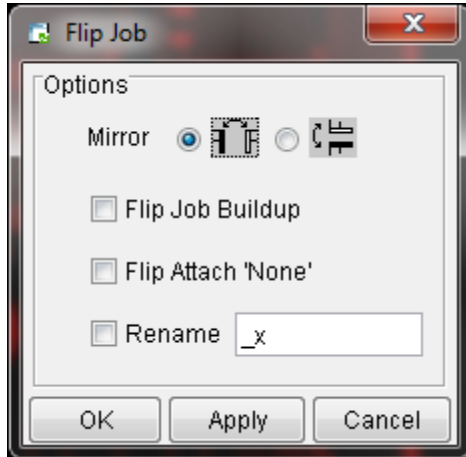
Use Masks

Limit find/replace only to objects in signal layers which are (partially) free of mask.

Deselect Nonmodel

Searches for models in 'selected data` only. Objects not belonging to model instances are deselected.

Flip Job...



Flip Job Buildup

Flips the entire job as one, and not each layer separately. Therefore the first layer becomes the last and so on. Non attached layers are not flipped and preserve their order in the buildup.

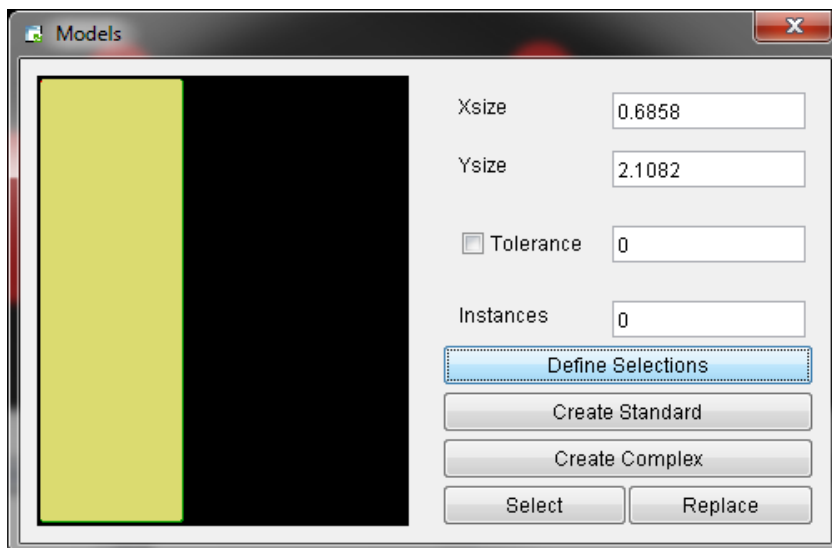
Flip Attach `None'

Flips the extra layers with `None' attachment. Normally the extra non-attached layers are not flipped.

Rename

Adds the extension specified in the Rename field to the flipped layers. The flipped layers lose the extension when they are flipped back to their original position

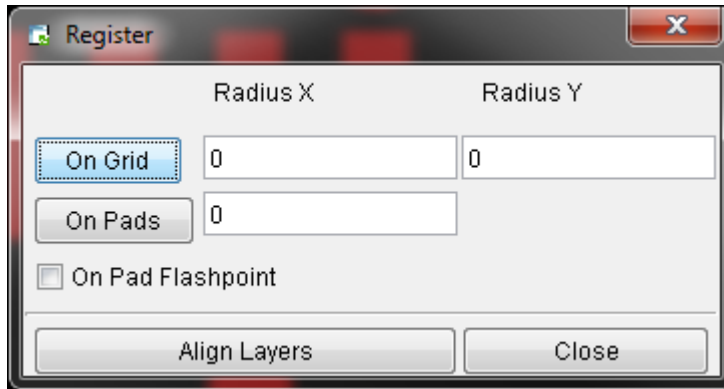
Models...



Tolerance

After clicking Select, "UCAM" selects instances of the defined model using a tolerance. This tolerance is derived from the length of the tracks in the model.

Register...



[On Grid]

Snaps all selected objects within the (rectangular) action area of a grid point to the grid. The action area is defined in the Radius X and Radius Y fields. All other objects are left at their original position.

[On Pads]

Pads in the active layers are registered to the nearest flash point of corresponding pads on a layer in **plane 2**. If the size of the pad on **plane 2** is more than 3 times the size of the pad to be registered, registration will be done on the closest of 3 points :

- Flashpoint

- Start position of a virtual track covering the pad on which to be registered

- End position of a virtual track covering the pad on which to be registered

Tracks are offset with the average offset of the pads.

On Pad Flashpoint

Activate this toggle to register on flashpoint only.

[Align Layers]

Adjusts the relative position of all active layers using translations, rotations and mirroring. A report on the result of the registration appears in the startup window.

The reference layer for the registration is defined with the following priority:

- The reference layer is the active layer in **Plane 3** is taken first.

- The leftmost drill layer in the Job Editor is the reference layer if there is no active layer in Plane 3.

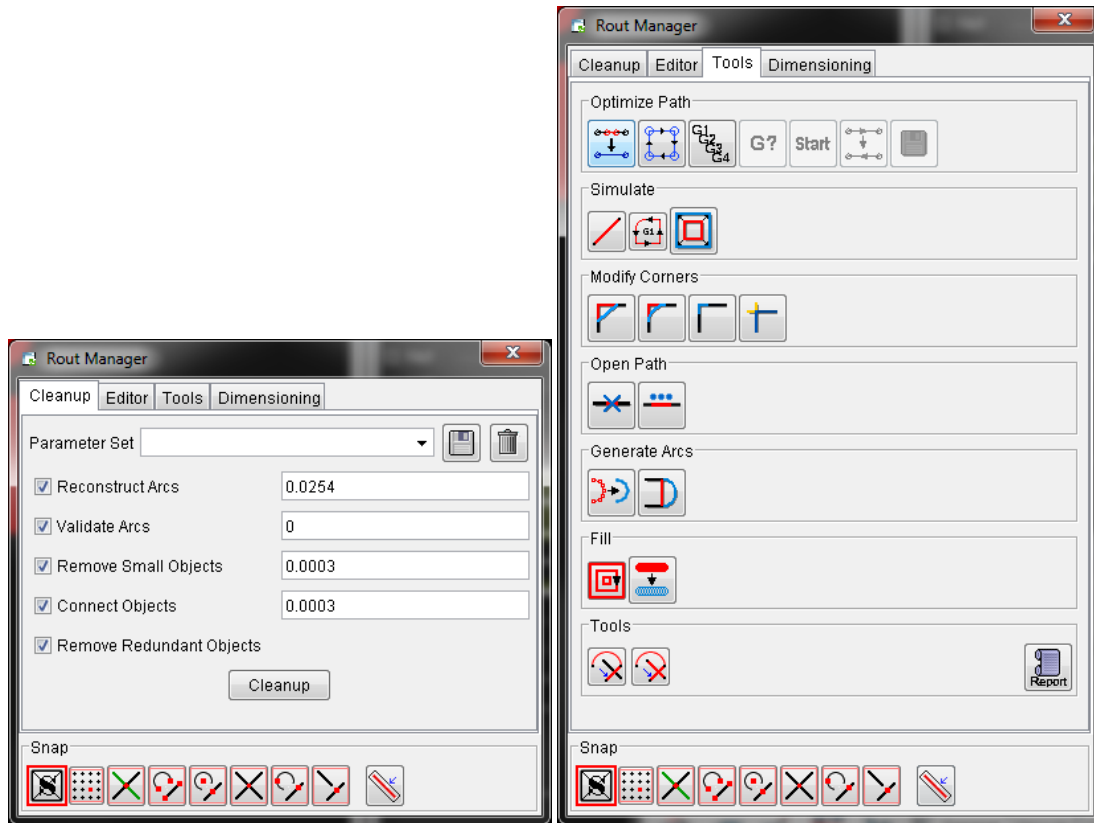
Reverse Layer

Choose Reverse Layer to reverse objects on all active layers (that are strictly positive).

The outline layer is used to determine which objects to reverse. Objects residing inside the outline layer are reversed.

Tooling submenu (Tools menu)

Rout...



Parameter Set

Enter new Parameter Set name or select existing Set from drop-down list

Reconstruct Arcs

Expanded arcs are reconstructed when they contain draws smaller than a specified value.

Validate Arcs

Automatic replacement of invalid arcs by valid ones.

Remove Small Objects

- Objects smaller than the specified value are removed.
- Objects which length is smaller than two times the aperture size are detected and connected. Connecting objects are trimmed if necessary.

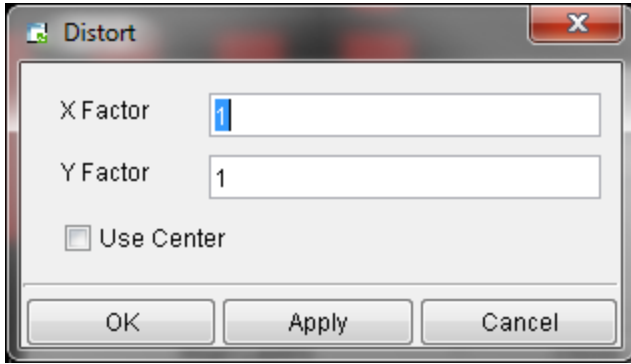
Connect Objects

Connect all objects in a chain if they are not connected within a specified tolerance.
Vectors which are not connected are, where possible, changed in length until they connect.

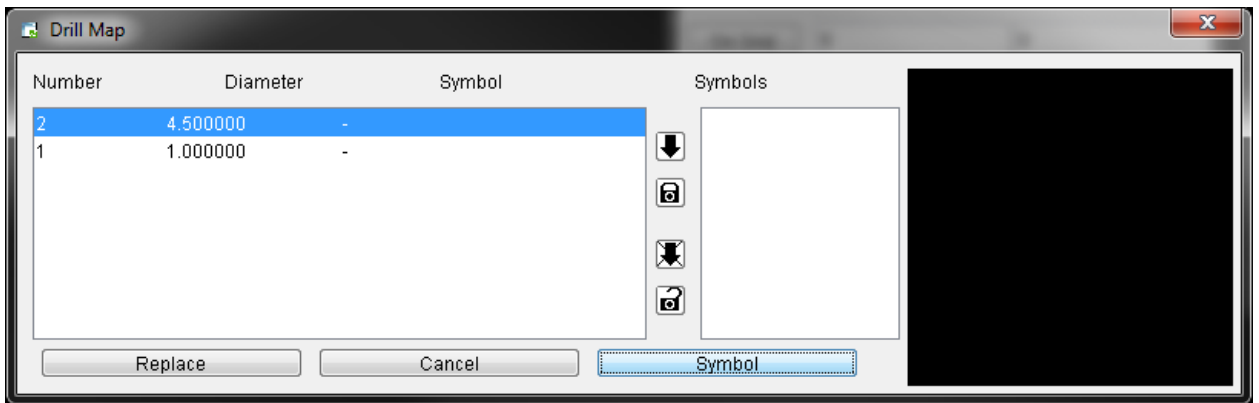
Remove Redundant Objects

Removes all objects which are no longer needed.

Distort...

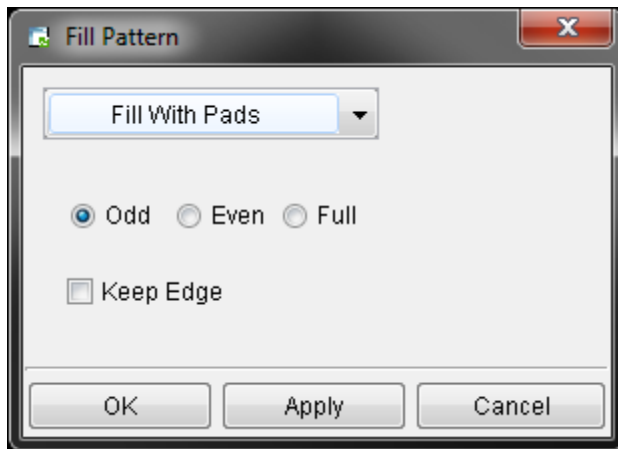


Drill Map...

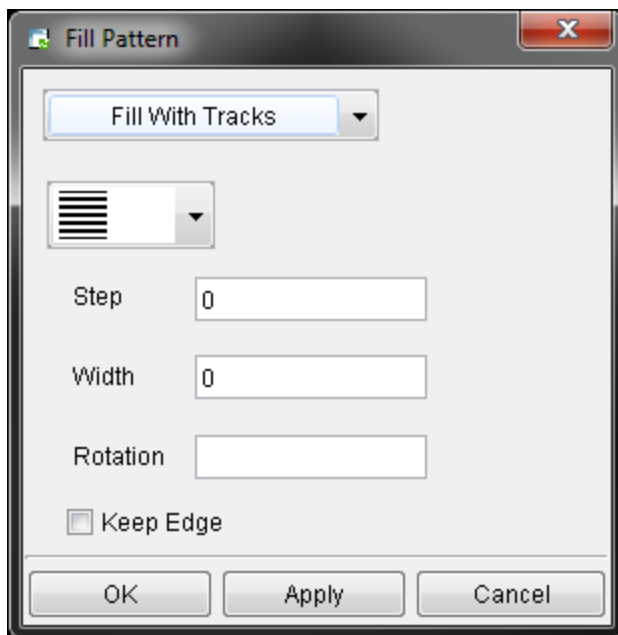


Fill Pattern...

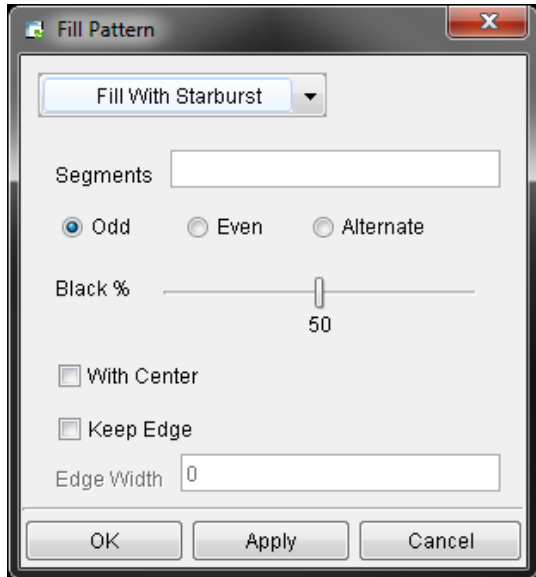
Fill with Pads



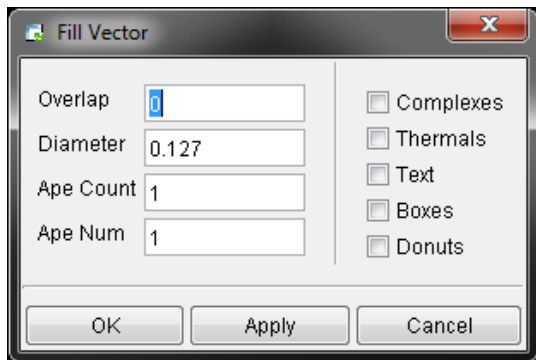
Fill with Tracks



Fill with Starburst



Fill Vector...



Overlap

The minimum overlap between two adjacent draws.

Diameter

The diameter of the smallest aperture used for filling.

Ape Count

Maximum number of apertures that can be used for filling.

For each new aperture, the diameter is doubled. So, if you enter 4 and the smallest aperture is 2 mils, the filling algorithm uses 2 mil, 4 mil, 8 mil and 16 mil apertures.

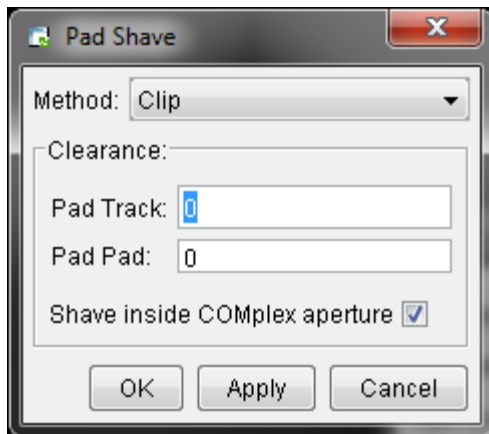
Ape Num

Lowest number that may be used as aperture number for newly created apertures.

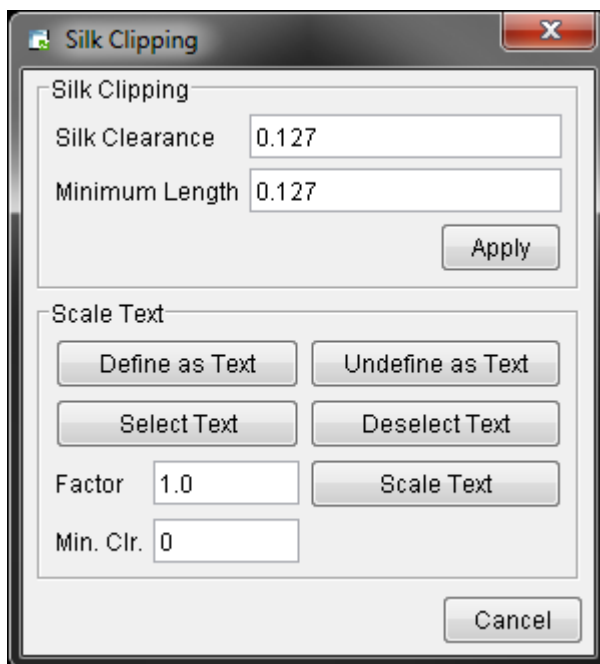
Complexes, Thermals, Text, Boxes, Donuts

If complexes, thermals, text, boxes and/or donuts also have to be filled, activate the corresponding toggle.

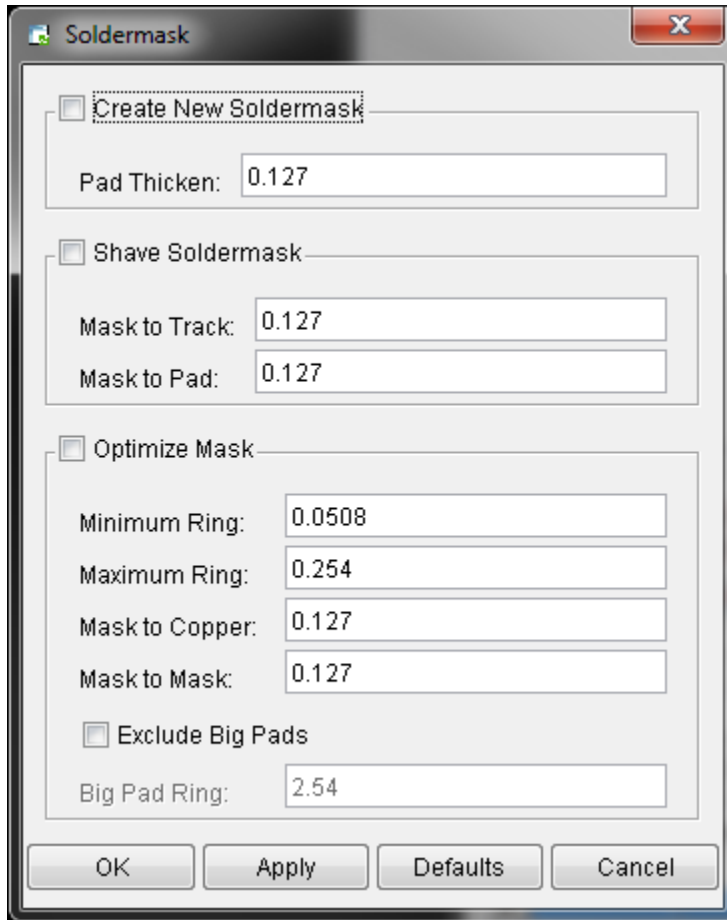
Shave...



Silk Optimize...



Soldermask...



Create New Soldermask

Pad Thicken:

Shave Soldermask

Mask to Track:

Mask to Pad:

Optimize Mask

Minimum Ring:

Maximum Ring:

Mask to Copper:

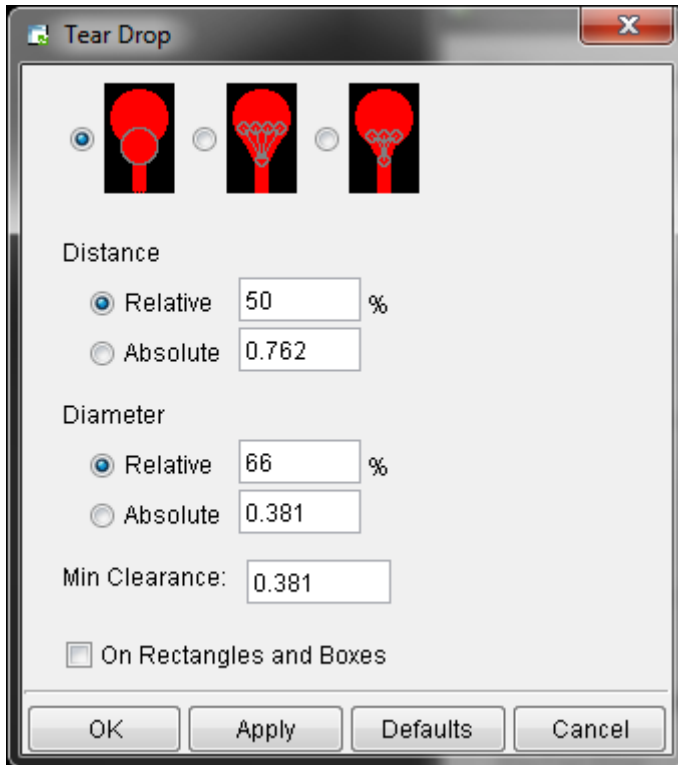
Mask to Mask:

Exclude Big Pads

Big Pad Ring:

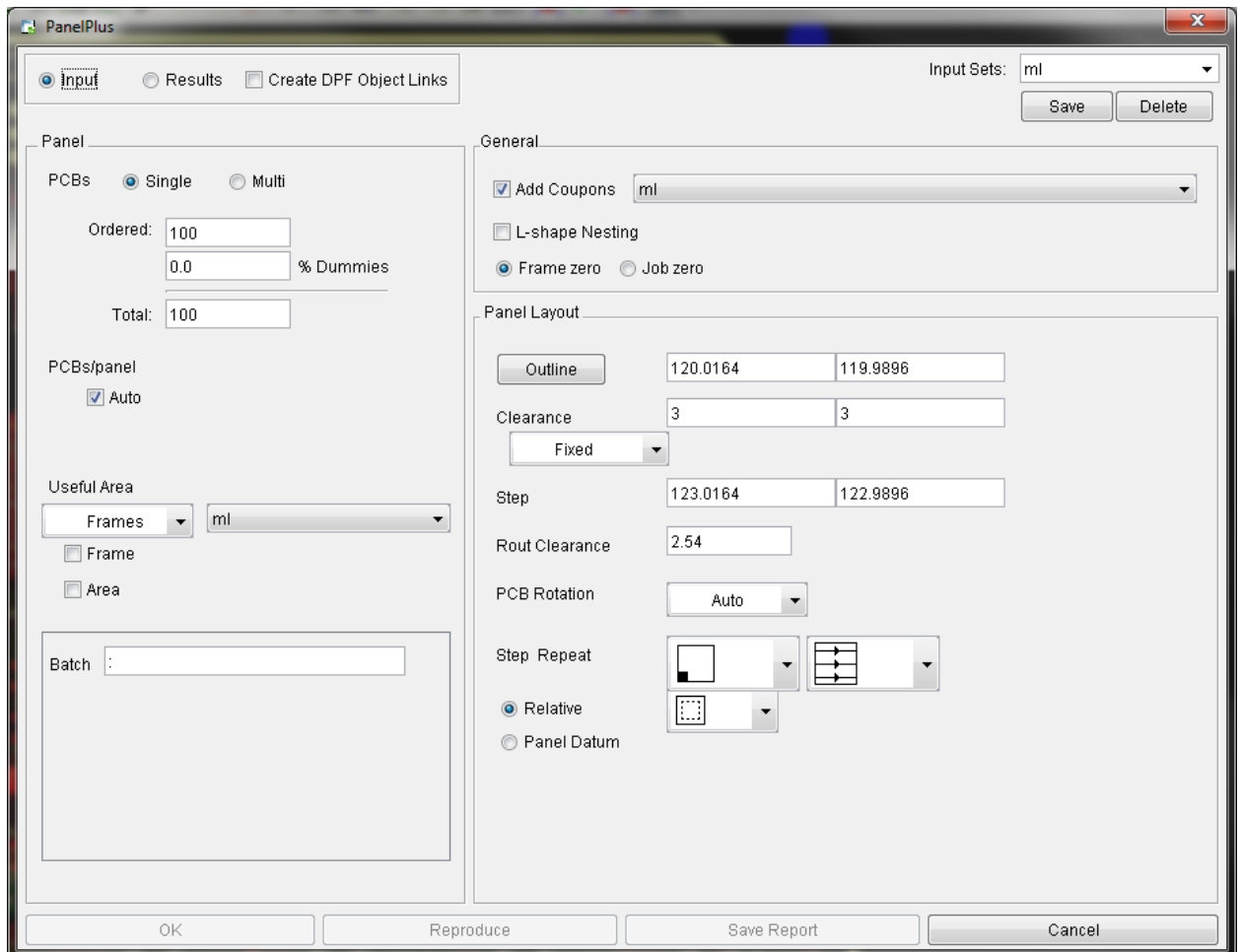
OK Apply Defaults Cancel

Teardrop...



Panel submenu (Tools menu)

PanelPlus...



PanelPlus Results

PanelPlus

Input
 Results
 Create DPF Object Links

Input Sets: ml Save Delete

Results

Frame	Size	PCBs	Rot	Fill	Yield	Panels	Total	Over
13x19	384 x 530	6	0.0	51	50	17	102	2
14x17	364 x 441	6	0.0	65	63	17	102	2
variable	500 x 650	15	0.0	78	74	7	105	5

Show PCB Number
 Show PCB Name

1	184.51	21.485	90.0
2	307.50	21.485	90.0
3	430.49	21.485	90.0
4	184.51	144.50	90.0
5	307.50	144.50	90.0
6	430.49	144.50	90.0

Flash: 184.514 21.486

Rotation: 90.0

Mirror: Modify

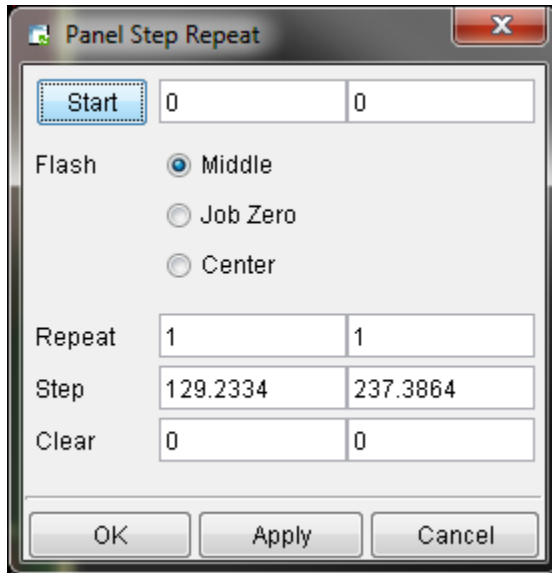
Clearance: 3 Set

Flash Order: 1 ReOrder

Report D:\Denis\Temp\Training\Training.prf

OK Reproduce Save Report Cancel

StepRepeat...



The screenshot shows a dialog box titled "Panel Step Repeat" with a close button (X) in the top right corner. The dialog contains several input fields and radio buttons:

Start	0	0
Flash	<input checked="" type="radio"/> Middle <input type="radio"/> Job Zero <input type="radio"/> Center	
Repeat	1	1
Step	129.2334	237.3864
Clear	0	0

At the bottom of the dialog are three buttons: "OK", "Apply", and "Cancel".

Middle

Takes the center of the enclosing box of the job as flash point of the block.

Job Zero

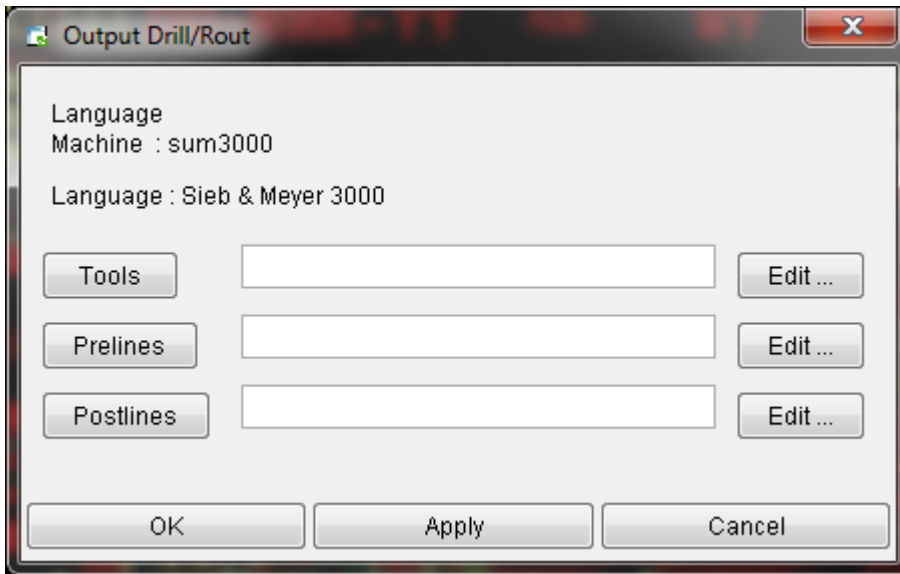
Takes the zero point of the job as flash point of the block.

Center

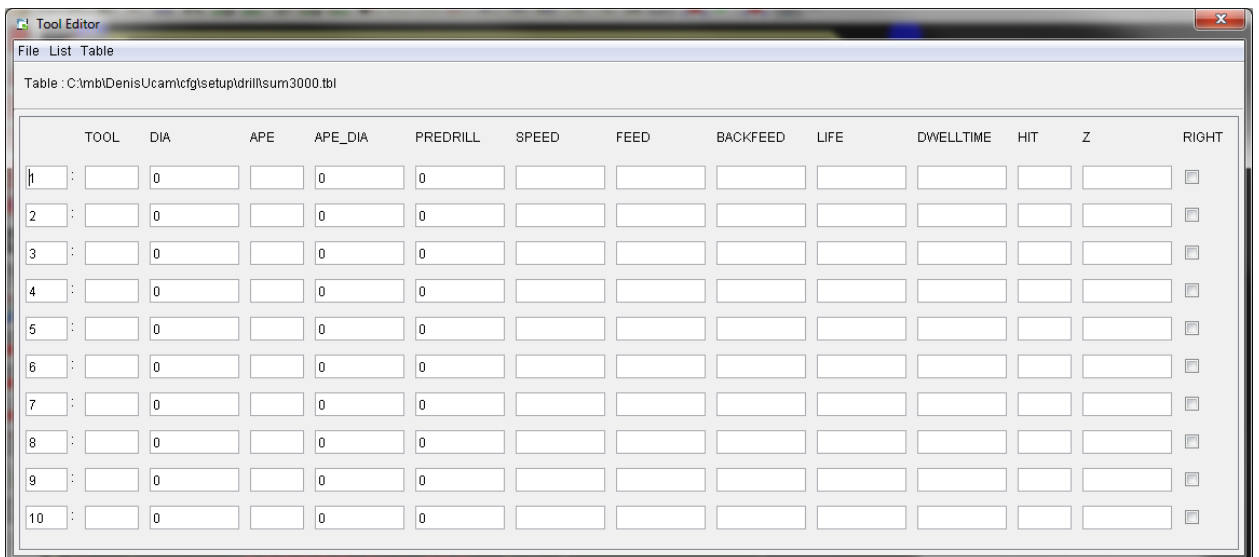
Takes the center coordinates from the Numbers dialog box as flash point of the block

Output menu

Drill/Rout: Machine...

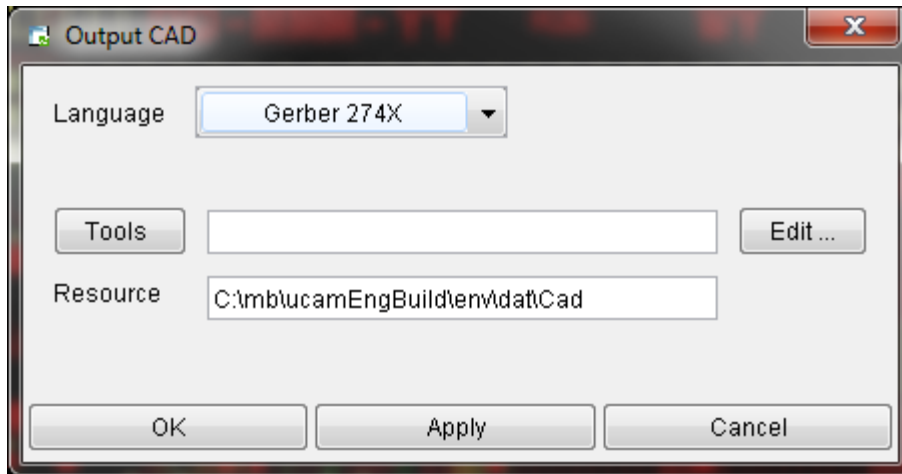


Edit Tools



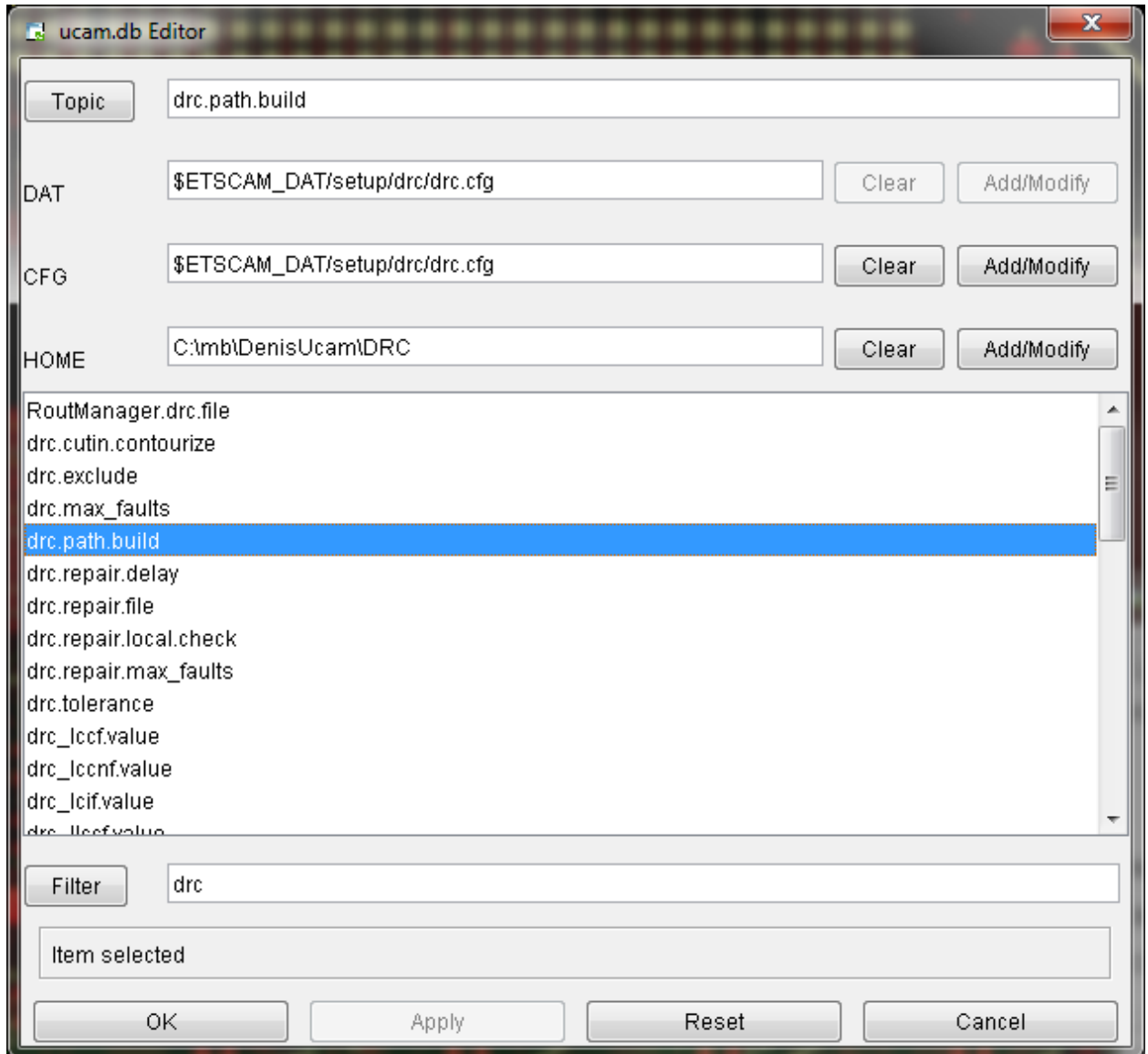
CAD...

Extended Gerber

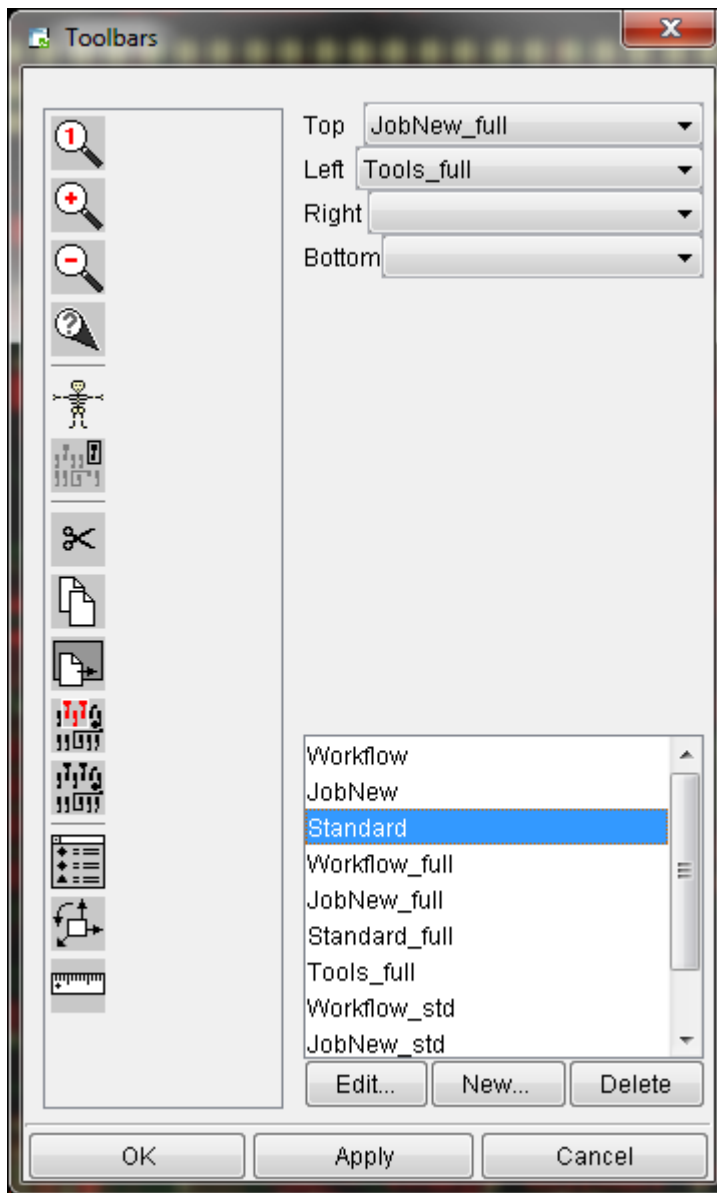


Setup

Ucam.db



Toolbars...



Layers menu (Job Editor)

Add DPF

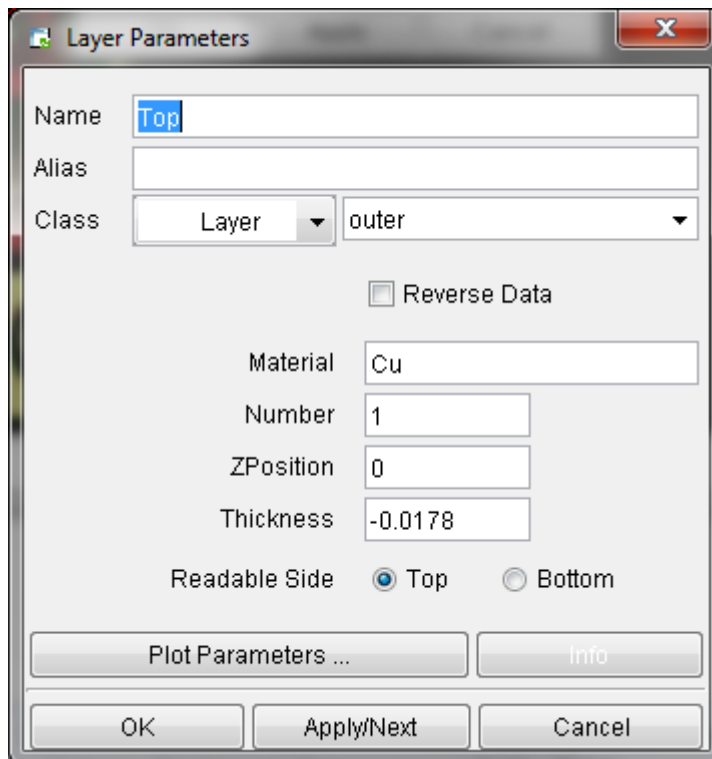
Choose Add DPF to display the File Select dialog box. Use the options of the File Select dialog box to add a DPF file to your current job..

Create

Choose Create to create a new DPF layer within your current job. This layer can be either of class LAYER, DRILL, EXTRA or FEEDBACK, depending on where and how the layer is inserted into the cross section area..

Modify

Layer



Subclass menu

UCAM comes with the following predefined subclasses for the main layer class LAYER: outer, inner, mixed.

Reverse Data

When this toggle is switched on, it indicates that the image you see in Ucam is reverse to the image of the produced PCB. You may want to execute the Reverse Layer command on such a layer.

Material

Displays the material used in the main layer class LAYER.

Position

Contains the layer number. Enter another number to change the position of the layer in your job.

Z-Position

Displays the layer's physical position (seen from top to bottom) in the PCB.

The Z-axis for a job goes from top (lowest positive value) to bottom. The Z-Position is used in copper area calculations.

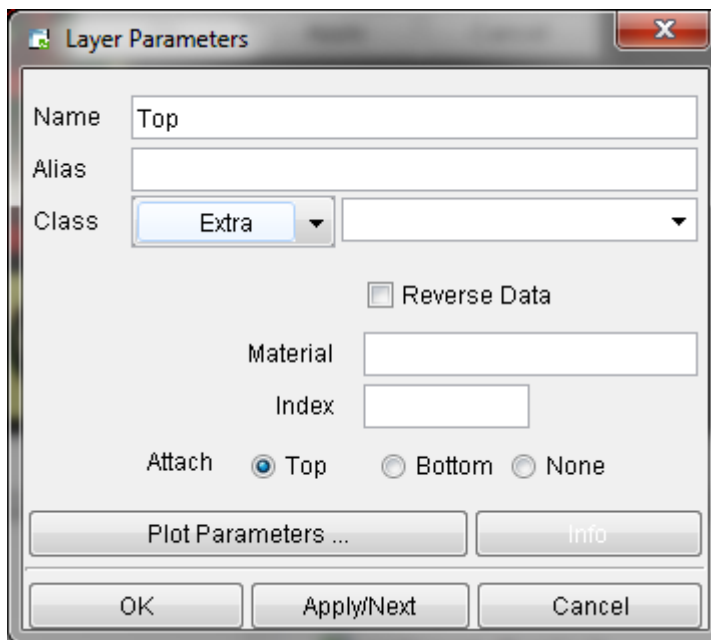
Thickness

Displays the copper thickness of the main layer class LAYER. The layer thickness is used in copper area calculations.

Readable Side

The readable side is displayed by an arrow indicating the direction in the cross section area.

Extra



Reverse Data

When this toggle is switched on, it indicates that the image you see in Ucam is reverse to the image of the produced PCB. You may want to execute Reverse Layer command on such a layer.

Material

Displays the material of the main layer class EXTRA.

Index

Displays the index information for the guideplates subclass only.

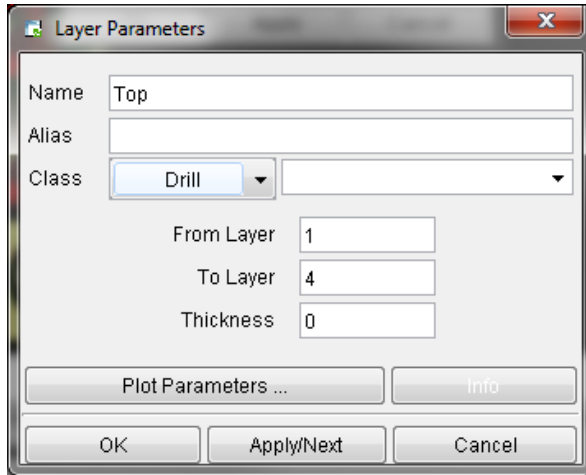
Attach

Top : Extra layer is attached or related to the top layer.

Bottom : Extra layer is attached or related to the bottom layer.

None : Extra layer is not attached to any layer.

Drill



From Layer

Displays the layer number of the layer where the drilling begins from. Enter another layer number if you want another layer to be in the From Layer for this drill layer.

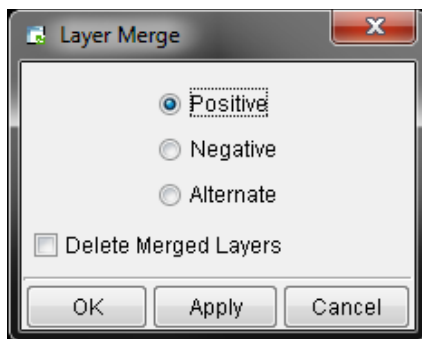
To Layer

Displays the layer number of the layer that is drilled to. Enter another layer number if you want another layer to be in the To Layer for this drill layer.

Thickness

Displays the copper thickness of the main layer class DRILL. The layer thickness is used in copper area calculations.

Merge



Positive

The polarity of the layer(s) to be merged remains as it is.

Negative

The data in the layer(s) to be merged is reversed before it is put into the layer in plane 1.

Alternate

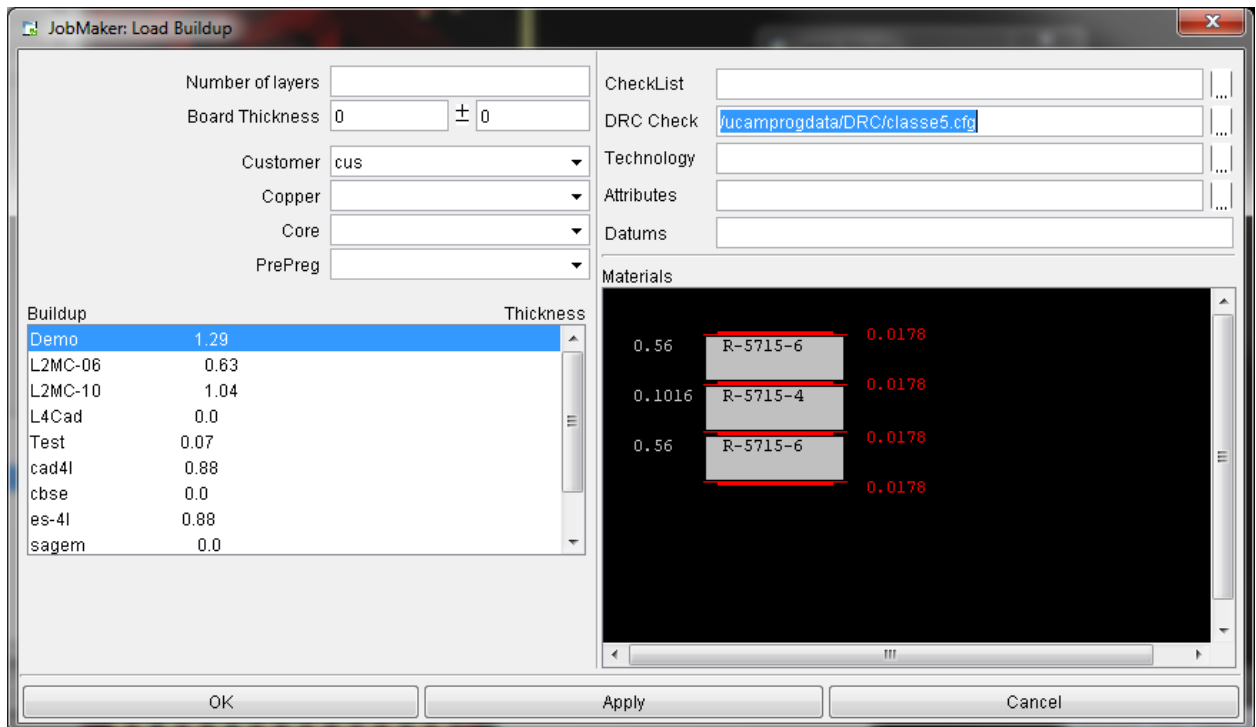
The first positive active layer to be merged remains as it is, the next one is reversed, and so on.

Delete Merged Layers

The layers that have been merged into plane 1 are deleted from the job.

Buildup menu (Job Editor)

Load...



Support

The UCAM help desk offers support in English, German, French and Dutch

Availability:

Monday – Thursday: 09:00 – 17:00

Friday: 09:00 – 16:00

Tel.: +32 9 216 99 00

Fax: +32 9 216 99 12

Email: support@ucamco.com