ADIVA Gerber / Drill Input (Quick-Start User Guide)

Adiva Version 9.5

Notice

Representations in this User Guide are meant as an overview and quick reference. Full details can be found in the On-Line manuals located at the *ADIVA Corporation* website - www.adiva.com

Step 1
Generic Gerber and Drill Input

- Translator will accept 274X Gerber along with Drill files in Excellon format

- Drill files in Cadence Allegro, Mentor Boardstation, Mentor Expedition, Altium, Mentor Pads, Zuken are also accepted.

- Place all files into a single directory.

- Start AdivaTools simply by double-clicking the AdivaTools icon on the Windows Desktop
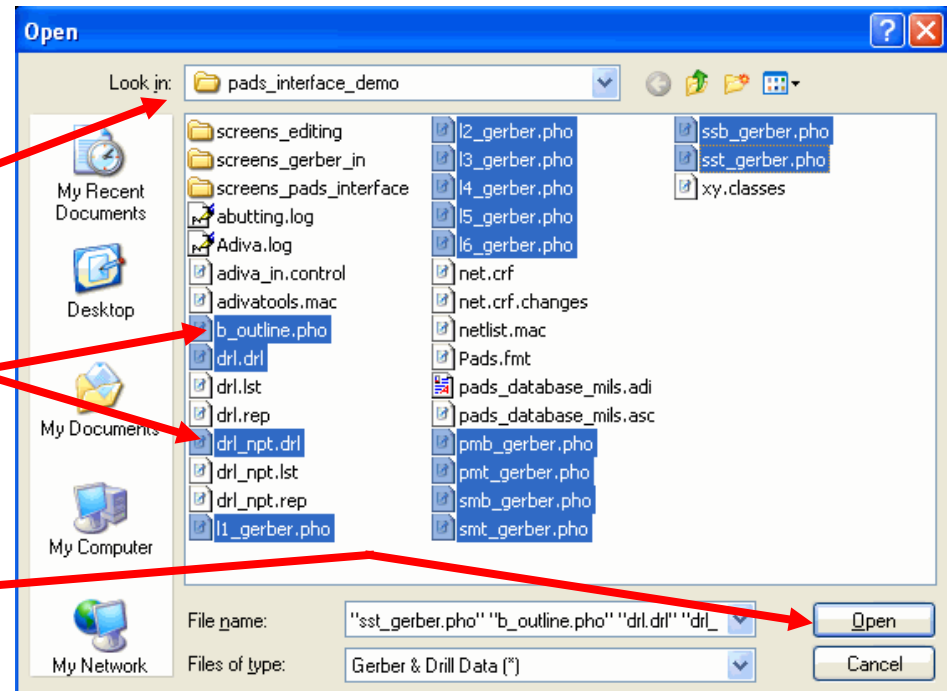
Start by double-clicking the **AdivaTools** desktop icon to start the application and provide access to the menus shown below…
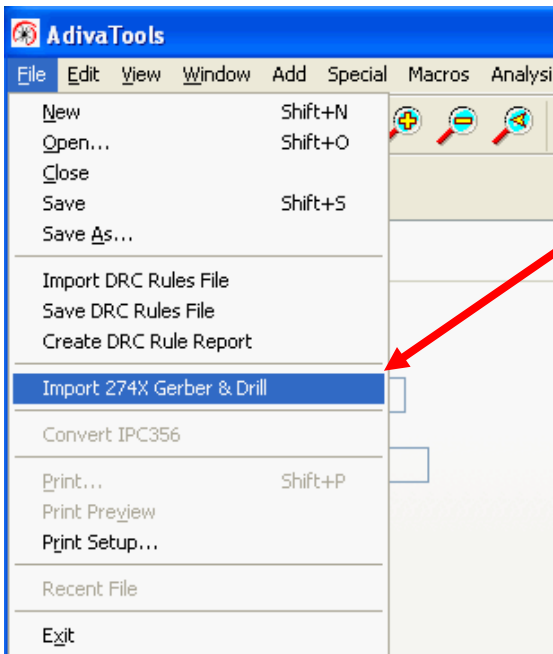
Select the **File > Import 274X Gerber & Drill** menu choice to open the file selection dialog

Navigate to the correct directory

Then choose file(s) by selecting each file to import

It helps to use the <cntl> key while selecting to collect multiple files to import

When all files are selected, select the **Open** button to register the files for further definition

A new dialog will open listing all of the files selected from the previous dialog.

This is a good time to review the list and make sure all of the files intended to be converted are on the list – if not, **Cancel** and start over.
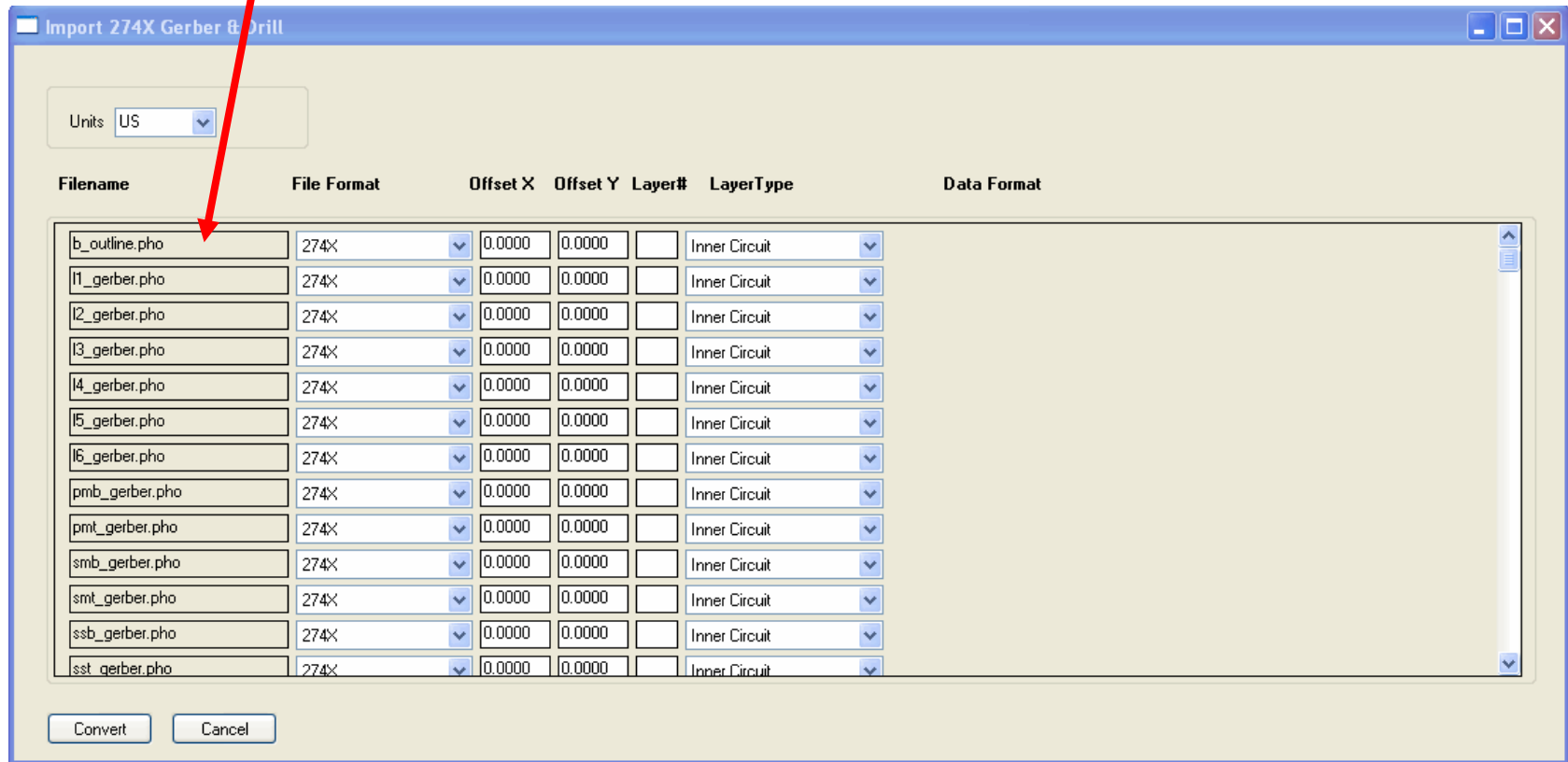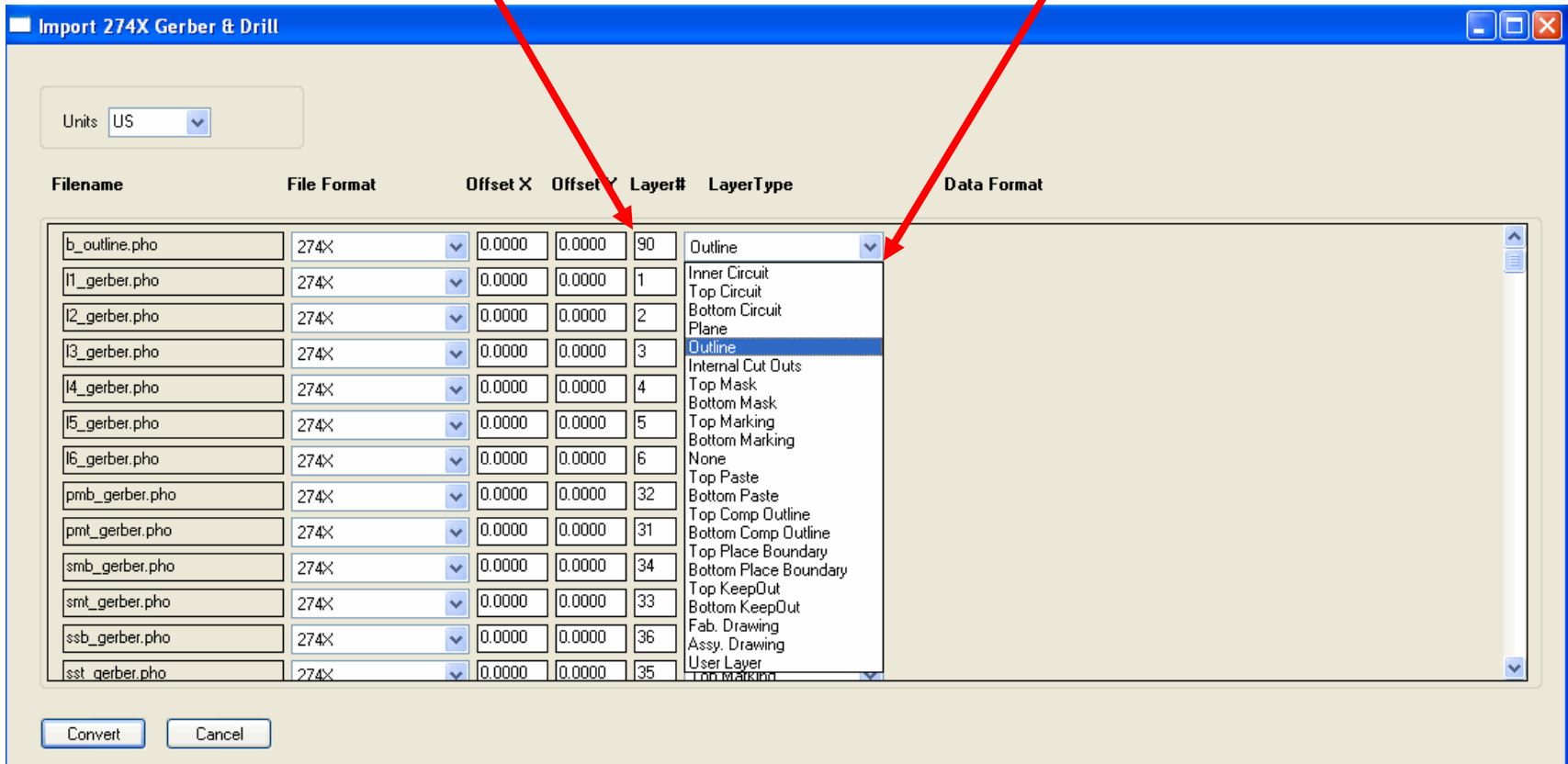
Assign layer numbers to each file on the list.

Number assignment should follow some reasonable order for clarity.

For example, The design's Top Circuit should be layer # 1 and so on…

Choose a layer type for each file.

This is important for later processing. ADIVA needs to know which is the Top Circuit, Outline, Plated Holes, etc….

Some files may need to be offset for alignment purposes. If this offset value is known, it can be entered in the spaces provided. Values are in inches or mm and a negative offset is defined with the minus (-) sign.

Note: if an offset value is not known, the data can be later edited to bring everything into alignment.
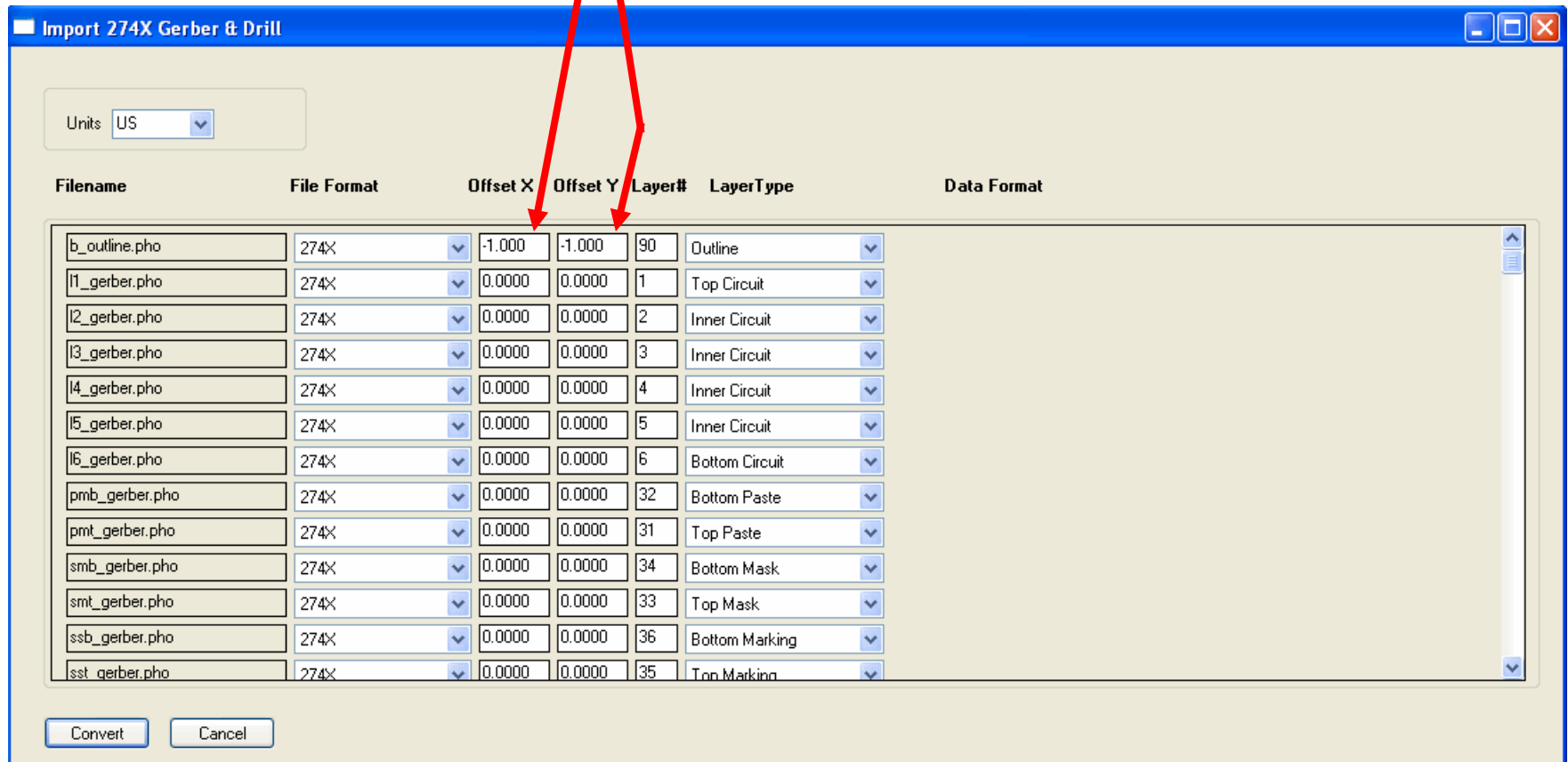
Top half of a completed file import list.
Note the Layer number and layer type assignments…

Import 274X Gerber & Drill

Units US

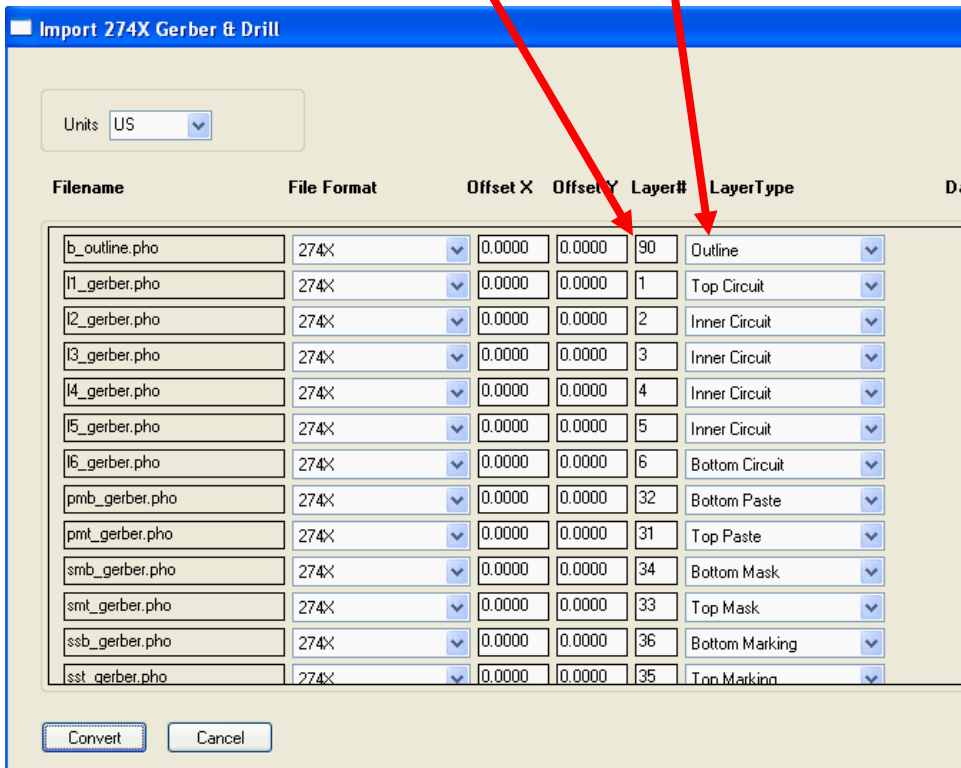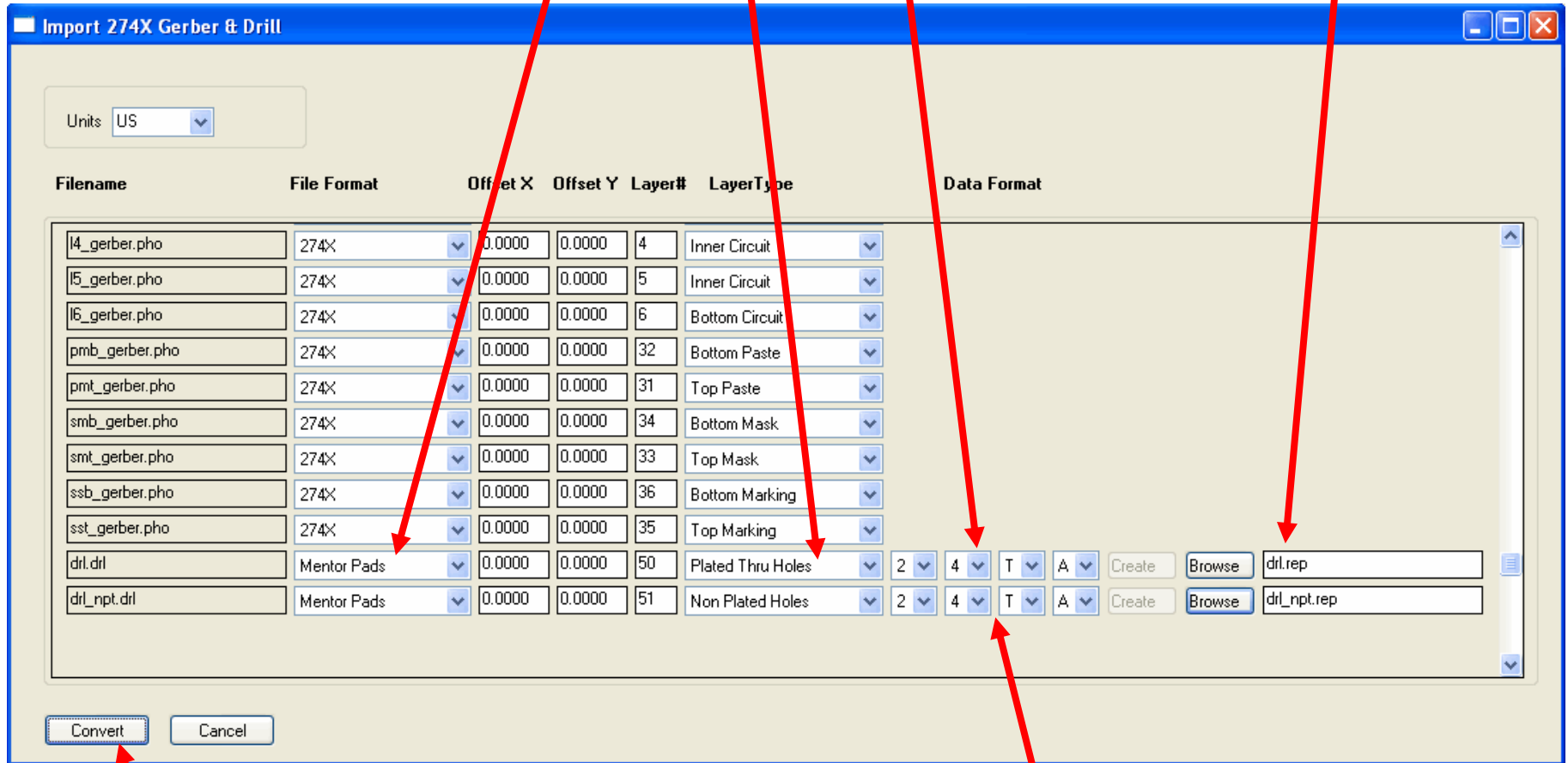| Filename	File Format	Offset X	Offset Y	Layer#	LayerType	Da
b_outline.pho	274X	0.0000	0.0000	90	Outline	
l1_gerber.pho	274X	0.0000	0.0000	1	Top Circuit	
l2_gerber.pho	274X	0.0000	0.0000	2	Inner Circuit	
l3_gerber.pho	274X	0.0000	0.0000	3	Inner Circuit	
l4_gerber.pho	274X	0.0000	0.0000	4	Inner Circuit	
l5_gerber.pho	274X	0.0000	0.0000	5	Inner Circuit	
l6_gerber.pho	274X	0.0000	0.0000	6	Bottom Circuit	
pmb_gerber.pho	274X	0.0000	0.0000	32	Bottom Paste	
pmt_gerber.pho	274X	0.0000	0.0000	31	Top Paste	
smb_gerber.pho	274X	0.0000	0.0000	34	Bottom Mask	
smt_gerber.pho	274X	0.0000	0.0000	33	Top Mask	
ssb_gerber.pho	274X	0.0000	0.0000	36	Bottom Marking	
sst_gerber.pho	274X	0.0000	0.0000	35	Top Marking	

Convert   Cancel

Bottom half of a completed file import list.
Note the Drill file format choices, layer type, data format and drill tool assignment files

**Import 274X Gerber & Drill**

Units US

Filename	File Format	Offset X	Offset Y	Layer#	LayerType	Data Format
l4_gerber.pho	274X	0.0000	0.0000	4	Inner Circuit	
l5_gerber.pho	274X	0.0000	0.0000	5	Inner Circuit	
l6_gerber.pho	274X	0.0000	0.0000	6	Bottom Circuit	
pmb_gerber.pho	274X	0.0000	0.0000	32	Bottom Paste	
pmt_gerber.pho	274X	0.0000	0.0000	31	Top Paste	
smb_gerber.pho	274X	0.0000	0.0000	34	Bottom Mask	
smt_gerber.pho	274X	0.0000	0.0000	33	Top Mask	
ssb_gerber.pho	274X	0.0000	0.0000	36	Bottom Marking	
sst_gerber.pho	274X	0.0000	0.0000	35	Top Marking	
drl.drl	Mentor Pads	0.0000	0.0000	50	Plated Thru Holes	2 ▾ 4 ▾ T ▾ A ▾ Create Browse drl.rep
drl_npt.drl	Mentor Pads	0.0000	0.0000	51	Non Plated Holes	2 ▾ 4 ▾ T ▾ A ▾ Create Browse drl_npt.rep

Convert   Cancel

Data format fields (in this case 2 4 T A) mean....
2=leading digits 4=trailing digits T=trailing suppression A=absolute reference
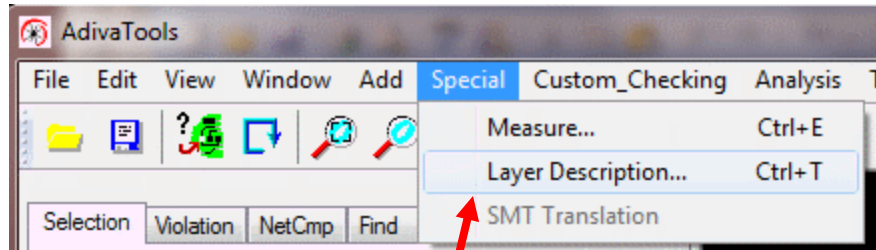L=leading suppression I=incremental reference

When everything is defined,
select **Convert** to build the ADIVA database

After conversion, select desired layers to view and Fit graphics to the screen
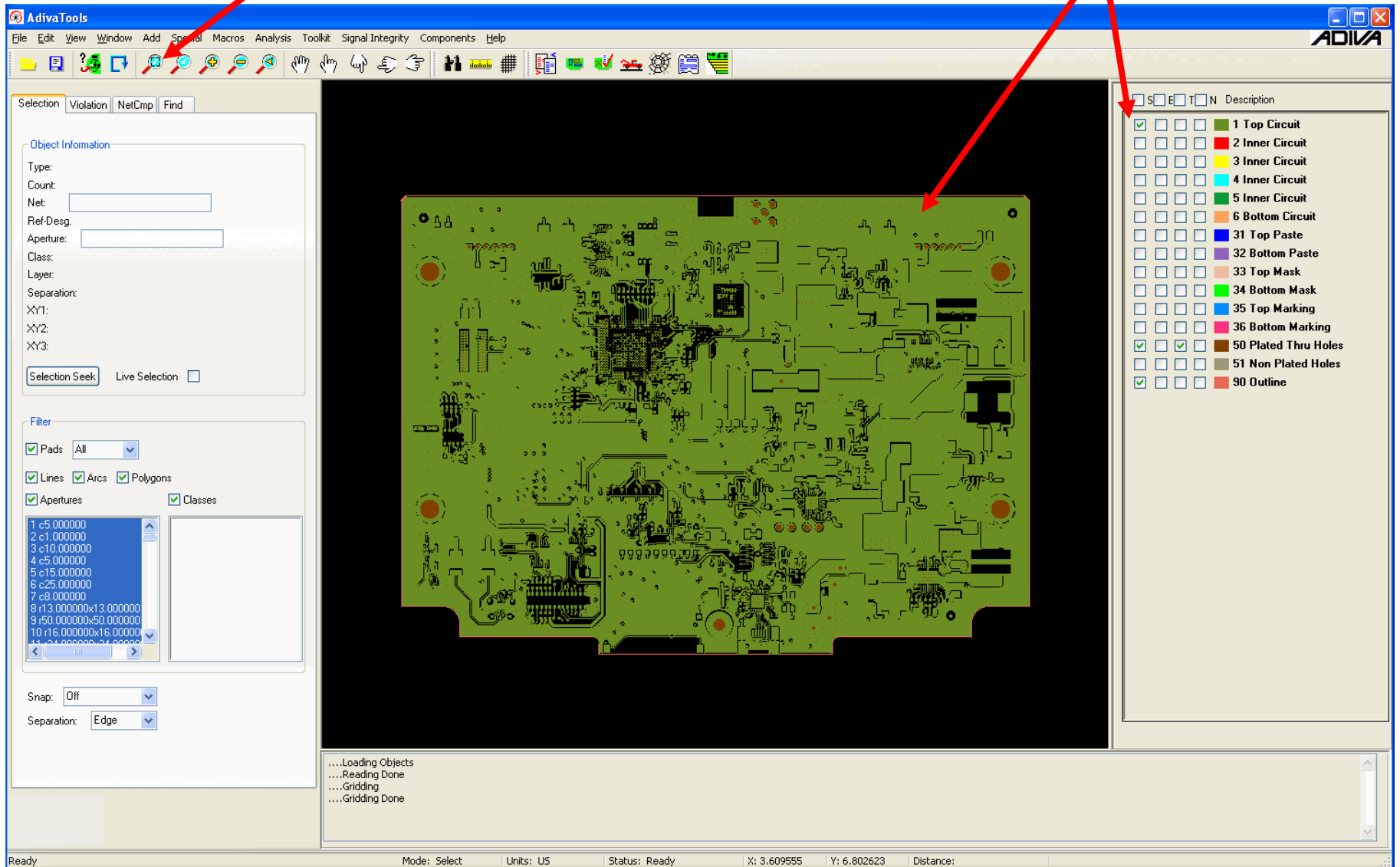
# Step 2

Layer Description

Next, if the **Layer Description** dialog is not already open then under the **Special** menu choose **Layer Description**.

Even though layers were defined earlier, there is more detail required to fulfill needs associated with DRC checks, Netlist Compare, etc…

Initial opening of the **Layer Description** dialog will look like the below image….

Adjustments may need to be made to further define layers

Note that the below image shows Z-Position values all set to zero. In certain cases, these values will be automatically defined such that each layer is 10 mils apart. This is a standard default value and should only need to be modified if the user has exact values to enter. More details regarding Z position are on the next page…
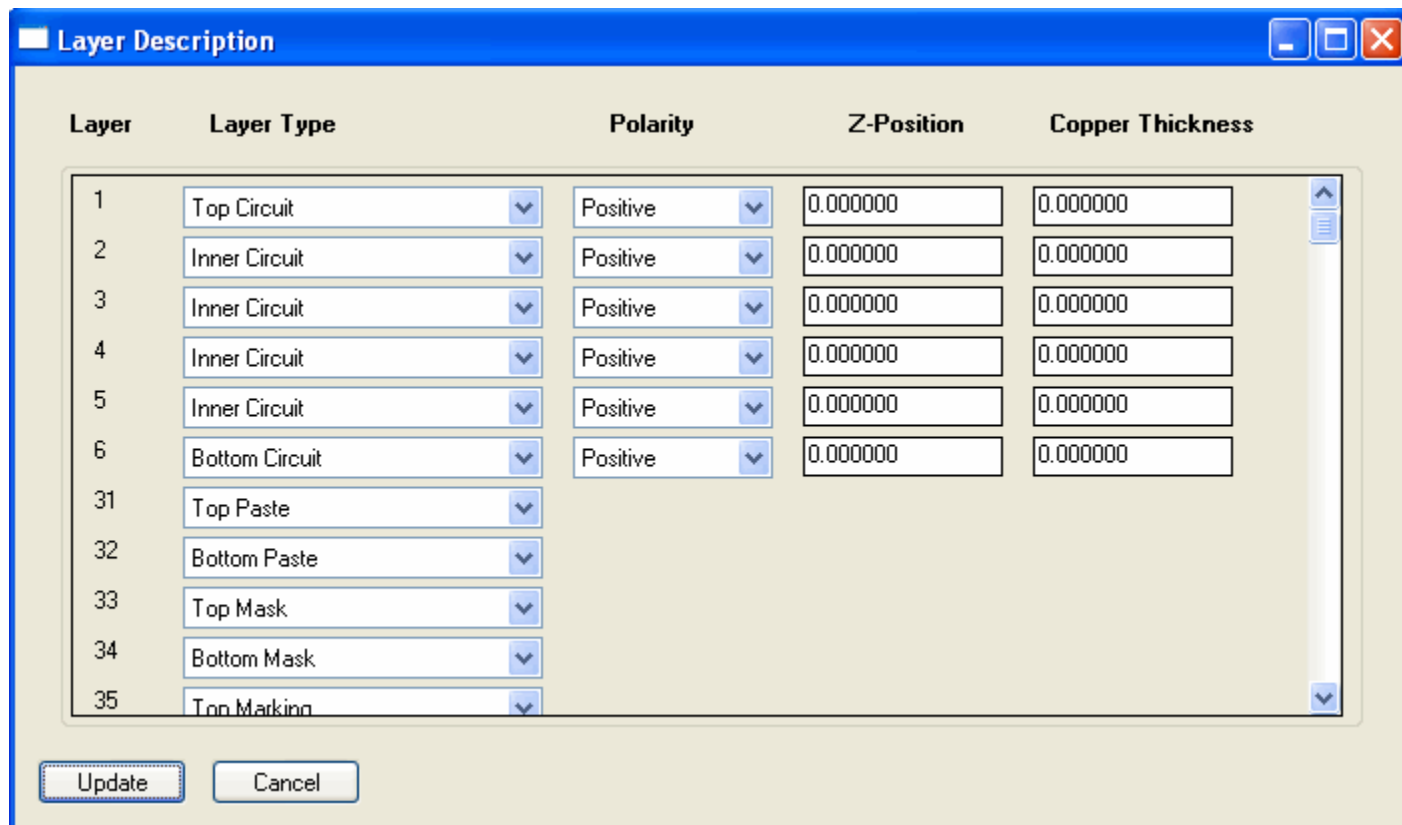
Z-Position defines the stackup – layer to layer dimension referenced from the top layer which should always be "0".

A couple of DRC checks (ie: Aspect Ratio) require this to be <u>absolutely</u> accurate (but most do not) otherwise a reasonable value is fine. Adiva inserts a default spacing value of 10 mils.

Polarity of an artwork layer is very important

Verify that layer types are correct. some may need to be changed slightly.

All aspects of AdivaTools require that each layer have its own unique value – value is in mils or mm.

Layer Description

Layer	Layer Type	Polarity	Z-Position	Copper Thickness
1	Top Circuit	Positive	0.000000	0.000000
2	Plane	Negative	10	0.000000
3	Inner Circuit	Positive	30	0.000000
4	Inner Circuit	Positive	35	0.000000
5	Plane	Negative	50	0.000000
6	Bottom Circuit	Positive	60	0.000000
31	Top Paste			
32	Bottom Paste			
33	Top Mask			
34	Bottom Mask			
35	Top Marking			

Update   Cancel

Copper Thickness can usually be left at the value "0"

Never leave these values all set to "0" only the top layer should be "0"

Select **Update** when complete

If Buried / Blind Vias or Back Drills are used in a design, then it is the **Layer Description** dialog that defines the start and end drill mapping for the drills.

The value entered is the Z-Position value assigned to the layers involved
– it is **<u>NOT</u>** the layer number.
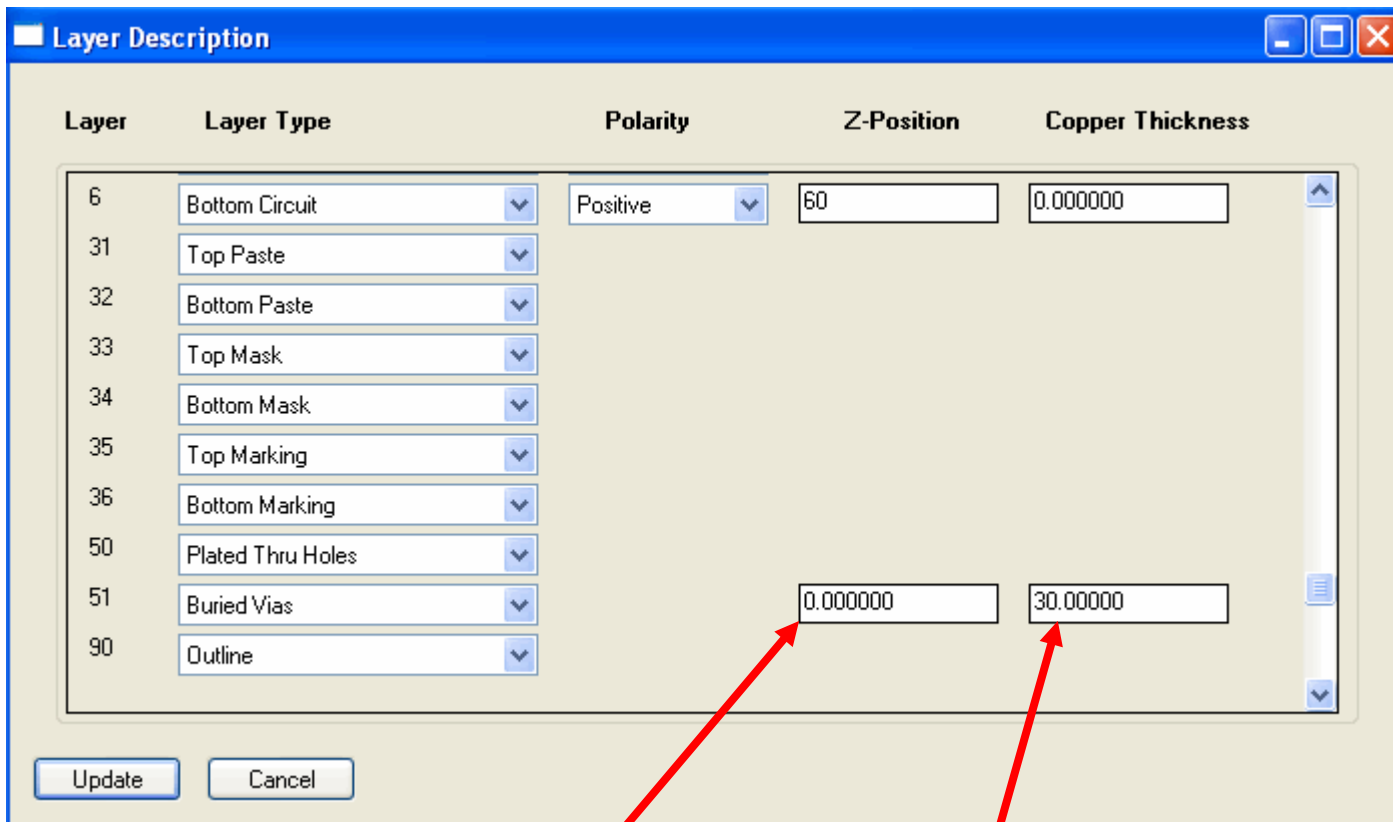
This is the Z-Position of the start layer   This is the Z-Position of the end layer

Step 3
Database Preparation - Editing

With a built database, there may be several other functions that need to be completed to prepare a design for DRC analysis. These functions may require some light editing of the data. They include….

    Layer Alignment
    Board Outline creation
    Splitting Non-Plated Holes away from Plated Holes onto their own layer
    Removing Title Blocks, Coupons, etc

If this is the case, reference the **ADIVA Data Editing Guide** for details on how to edit for these requirements.

Then continue the process of prepping data for analysis….

Step 4

Gerber Netlist Extraction
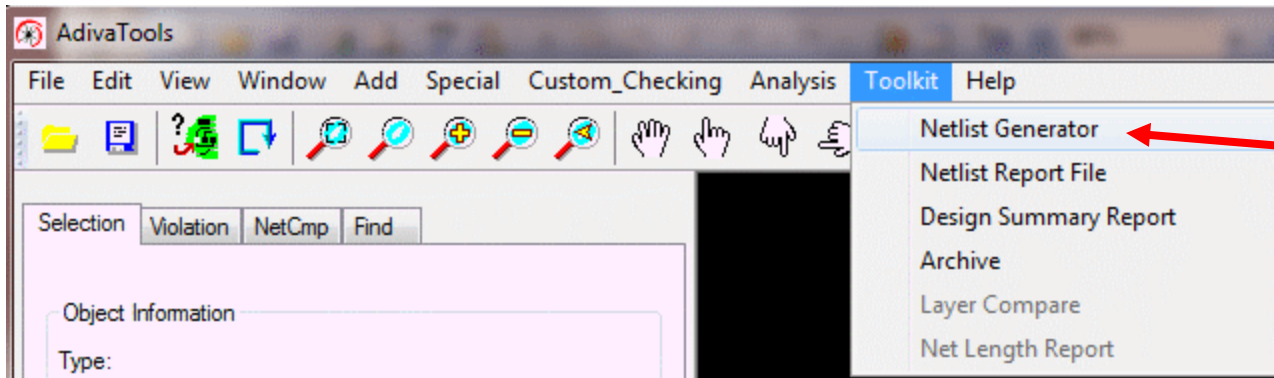
Select **Netlist Generator** from **Toolkit** Menu

When netting of Gerber is complete, "Process Finished" will be displayed in message box

....Adding positive objects
....Writing Nets
.... (0 Power/Ground Nets - 788 Signal Nets)

....Netting: ** Normal Termination **....Process Finished.
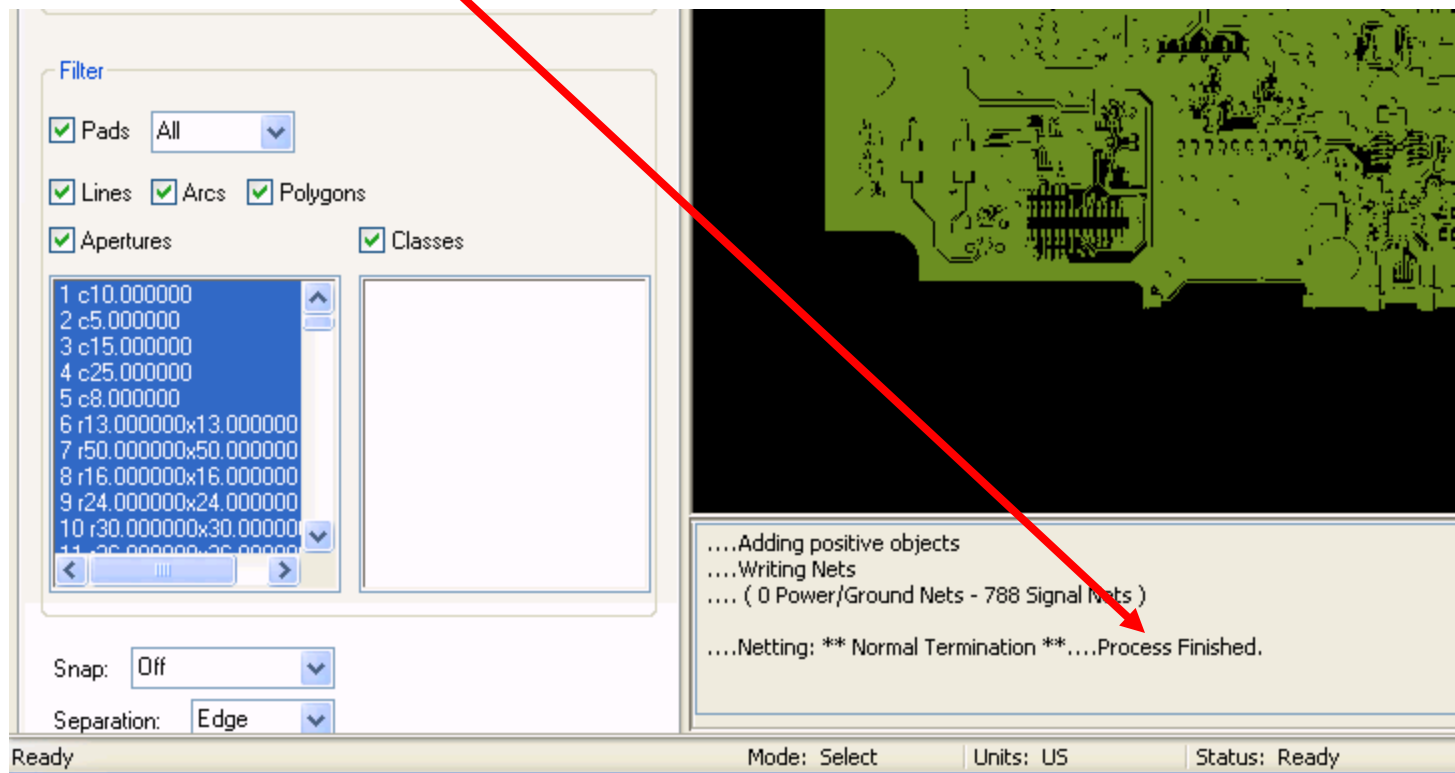
Step 5

Netlist Compare

(See the ADIVA CAD Netlist Comparison Guide
for further details of this process)
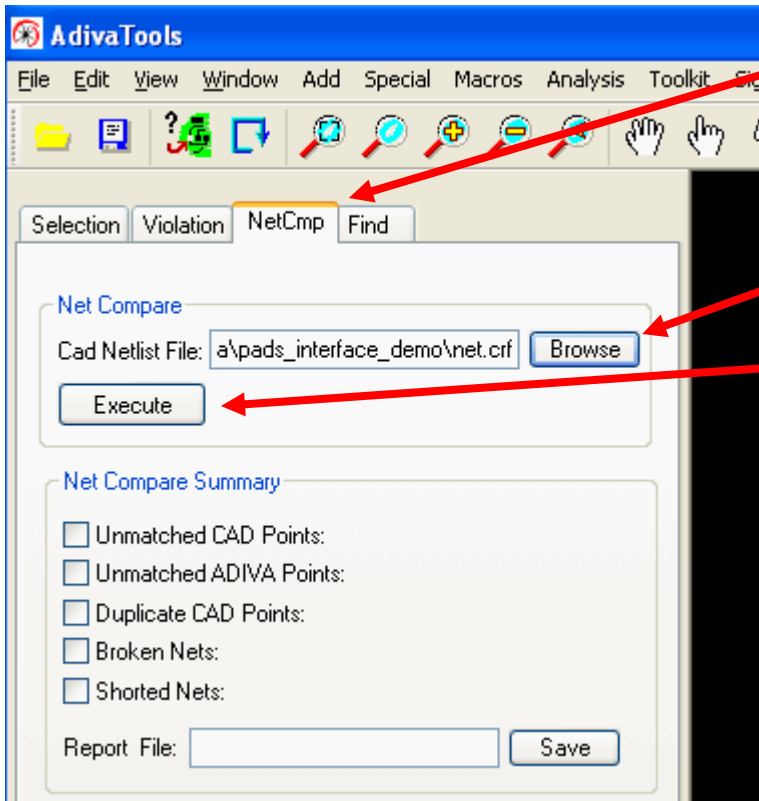
Select the NetCmp tab

Browse and select the "net.crf" file for this job

Execute the Net Compare Routine
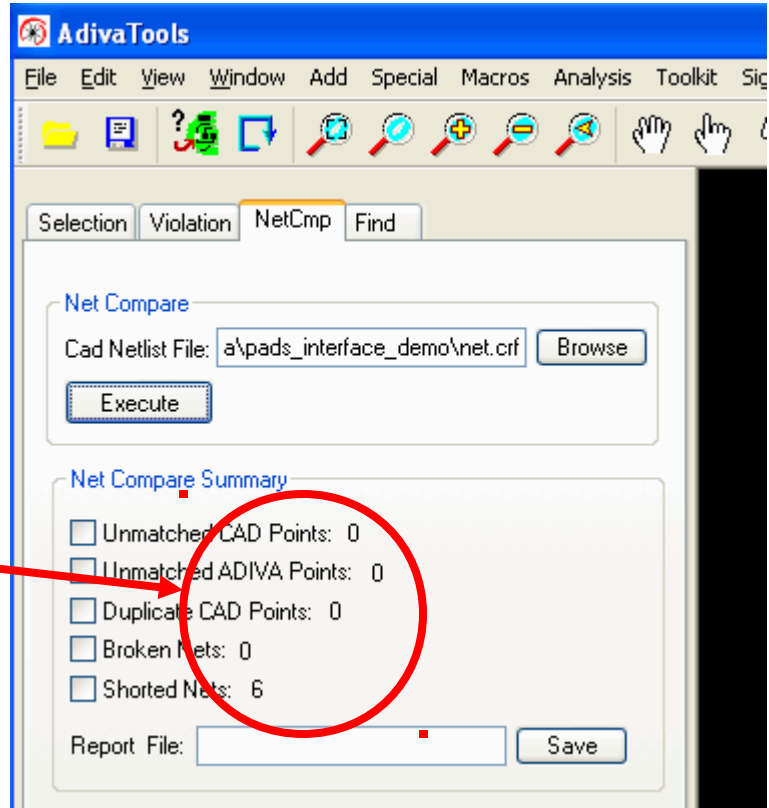
When Net Compare completes, a summary will appear describing any issues

Step 1: Choose the Summary Item to Review

Step 2: Scroll to Review Problems and select one to see

Turn on Layer(s)
Redraw or Zoom
if Needed

Highlight toggles on or off the selected netname

Step 3: Select "Show Errors"
to get idea where problem is

Select a pin to bulls-eye its location
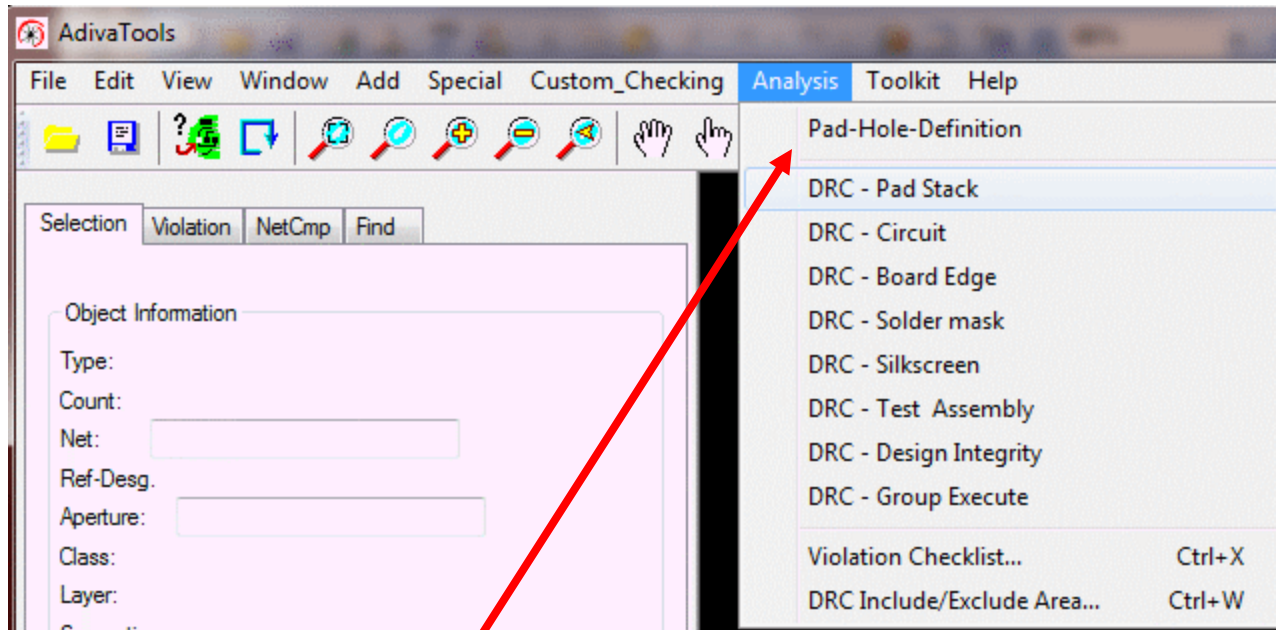
Copyright © 2021 – Adiva Corporation

Uncheck All Summary Items to "exit" Net Compare

Step 6

Pad / Hole Definition

Adds Pad "FUNCTION" Intelligence to Database

Pad / Hole Definition needed to identify Pad and Hole types
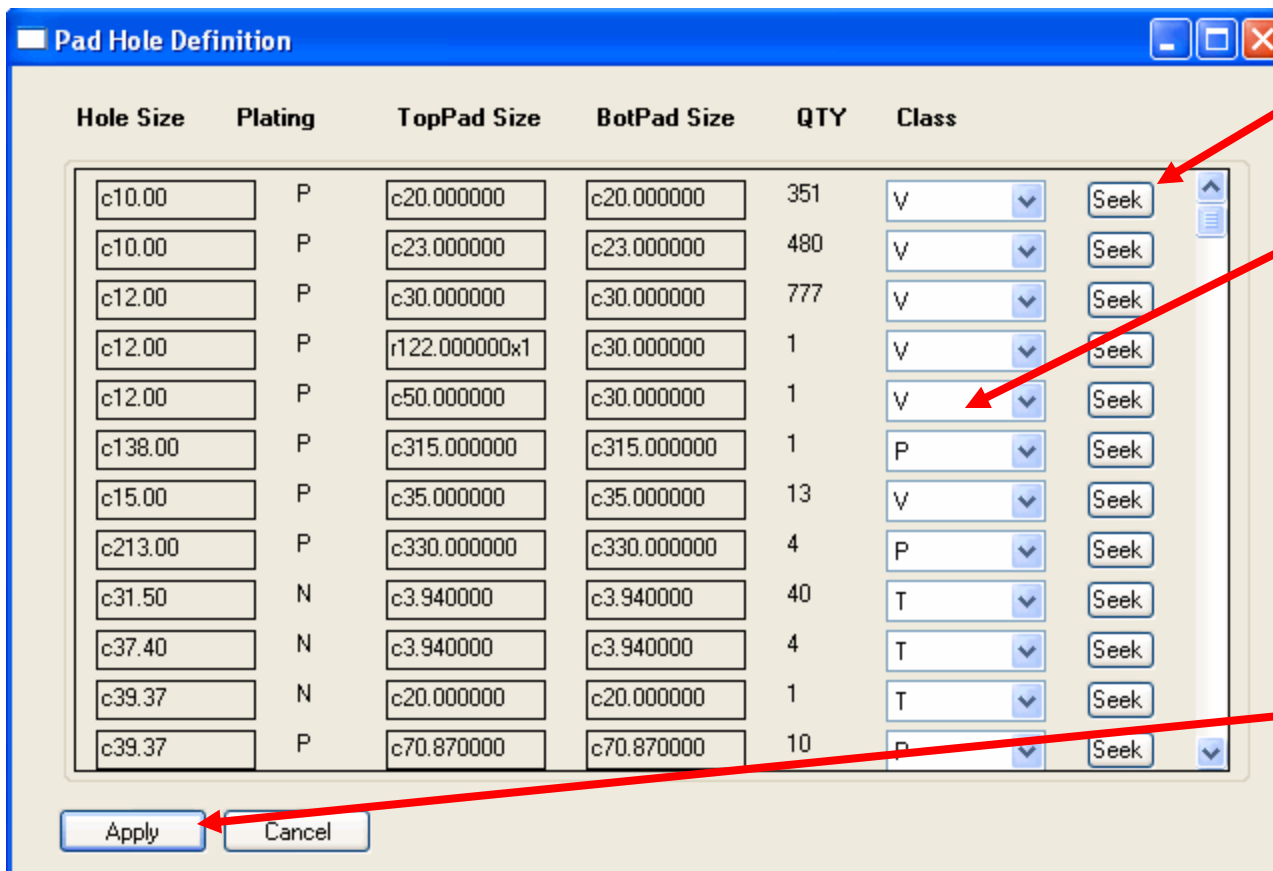so that various checks can be run accurately

Select **Analysis > Pad-Hole Definition** to start the function…

Review the "stackups" that are created by zooming in on Layer 1
And selecting the "Seek" button for each Padstack Type. Watch the screen jump
to the next "seek"

NOTE: Only 1 or 2 "seeks" per padstack type is needed to determine if the
Default choice is correct.

Do a quick glance at each one, adjust if needed (usually not needed) then move on
to the next one – don't let this process take more than a few minutes!

Pad Hole Definition

Hole Size	Plating	TopPad Size	BotPad Size	QTY	Class	
c10.00	P	c20.000000	c20.000000	351	V	Seek
c10.00	P	c23.000000	c23.000000	480	V	Seek
c12.00	P	c30.000000	c30.000000	777	V	Seek
c12.00	P	r122.000000x1	c30.000000	1	V	Seek
c12.00	P	c50.000000	c30.000000	1	V	Seek
c138.00	P	c315.000000	c315.000000	1	P	Seek
c15.00	P	c35.000000	c35.000000	13	V	Seek
c213.00	P	c330.000000	c330.000000	4	P	Seek
c31.50	N	c3.940000	c3.940000	40	T	Seek
c37.40	N	c3.940000	c3.940000	4	T	Seek
c39.37	N	c20.000000	c20.000000	1	T	Seek
c39.37	P	c70.870000	c70.870000	10	P	Seek

Apply   Cancel

If default choice requires
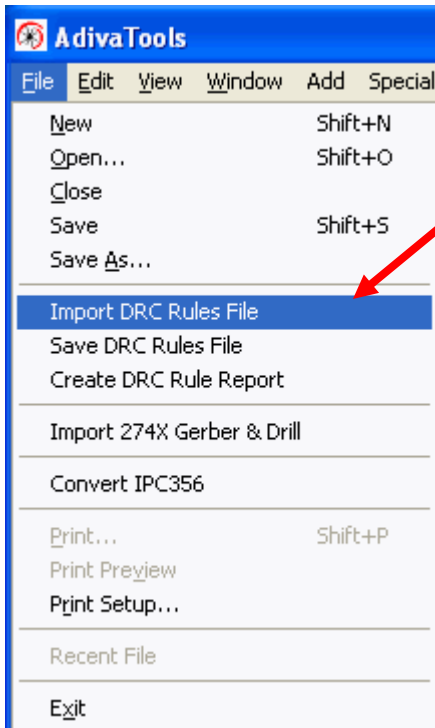adjustment, adjust as needed
to one of the following options…

V = Via
S = SMT
P = Pin -Thru hole
C = Cosmetic (no real function)
 t = test point
T = Non-Plated Hole
F = fiducial

Select **Apply** to finish routine

Step 7

Load DRC Check Rules
(See ADIVA Running DRC Checks Guide for more details)

Select **File > Import DRC Rules** to bring in a master set of rules that you may have created.

Typically these are stored in the c:\adiva\data directory

In this case, load a file called "**95_example.rul**" which is a basic set of IPC rules and industry standards that ADIVA supplies with all installations.

You can skip this function if all you need to do is set a few rules in a menu and run checks.... The DRC check menus will appear blank ready for value entries.

Step 8

DRC Checks
(See ADIVA Running DRC Checks Guide for more details)
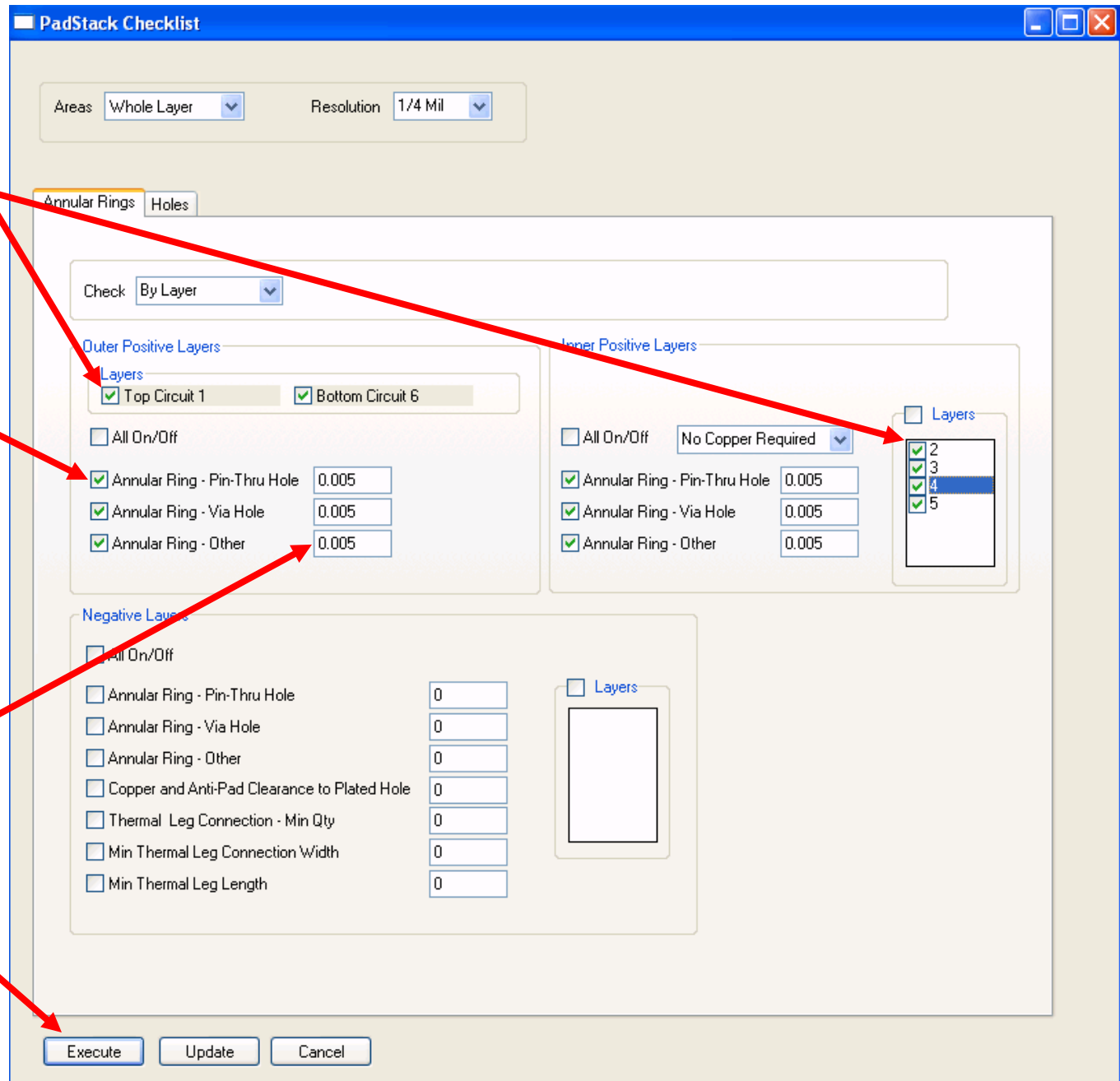
Check ON layers to review

Check ON checks to run

Values are in inches or mm
5-mil space = 0.005 value

Execute to start checks

PadStack Checklist

Areas [Whole Layer ▾]   Resolution [1/4 Mil ▾]

Annular Rings | Holes

Check [By Layer ▾]

Outer Positive Layers

Layers
☑ Top Circuit 1   ☑ Bottom Circuit 6

☐ All On/Off

☑ Annular Ring - Pin-Thru Hole   0.005
☑ Annular Ring - Via Hole   0.005
☑ Annular Ring - Other   0.005

Inner Positive Layers

☐ All On/Off   [No Copper Required ▾]

☑ Annular Ring - Pin-Thru Hole   0.005
☑ Annular Ring - Via Hole   0.005
☑ Annular Ring - Other   0.005

☐ Layers
☑ 2
☑ 3
☑ 4
☑ 5

Negative Layers

☐ All On/Off

☐ Annular Ring - Pin-Thru Hole   0
☐ Annular Ring - Via Hole   0
☐ Annular Ring - Other   0
☐ Copper and Anti-Pad Clearance to Plated Hole   0
☐ Thermal Leg Connection - Min Qty   0
☐ Min Thermal Leg Connection Width   0
☐ Min Thermal Leg Length   0

☐ Layers

[Execute] [Update] [Cancel]

Circuit Checklist

Areas: Whole Layer   Resolution: 1/4 Mil

Check: By Layer

Tabs: Outer | Inner | NegPlane

Outer Positive Layers

Layers
- ☑ Top Circuit 1   ☑ Bottom Circuit 8

☐ All On/Off

Checks

Check	Value	Check	Value
☑ Min Trace to Trace	0.004	☑ Min SMT to SMT	0.004
☑ Min Trace to Pad	0.004	☑ Min SMT to SMT (Same Net)	0.004
☑ Min Trace to ViaPad	0.004	☑ Min ViaPad to ViaPad	0.004
☑ Min Trace to SMT	0.004	☑ Min ViaPad to SMT	0.004
☑ Min Trace to TestPad	0.004	☑ Min ViaPad to SMT (Same Net)	0.004
☑ Min Pad to Pad	0.004	☑ Min ViaPad to TestPad	0.004
☑ Min Pad to Pad (Same Net)	0.004	☑ Min TestPad to TestPad	0.004
☑ Min Pad to ViaPad	0.004	☑ Min TestPad to SMT	0.004
☑ Min Pad to TestPad	0.004	☑ Min TestPad to SMT (Same Net)	0.004
☑ Min Pad to SMT	0.004	☑ Min Back-Drill to Trace	0.012
☑ Min Pad to SMT (Same Net)	0.004	☑ Min Back-Drill to Pad (any type)	0.012
☑ Min Copper to Fiducial	0.02	☑ Min Trace Width	0.004
☑ Min Fiducial Barrel	0.02	☐ Min Trace Connection Width	
☑ Min Copper to Board Edge	0.02	☐ Min Resist Sliver	0
☑ Min Trace to Non-Plated-Hole	0.02	☑ Min Acid Trap ☑ Traces Only	3
☑ Min Pad (any type) to Non-Plated-Hole	0.02	☐ Min Trace Angle	135

Buttons: Execute | Update | Cancel

Some checks don't use mils for a value…

This is pixels

This is degrees

Step 9

Violation Review

(See ADIVA Running DRC Checks Guide for more details)

The Violation Checklist appears when checks are completed

The Checklist can also be opened while checks are running by selecting its Toolbar Icon

Violations are displayed by concern level as defined by the range setting

Save violations to a file to read back and review later

Violation Checklist Report

Adjust Violation Range

Violation File: ./my_violation_file.vio

Save Violation File   Read Violation File   Browse

Choose Violations to View...

	Critical		Concern		Tol	Accepted	Param	Layer	Seq	Violation Type	Comment
	12		0		0					Thermal Leg Connection - Min Qty	
	12		0		0	0	4.00000	4	34	Thermal Leg Connection - Min Qty	
	12		0		0	0	4.00000	7	36	Thermal Leg Connection - Min Qty	
✓	7	✓	0	✓	0	0	0.00500	2	17	Annular Ring - Via Hole	
✓	7		0		0	0	0.00500	4	18	Annular Ring - Via Hole	
✓	7		0		0	0	0.00500	7	20	Annular Ring - Via Hole	
✓	7		0		0	0	4.00000	5	35	Thermal Leg Connection - Min Qty	
✓	4		0		0	0	0.00500	5	19	Annular Ring - Via Hole	
	2		0		0	0	0.00500	2	21	Annular Ring - Other	
	2		0		0	0	0.00500	4	22	Annular Ring - Other	

Delete Selected Violations   Clear Accepted Violation File

Close Violation Checklist   Save Violation Summary Report

Choose a **Violation Type** and amount to review by using **ViolSeek** on the main user interface

Select **Close Violation Checklist** to close the dialog (violations are not lost)

Adjusting the **Violation Range** effects violation count distribution in the **Violation Checklist**. The values listed for each range analyze how close a violation comes to the parameter to determine the category a particular violation will be placed. Changes take effect on **Update**.

For example…. given the range values shown, if a check parameter is 0.005 and the violation amount is 0.00480 – this violation amount falls within ¼ Mil of the parameter categorizing the violation as "**Tolerance**". If the violation amount is 0.0046 – this makes the violation amount fall between ¼ and ½ mil of the parameter making it a "**Concern**" violation.
Anything else is deemed "**Critical**".

Violations can be **sorted** by selecting the column button above each data column.
First selection sorts high to low, second sorts low to high, third sorts high to low again…

Check all boxes on for a violation type to **Delete** or **Save** from list

Creates a text summary report of all DRC violations. These violations are itemized by violation amounts and sorted by type. Creation of the file can be either in ASCII ".txt" file format or in a comma-delimited spreadsheet-ready format.

Empties all data contained in the "approved.vio" file. All **Accepted** violations are returned to the **Violation Checklist** for review or deletion.

This column shows the checking sequence
which is the order the checks were performed

Violation Checklist Report

Adjust Violation Range

Violation File: ./my_violation_file.vio

Save Violation File   Read Violation File   Browse

Choose Violations to View...

☐ Critical	☐ Concern	☐ Tol	Accepted	Param	Layer	Seq	Violation Type	Comment
☐ 30	☐ 0	☐ 0	0	0.00000	0	16	Annular Ring - Min Thru Hole	
☐ 12	☐ 0	☐ 0	0	4.00000	2	33	Thermal Leg Connection - Min Qty	
☐ 12	☐ 0	☐ 0	0	4.00000	4	34	Thermal Leg Connection - Min Qty	
☑ 12	☑ 0	☑ 0	0	4.00000	7	36	Thermal Leg Connection - Min Qty	Need to Review Again
☑ 6	☐ 0	☐ 0	1	4.00000	5	35	Thermal Leg Connection - Min Qty	Rvwd - 1 accepted
☑ 6	☐ 0	☐ 0	1	0.00500	2	17	Annular Ring - Via Hole	Rvwd - 1 accepted
☑ 6	☐ 0	☐ 0	1	0.00500	4	18	Annular Ring - Via Hole	Rvwd - 1 accepted
☑ 6	☐ 0	☐ 0	1	0.00500	7	20	Annular Ring - Via Hole	Rvwd - 1 accepted
☑ 4	☐ 0	☐ 0	0	0.00500	5	19	Annular Ring - Via Hole	
☐ 2	☐ 0	☐ 0	0	0.00500	2	21	Annular Ring - Other	

Delete Selected Violations   Clear Accepted Violation File

Close Violation Checklist   Save Violation Summary Report

Comments can be added to the checklist and saved to a Violation file. Enter any text and save the violation file – when the violation file is reloaded, these comments will display as they were entered
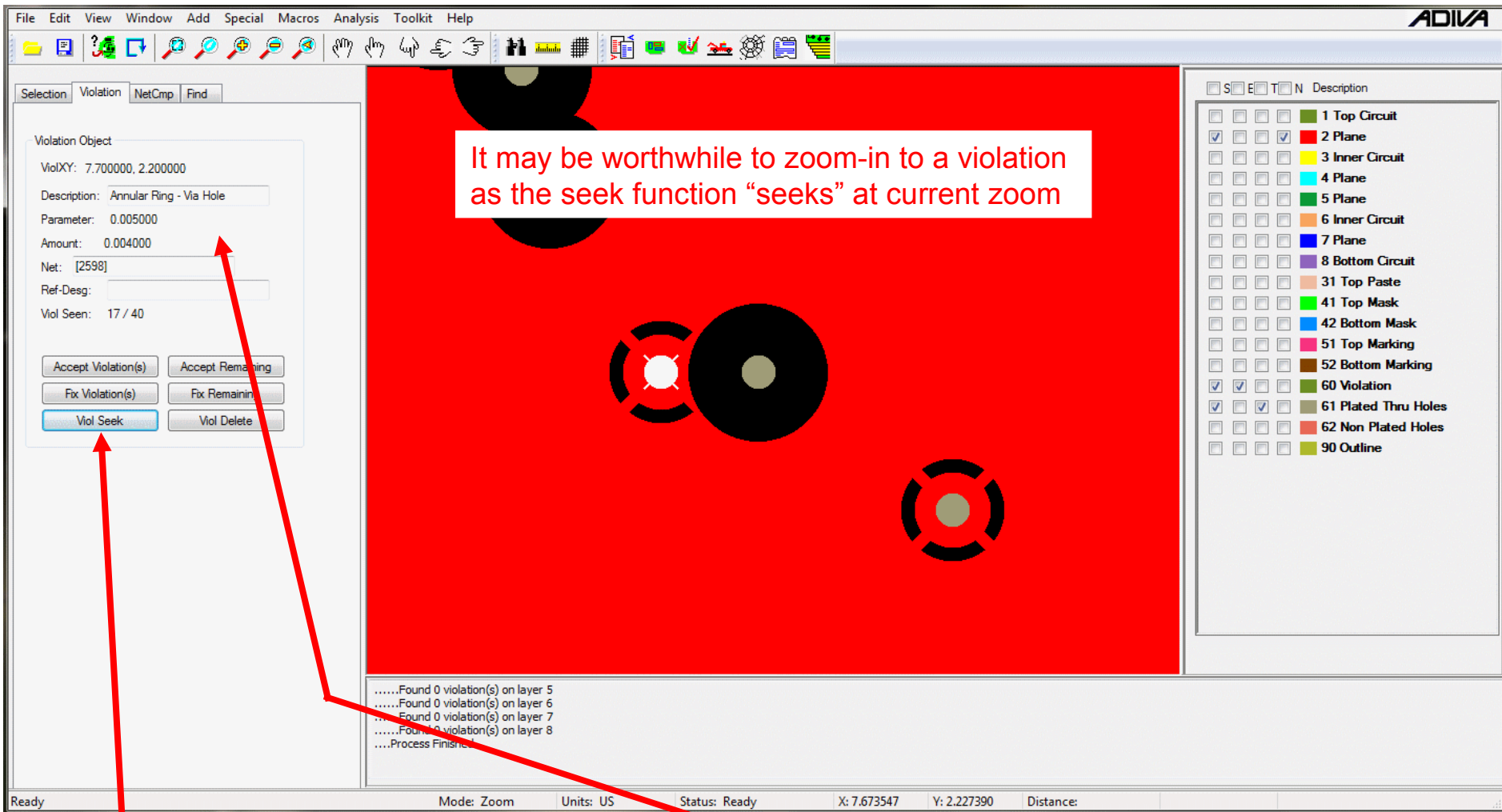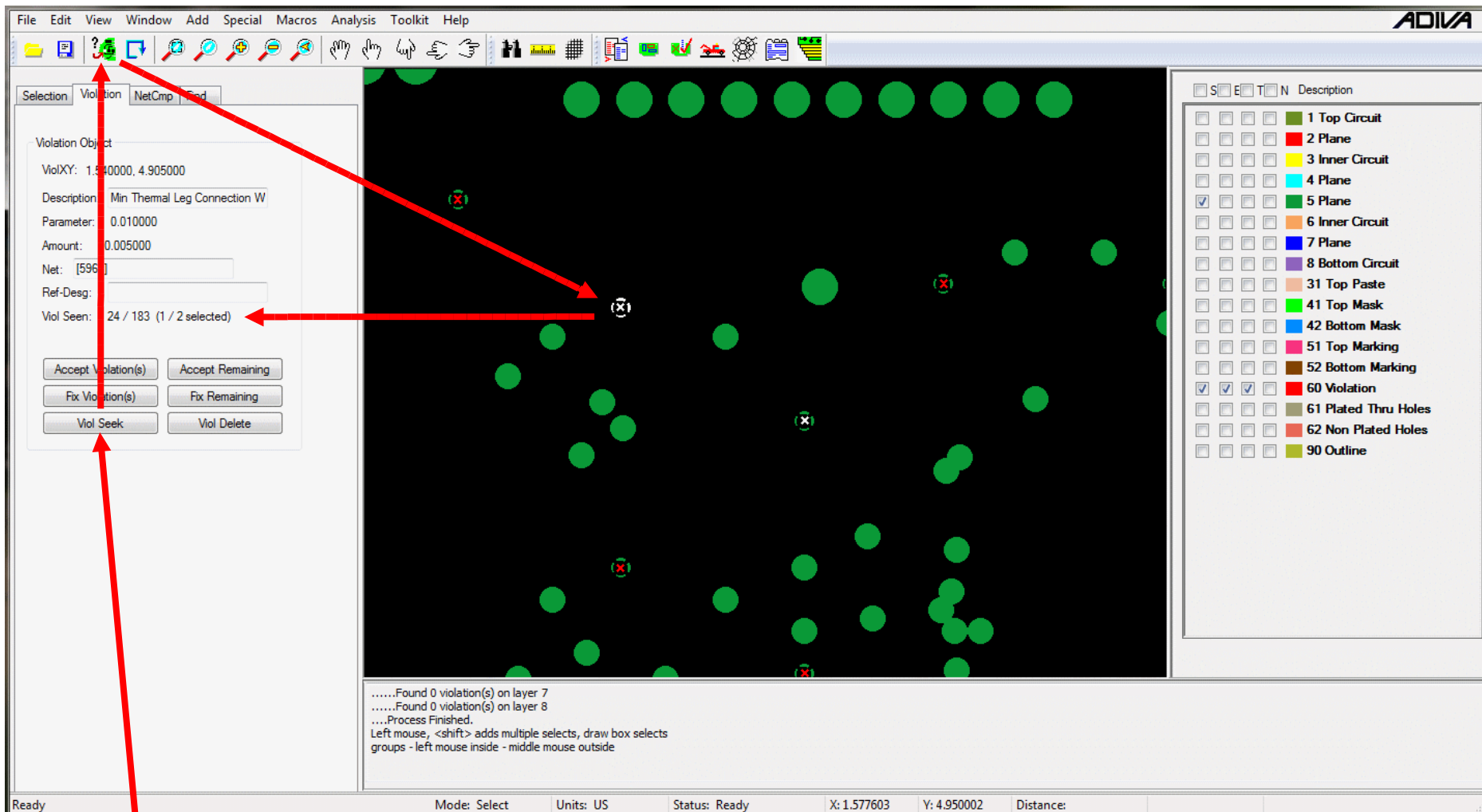
It may be worthwhile to zoom-in to a violation as the seek function "seeks" at current zoom

Violation details are shown here

Once a Violation Type is chosen for review,
select **Viol Seek** to review graphically the violations selected **<shift>Viol Seek** progresses backward

NOTE: Worst violations are always shown first

Individual or groups of violations can also be reviewed. **ViolSeek** to the first violation type selected in the **Violation Checklist,** choose the **Select** button then click on an individual violation or window-select a group of violations to review. Notice the **ViolSeen** list shows the qty selected

Read information on the one violation selected – or - **ViolSeek** again to review the group items selected. Choose **Select** again to un-select violations.

A violation (or group of violations) can be **Accepted** which removes the violation(s) from the "violation seek" list.

The violation(s) is(are) not removed – just marked so that the violation(s) is(are) not seen. Notice the violation count shown in the Violation Checklist adjusts to a lower number while the count for the **Accepted** violation(s) increases.
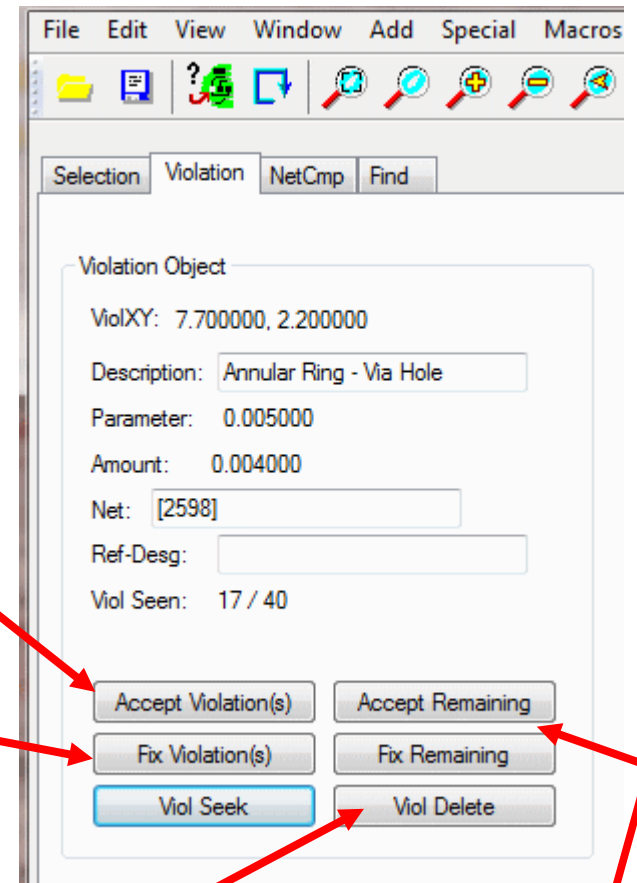
An "approved.vio" file is created in the DRC project directory containing accepted violations. This file can be used in future DRC analysis to filter already approved violations from a new design.

A violation (or group of violations) can be **Fixed** which creates a file in the DRC project directory called "fix.vio".

This file is typically a collection of violations that a reviewer is interested in having someone else review or fix the violation in a CAD system.

The "fix.vio" file can be read into specific CAD systems or read back into Adiva's **Violation Checklist** to review only the violations to be "fixed".

A violation (or group of violations) can be **Deleted** removing it from the Violation Checklist results list.

File   Edit   View   Window   Add   Special   Macros

| Selection | Violation | NetCmp | Find |

Violation Object

VioIXY: 7.700000, 2.200000

Description: Annular Ring - Via Hole

Parameter: 0.005000

Amount: 0.004000

Net: [2598]

Ref-Desg:

Viol Seen: 17 / 40

Accept Violation(s)	Accept Remaining
Fix Violation(s)	Fix Remaining
Viol Seek	Viol Delete

Fixing or **Accepting** the **Remaining** violations adds the currently viewed violation and all those left to be seen into their appropriate .vio files

Violations can also be saved in a format suitable for web-browser display

Select the DRC Archive Icon for Web Creation

A DRC Archive dialog will appear…

Design Analysis Archive

Archive Directory	e_demo\.\pads_interface_demo-HTML
Archive Index File	index.htm
Part Number	123_23ASB
Revision	AA
Designer Name	Designer
Checker Name	Checker
Date	
Data Type	Error Data

Description

These Non-Plated Holes are too close...

Create   Cancel

Fill in items such as part number, revision, designer's and checker's name if desired then…

Add any custom notes to help communicate the issue…

Select **Create** to finish the DRC Archive

Leave this dialog open and select **Create** for other violations to be archived

To view violations that have been archived to HTML, navigate through Windows Explorer finding the Adiva HTML directory (should be under the main job directory) and double-click on "index.htm"….
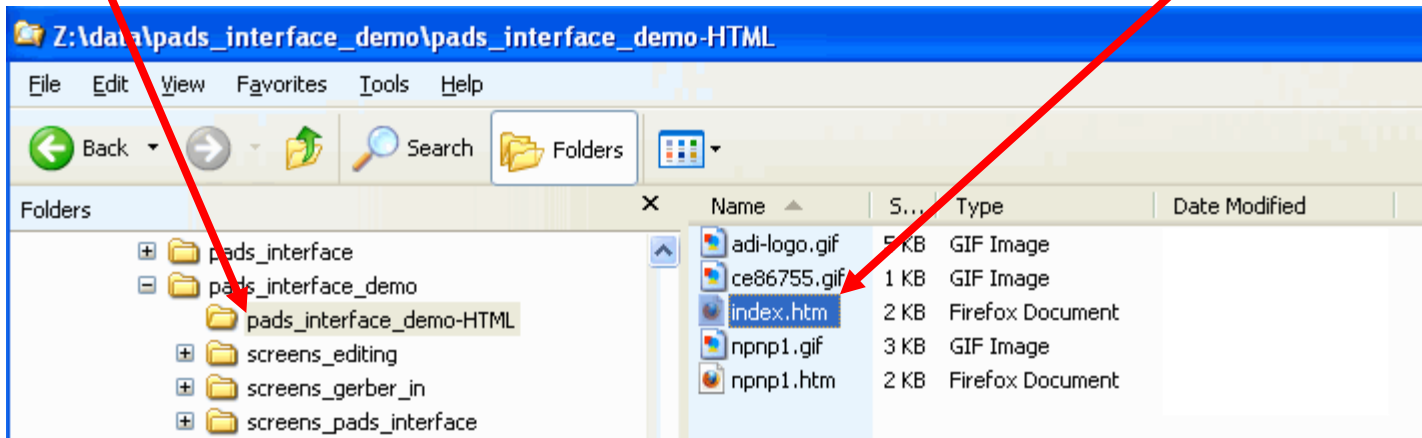
A web browser should open displaying a matrix of violations that have been archived.

Violations should be clearly described – click on one to see a graphic of the violation

Web browser should now show a graphic of the selected violation
including specific details about the violation…

Violation Description,
Check parameter,
Violation amount,
XY location,
Layer involved

Custom note
added from main dialog

Same graphic displayed
in AdivaTools DRC Violation
review

END
ADIVA Gerber / Drill Input
(Quick-Start User Guide)