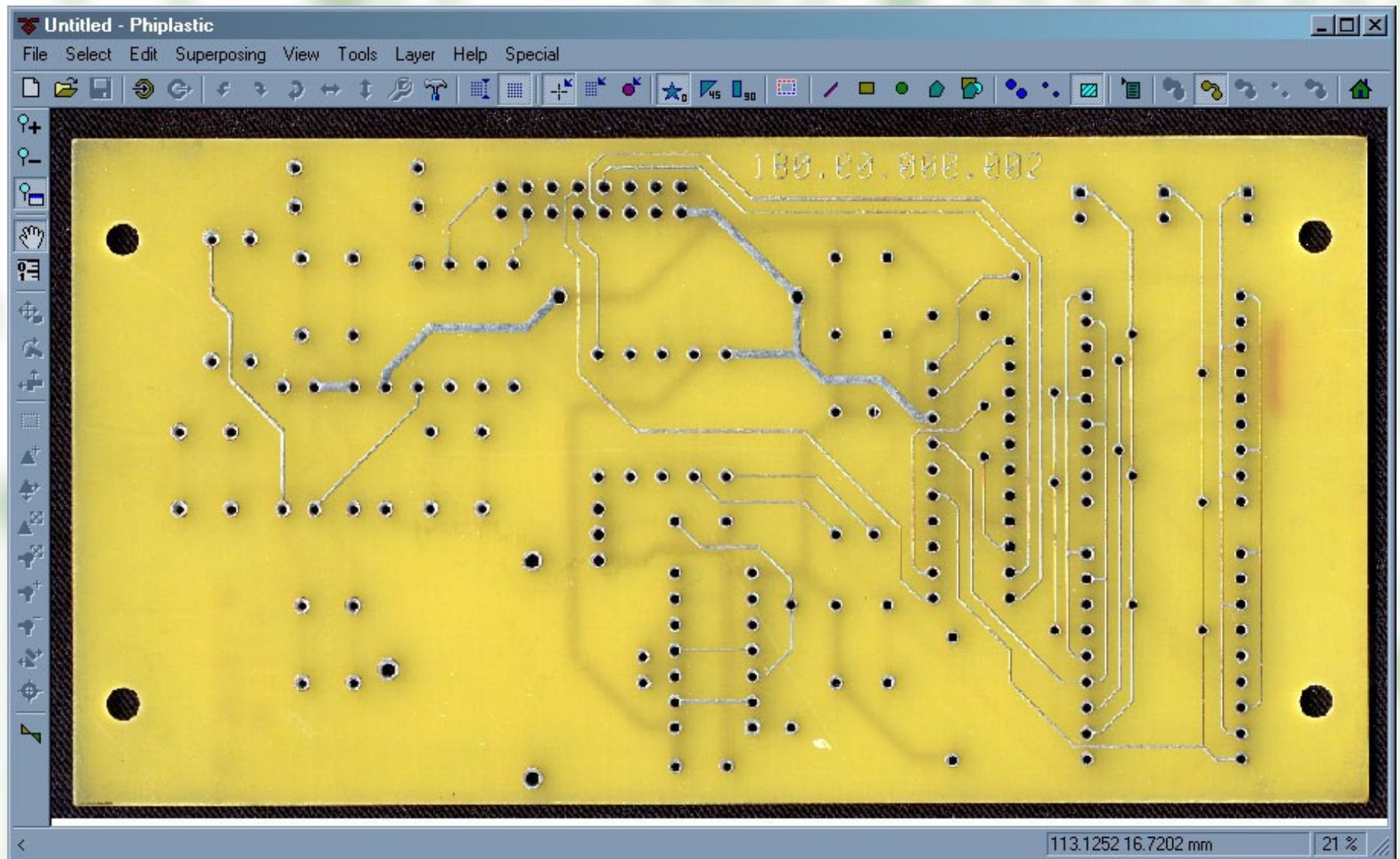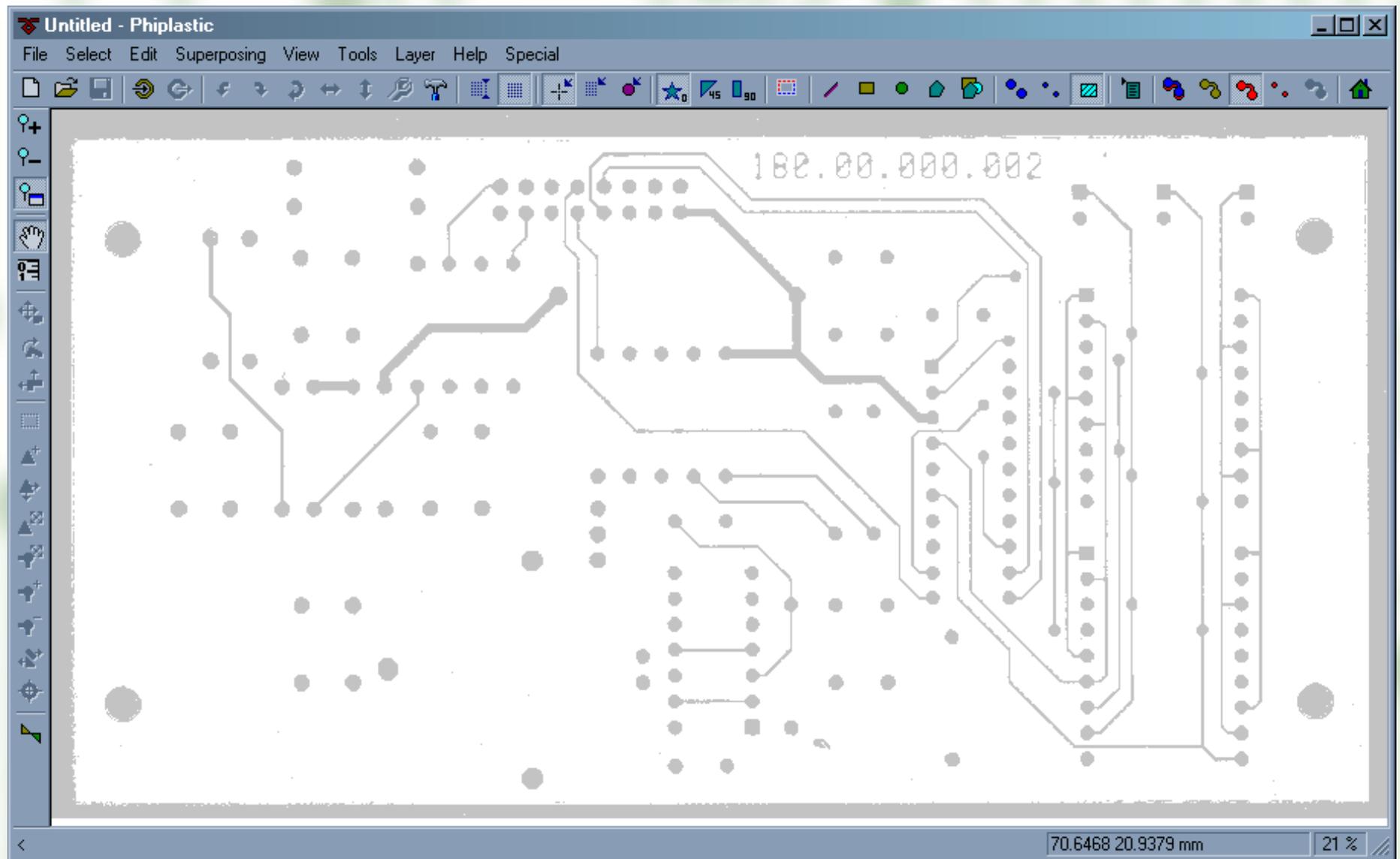# PHIPLASTIC

Vector
# vectoring system for printed boards

Main features:

- Automated circuit vectoring, using lines and pads;

- Automated hole vectoring;

- Creating and applying aperture lists;

- Eliminating the image tilt;

- Applying grids to size and position of primitives;

- Verification and correction of results with high level of automation;

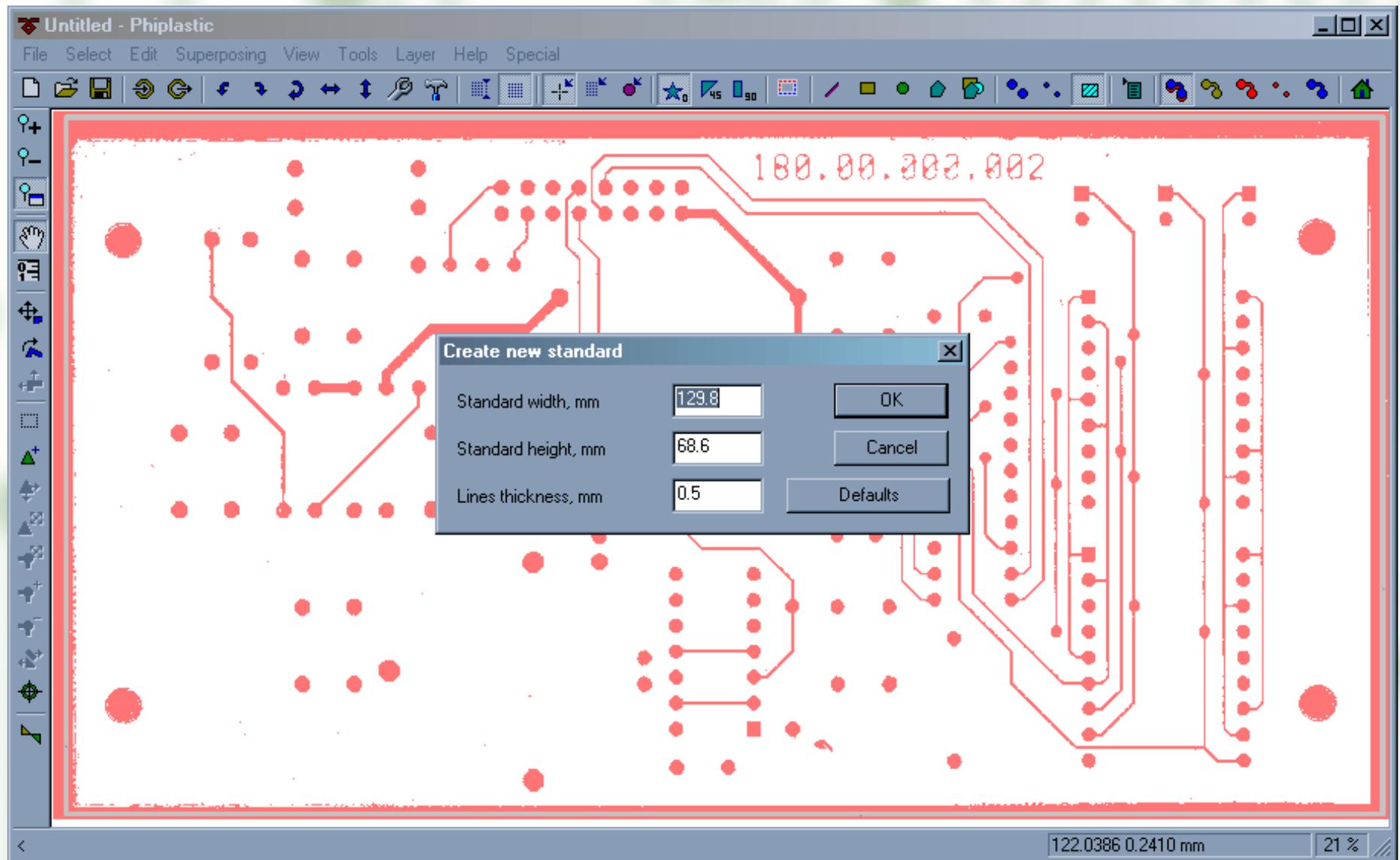- Data export for production or additional treatment;

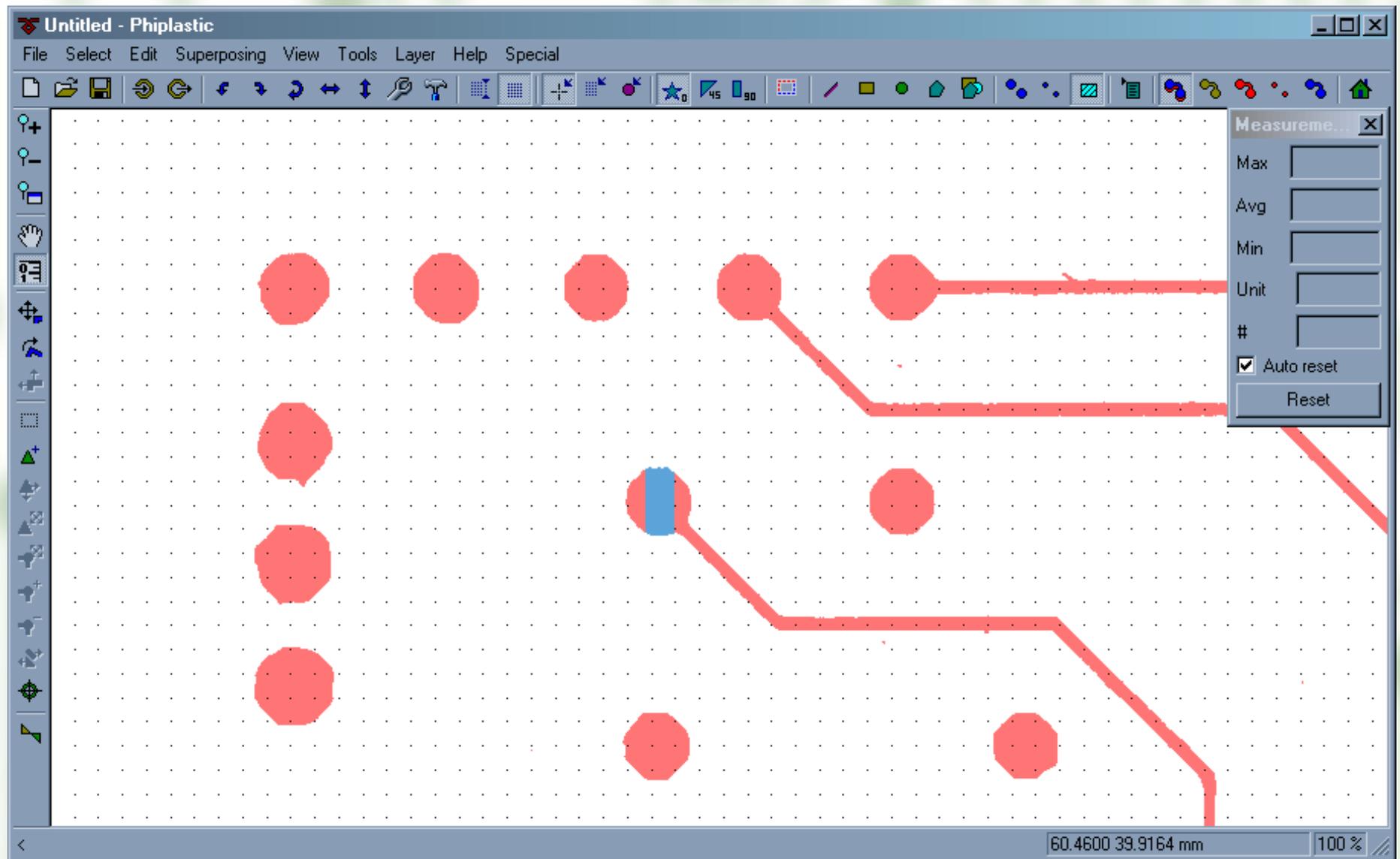PCB is scanned from Phiplastic program

Color image is transformed to black-and-white.
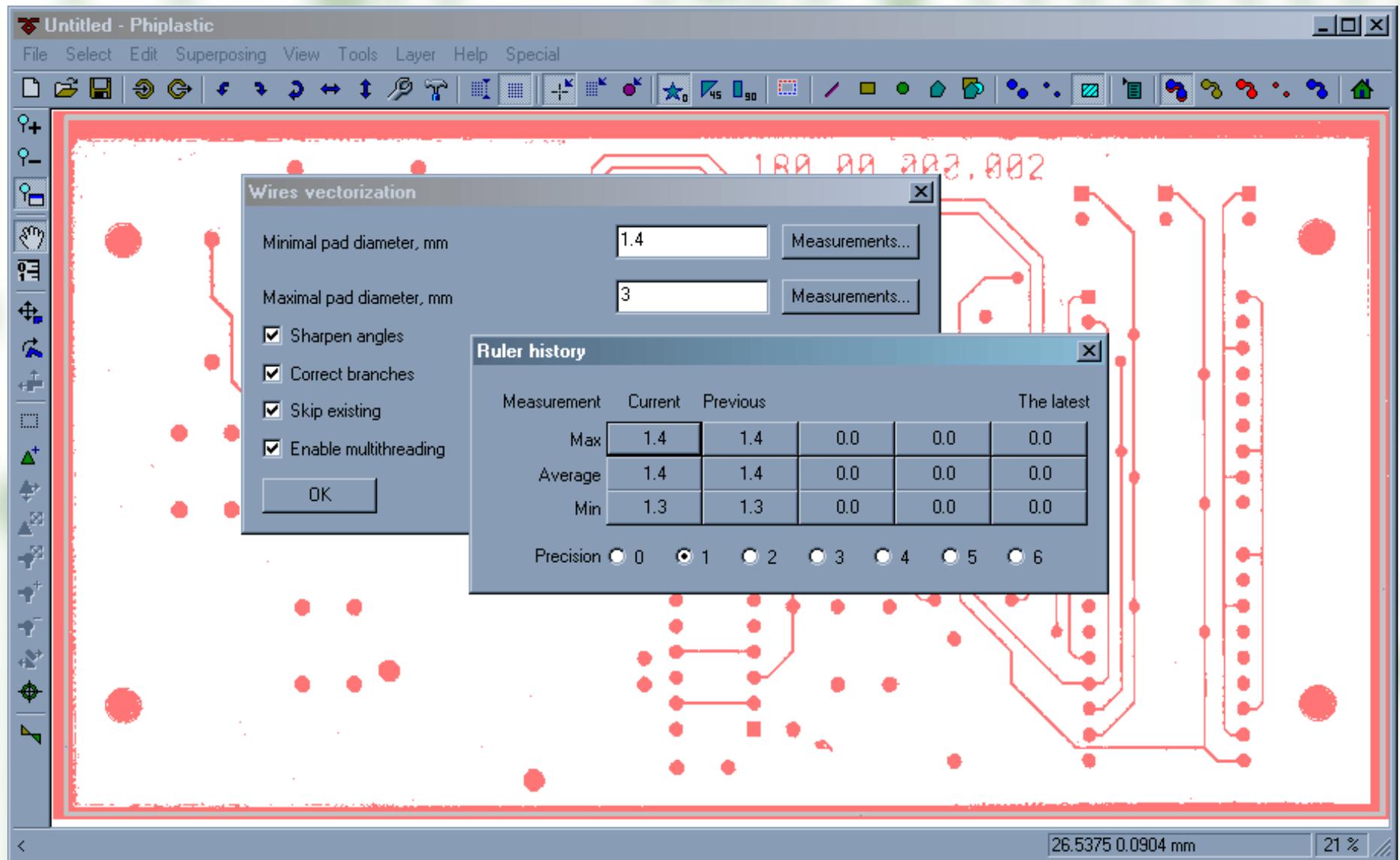Phiplastic Color deals with it.
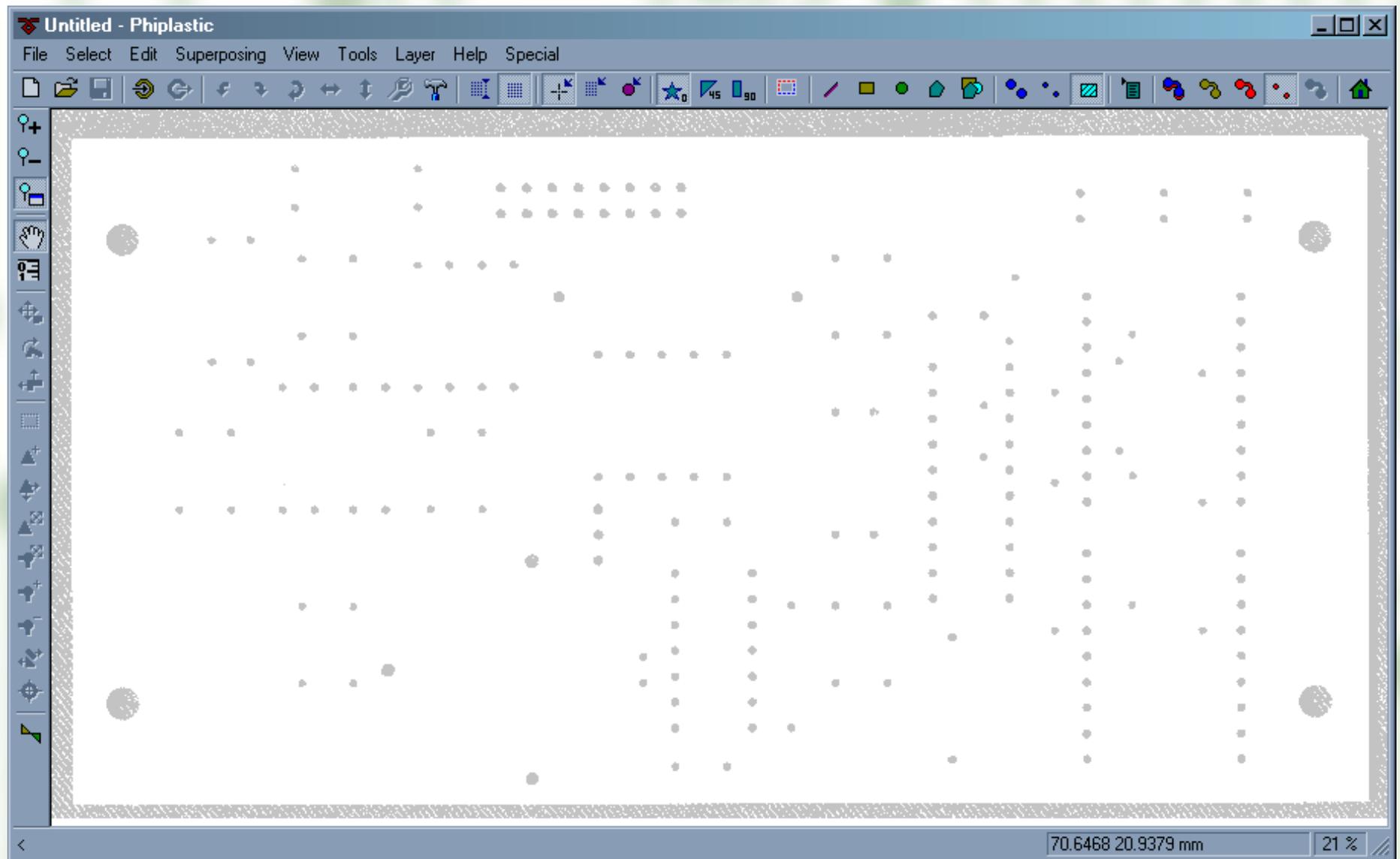
Holes are displayed in a separate layer

First of all, an empty standard is created. It's dimensions are determined by the scanned image.

Pads are measured with the ruler tool to determine
valid diameter range

Untitled - Phiplastic

File Select Edit Superposing View Tools Layer Help Special

Wires vectorization

Minimal pad diameter, mm   `1.4`   [Measurements...]

Maximal pad diameter, mm   `3`   [Measurements...]

☑ Sharpen angles
☑ Correct branches
☑ Skip existing
☑ Enable multithreading

[OK]

Ruler history

Measurement	Current	Previous			The latest
Max	1.4	1.4	0.0	0.0	0.0
Average	1.4	1.4	0.0	0.0	0.0
Min	1.3	1.3	0.0	0.0	0.0

Precision ○ 0 ● 1 ○ 2 ○ 3 ○ 4 ○ 5 ○ 6
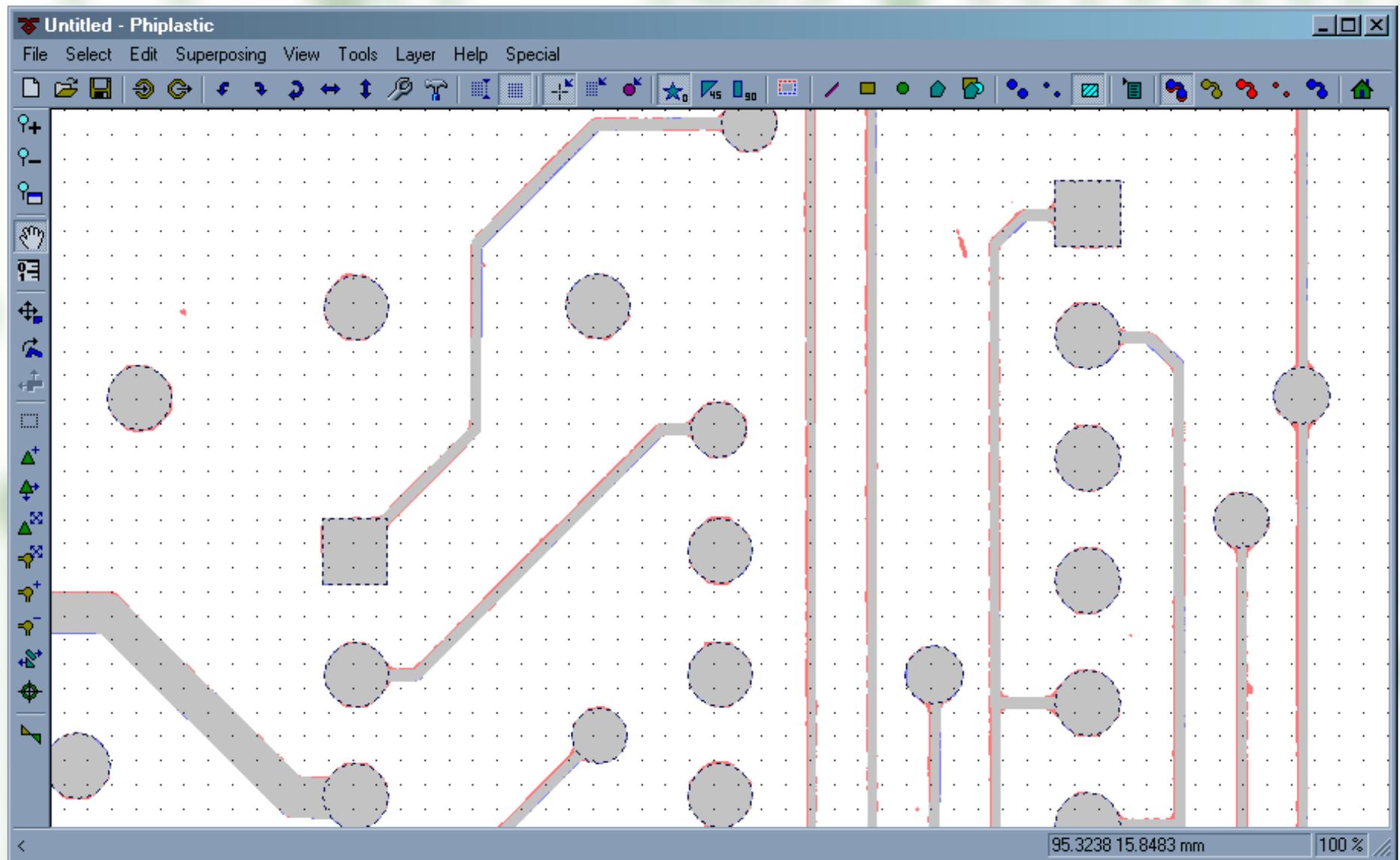
`26.5375 0.0904 mm`   `21 %`

This range is required to start vectoring. Measurements history prevents the user from typing and remembering numbers.
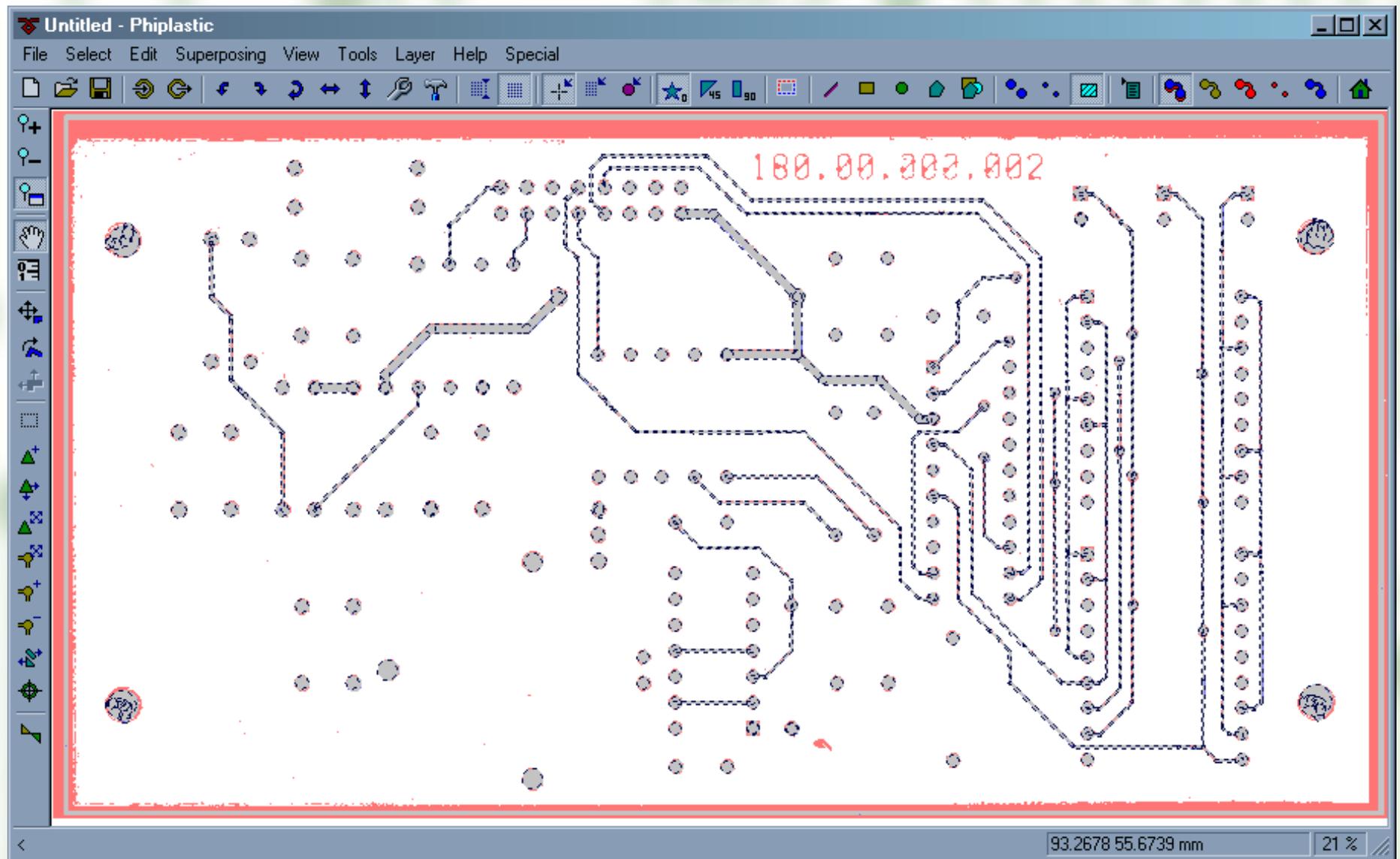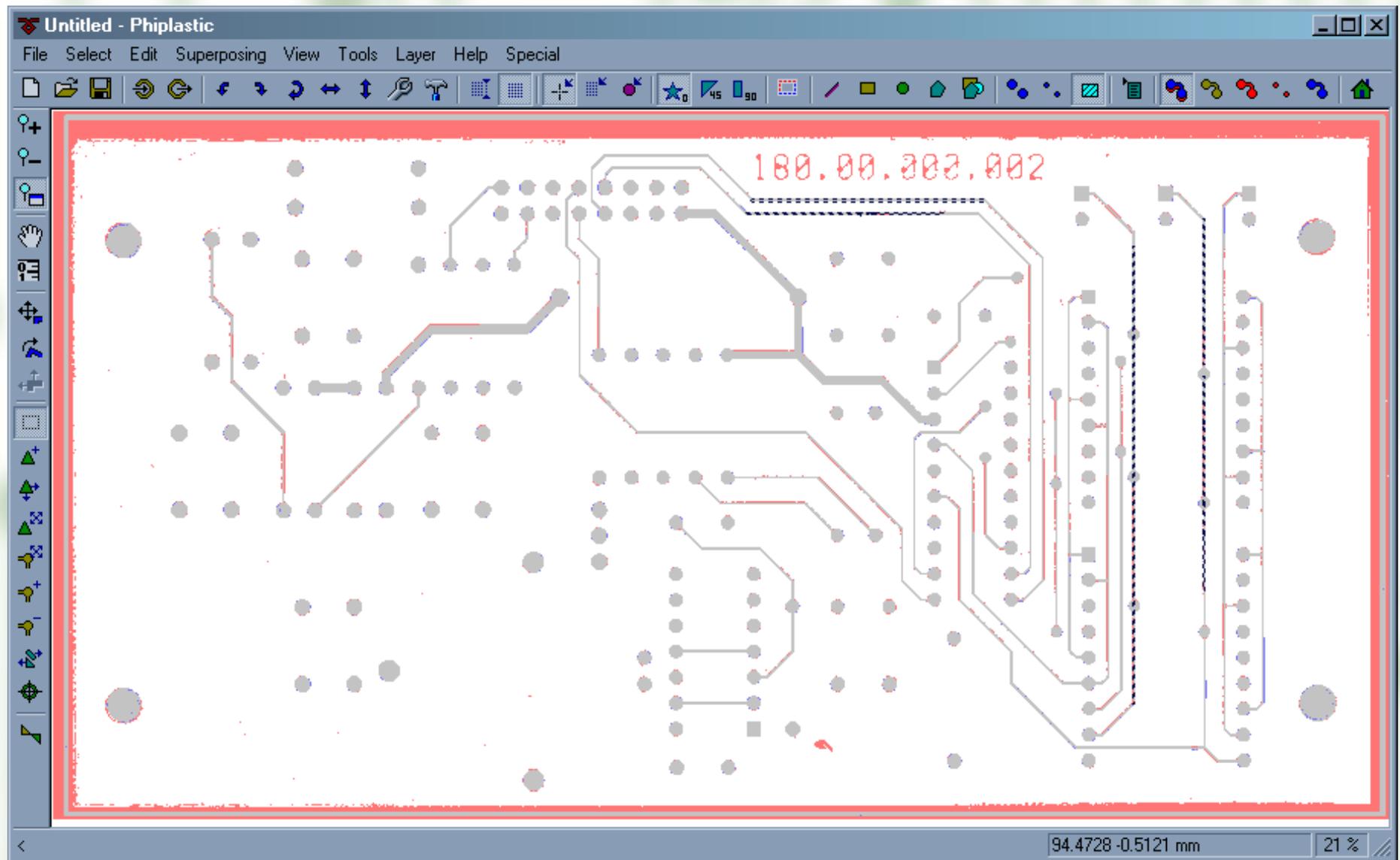
The first vectoring result is achieved in a couple of seconds.
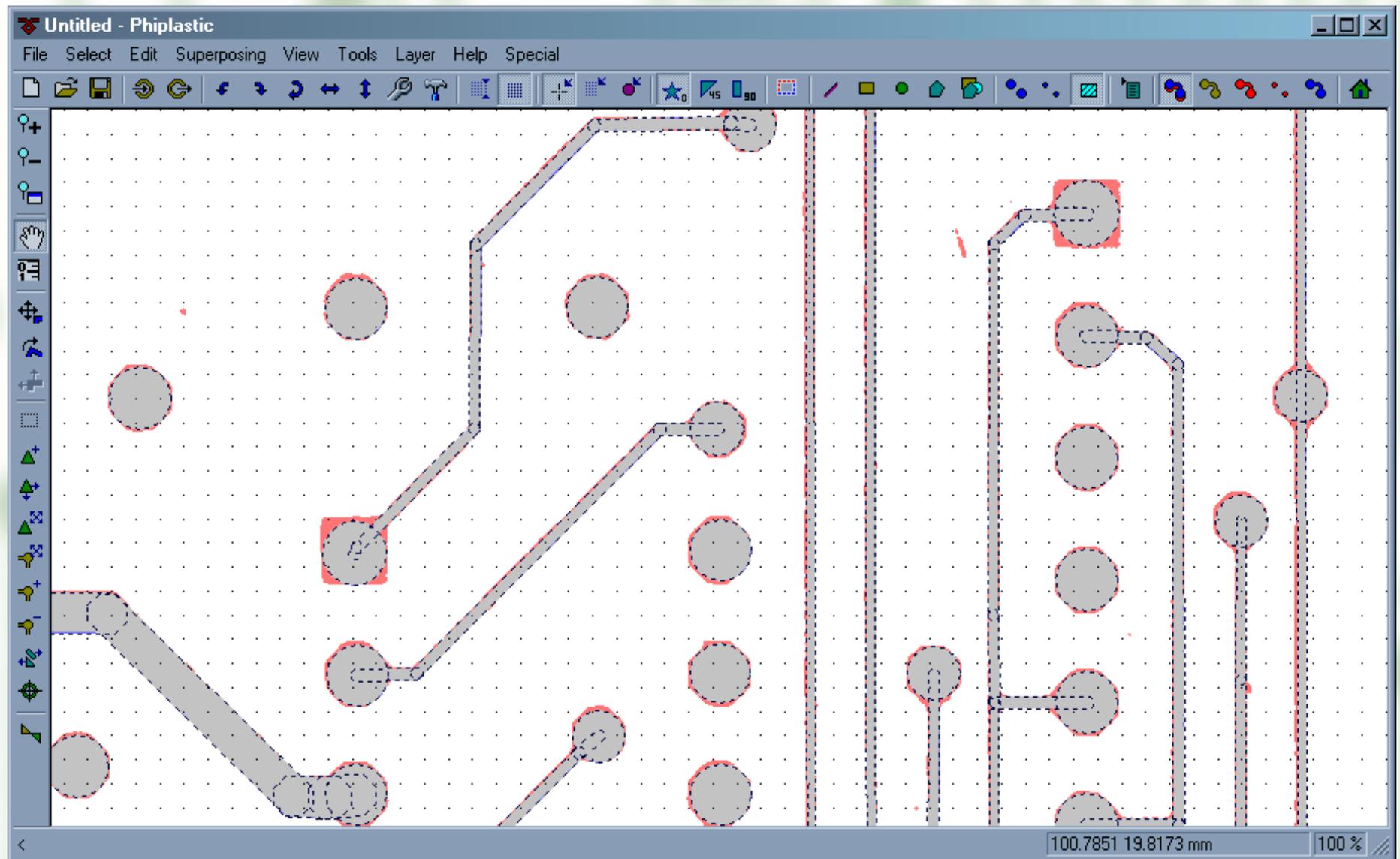
Wires are precisely vectorized by lines. Pads are all round yet.

Then pads are automatically optimized. After a few seconds they all
fit the image perfectly.

Scanned images are always slightly tilted. Phiplastic allows to eliminate the scanning tilt. To do that several long vertical or horizontal lines are selected.
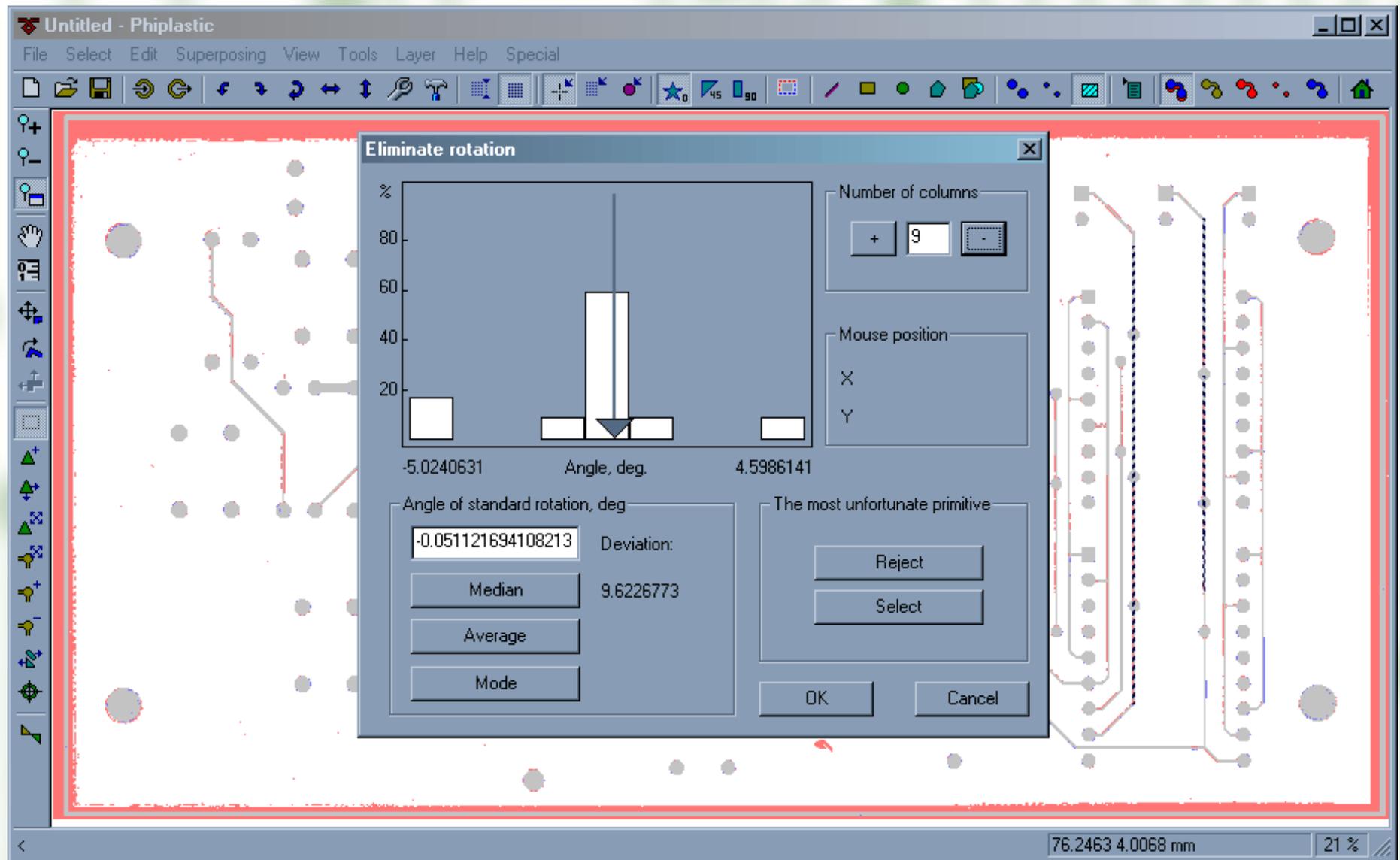
Special command rotates the vector image so that direction of the selected lines approach true vertical and horizontal line as close as possible. There's nothing to do in this complex dialog box except pressing OK. Default values suit all cases.
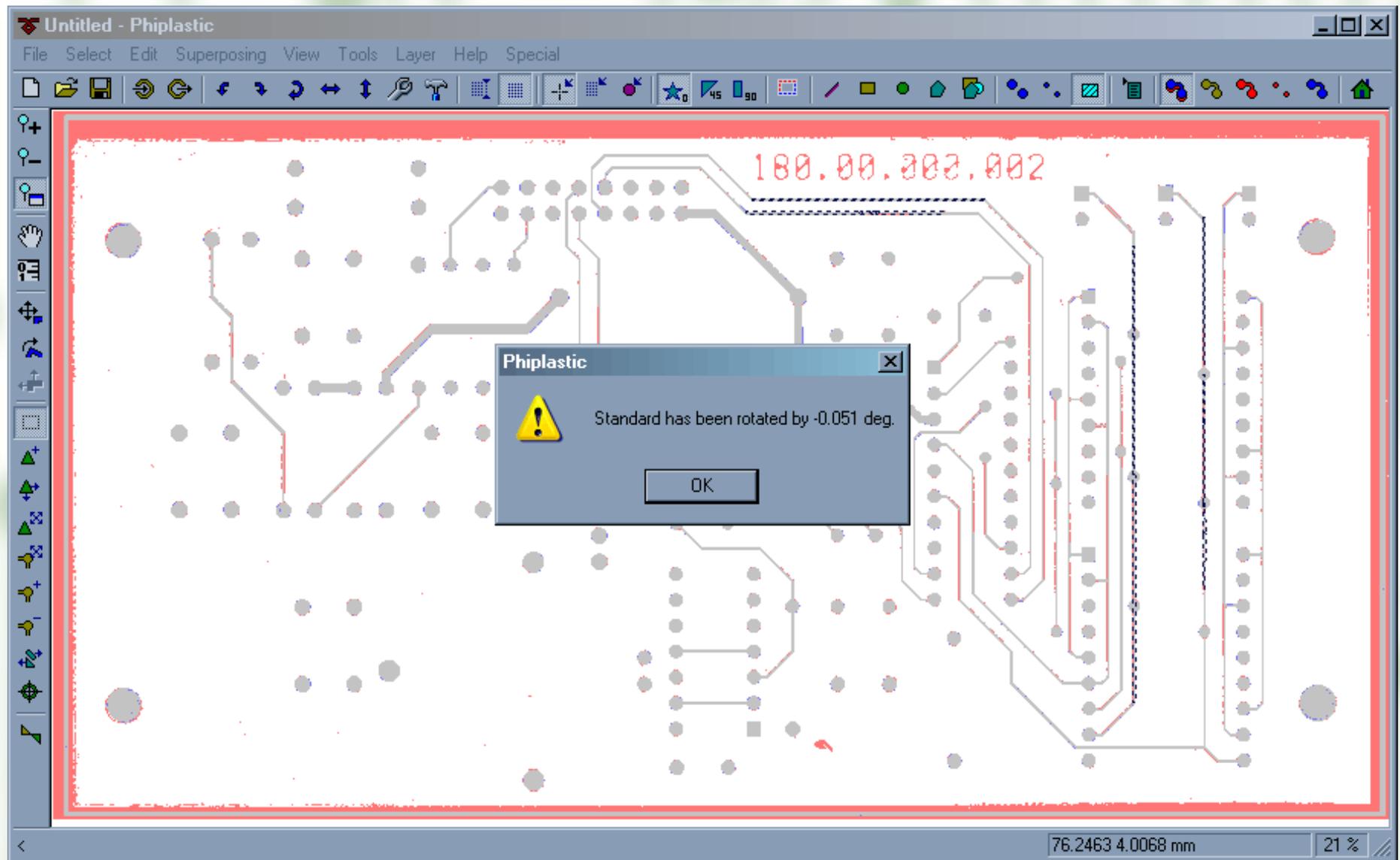
Superposing system automatically compensates the rotation made, so nothing changes on the surface. But graphics primitives in the vectorial image are not tilted now.
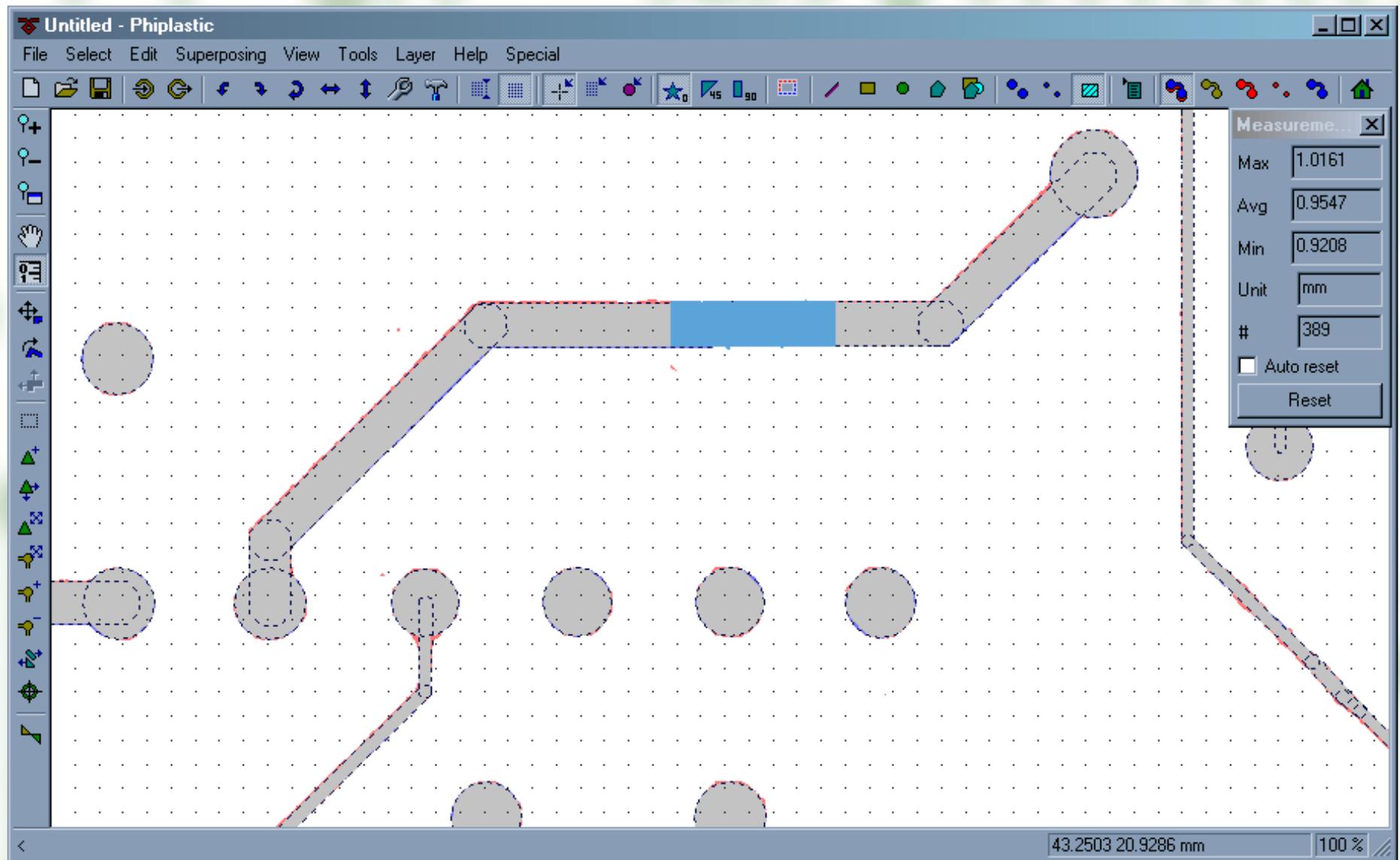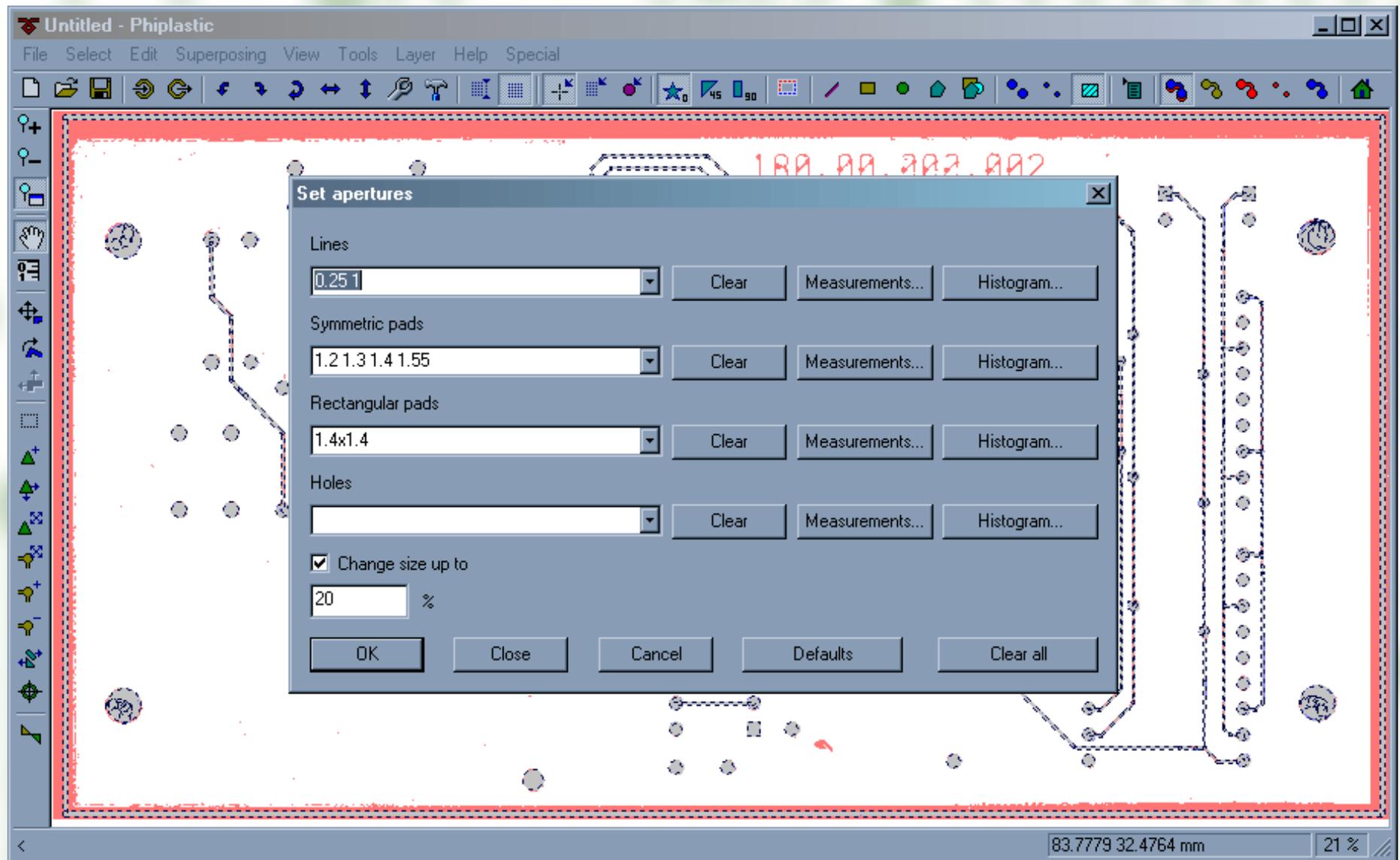
Now all dimensions of the graphics primitives match raster image as close as possible. True vectoring means using a relatively short list of standard apertures. If this list is unknown for the given board, it must be created. To do that all typical primitives are measured with the ruler tool.
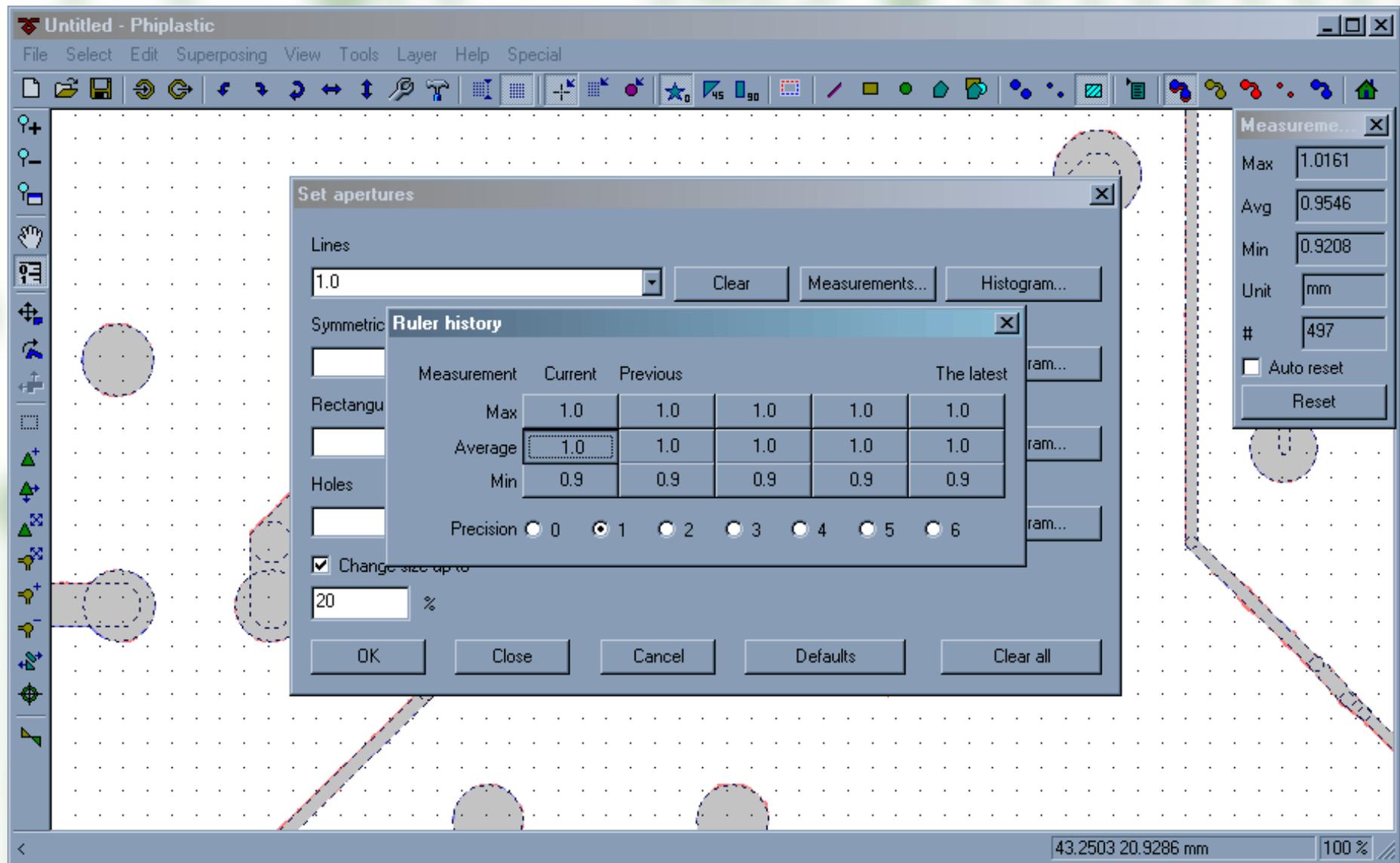
Then the measurements taken make up the list of apertures
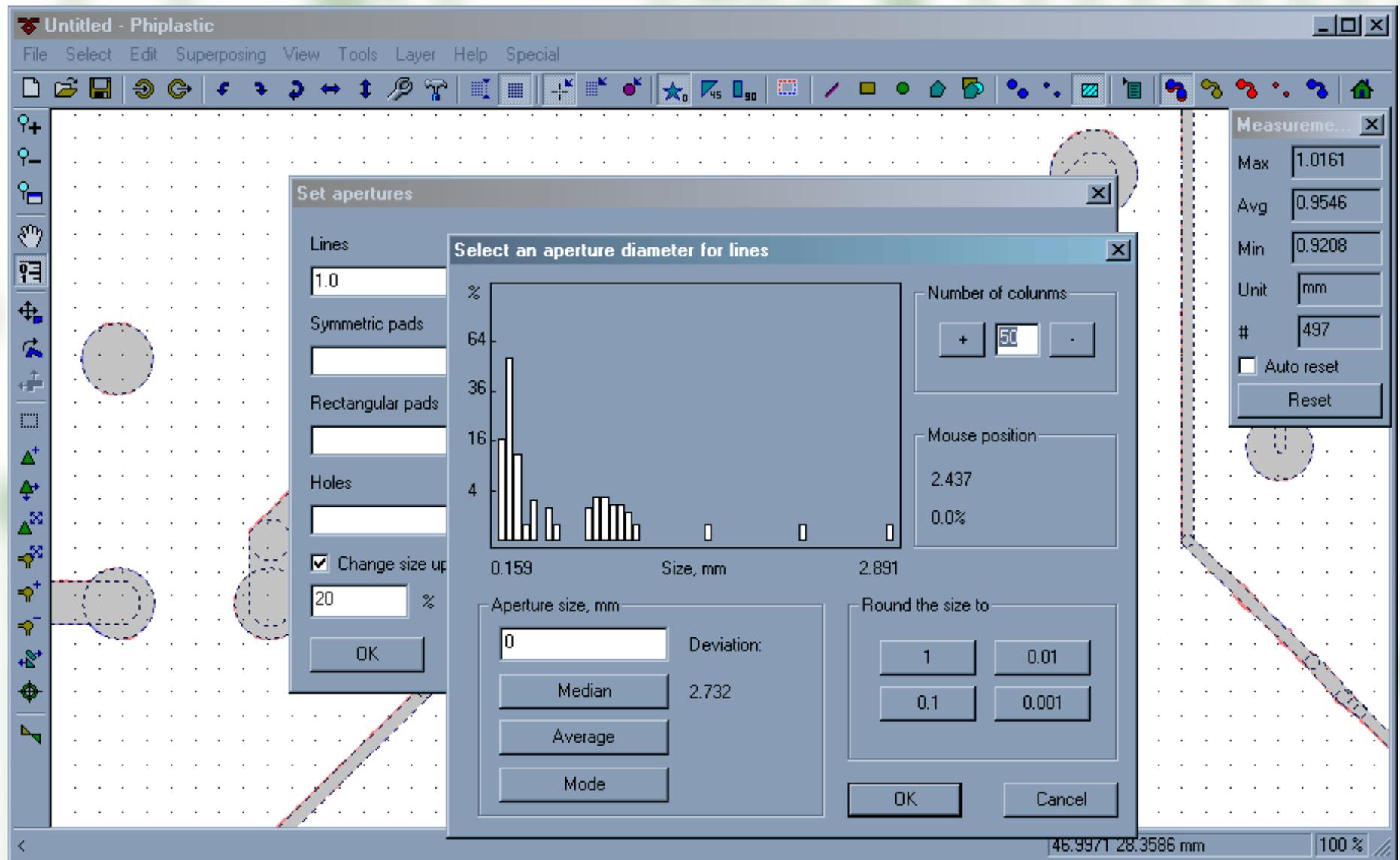
Another way to build this list is selecting typical primitive dimensions
on the dimensions histogram. The work scenario is thought over
to the smallest detail. User doesn't have to do any excessive tiring manipulations.

Set apertures

Lines

`0.25 1`   Clear   Measurements...   Histogram...

Symmetric pads

`1.2 1.3 1.4 1.55`   Clear   Measurements...   Histogram...

Rectangular pads

`1.4x1.4`   Clear   Measurements...   Histogram...

Holes

` `   Clear   Measurements...   Histogram...

☑ Change size up to

`20` %

OK   Close   Cancel   Defaults   Clear all

After the aperture lists are built, the first step of applying the new apertures is done
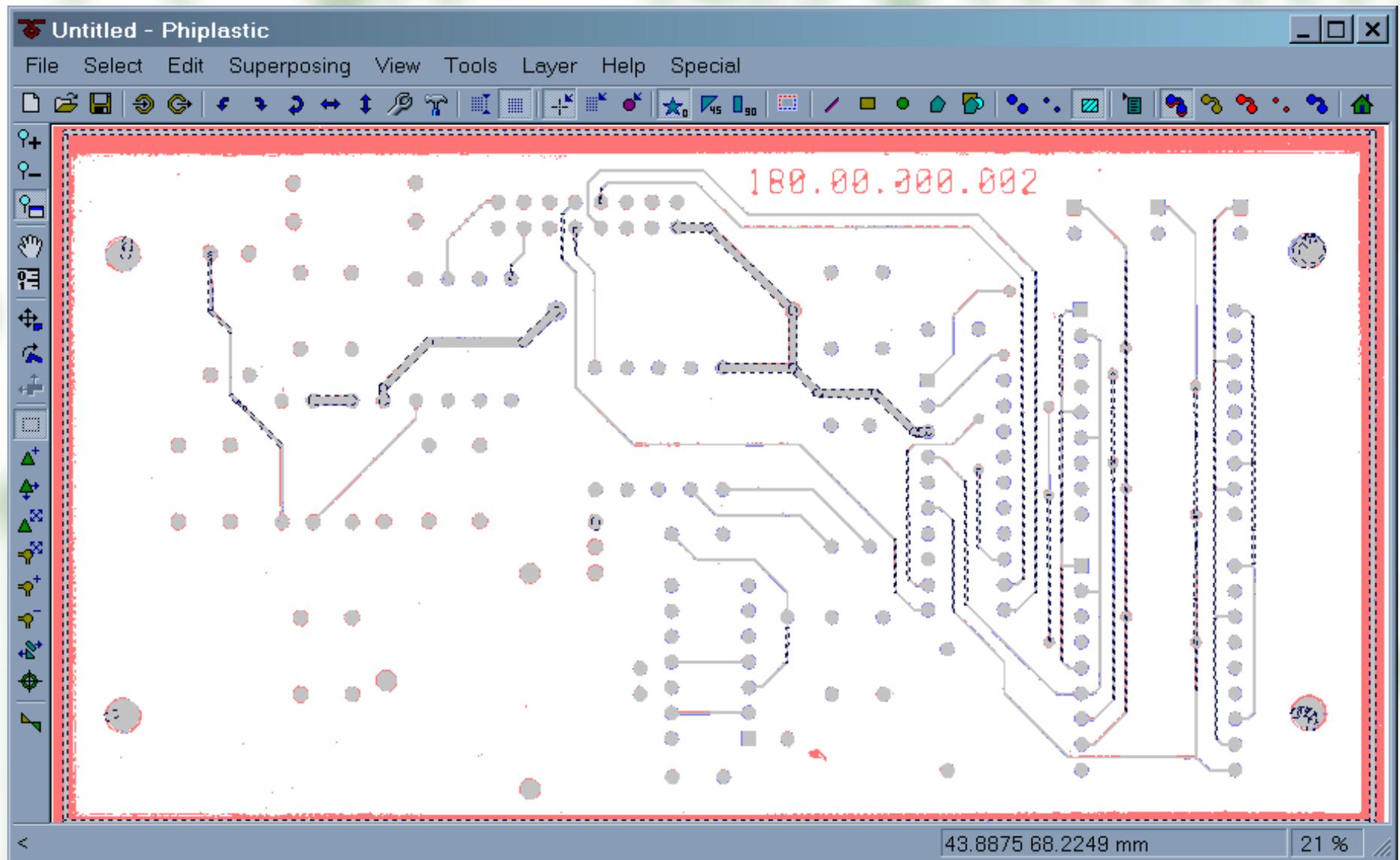
New apertures are applied to all primitives except for those that would change too greatly. These primitives are suspected to have their own apertures that are missing in the current list. Selection is left on the suspected primitives only.
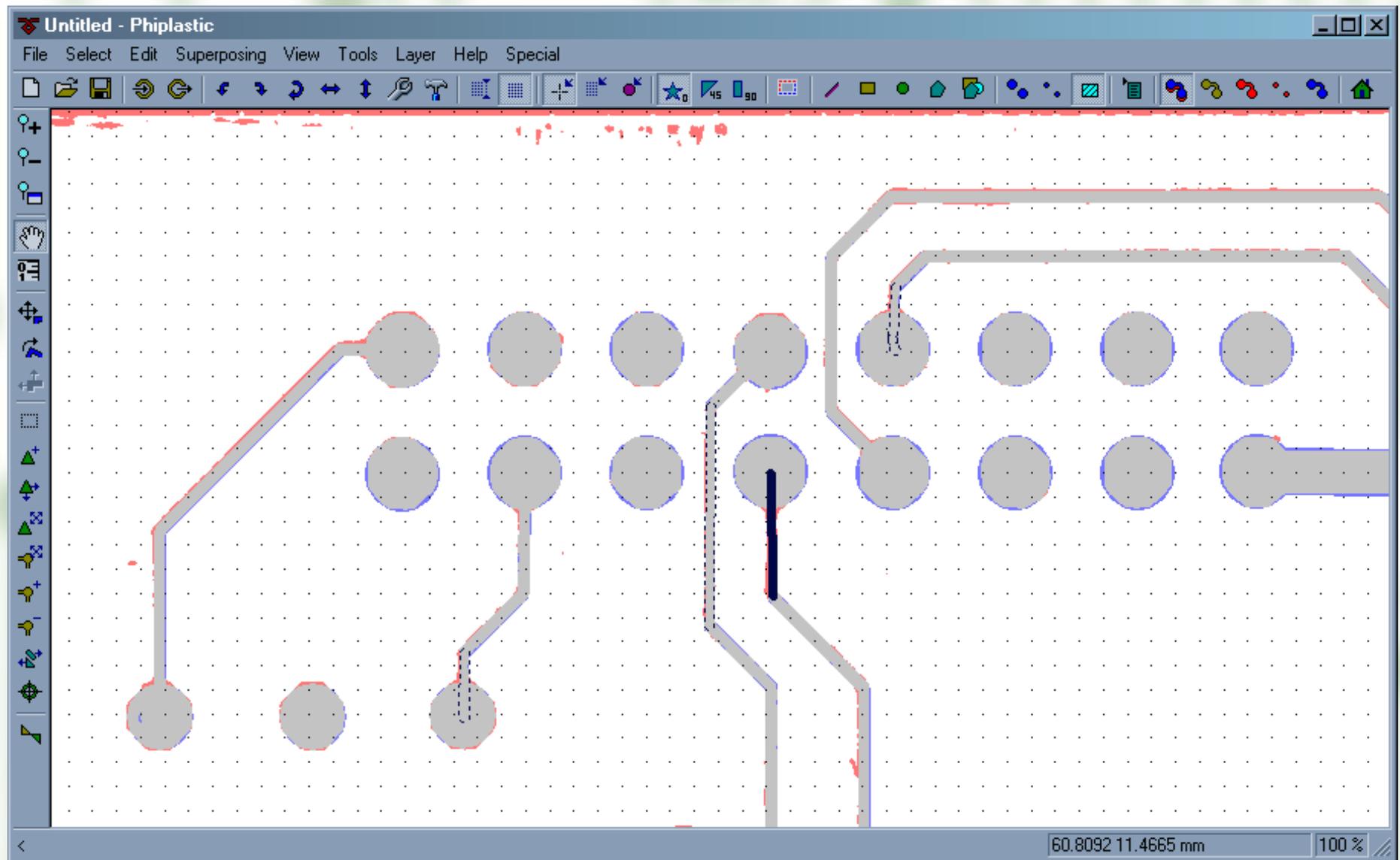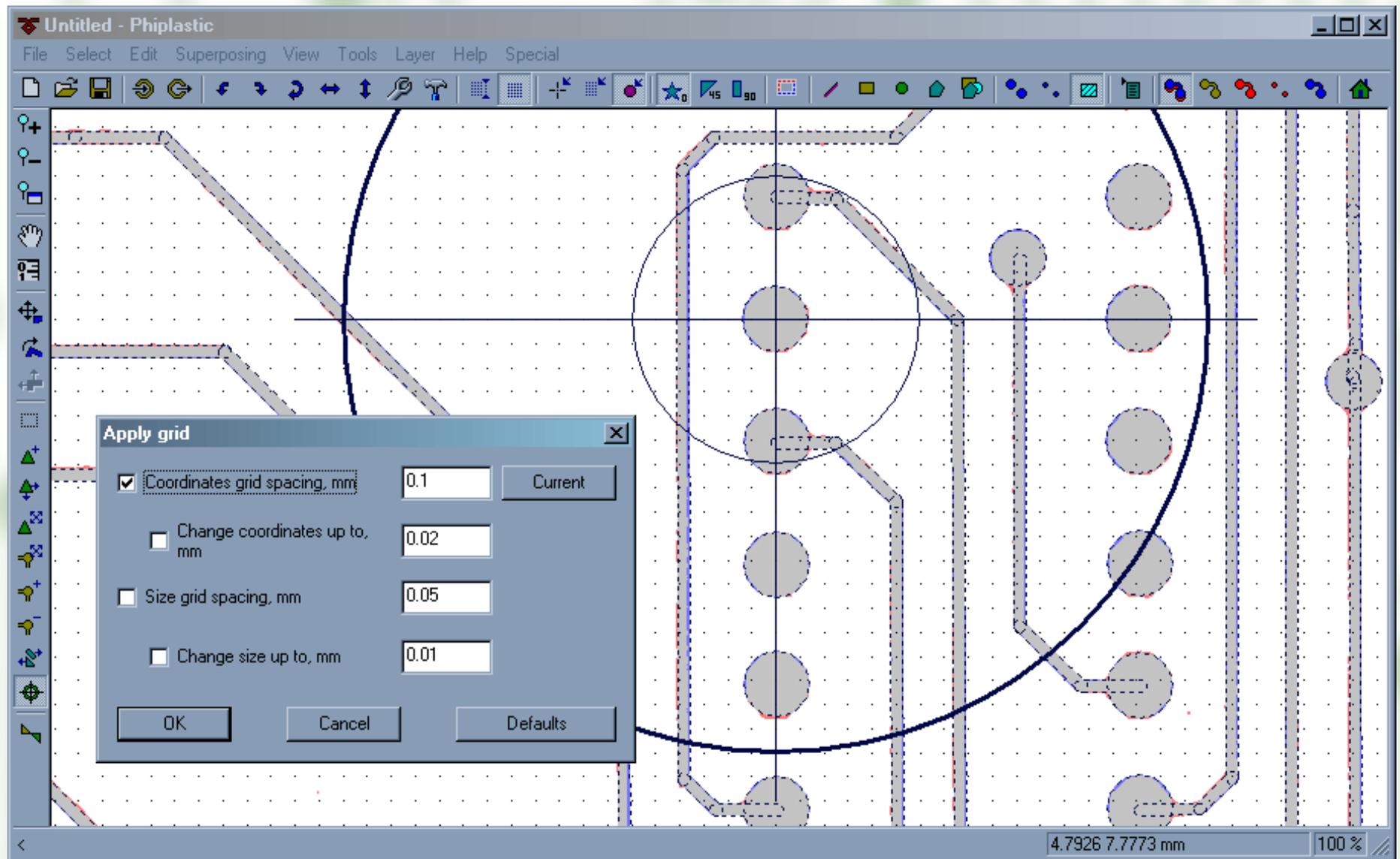
It's very easy to review a few selected primitives one by one. After the user
has decided that there will be no more apertures, the second step
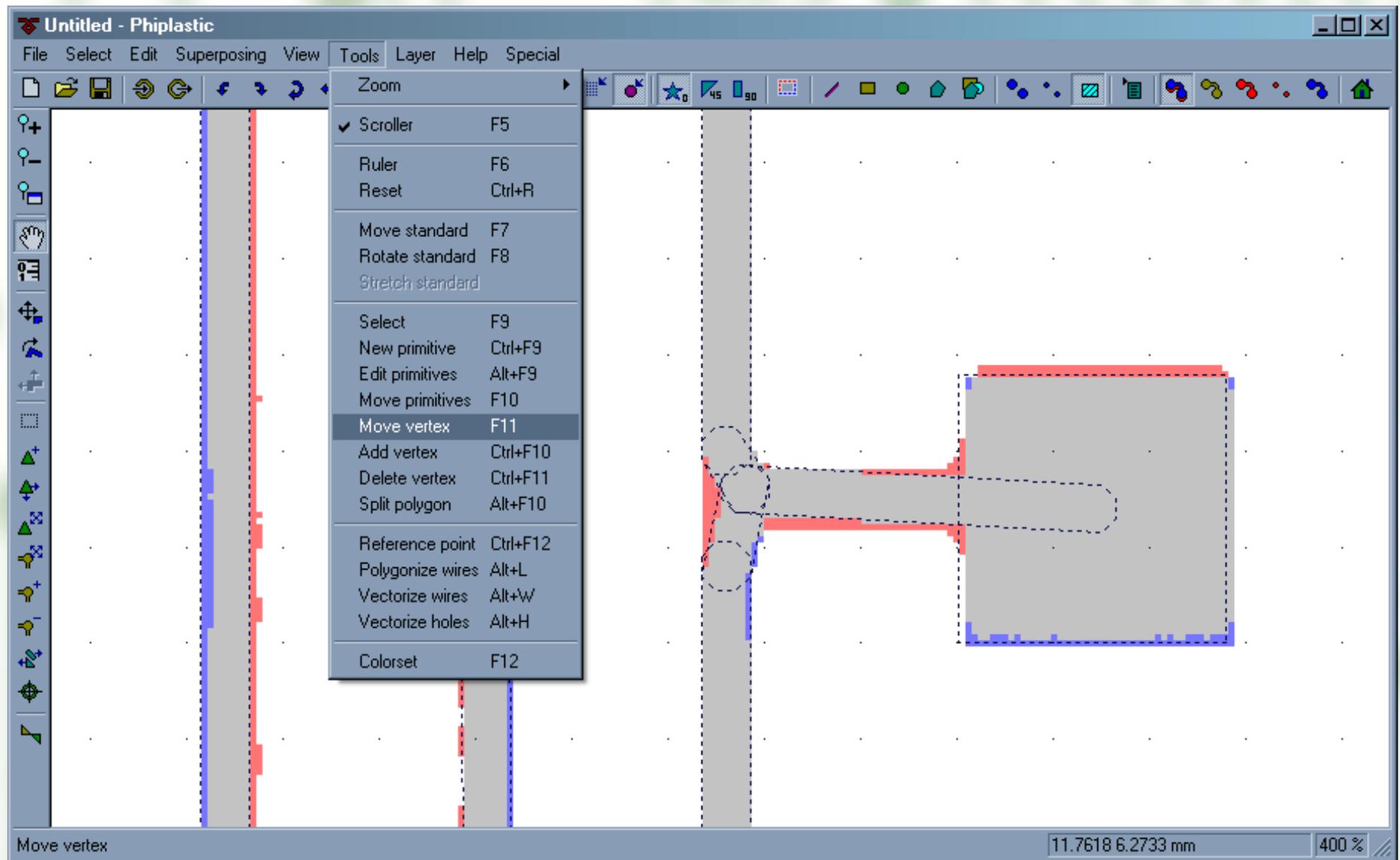of applying the aperture list is done.
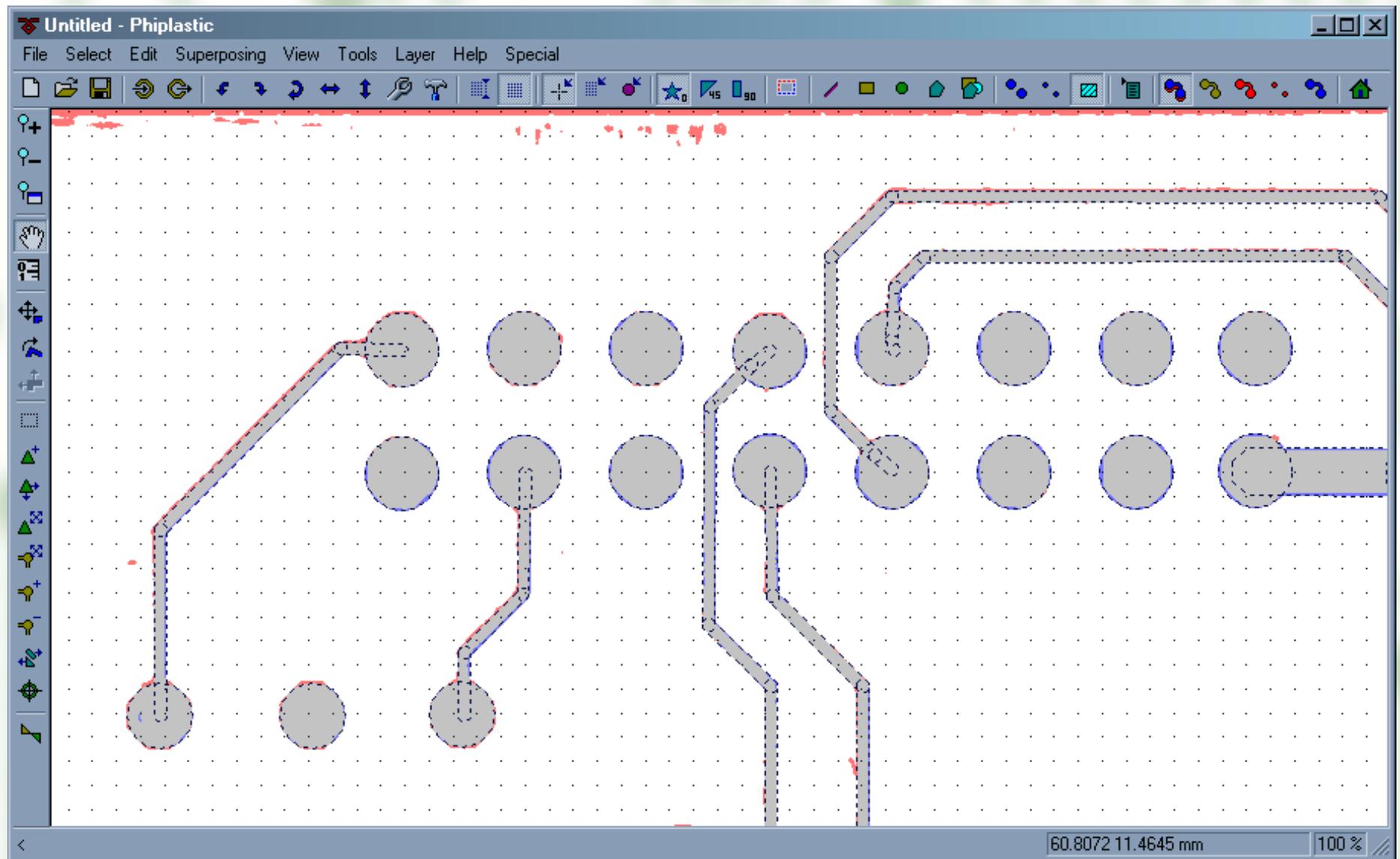
Now all graphics primitives in the standard use apertures from the right list
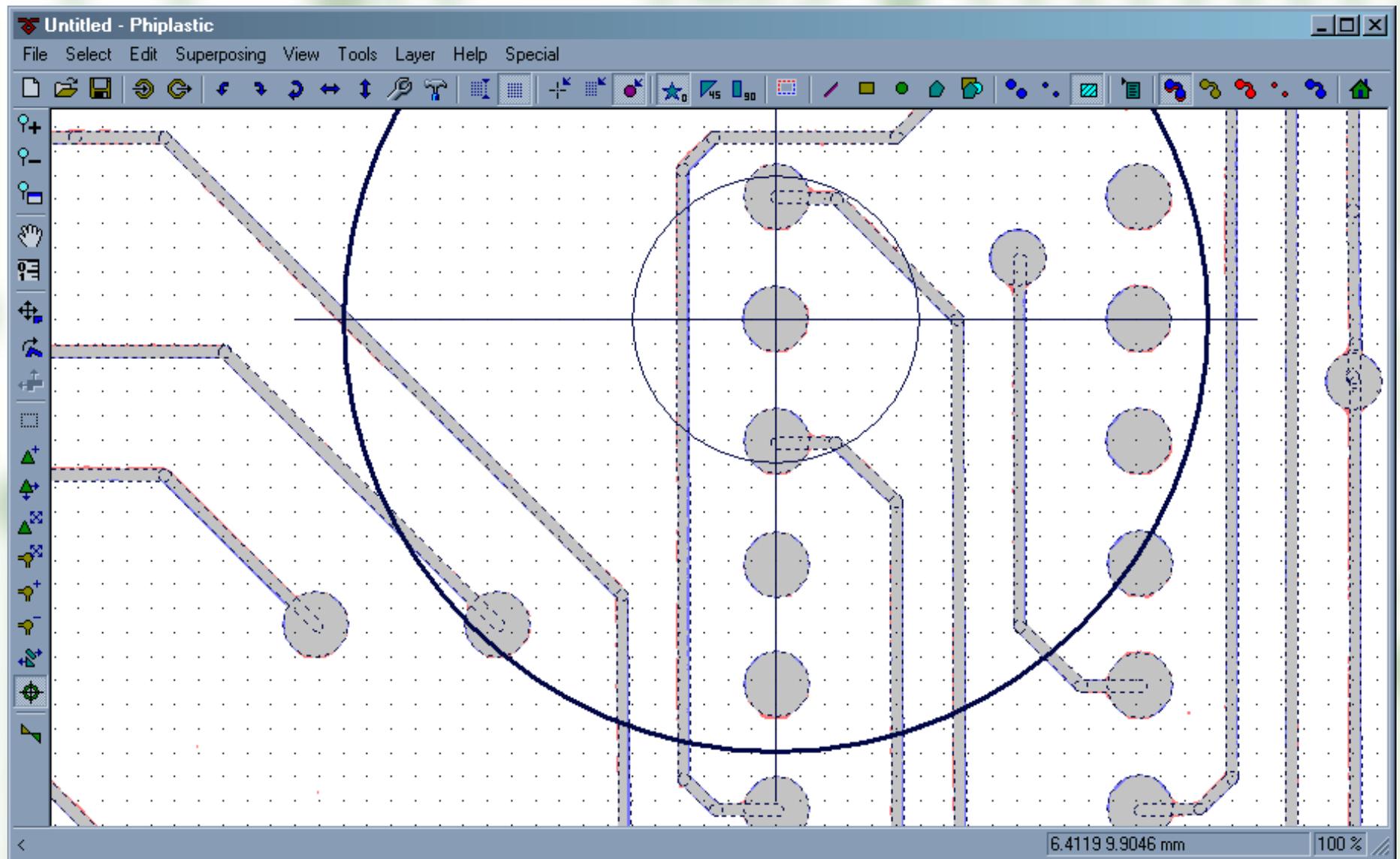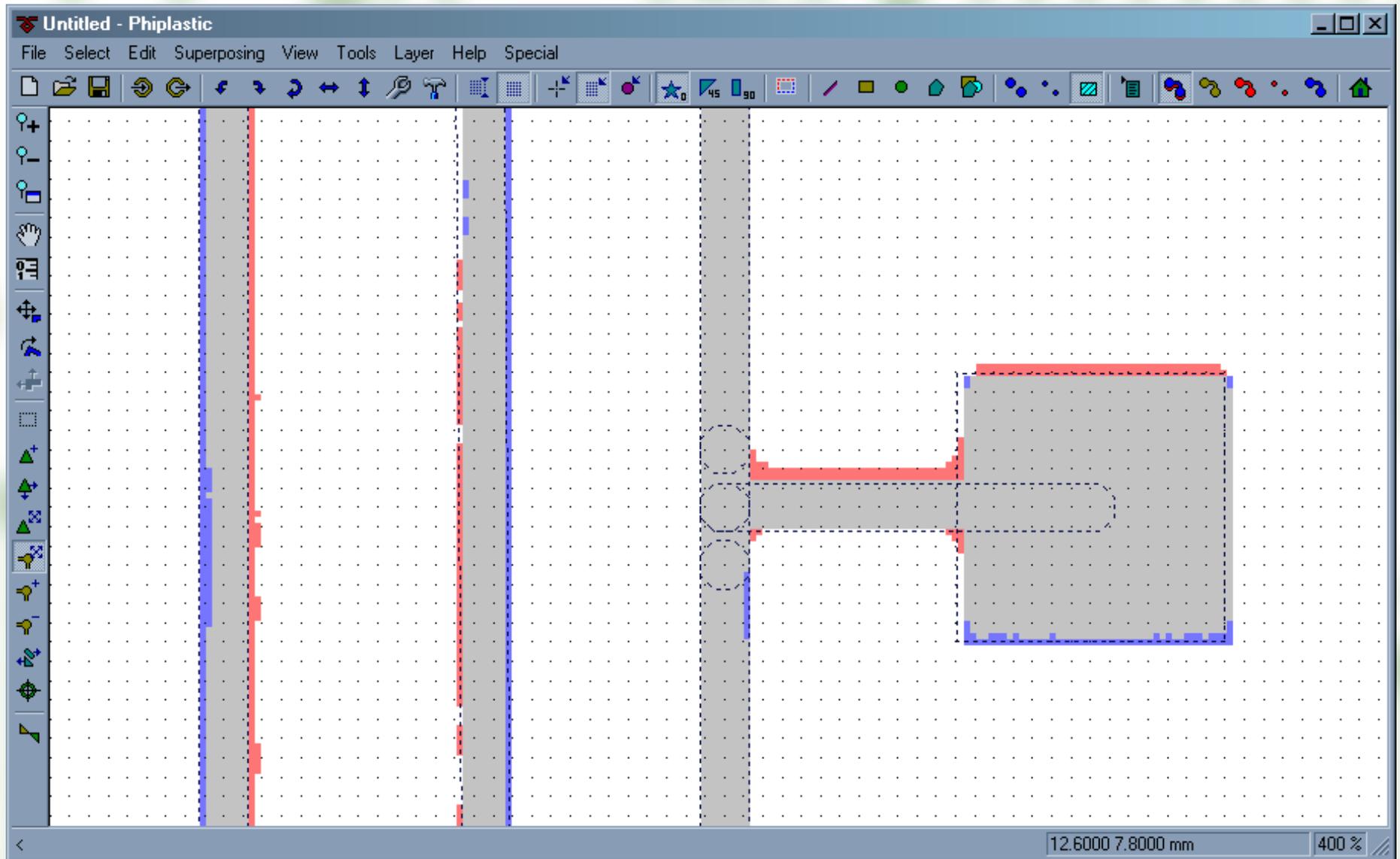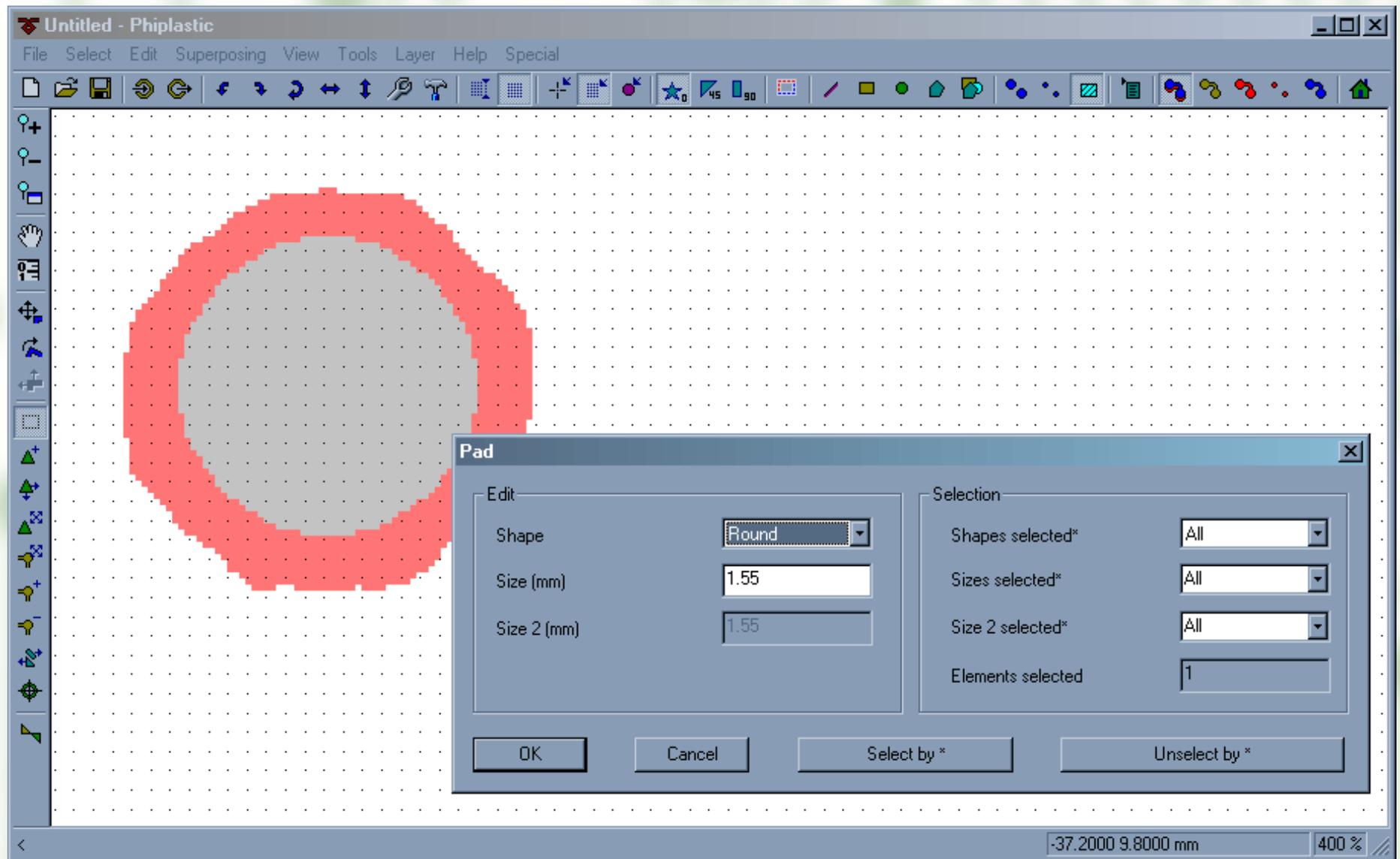
Special tool allows to specify the origin point

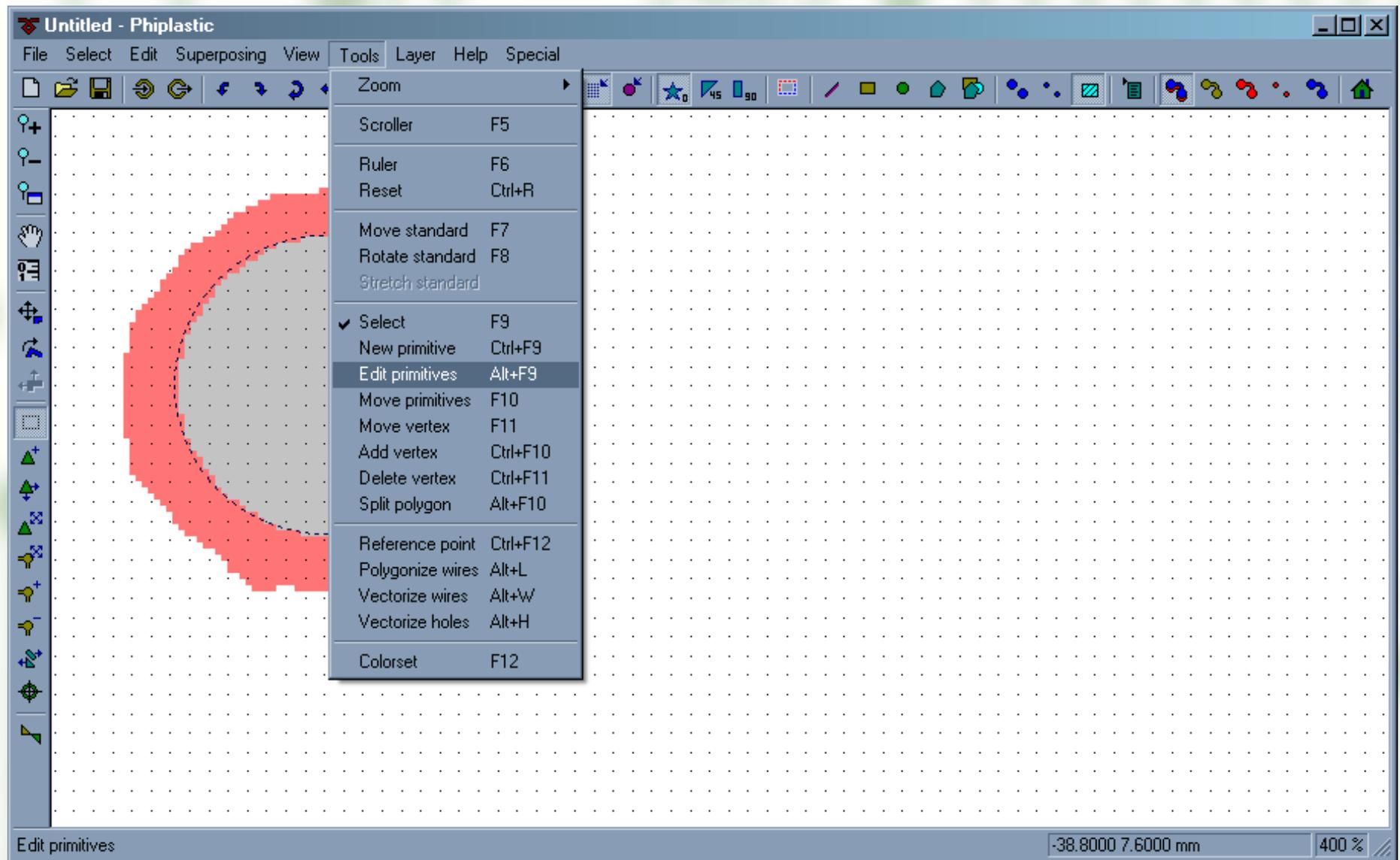Grid can be applied to primitives position

Phiplastic provides handy and powerful tools that can fix any distortions that appeared as a result of manipulations described above.
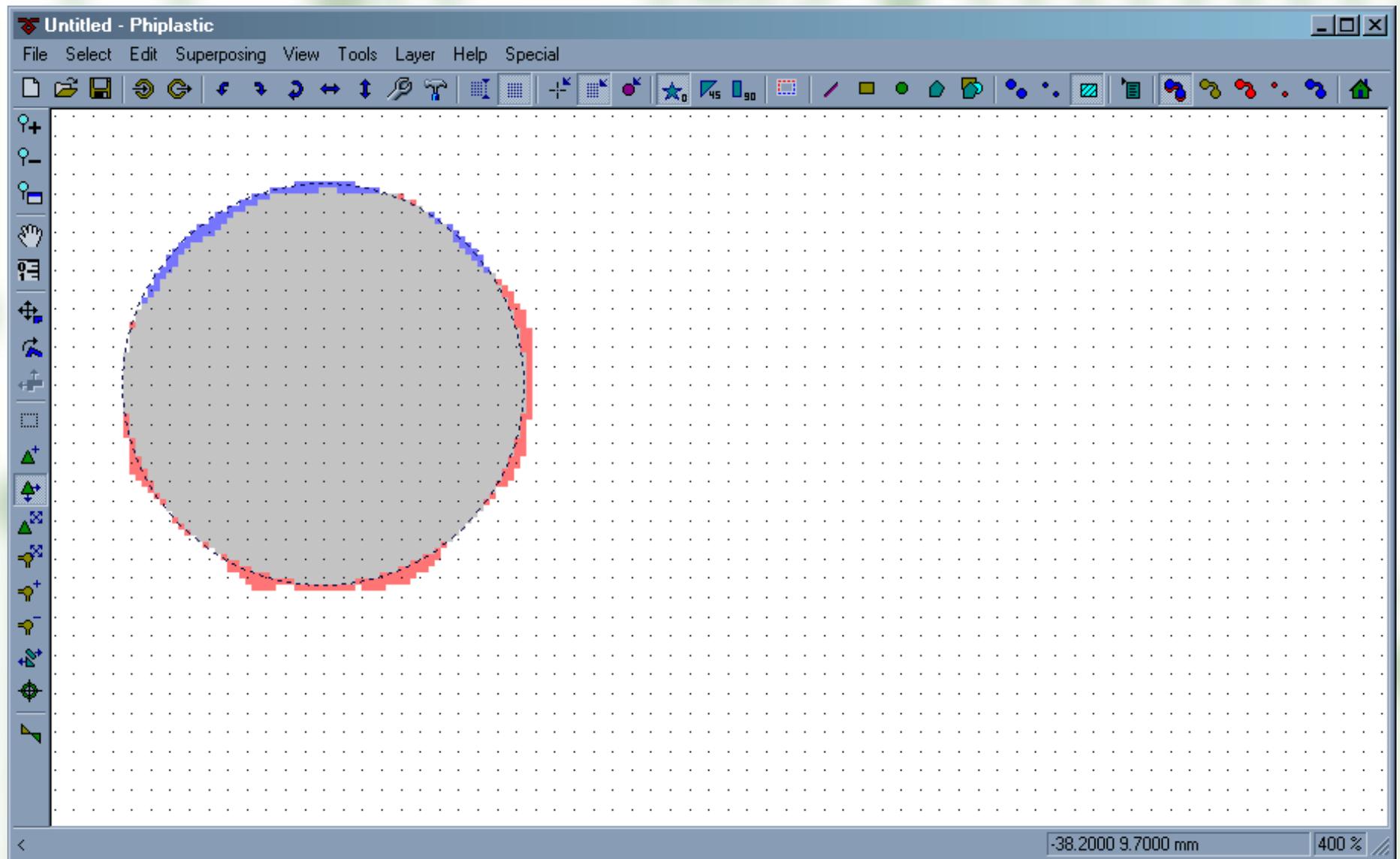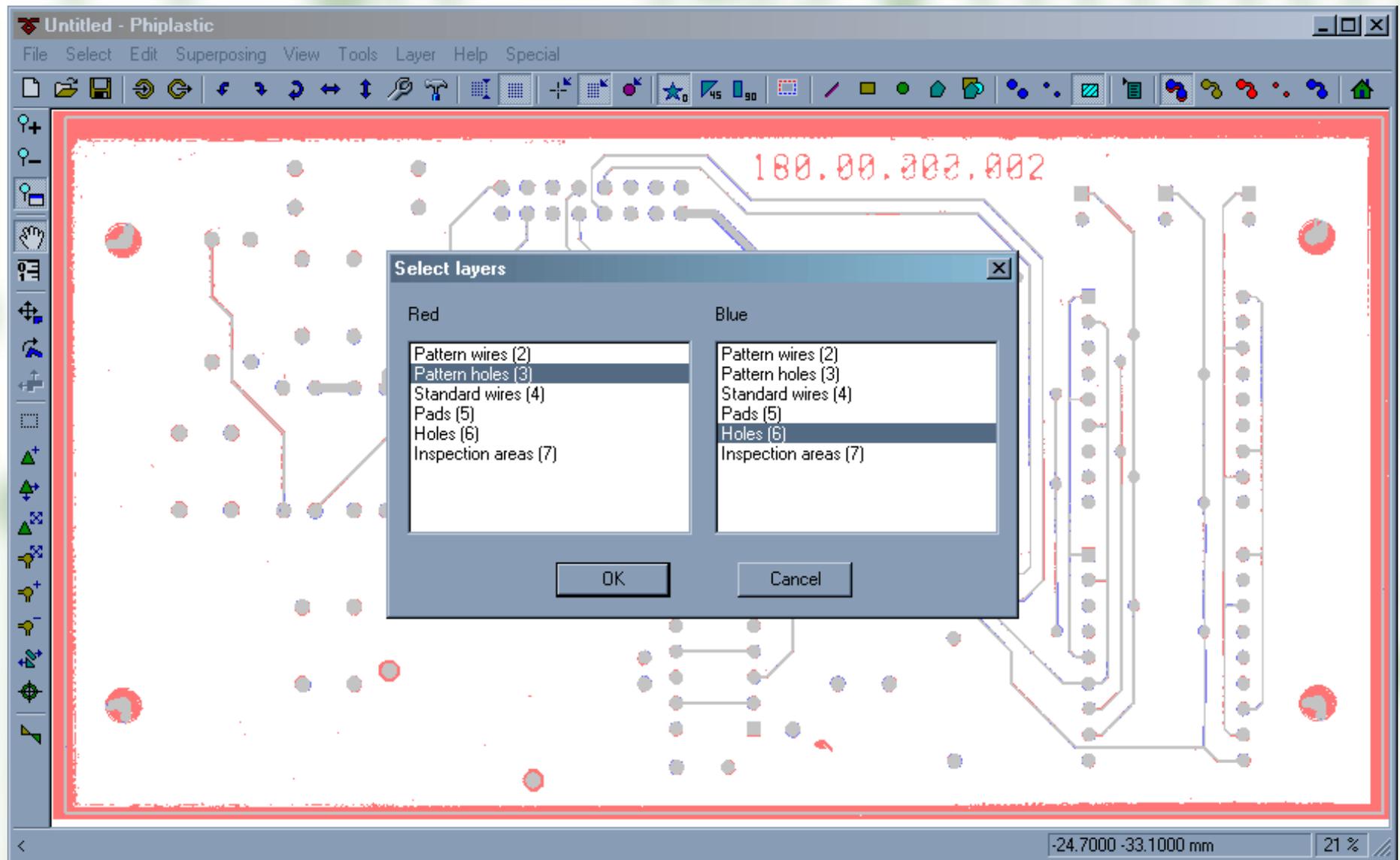
The problem is fixed

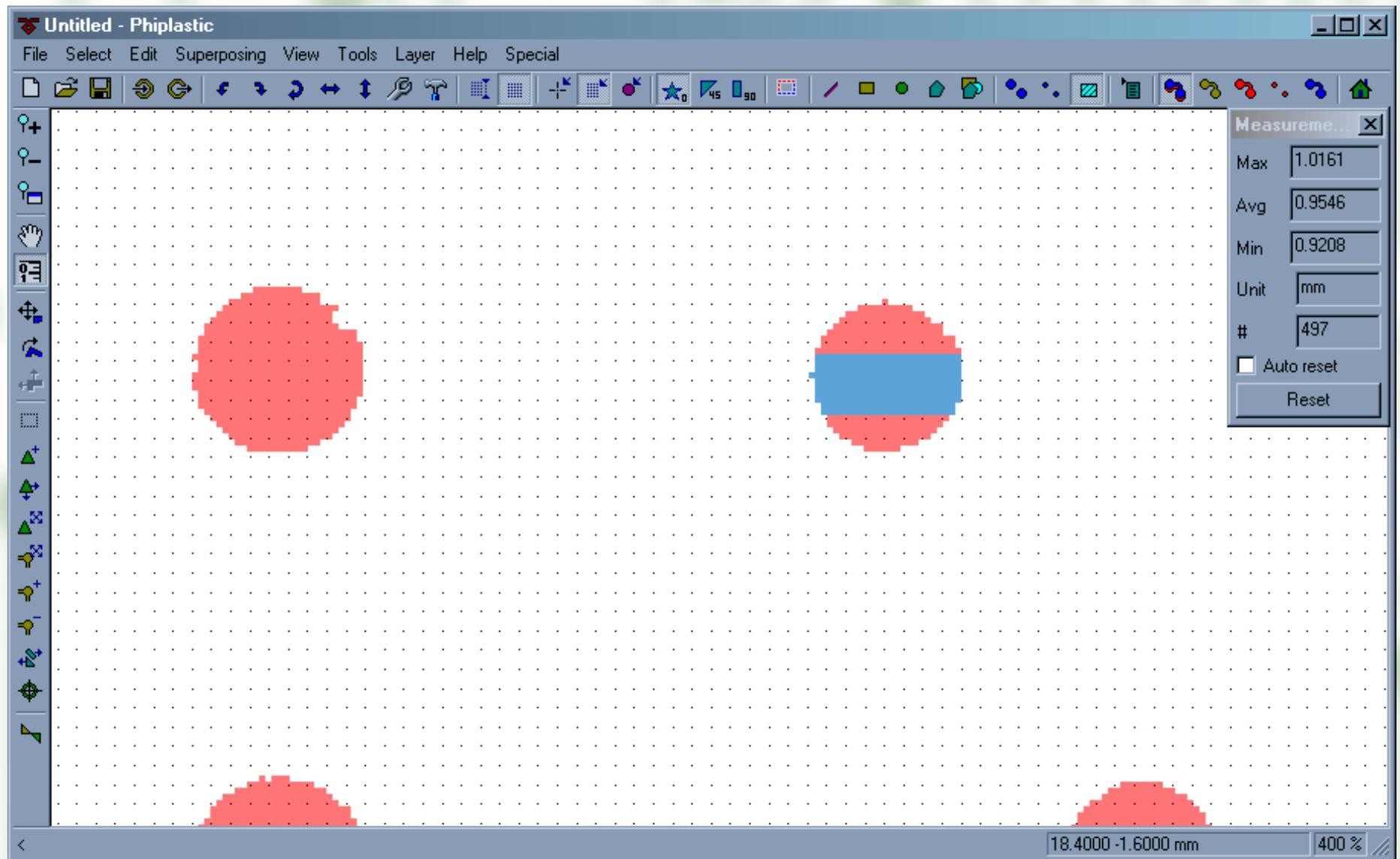Wrong pad size can be fixed in pads properties

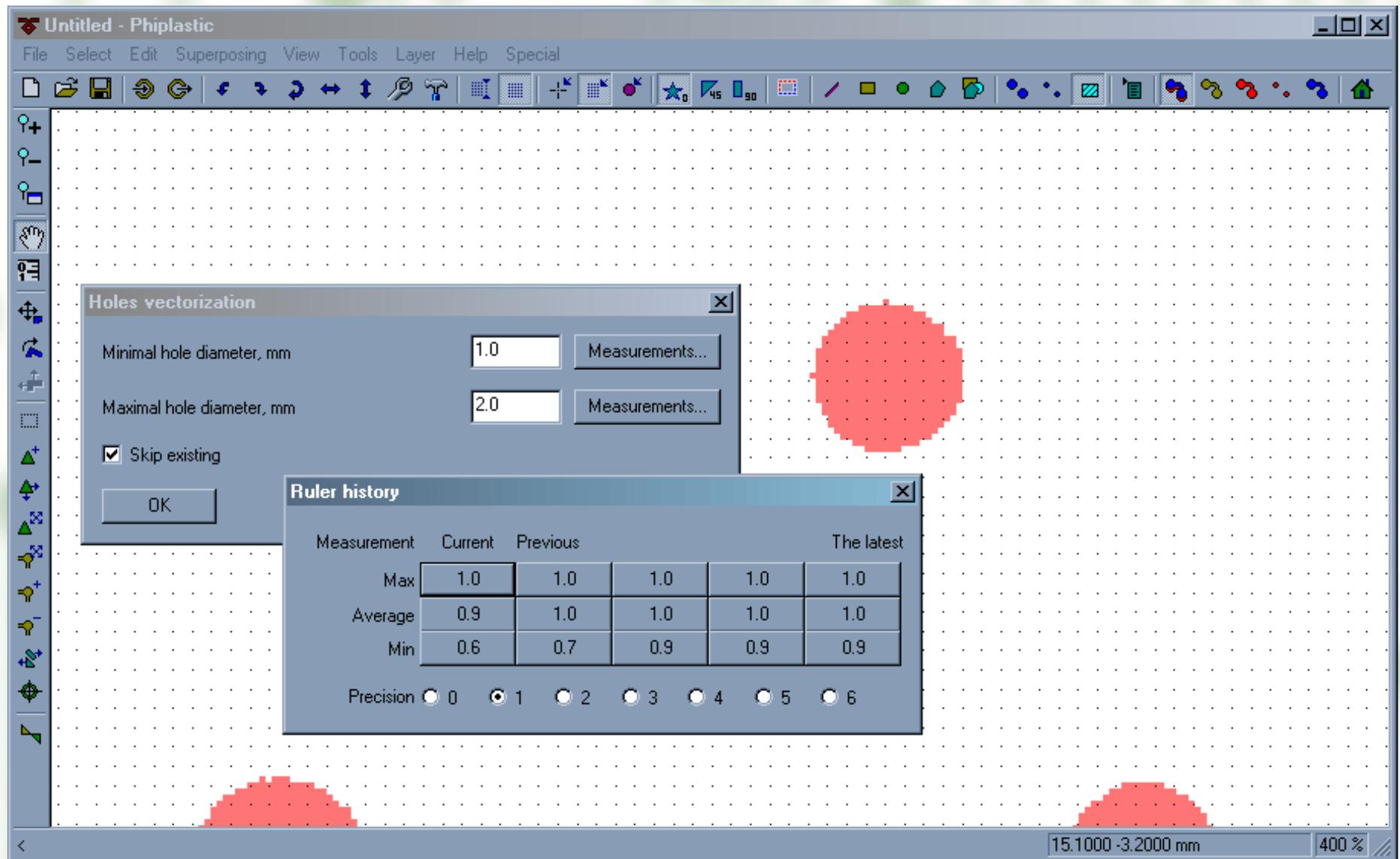Another way to do that — the corresponding tool

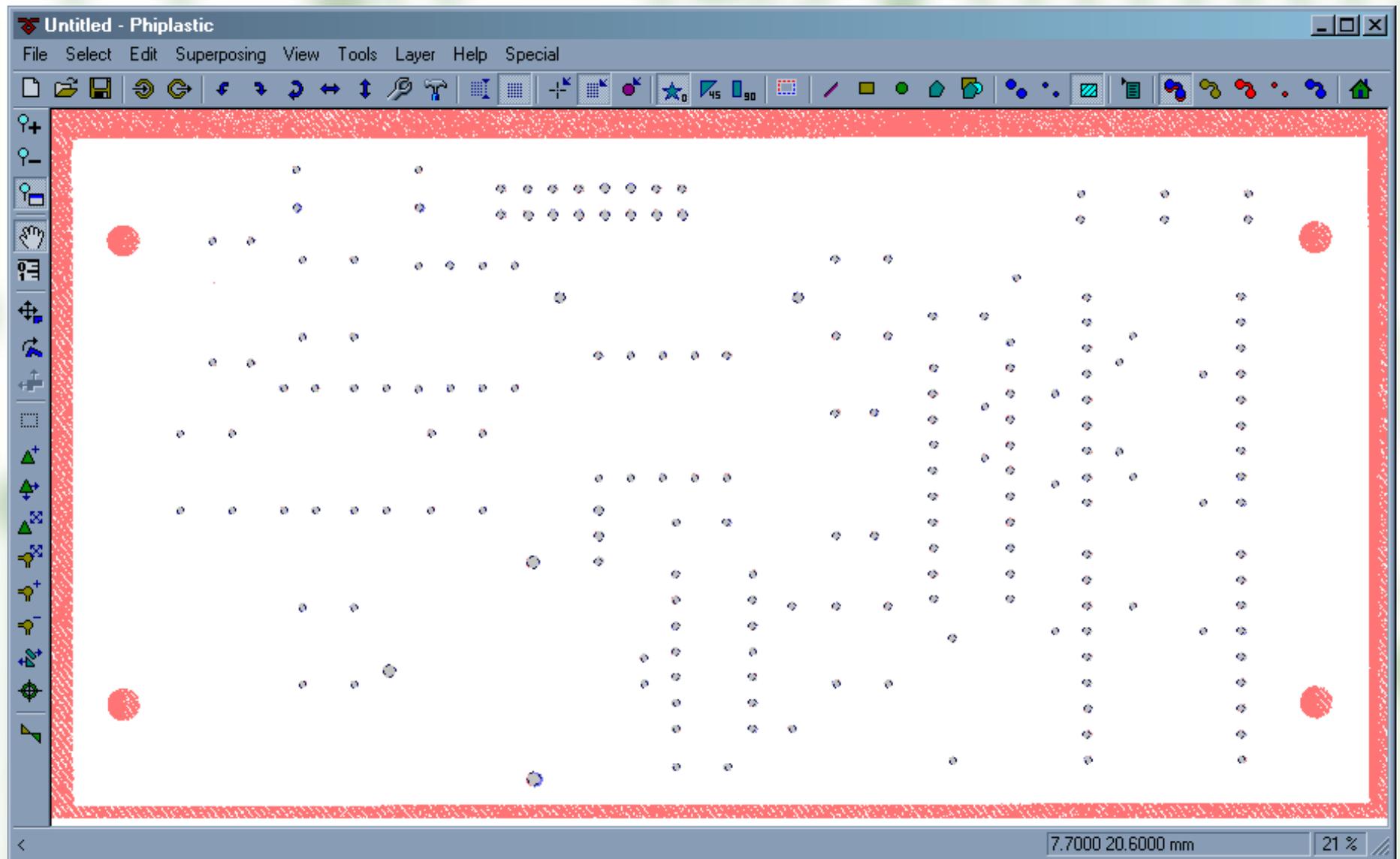The problem is fixed

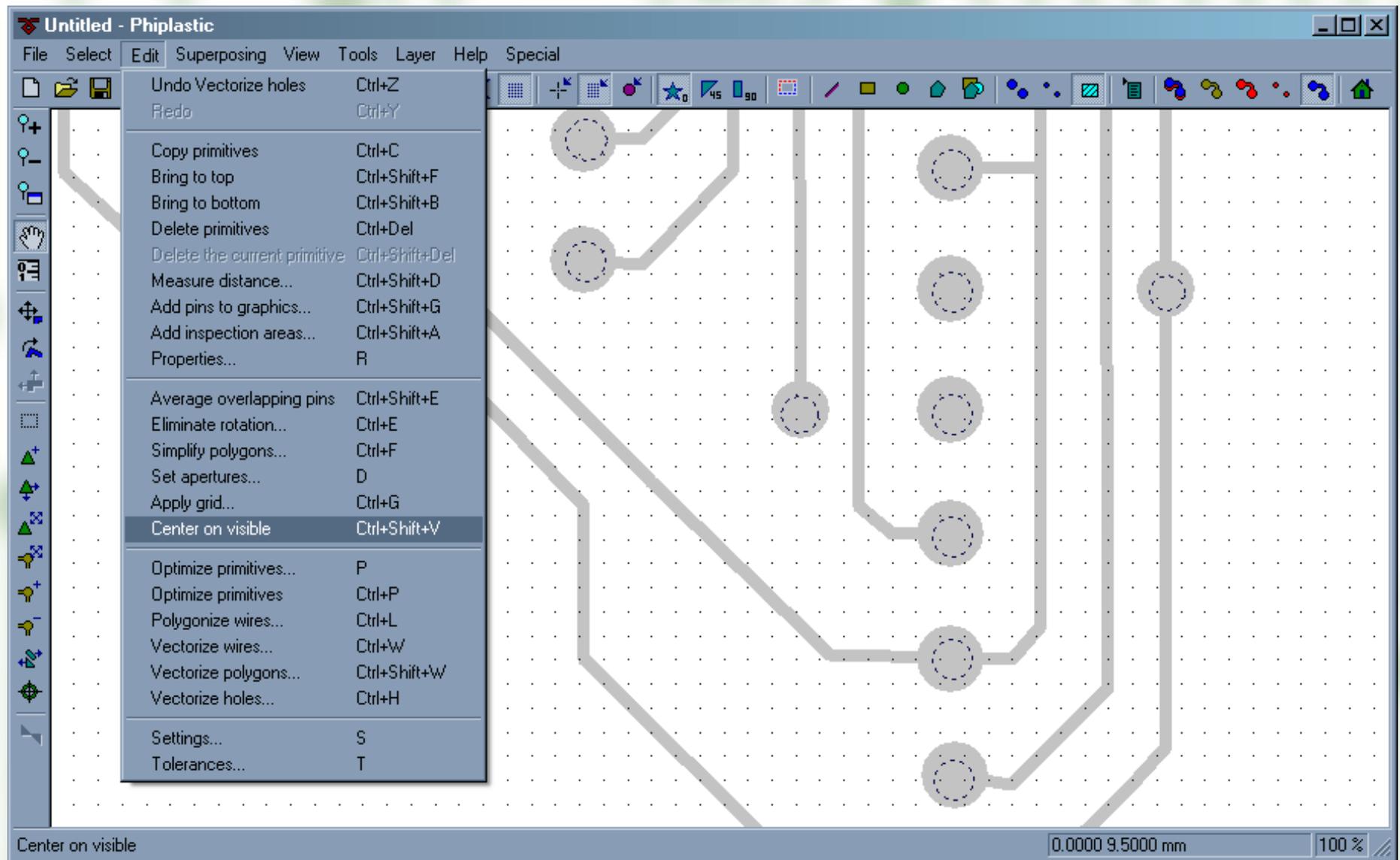To vectorize holes user switches to the corresponding layers

Then two hole diameters are measured

Diameter range is specified in the same way as it was done for pads

After a few seconds holes are vectorized

For better precision holes are centered according to pads
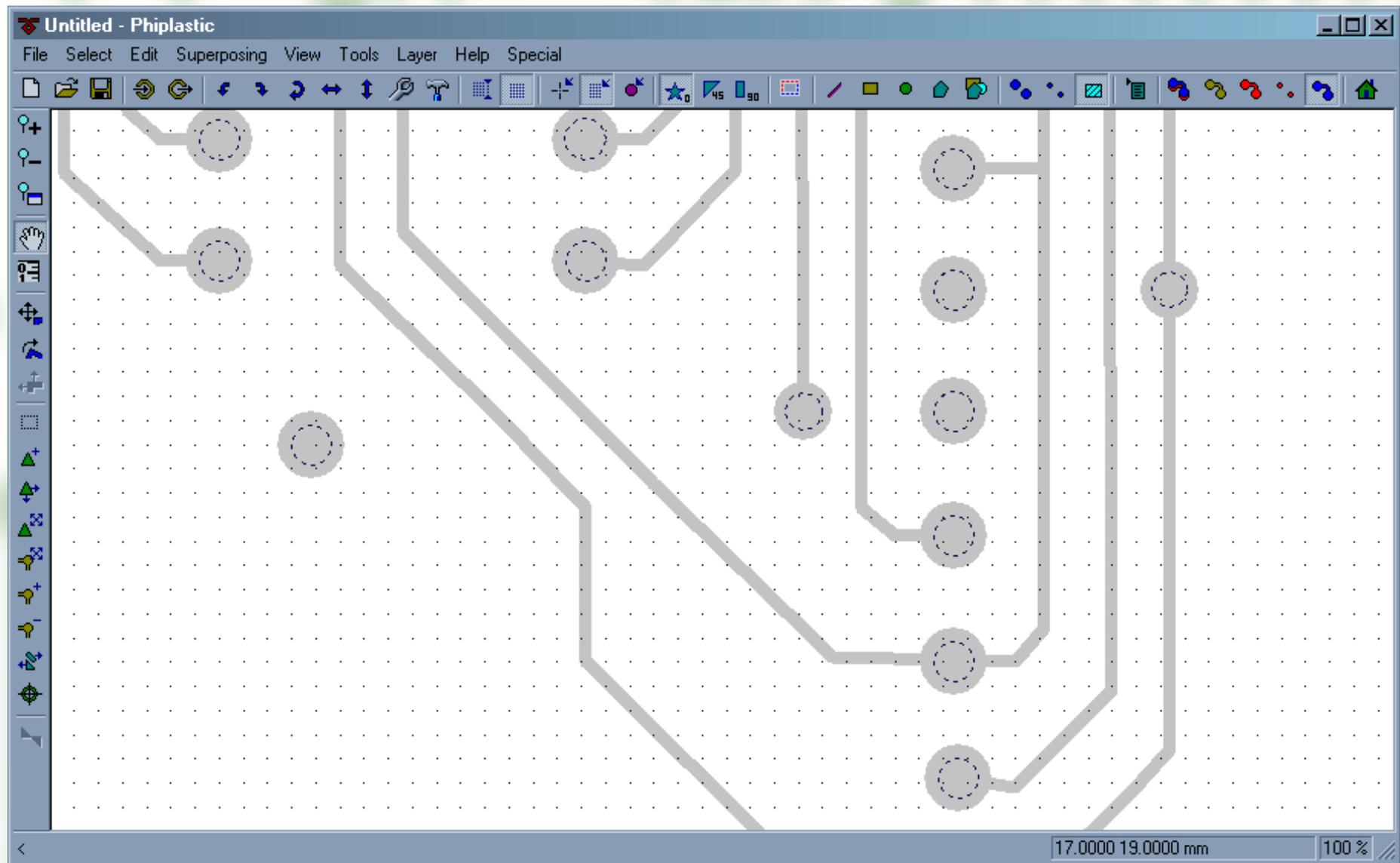
Now they match perfectly.
The list of hole diameters is made up in the same way that it was done for pads.

Phiplastic Inspection helps greatly to verify the results of vectoring.
With a few keystrokes user performs the comprehensive automatic comparison
of the original board and the vectoring results.
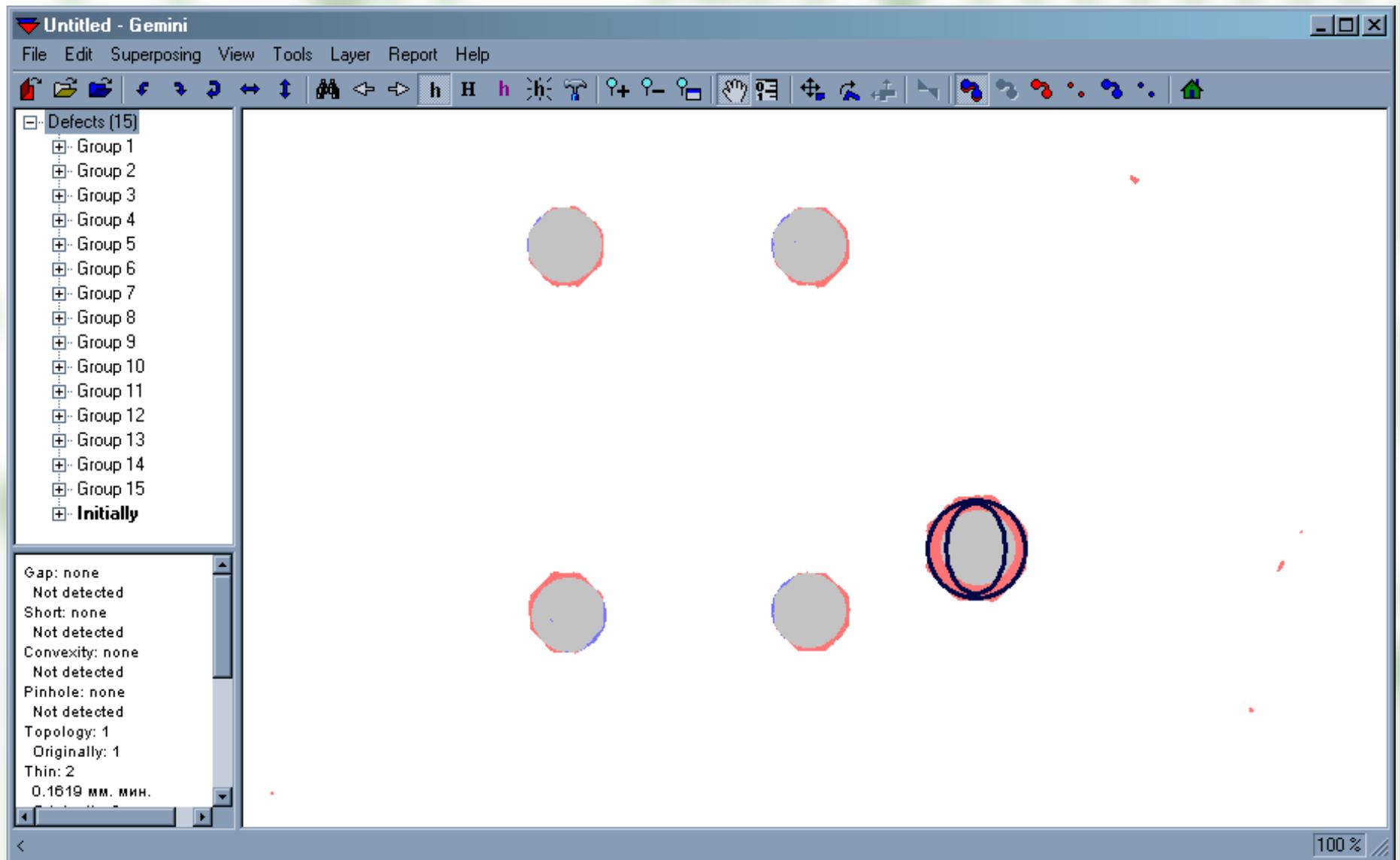
This pad has a wrong size due to users inattention

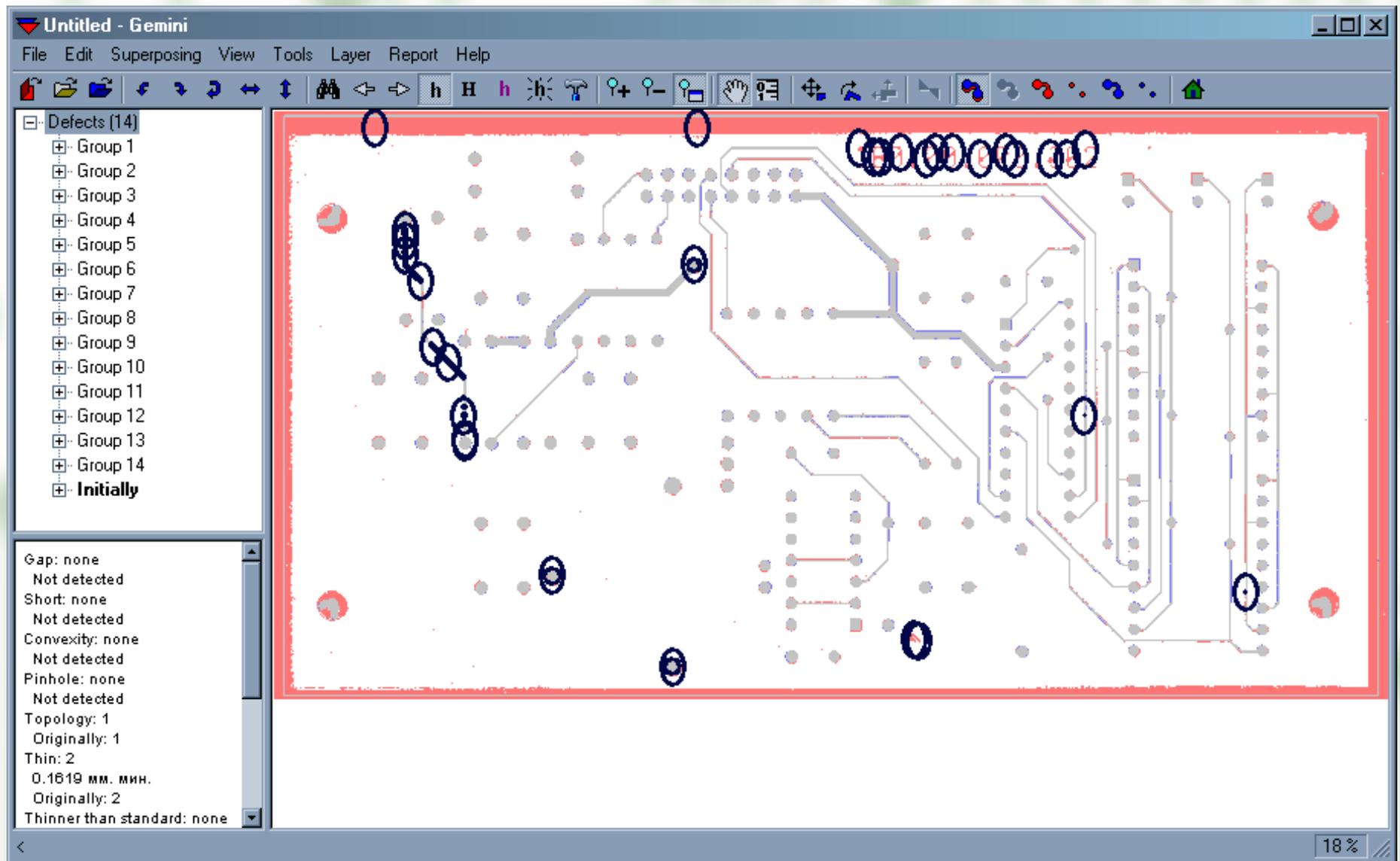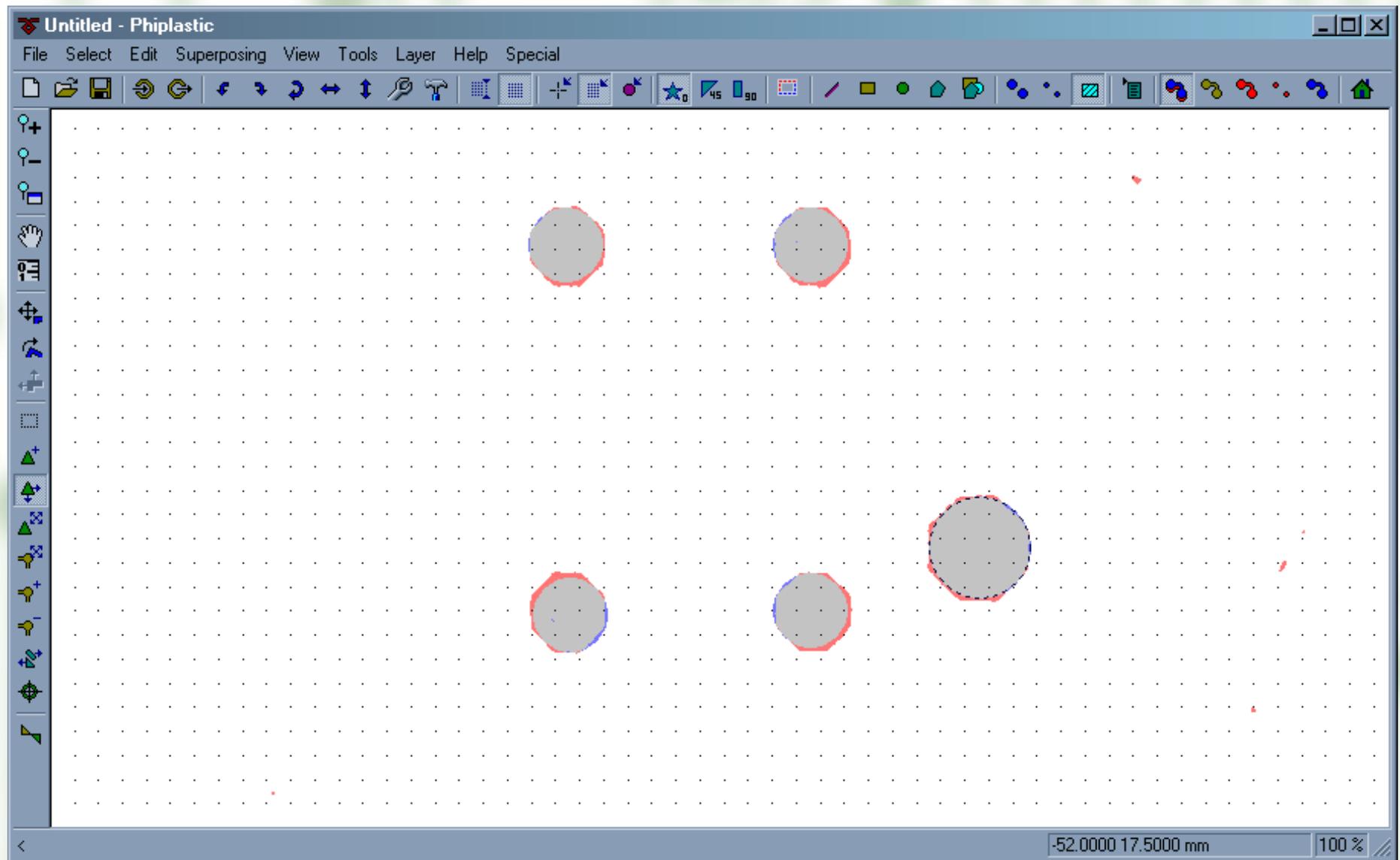Phiplastic (the standard editor) and Gemini (the inspection system) are tightly integrated. For any inaccuracy found by Gemini user can press just one key to open it in Phiplastic on the full scale. After the error has been fixed user can continue reviewing the inspection report starting from the next defect.
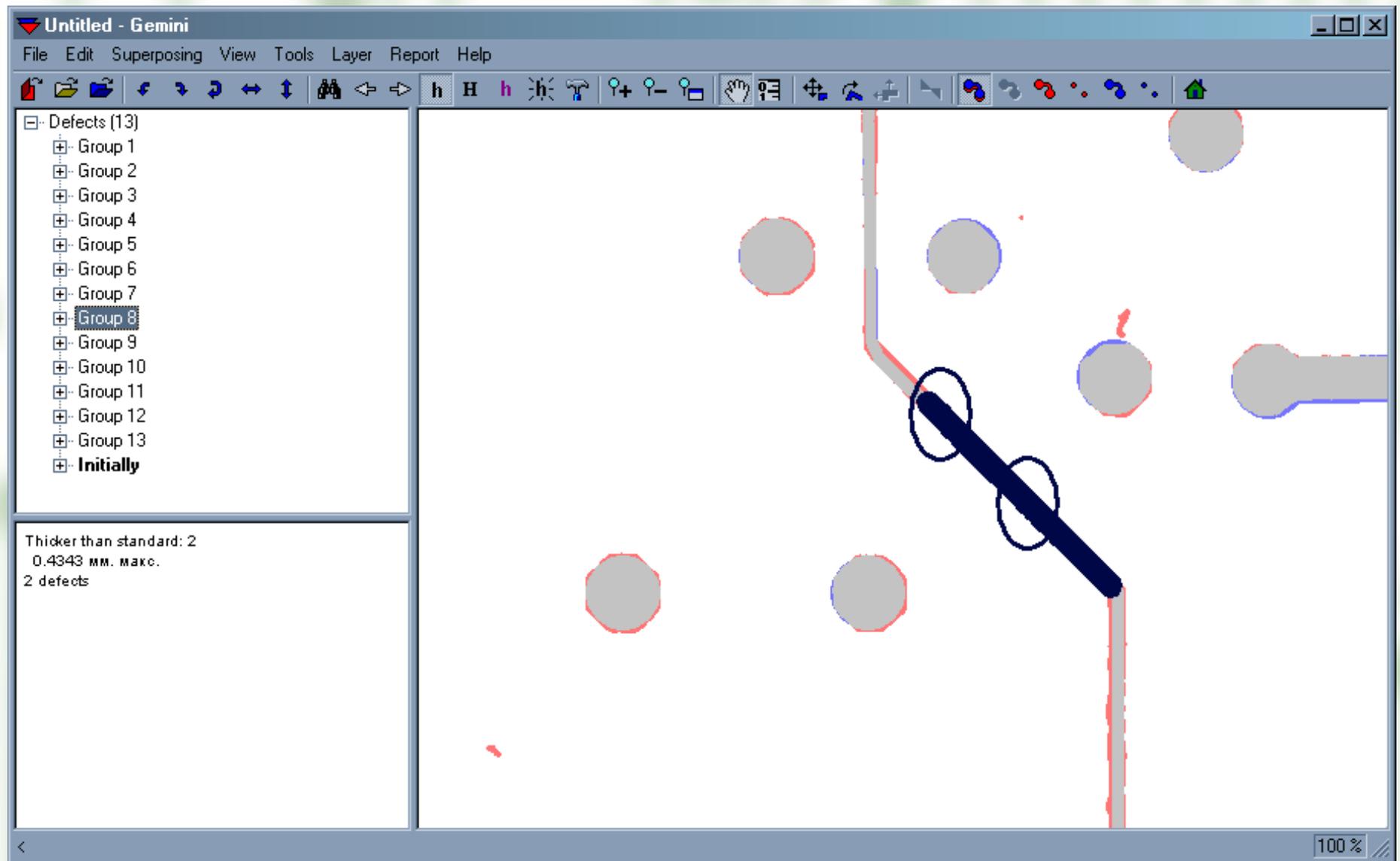
It's a defect of PCB which was vectorized: the diagonal wire is thicker than the vertical one
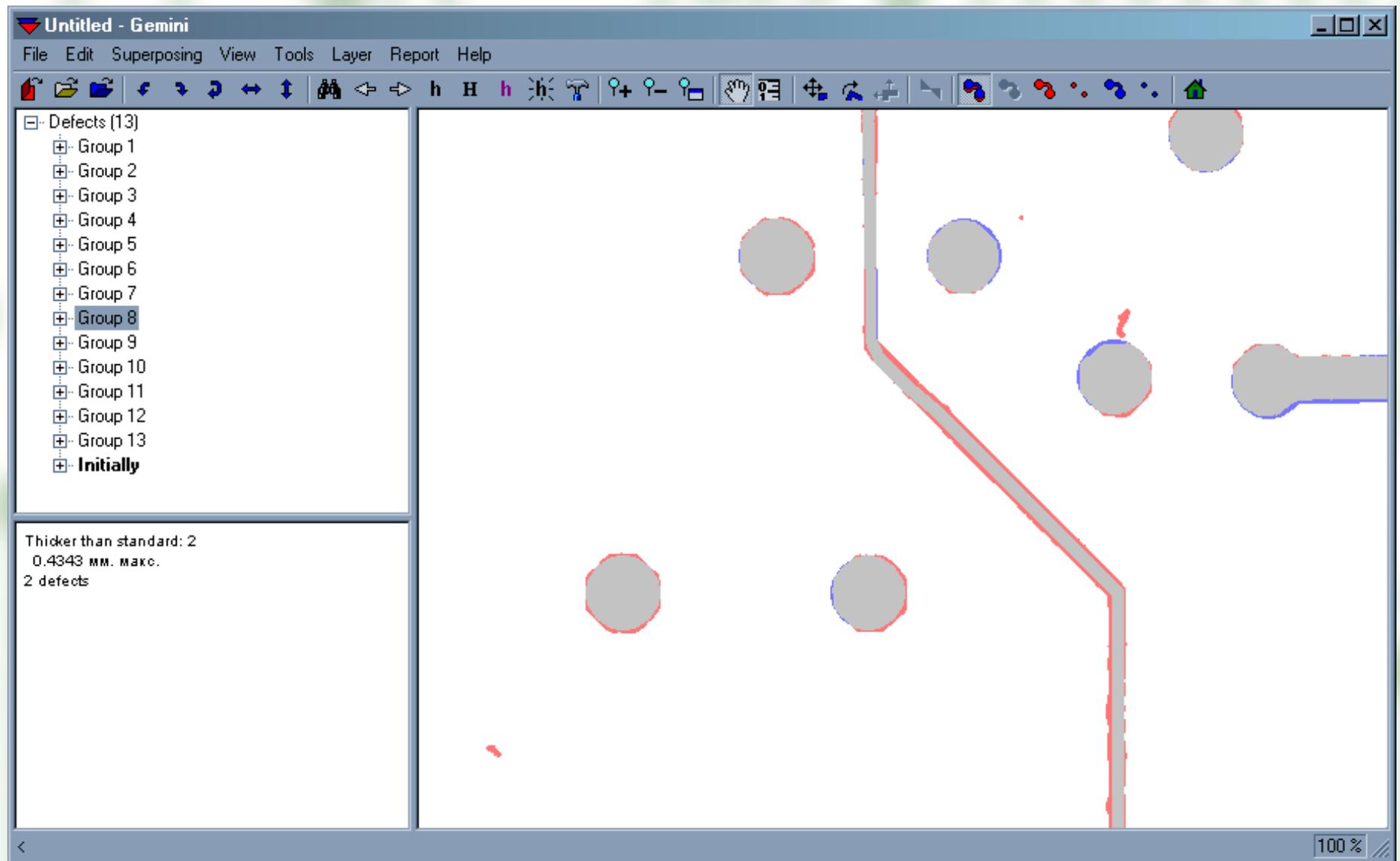
The standard doesn't require correction

Powerful editor

- Vector image manipulations that was outlined above are very simple.

- Phiplastic editor has a lot of commands and tools that allows it to compete with the best programs for this industry.

- Vector image is displayed over the original board.

Data export

One keystroke is enough to get
Gerber RS-274-X file
with the vectorized topology

Multilayer boards

- Phiplastic provides vectoring of any number of PCB layers.

- All that is needed is to obtain their images.

- For ordinary double-sided PCB it's not a problem.

- For multilayer PCBs all layers before pasting together are required.

Extensions

- **Phiplastic Inspection** and **Gold** allows to make a comprehensive comparison of the original with vectoring results, which guarantees their equivalence.

- **Phiplastic Color** makes it possible to vectorize the printed boards and blanks on any 'color' stage of technological process. Color images are converted to black-and-white.

- **Phiplastic Gold** vectorizes with polygons those wires that cannot be represented with lines and pads.

Advantages

- Extremely low cost, no expensive specialized equipment is required.

- Phiplastic easily deals with very large projects.

- Phiplastic works very fast.

- Calculations are made in parallel, modern processor features are utilized when possible.

Other advantages

- Phiplastic evolves for more than 10 years.

- We support our users.

- Software updates are released routinely (usually 2 new versions annually).

- We carry on a dialog to users constantly. Their requests enrich our tasks list.

www.phiplastic.com

www.eurointech.ru