

## Smart Symbols Recognition

A new version of Autolmage Pro for AutoCAD 2000/i and AutoCAD LT 2000/i has intelligent expert system for the symbol recognition. This tool can be very essential in conversion procedures as many technical drawings contain conventional graphical symbols: maps, plans, electric circuits, hydraulic and processing schemes.

### Training Symbols Recognition

It is possible to train the program to recognize any graphic symbols, make a selection by picking, search and replace, and convert raster symbols to vector block or symbols.

You first create vector objects (templates) that approximates raster symbols. You can draw vector objects or create them using the vectorization or tracing modes of Autolmage Pro. Joining the objects in a block is recommended, so you can easily replace the named blocks with other graphic symbols.

Select vector block, from *rConvert* menu choose *Train Symbol*, and press the *Select vectors* button. The selected block will appear in the dialog box (figure one).

You can set connecting lines on a template. This action will increase the productivity of vector symbols recognition, due to the more exact and flexible description of a symbols' geometry.

To do this, press the button the *Connecting lines definition*. In the browser click the sample objects that are to be defined as connecting lines. The connecting line is highlighted on a template in red (figure one). If you make a mistake, click on the object once more to deselect it. Note that the connection line should be a segment with one end adjoining the template objects, and another free. Otherwise, the program will not assign the object to the connecting line.

While saving the template, it is convenient to allocate it to the assigned subfolder. For example, one subfolder contains the templates for recognition of electrical devices denotations, another one contains those of sanitary instruments, the third one contains radio engineering components, and etc. In this case, searching as well as connecting and disconnecting of the subject-oriented groups of templates is made considerably easier.

Since the templates are stored in separate files, you can delete and copy them using standard tools of operating system.

### Tuning symbol conversion parameters.

The procedure of selection, tracing, and automatic recognition of raster entities are based on the algorithms of raster recognition by vector templates. The basic comparison criterion is the resemblance of the raster and template geometric characteristics: relations between composing object sizes, link types, angle value, and so on.

Before any recognition procedures, you should specify the required templates in *Conversion Options* dialog box. For example, if you want the software to manipulate symbols, under *Recognition* tab you should turn on the *Symbols* algorithm.

In the *Symbols* tab you can also specify other parameters such as shape, strategy, accuracy, scale and orientation. The left part

displays the content of the folder in which the symbol files are saved. This box displays all the template files in the folder as well as all subfolders of this folder. To specify the required template, you need to mark the box. A bitmap of highlighted template is shown in the special window (figure two).

**Strategy:** The choice of strategy influences the balance speed vs accuracy in the algorithm operation. Fast strategy has the highest speed of the raster analysis, but it may not find symbols even very similar to the template. Smart strategy operates at the low est speed, but yields the most correct results. Standard is used by default.

**Fixed scale:** This parameter sets the tolerance for recognizing symbols of various sizes. If the check box is on, only the symbols whose sizes are proportional to templates, with the factors set in the numerical box, will be recognized. When replacing the recognized raster symbols, this factor will be used for scaling the inserted vector symbol. If the check box is off, all raster symbols will be checked on tolerance, and the scaling factor for replacement will be calculated automatically. In this case the program operation may be slower.

**Accuracy:** This parameter defines the accepted deviation of raster symbol geometry parameters from the sample.

**Orientation:** This sets possible angular deviations of raster symbols from the specified templates. If you select *Horizontal*, only the symbols having the same orientation as the specified templates will be recognized. If you select *Horizontal and Vertical*, the symbols rotated by an angle multiplied 90 degrees will be recognized. If you select *Arbitrary*, the symbols rotated by arbitrary angles relative to the specified samples will be recognized. The choice of this last option significantly slows down the operation of the recognition algorithms.

**Only Standalone symbols** If this checkbox is off, all symbols appropriate to the template will be recognized, even if raster objects that do not have analogues with objects, set in the template, cross them. Otherwise only Standalone Symbols that do not contain foreign object will be retrieved.

For more information please visit:

[www.rastertech.com.au](http://www.rastertech.com.au)

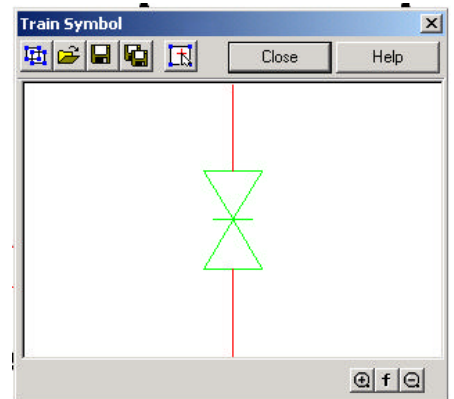


Figure one. Vector template with the connecting lines

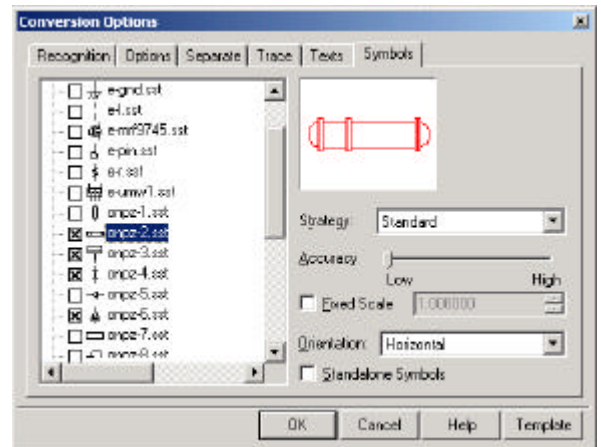


Figure two. The Symbols tab Conversion Options Dialog Box

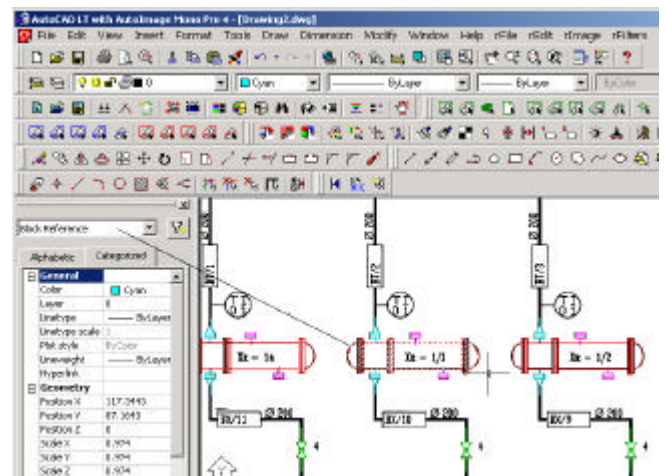


Figure three. Vector blocks as the result of raster symbols conversion