



Optimization Technologies for Cutting

Scan-Way 1.1 User's Manual

OPTIMA SOFTWARE

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0 - INTRODUCTION

OPTIMA reserves the right to make changes to the product described in this manual at any time without prior notice. This document was prepared by OPTIMA for the sole use of its customers. The user utilizes this document under his own responsibility. OPTIMA makes no further warranty of any kind (particularly with regard to possible imperfections, incompleteness and/or operating problems) and will not be held liable for any direct or indirect damage arising from the use of this documentation.

This USER'S MANUAL is a guide for using the standard version of Scan-Way. It provides information about commands, as they appear in the standard graphic interface supplied by OPTIMA.

Scan-Way is an innovative software application that runs under Windows. With a common scanner and a few commands, you can process paper drawings of any kind and automatically convert raster images (acquired from a scanner) into vector files in the DXF format, which can be directly edited in any CAD program.

Scan-Way minimizes processing times. In just a few minutes you can vectorize drawings and obtain high-quality and extremely faithful-to-the-original results.

Special morphological filters let you recover even extensively damaged drawings (thin and non-uniform lines, yellowed heliographic prints, etc.).

Scan-Way is a powerful and technologically advanced software application, but, at the same time, it's also easy to learn and to utilize. Command icons are grouped on practical toolbars that the user can position as needed.

Scan-Way has been specially designed to meet various requirements. For this reason, different versions have been created, and each with its own specific dedicated routines:

- ◆ Scan-Way
- ◆ Scan-Way PRO
- ◆ Scan-Way 3D

Thus, this manual includes a common part for all versions and appendices for the specific versions.

Scan-Way Features

Raster commands

Read and write the most commonly used raster formats.

Note: the GIF and LZW-compressed TIFF formats are not supported. It is recommended to save black and white images in the TIFF format with PackBits or Group 3 compression and color images in the JPG or BMP formats.

Operations on raster images: zoom, scroll, rotate and mirror.

Functions: eraser and pencil tools, erase box, copy and paste, erase and fill areas.

Commands sheet bordering, automatic despeckling, deskewing and application of morphological and smooth filters.

Vectorization commands

Qualitative selection of vectorization parameters.

Three vectorization methods: centerline, outline, center & outline.

Select the area to vectorize.

CAD commands

Draw, edit, move, copy, and delete polylines, lines, arcs, circles and points.

Join polylines.

Rasterize polylines and reduce the number of polyline points.

Snap to raster centerline or outline.

Orthogonal drawing capabilities to easily insert vector entities.

Undo to cancel performed operations.

Scan-Way PRO Features

Raster, vectorization and CAD commands

Same functions as described for the Scan-Way version.

Rubbersheeting/calibration commands

Manage control points, rubbersheet and merge images, and correct template thickness.

Scan-Way 3D Features

Scan-Way 3D is a Windows application that automatically generates 3D tool paths from black and white or color raster images.

Specifically, it lets you convert any kind of drawing on paper or photographic print, acquired from a scanner or other technology (e.g. laser technology), into a tool path (ISO code).

Using it will speed up the NC program file generation stage. You just need to specify the required machining technological parameters.

It is ideal for artistic drawings and whenever the geometric characteristics of a drawing are unknown.

Scan-Way 3D is entirely parameter-based to let you adapt the machining process to the kind of drawing, the characteristics of the selected tools and the result you wish to obtain.

A program file can contain machining code for an entire drawing or portions of it using the same or different parameters.

The quality of the result obtained will differ depending on the characteristics of the original image, the scanner calibration and the care you put into scanning.

Scan-Way 3D can process images with up to 3,550 columns and 3,550 rows, corresponding to the A4 size, with a resolution of 300 DPI. For color or grayscale images it is recommended not to exceed 1,500 x 1,500 pixels when using entry-level processors. To obtain the desired machining size, use the RESIZE command and the scale parameter available for each machining operation, if required.

Raster commands

Read and write the most commonly used raster formats.

Note: the GIF and LZW-compressed TIFF formats are not supported. It is recommended to save black and white images in the TIFF format with PackBits or Group 3 compression and color images in the JPG or BMP formats.

Operations on raster images: zoom, scroll, rotate and mirror.

Functions: eraser and pencil tools, erase box, copy and paste, erase and fill areas.

Commands: sheet bordering, automatic despeckling, deskewing and application of morphological and smooth filters.

3D Project commands

Manage the project, simulate, control tools, texture and render.

Hardware and Software Requirements

The program runs on all PCs equipped with the Windows 98/ME/2000/XP/2003 operating system, when properly installed and working. The microprocessor and the RAM must be adequate for the installed operating system.

The PC must be equipped with an SVGA video card with a resolution of at least 800 x 600 with 65,000 colors and small characters for correctly displaying all program menus.

To install the program, at least 100 MB must be available on the hard disk.

Minimum and recommended requirements for running Scan-Way

- ◆ Microsoft WINDOWS XP HOME / PRO
- ◆ Personal computer equipped with a PENTIUM III or higher processor.
- ◆ 128 MB RAM or more when using Windows 98/ME.
- ◆ 512 MB or larger RAM
- ◆ 500 MB of available space on the hard disk.
- ◆ 3.5" floppy disk drive.
- ◆ CD-ROM drive.
- ◆ SVGA video card (800x600) (1,024x768 recommended).
- ◆ Ink jet or laser printer.
- ◆ Mouse and keyboard.
- ◆ Parallel port to connect to the program hardware security key and to the printer or USB port.

If the technical features of your computer do not match those listed above, or if you have any doubts about the required minimum configuration, do not hesitate to contact OPTIMA's service department for additional details.

Optional devices

Scanner of any type and size.

Digital camera with a minimum resolution of 5M pixels.

TWAIN driver - version 1.5 or higher.

Vectorization Methods

Scan-Way supports three vectorization methods:

- ◆ centerline
- ◆ outline
- ◆ center & outline.

Centerline

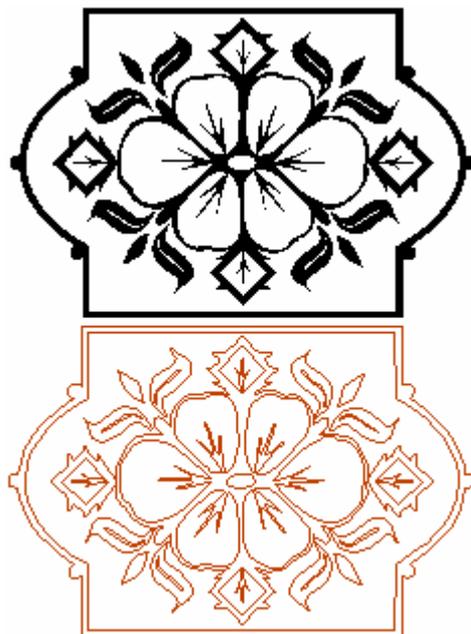
Centerline vectorization is used for drawings that contain lines with a width of a few pixels, i.e. similar to the lines traced by a pen with a maximum width of 0.8-0.9 mm.

Scan-Way reproduces the centerline of each scanned element. Consequently, this vectorization method gives the best results in the reproduction of the original drawing if the raster image contains only thin elements.



Figure 4.1: Example of centerline extraction. Suppose the figure shows an enlarged line. This option vectorizes the centerline of the original trace.

Outline



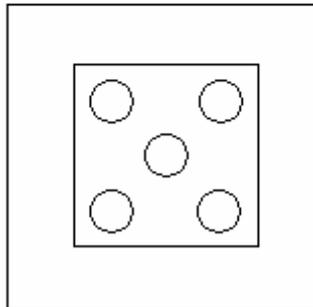
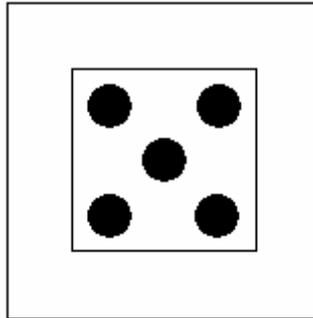
Outline vectorization is used for drawings that contain dark spots or solid black characters or symbols.

This vectorization method returns one single line for lines with a width of two pixels or less and two parallel lines for lines with a width of more than two pixels, as shown in Figures 4.2 and 4.3.

Figure 4.2: Example of outline extraction. The picture on the left shows the original raster file.

Figure 4.3: Result of the outline vectorization.

Center & Outline



This vectorization method is a combination of the two previous methods, which are applied to the same drawing simultaneously.

The main parameter of the Center & Outline vectorization is Thin line width (SOT). By default, it is set to three pixels in the parameter dialog box.

If the raster object Scan-Way is vectorizing has a thickness less than or equal to the Thin line width parameter, its centerline is extracted. On the contrary, its outline is extracted.

The figures show an example of Center & Outline vectorization. The picture has solid shapes and a thin outline. To vectorize it in a single operation you must use the Center & Outline vectorization method.

The result of the center & outline vectorization will be an outer boundary polyline and polylines around dark areas.

Vectorization Parameters

Point reduction tolerance (PRE)

Point reduction tolerance or Precision is a parameter, measured in pixels, that Scan-Way utilizes during the vectorization process to reduce the number of points in the polylines generated by vectorization.

This parameter, which may range from one to five, indicates the maximum permissible deviation between the real entity in the raster file and the entity generated by vectorization.

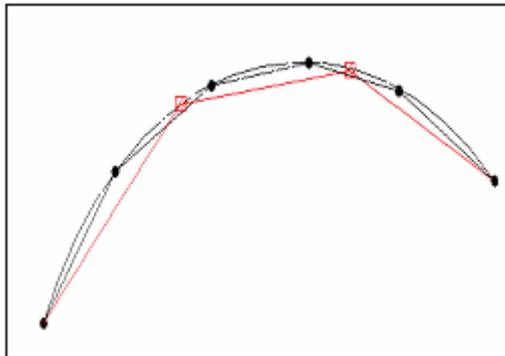
You must set the PRE parameter to a value that is inversely proportional to the number of points in a polyline. To obtain a vector representation that is very close to the raster file representation, set the PRE parameter to a low value (1 or 2). For a less precise vector representation, set the PRE parameter to a high value (3, 4 or 5).

When the value of the PRE parameter is low, Scan-Way produces polylines with a greater number of points than with a high value.

To obtain a faithful representation or when the raster file has very sharp curves, set the Tolerance to a low value to obtain a greater number of vertices.

Instead, when the raster file is made up mostly of straight lines or contains unwanted roughness or noise, set the tolerance to 2-3 pixels to obtain more linear polylines.

The figures show some examples of how the PRE parameter can be used.

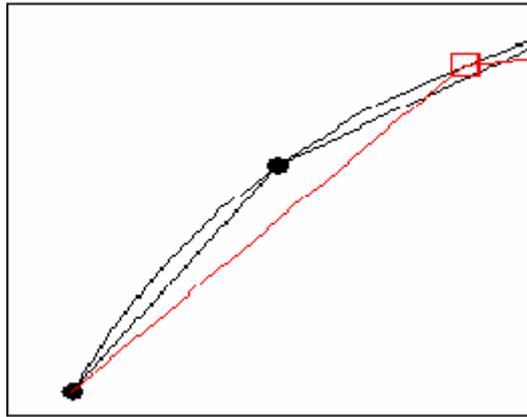


Utilization of the PRE parameter: varying the PRE parameter will vary the number of sides of the polyline generated by vectorization.

The arc shown in the figure represents the original curve in the raster file. The broken line marked with circles is the polyline generated by the vectorization process using a

PRE value of 2, whereas the line marked with small squares is the result of a PRE value of 4 pixels.

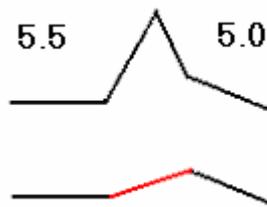
The following figure (detail of the previous figure) shows how the tolerance affects the vectorization result. The lower the PRE value, the greater the precision and the number of vertices of the polyline (black circles). On the contrary, the greater the PRE value (hatched squares), the lower the number of vertices in the polyline.



Furthermore, the Tolerance parameter is used to remove "peaks" and "steps" from vectorized polylines. Scan-Way, in fact, vectorizes only raster segments with a size in pixels equal to or greater than the PRE parameter value.

In most cases, this feature of the vectorizer lets you work with low tolerances and still obtain precise polylines made up of a minimum

number of points.



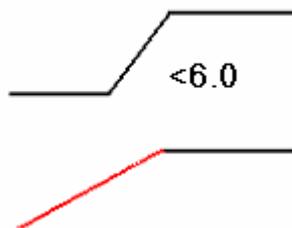
To better understand this concept, refer to the two illustrated examples.

Example of peak removal from a polyline.

Example of peak removal. Suppose you have a vectorized polyline like the one on the side. You can clearly see a peak (and its size) that disturbs the course of the polyline.

If you set the PRE parameter to 3 pixels, Scan-Way utilizes a work value that is twice as big as the set value (6 pixels). The situation described above changes as illustrated in the figure.

Example of step removal from a polyline.



Example of step removal. The figure on the left shows a polyline with an unwanted step whose height is more than 6 pixels.

This is the resulting polyline after you set the PRE parameter value to 3 pixels.

The PRE parameter value is also used as a factor to increase the Initial search radius in the polyline removal and connection process. The Initial search radius, in fact, is incremented by the tolerance value up to the value set for the Final search radius (see the iterative example in the section below).

1 - USER INTERFACE

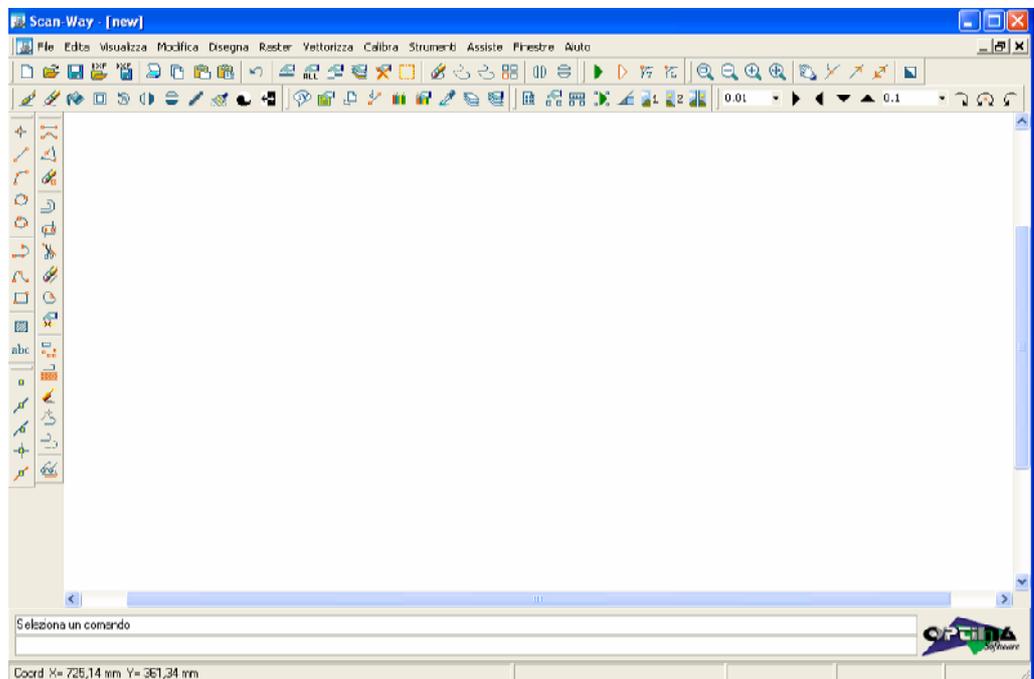
Scan-Way resources

As you will see below, the program is extremely flexible and easy to customize thanks to various special tools. Even the program interface, i.e. the way it is presented to the user, can be modified as required.

Because this is a user's manual, reference will be made to the standard interface.

Screen Structure

At startup, Scan-Way displays a graphic environment window with the following layout:



The characteristic elements of the user interface are:

- ◆ **Title bar:** This is the blue bar in the top part of the window. It shows the current file name and the program version on the left. Instead, it has three buttons to minimize, resize and close the program on the right.
- ◆ **Command menu:** Pull-down menus are located right below the title bar. They contain all the Scan-Way commands. Commands have been grouped according to their function.
- ◆ **Toolbars** Toolbars with commonly used tools are located on the three sides of the screen. Toolbars are groups of icons, and each icon represents a menu command that can be invoked with a click of the mouse. You can place toolbars anywhere just by clicking with the left mouse button on the toolbar double rule and holding it down while dragging them into the graphic interface. To hide a toolbar, just click on the "X" that appears in the top right part of it, after dragging it to the center of the screen.
To restore hidden toolbars, use the Customize command from the Tools menu or the pop-up menu that appears after pressing the right mouse button in the toolbar area.
At start-up, the program automatically loads the last configuration you set.
- ◆ **Work window:** This is the center part of the screen used for handling both the raster image and the vector image. The + and - keys of the numeric keypad let you zoom in and out in real time until you obtain the optimum raster display.
- ◆ **Status bar:** The bottom part of the screen is divided into various areas. The first area displays messages to the user. Commands or the prompted data can be typed in the second area. The third area shows information about coordinates and units of measurements, operations in progress, and percentage values of operations performed.

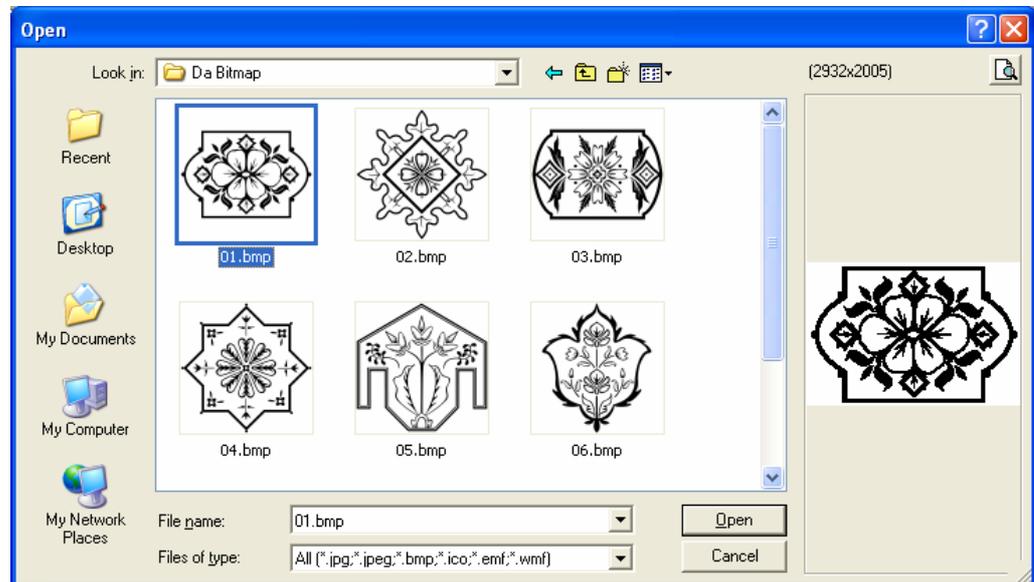
2 - GENERAL CONCEPTS ABOUT COMMANDS

Selecting Commands

Scan-Way commands can be accessed through the menus that appear on the screen. Menus and their contents can be modified to create your personalized work environment. Reference will be made below to the menu of the standard interface.

Standard Dialog Box

The Scan-Way 1.0 standard Dialog Box lets you navigate through your local and network drives to make selections for operations on files.



Available options are:

Look In

Displays the current folder or drive. Click on the line to view the hierarchy of folders and navigate up the path tree or to other drives, network connections, etc.

Back to last accessed folders

Returns to the last accessed folders.

Up One Level 

Navigates one level up in the current path tree.

Create New Folder 

Creates a new folder in the current path using a name that you specify.

Display 

Controls how the list of files is displayed.

Large Icons

Displays files using a large icon. Image files are displayed.

Small Icons

Displays files using a small icon in a multicolumn format.

Titles

Displays files using a small icon in a single-column format.

List

Displays files in a multicolumn format.

Details

Displays files in a single-column format with file details.

Preview 

Displays a bitmap of the selected file.

File Name

Displays the name of the file you select from the list of files. Multiple selection is not allowed. You can enter a file name only if it is present.

File Type

Filters the list of files by the selected file type. When saving files, File Type specifies the format in which the file is saved.

Open/Save/Position/Join

Displays the operation based on the current context.

3 - FILE

Operations on Files

New

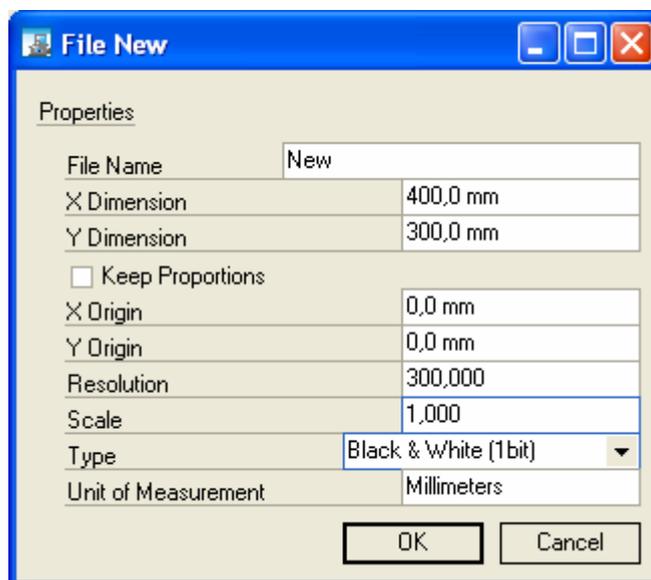
 Standard Toolbar 

File Menu New

 Shortcut Key Ctrl+N

This allows you to create a new file and specify its characteristics.

Once you have invoked the command, the following dialog box appears:



Creation of a new file

Set the characteristics of the new file in the dialog box: width and height in pixels, origin, resolution, scale, type (black and white, grayscale, 128-color, True Color). Unit of measurement can't be modified from this panel.

Open

 Standard Toolbar	
File Menu	Open
 Shortcut Key	Ctrl+O

See [Standard Dialog Box](#).

Please note that Scan-Way can handle the most commonly used raster formats except the GIF and LZW-compressed TIFF formats.

When you open a file, its name appears on the title bar in the top left corner of the window, next to the program name Scan-Way.

Save

 Standard Toolbar	
File Menu	Save
 Shortcut Key	Ctrl+S

Saves the on-screen raster image in the specified format.

In the File Name field, type the name under which you want to save the file. If you type an existing file name, you are prompted to confirm before overwriting the file on the hard disk.

The File Type field is very important, because it determines the format of the graphic file. The TIF format is recommended when no special requirements must be met.

See [Standard Dialog Box](#).

Close

 Standard Toolbar	
File Menu	Close

Closes the on-screen raster file.

The current, on-screen, file is closed. Any changes made to the raster file as well as any on-screen vector entities will be lost if not saved.

Save DXF



Saves a file containing the vectorization results in the DXF format so that it can be handled using any CAD program that reads DXF. See [Standard Dialog Box](#).

Please note that you need to select the Metric coordinates option to obtain a full-scale DXF file.

Open DXF



Loads a vector file in the DXF format onto the screen.

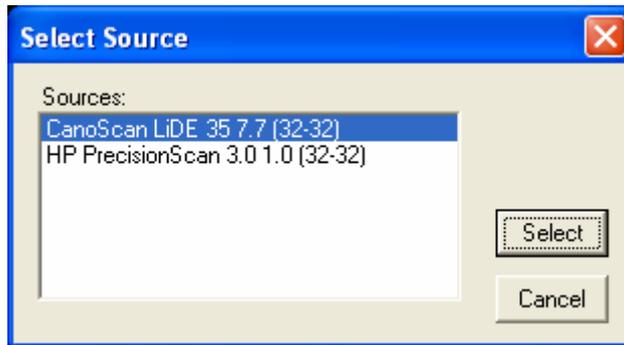
You can use the Read DXF format command to load a file in the vector format generated by Scan-Way or another CAD application onto the screen, and superimpose it on the on-screen raster previously loaded with the Open command or created with the New command.

Scan



Acquires an image from an external scanning device.

To use the Scan command you must have an external digital image acquisition device (scanner, digital camera, etc.). The device must be correctly connected to the computer and installed. Scan-Way only supports devices that utilize a TWAIN driver.



When you invoke the Scan command, the following dialog box appears in which you can select the device.

Figure 7.10: Selection of the source for the external acquisition of digital images.

The dialog box shows the list of the acquisition

devices connected to the computer. Once you select the device, Scan-Way displays the acquisition device control panel for you to acquire the image. Obviously, each acquisition device has its own control panel.

At the end of the acquisition, the Scan-Way environment is automatically opened and a dialog box for saving the acquired file will appear.

The following problems may arise while acquiring images from an external device:

- ◆ The selection dialog box does not appear when the command is invoked. The installed TWAIN driver version may not be compatible with the current operating system. In this case, it is recommended to install the adequate device driver (usually available on the Internet or from the device manufacturer), restart the computer and invoke the command again.
- ◆ The desired option does not appear in the selection dialog box when the command is invoked. The acquisition device may not be properly installed or connected to the computer. In this case, it is recommended to check if the connection cables are firmly connected. If the problem continues, contact the service department.
- ◆ The acquisition device control panel does not work correctly in the Scan-Way environment. In this case, it is recommended to acquire the image using the acquisition software supplied with the device. After saving the raster file in a format compatible with Scan-Way (the TIF format is recommended, if available), close the acquisition software, start Scan-Way and open the previously saved raster file.

Print setup

Configures the printing device.

The dialog box also lets you choose the printing device from among those configured in the operating system printer folder. You can set paper size, paper feed tray and paper orientation.

After clicking on the Properties button, you can also change the print quality and printing speed settings directly from the printer driver.

Print

Prints the on-screen raster file using the current printing device.

In this stage you can set the number of copies to print.

This command prints only the raster data of the file, while the vector data is discarded. The raster is not printed to scale.

To print the file vector data you need to import the vector image into a CAD program and print it from there.

Properties



File Menu

Properties

Displays some information about the current raster file.

Drawing properties cannot be changed.

See [File New](#).

Select Origin



File Menu

Move Origin

Moves the origin of the Cartesian reference system.

The system origin is marked with a cross placed at the intersection of the axes.

By default, whenever a raster file is opened or a new raster file is created, Scan-Way considers the upper-left corner of the page to be the origin of the Cartesian axes.

You can define a new origin with the Select Origin command just by indicating a point in the graphic area. Click on the right mouse button to reset the origin to the coordinates 0,0.

This command is active only when you work in metric coordinates.

This command is vector snap-sensitive, which means you can force the origin to be placed at the end or midpoint of a vector entity.

Recent Files

Provides quick access to the drawings that were opened last.

The bottom part of the File menu shows the names of the raster files that were opened last. Just use the mouse to click on the desired file name to open it.

Exit

Closes the work session and exits the program.

When you invoke this command, the system will prompt you to save in case you made any changes.

4 - EDIT

Canceling an operation

Undo

 Standard Toolbar	
Edit Menu	Undo
 Shortcut Key	Ctrl+U

Cancels executed commands one at a time.

You can set the number of undo steps in the Preferences dialog box.

The counter is automatically reset each time you save. Therefore, operations performed before saving cannot be undone.

Clipboard

Copy Raster

 Standard Toolbar	
Edit Menu	Copy Raster
 Shortcut Key	Ctrl+C

Stores a portion of the raster file.

This command lets you copy a portion of the raster file to the clipboard and then paste it using different methods. This command includes five subcommands, which are described below.

Before using the Copy command, you need to select the portion of the raster file you wish to copy by using the  selection window.

The Copy command issues a warning message if no valid selection is made in the raster file.

After invoking the Copy command, one of the following commands is usually selected:

- ◆ Paste Selection
- ◆ Paste into New Image
- ◆ Paste to Center
- ◆ Paste to Side
- ◆ Paste Multiple

Paste Selection

 Standard Toolbar 

Edit Menu Paste

 Shortcut Key Ctrl+V

Pastes the results of the last Copy command.

Specifically, it pastes the last portion of the raster, stored with the Copy command, onto an area of the current raster.

Before invoking the Paste Selection command, you need to select the raster area, onto which to paste the stored raster portion, by using the  tracker window.

When you invoke this command, a window is displayed showing the location and the size of the image you are pasting. Note that the insertion point is the upper-left corner of the window.

The pasted raster is superimposed on the raster underneath, maintaining its original size regardless of the selection window size, and without being distorted or stretched.

Paste into New Image

 Standard Toolbar 

Edit Menu Paste Special ▶ Paste into New Image

Creates a new image containing the last selection of the Copy command.

It creates a new image starting from the last raster image selection copied with the Copy command. Before displaying the new image, the program prompts you to confirm that you want to close the on-screen raster image and save any changes.

Selection

Select Objects



Standard Toolbar

Edit Menu

Select

Allows you to select one or more objects that exist in the graphics.

You can also select all vectors that exist inside a rectangular area by specifying two opposite corners of the rectangle.

Select All



Standard Toolbar

Edit Menu

Select All

Allows you to select all objects that exist in the graphics.

Invert Selection



Standard Toolbar

Edit Menu

Invert Selection

Inverts the property that determines if entities belong to a selection set.

This command can be used only after creating a selection set, as described above.

All objects that belong to the active selection set are deselected and thus excluded from the selection set, whereas all the other objects are included in the selection set.

Whether an object belongs to the selection set or not is indicated by the object color.

Deselect All



Standard Toolbar

Edit Menu

Deselect All

Deselects all previously selected objects.

Tracker



Edit Menu

Tracker

Creates a moveable and resizable work window.

Specifically, it creates an on-screen work area (window) in the active file.

The tracker window is a rectangle with a dashed edge and eight black grips along the perimeter. You can resize the window by dragging one of its grips or move it from one location to another by pressing and holding down the left mouse button inside it and dragging it to the new location.

Some commands will have an effect only inside the created window.

For instance, when you create a window on the screen and then invoke the Vectorize command, only what is inside the window will be vectorized.

The same applies to the Recognize Text and Despeckle commands.

Attributes

Color



Tools Menu

Color

Allows you to select the active color.

Modify Color



Tools Menu

Modify Color

Allows you to modify the color of the selected objects.

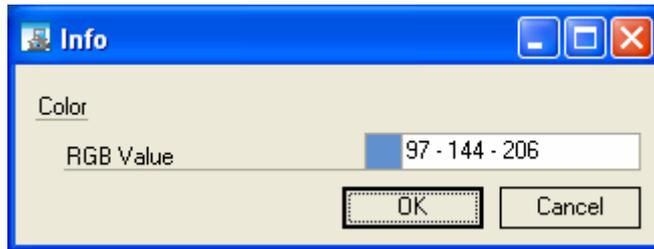
Select Color from Screen



Tools Menu

Select Color from Screen

Allows you to select the desired active color from the screen.



5 - VIEW

Zoom

Zoom +



View Toolbar



View Menu

Zoom +



Shortcut Key

+ (Numeric Keypad)

Allows you to zoom in.

The on-screen image is enlarged with respect to the current view.

Once the maximum zoom-in limit is reached, the command has no effect.

Zoom -



View Toolbar



View Menu

Zoom -



Shortcut Key

- (Numeric Keypad)

Allows you to zoom out.

The on-screen image is reduced with respect to the current view.

Once the maximum zoom-out limit is reached, the command has no effect.

Zoom All

 View Toolbar 

View Menu Zoom All

 Shortcut Key Ctrl+F

Displays the entire raster image.

This command lets you quickly zoom on the entire work sheet. It may be useful to display the entire file after zooming on details.

Zoom Window

 View Toolbar 

View Menu Zoom Window

 Shortcut Key Ctrl+Z

Zooms on a selected area of the screen.

This command is used to zoom on a specific area of the screen, defined by creating a zoom window on the screen.

To create a zoom window, invoke the Zoom window command, position the cursor on a point of the raster file, press and hold down the left mouse button while dragging the pointer to the opposite corner of the rubber-band dashed rectangle that appears on the screen. When you release the left mouse button, the contents of the dashed window are presented as a full-screen display.

View commands

Pan

 View Toolbar	
View Menu	Pan
 Shortcut Key	Ctrl+K

Allows you to select a specific work area of the raster file.



This command will show a new window named PanWin inside the Scan-Way work sheet, as illustrated in Figure.

Utilization of the Pan window.

The PanWin window shows the entire work sheet (white part) that contains a black rectangular Pan window, indicating the image portion displayed in the Scan-Way work area.

The black Pan window is displayed full-screen in the Scan-Way work area with the zoom you specified.

You can move the black Pan window by dragging it with the left mouse button to the desired location. While moving the black Pan window, the Scan-Way work area shows a full-screen preview of its contents.

The Pan window will become easier to use the higher the zoom level you use and the larger the raster file you are working on.

Changing the zoom level will change the size of the black Pan window. The higher the zoom on the work area, the smaller the black Pan window.

When the PanWin command is active, use one of the Zoom commands described above to change the zoom on the Scan-Way work area. Then, you can go back to the Pan window to move the display to another raster area.

To end the Pan Window command, click on the X button in the upper-right corner on the title bar of the PanWin window.

The black Pan window may cover the entire area. This occurs after a Zoom All on the work sheet. In this case, the Pan Window command has no effect on the on-screen file.

Show/Hide Raster



View Toolbar



View Menu

Show/Hide Raster



Shortcut Key

Ctrl+R

Allows you to show or hide the raster file.

This command is used to show or hide the on-screen raster file depending on your requirements.

Hiding the raster file may be useful after a vectorization to check the results obtained.

6 - RASTER

Edit Raster

Various useful commands have been implemented to edit a raster, to remove portions of a raster, to draw and to erase.

You can:

- ◆ erase or fill the selected area of a raster (Erase box/Fill box).
- ◆ use the pen to draw new objects or modify raster areas.
- ◆ use the eraser to erase objects or modify raster areas.

You can change the value of the pen/eraser size using the Pen/Eraser dialog box.

You can also use the Smooth and Reduce to Black & White commands to improve the quality of the image and the Despeckle command to remove spurious pixels from the image.

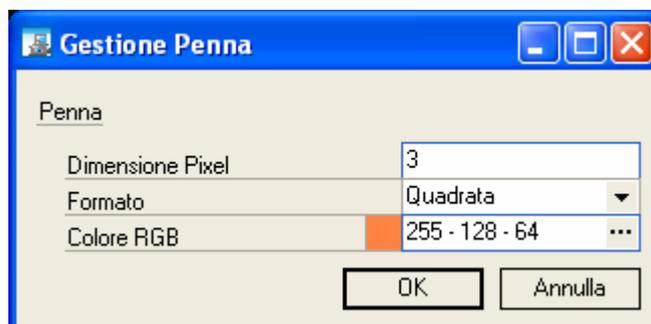
Pen



Raster Menu Pen

Allows you to draw freehand in the raster file.

When you invoke the command, a dialog box is displayed in which you can set the tool size, shape and color.



The smaller the tool size, the greater the accuracy achieved when utilizing the tool. A large tool is useful to fill in large areas.

To draw freehand, confirm by clicking OK, press and hold down the left mouse button on the raster file. The mouse will act like a pen. Moving the mouse too quickly on the raster file might create a dashed line. To obtain a continuous line, move the mouse slowly on the screen.

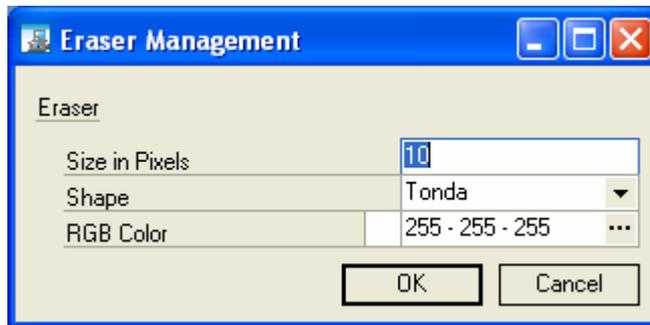
Eraser



Raster Menu Eraser

Allows you to erase freehand on the raster.

When you invoke the command, a dialog box is displayed in which you can set the tool size, shape and color.



To erase freehand, confirm by clicking OK, position the mouse on the point of the raster you want to erase, and click the left mouse button. The size of the erased area depends on the value you set for the Size in Pixels.

Press and hold down the left mouse button to erase smoothly and continuously. When you are done, release the mouse button. Moving the mouse too quickly might cause the eraser to act discontinuously.

Fill Box



Raster Menu Fill Box

Fills in the raster area inside a selection window using the active color.

Select the area you want to fill by means of a window on the screen, and then invoke the Fill Box command.

Erase Box



Raster Toolbar



Raster Menu

Erase Box

Removes all raster entities contained inside a selection window.

This command is used to remove a large portion of the raster file contained inside a selection window you trace on the screen by using the mouse.

Despeckle



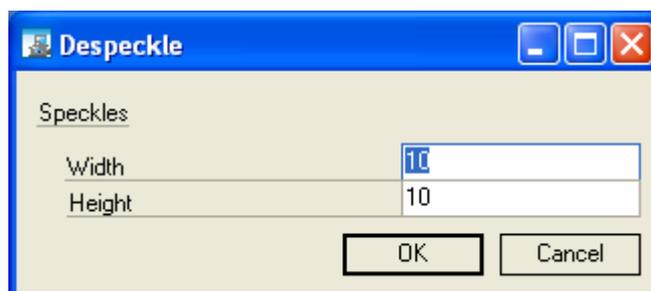
Raster Toolbar



Raster Menu

Despeckle

Automatically removes speckles from the raster.



Scan-Way considers isolated, variable-sized (yet always small) dark spots, or speckles as "noise". You can set the size of the speckles to remove by specifying a Width and a Height in pixels in the corresponding dialog box.

Confirming with OK will cause isolated dark spots to be localized and removed if their size is smaller than the value you set.

The smaller the size, the lower the number of speckles removed and vice versa. However, it is recommended not to set too high a value for the speckle size to avoid removing entities that you want to be vectorized, such as very small characters.

Despeckling can be performed in subsequent steps. First, set a low value of a few pixels for the speckle size, check the results obtained, and then increase the size, if required.

Speckles can be removed from the entire raster file or only from a portion selected with the tracker.

Modify Raster

Border Management



Raster Toolbar

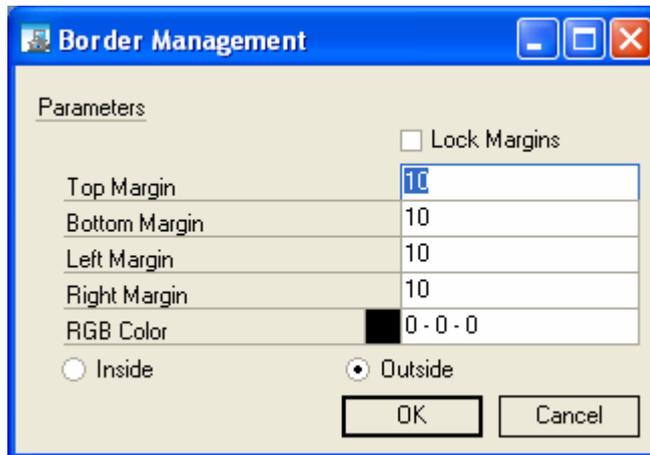
Raster Menu

Sheet Border

Creates a white border in the raster file.

This command is used to create a rectangular white border (frame) on the outer edge of the raster file. The raster portion covered by the frame is lost and will not be vectorized.

When you invoke the command, the dialog box appears in which you can set the border size. You can set the border size to a value from 1 to 100 pixels by entering it in the corresponding field.



Sheet border width selection dialog box.

If the Lock Margins option is active, you can only enter the value for the first field (Top Margin), which will be used also for the other three fields.

You can define a color and specify whether the border must be Inside or Outside.

Rotate



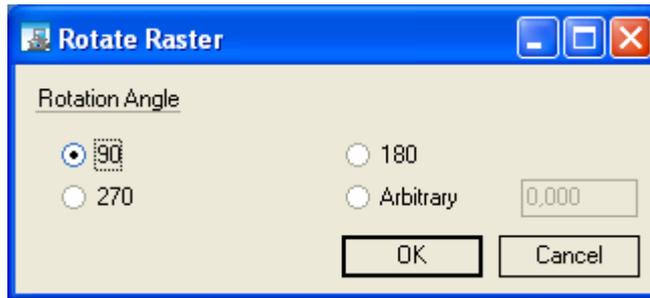
Raster Toolbar

Raster Menu

Rotate

Rotates the on-screen raster image.

When you invoke the command, the following dialog box is opened.

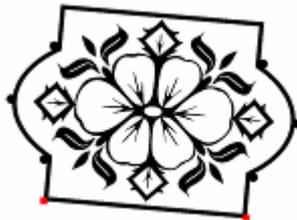


Arbitrary

Rotates an image by the specified angle.

Angles are measured from the vertical position and clockwise.

If you select two alignment points on the screen before invoking the command, the Arbitrary field is checked and filled with the angle in the plane of the straight line that connects the two on-screen points.



In the example, 2 points were inserted and selected. When invoking the command, the Arbitrary option is already selected and the value in degrees to align the 2 points with the X-axis is already set.

Mirror Horizontally



Raster Toolbar



Raster Menu Mirror Horizontally

Creates a mirror image of the on-screen raster image horizontally.

Specifically, it flips the on-screen raster image horizontally along the vertical axis.

Mirror Vertically



Raster Toolbar



Raster Menu Mirror Vertically

Creates a mirror image of the on-screen raster image vertically.

Specifically, it flips the on-screen raster image vertically along the horizontal axis.

Invert Color



Raster Menu Invert Color

Inverts the colors of an image.

This command converts all pixels into their RGB complementary colors.

An example of application of the Invert Color command is illustrated in the figures on the left.

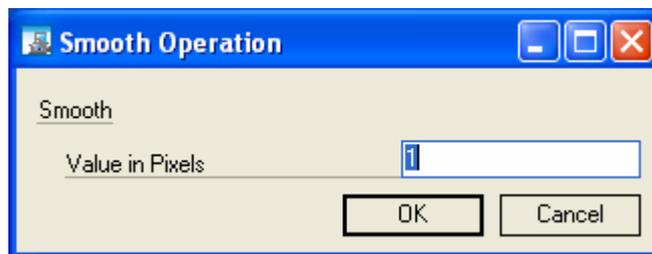


Smooth

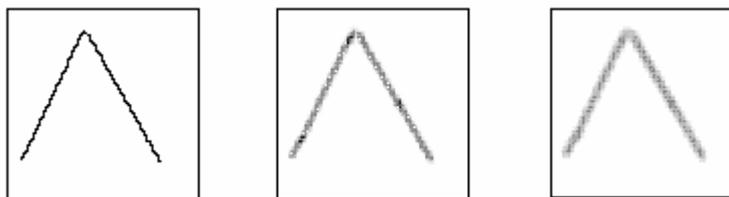


Raster Menu Smooth

Applies a filter to soften the current raster image.



You can set the Smooth value from 1 to 4 pixels. The greater the value, the more the image will be softened (smoothed).



Example of application of the Smooth command. The figure on the left shows the original image, the central figure the image treated with a 2-pixel smooth filter, and the one on the right the image treated with a 4-pixel smooth filter.

The smooth filter reduces the color difference between adjacent pixels, so the resulting image will be softened, blurred, and thus not as sharp as the original image. Smoothing can be used to hide imperfections of the raster file. This makes it possible to eliminate zigzags from lines.

When you apply the smooth filter to a black and white image, it is automatically converted into a grayscale image (256 shades of gray). For this reason, you

need to convert the image back to black and white before vectorizing it. The conversion from grayscale to black and white requires special parameters to be set depending on the effect you wish to obtain (see the Reduce to Black & White command).

Using the Smooth filter and the Reduce to Black & White command in combination is a major step towards a good vectorization.

Reduce to Black & White



Raster Toolbar



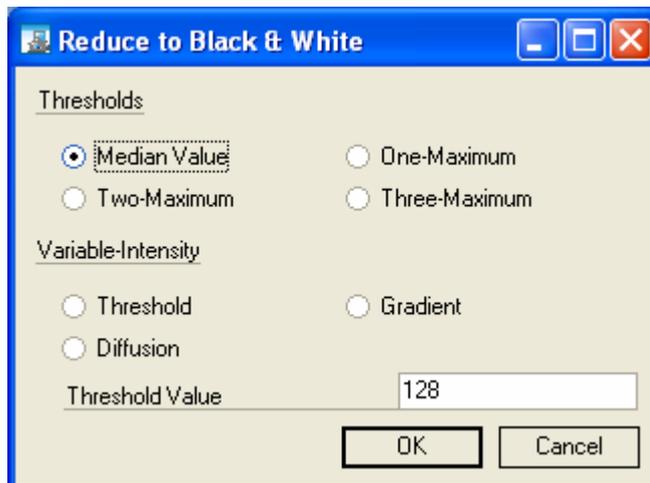
Raster Menu

Reduce to B/W

Converts a raster image from color or grayscale to black and white.

This command lets you convert a color or grayscale image to a black and white image. This may be useful before the vectorization process.

When you invoke the command, the dialog box illustrated in Figure appears.



Selection of the method to use to convert an image to black and white.

There are two types of methods for converting an image to black and white: Automatic Thresholds and Variable Intensity.

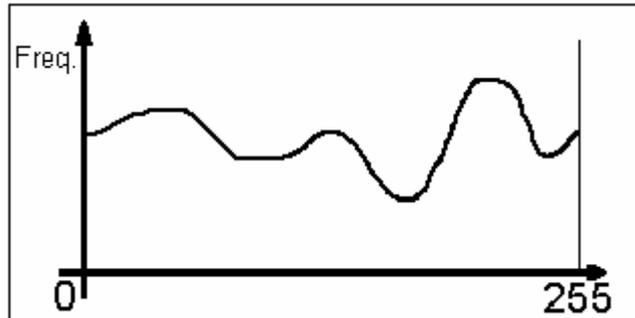
It is impossible to describe cases in which one type is more convenient than the other. The user must select the most adequate type each time based on experience and knowledge.

To better understand the difference between the two types, note that the representation spectrum of a grayscale image ranges from a value of 0 (black) to a value of 255 (white). All intermediate values represent the different shades of gray.

Before illustrating the methods relative to the two types in greater detail, it should be noted that a color image is automatically converted into a grayscale image prior to its conversion into a black and white image.

Automatic Threshold Methods

All automatic threshold methods act on the frequency histogram of the shades of gray. The histogram shows all 256 shades of gray on the axis of the abscissas and the frequency at which pixels of a specific shade occur on the axis of the ordinates. Each raster file has its own histogram, usually with one or more maximum points, as illustrated in Figure 7.31.



Example of histogram of an image's shades of gray.

The **Median Value** threshold method converts an image from grayscale to black and white optimizing the ratio of the number of white pixels to black pixels. In particular, Scan-Way analyzes the histogram and automatically sets a threshold value (median value) so as to equally divide the number of pixels that will become white and those that will become black.

In other words, this transformation lets you obtain an image in which the amount of white pixels equals the amount of black pixels by means of an automatic threshold shade. Gray pixels above the automatic shade threshold setting are converted to white and those below it to black. Actually, this transformation is not that rigid and the resulting number of white pixels almost always differs, though slightly, from the number of black pixels.

The **One-Maximum** threshold method converts an image from grayscale to black and white using a single threshold shade. The threshold shade is the one corresponding to the maximum frequency calculated on the histogram of the shades of gray. All image pixels with a shade above the threshold will become white, while the remaining pixels with a shade below the threshold will become black.

For instance, if the threshold shade value is 198, all pixels with a value between 198 and 255 will be converted to white and all the remaining pixels (with a value between 0 and 197) will be converted to black.

The **Two-Maximum** threshold method converts an image from grayscale to black and white using two threshold shades. The two threshold shades are those corresponding to the two maximum frequencies calculated on the histogram of the shades of gray. The two thresholds produce three intervals on the histogram, inside which the different shades of gray will be uniformly converted to black and white.

The **Three-Maximum** threshold method converts an image from grayscale to black and white using three threshold shades. The three threshold shades are those corresponding to the three maximum frequencies calculated on the histogram of the shades of gray. The three thresholds produce three intervals on the histogram, inside which the different shades of gray will be uniformly converted to black and white.

Variable-Intensity Methods

The Variable-Intensity based **Threshold** method lets you convert an image from grayscale to black and white setting a threshold shade manually. This method is based on the same operating principle as the One-Maximum method. The only difference is that, in this case, the threshold shade is set by the user instead of being automatically calculated by Scan-Way.

This method may be useful when you want a stronger conversion of the shades of gray to black rather than to white, or vice versa. To obtain an image with a greater amount of black pixels, set a low threshold.

The **Gradient**-based method converts an image from grayscale to black and white setting a gradient. Scan-Way will analyze one pixel at a time and compare it with the eight neighboring pixels.

The central pixel shade is compared with the gray shades of the eight neighboring pixels. The set gradient value assigns the black or white color to the central pixel.

The gradient-based method uses a serial algorithm to assign the black or white color to a pixel depending on the shade variation (gradient) between the central pixel and its neighbors.

The **Diffusion** method converts an image from grayscale to black and white using a manually set diffusion value. This method is based on a complex algorithm that will not be described here.

This should be used when you want to convert an image for 3D machining operations.

7 - DRAW

Scan-Way and Scan-Way PRO. Scan-Way 3D provides only the Polyline drawing option.

Objects

Point



Draw Toolbar



Draw Menu

Point

Inserts a point on the screen.

When you invoke the command, you are prompted to select a point on the screen where you want the point to be inserted.

You can insert several points one after the other or end the command by pressing the right mouse button.

Line



Draw Toolbar



Draw Menu

Line

Draws a vector line.

When you invoke the command, you are prompted to insert two points on the screen corresponding to the endpoints of the line you want to draw. To end the command, press the right mouse button.

You can insert several lines one after the other so that the end vertex of the first line is the start vertex of the second, and so on.

Clicking the second point and invoking the Arc command will draw an arc coming out of the endpoint of the line whose endpoint will be the next point clicked on the screen.

Arc



Draws an arc through three points.

Like the previous command, you can first draw an arc, and then invoke commands to draw other vector entities, such as lines, for which the endpoint of the arc is their start point and the next selected point is their endpoint. Use the right mouse button to end the Arc command.

Circle, 2P



Inserts a circle on the screen.

To draw a circle, you need to click two points on the screen using the left mouse button. The first point is the center of the circle and the second is a point on its circumference.

Obviously, the distance between the two points, marked with a thin black rubber-band line, is the radius of the circle.

Circle, 3P



Inserts a circle on the screen.

To draw a circle, you need to click three points on the screen using the left mouse button. The circle will pass through the three points.

Spline



Draws a spline.

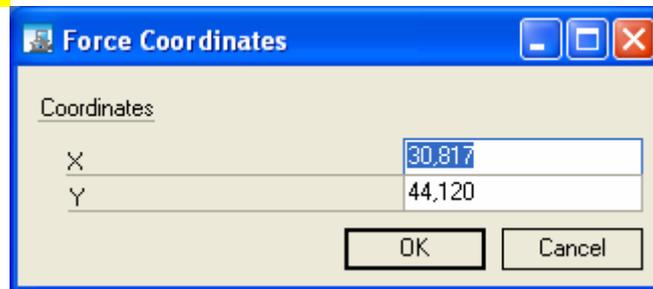
After selecting the command, click a series of points on the screen corresponding to the nodes of the spline.

Once the last point has been inserted, click the right mouse button to end the command.



Spline closing dialog box.

- ◆ End. The spline is not closed and the command is ended.
- ◆ End and Close. The spline is closed by connecting the first and last vertex inserted with an additional segment, and then the command is ended.
- ◆ Remove Last Point. The last selected point is removed from the spline. You can continue selecting points.
- ◆ Cancel. The spline generation command is canceled and inputs are deleted.
- ◆ Force Coordinates. Allows you to insert points from the coordinate entry dialog box.



Polyline



Draw Toolbar



Draw Menu

Polyline

Draws a polyline.

After selecting the command, click a series of points on the screen corresponding to the vertices of the polyline.

Once the last point has been inserted, click the right mouse button to end the command.

If two points were inserted, the polyline is marked in red and the command is ended.

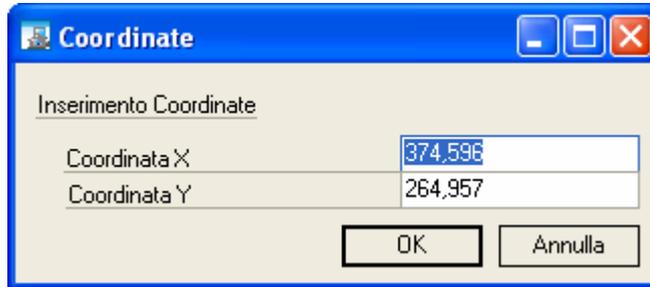
If several points were inserted for the polyline, a dialog box is displayed in which you can specify how to treat the drawn polyline.



Polyline closing dialog box.

- ◆ End. The polyline is not closed and the command is ended.
- ◆ End and Close. The polyline is closed by connecting the first and last vertex inserted with an additional segment, and then the command is ended.
- ◆ Remove Last Point. The last selected point is removed from the polyline.

- You can continue selecting points.
- ◆ Cancel. The polyline generation command is canceled and inputs are deleted.
 - ◆ Force Coordinates. Allows you to insert points from the coordinate entry dialog box.



Rectangle



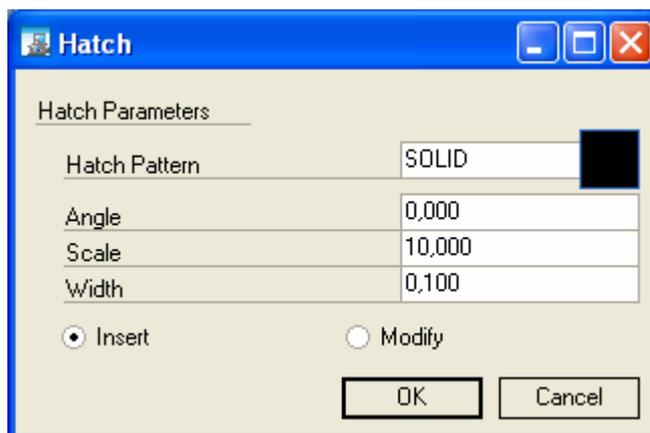
Draws a rectangle.

When you invoke the command, you are prompted to select two opposite corners of the desired rectangle.

Hatch

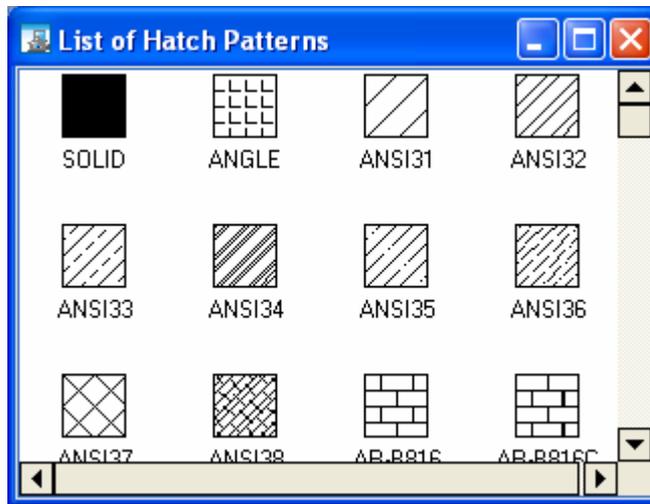


Draws a hatch inside the selected polyline.



You can define:

- ◆ Hatch Pattern. Click on the hatch pattern button to access the List of Hatch Patterns.



- ◆ Angle. Allows you to rotate the hatch pattern.
- ◆ Scale. Allows you to change the scale of the hatch pattern.
- ◆ Width. Sets the width of the hatch lines.
- ◆ Insert/Modify. Sets the type of operation to be performed: insert a hatch or modify an existing one.

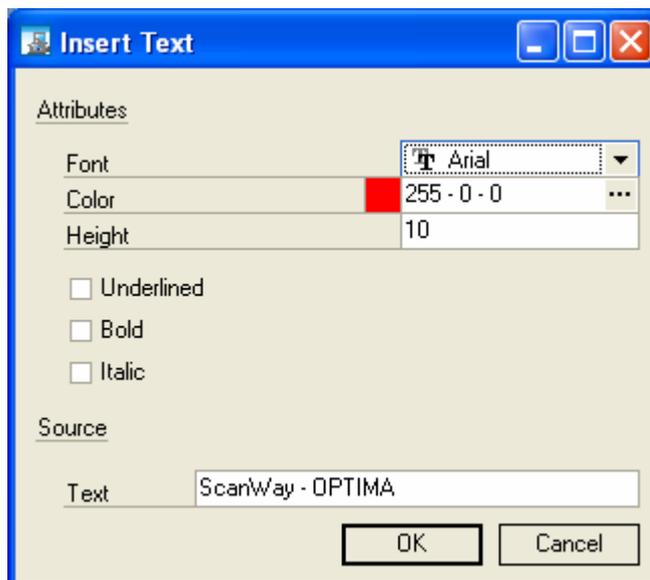
Text



Draw Menu Text

Inserts a text on the screen.

This command allows you to write a text in the current file.



The corresponding dialog box appears.

You can set the character font, color and height and select among the Italic, Bold, and Underlined options.

After entering the text, you are prompted to select two points on the screen. The first point is the insertion point for the text and the second point displays a rubber-band line indicating the direction of the text.

8 - MODIFY

Scan-Way and Scan-Way PRO.

Operations on Polylines

Select a polyline or a vector entity on the screen to modify it.

Entities and polylines in particular that are drawn on the screen can be selected and modified.

For polylines, the following operations are available:

- ◆ add node
- ◆ move node
- ◆ delete node
- ◆ offset
- ◆ join polylines
- ◆ convert a polyline into n polylines
- ◆ delete short polylines
- ◆ close polyline
- ◆ move polyline origin
- ◆ show open and closed polylines
- ◆ reduce polyline points
- ◆ rebuild polylines
- ◆ explode polylines
- ◆ convert into polyline
- ◆ convert polyline into spline
- ◆ delete raster inside polyline
- ◆ convert drawn polyline into raster entities.

To select a polyline on the screen, click with the mouse on one side of the polyline, and then choose the command you wish to perform.

Add Node

 Modify Toolbar



Modify Menu

Add Node

Allows you to add a vertex to an existing polyline. Click with the mouse on the point at which you wish to insert the new vertex. The point you clicked on will be the new vertex. If the point you clicked on is too close to an external vertex

of the polyline, a segment will be added. Instead, if the vertex is close to two internal vertices of the polyline, one polyline segment will be replaced by two new segments.

Move Node



[Modify Menu](#) [Move Node](#)

Allows you to move a vertex of a polyline. Click with the mouse on the vertex you wish to move, drag the vertex to the new position and confirm the operation with the right mouse button.

Delete Node



[Modify Menu](#) [Delete Node](#)

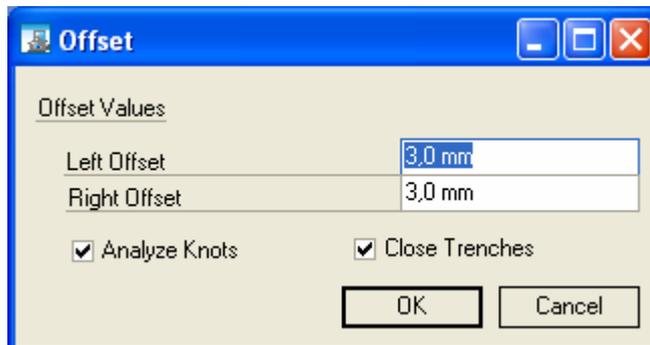
Allows you to remove an intermediate vertex from a polyline. This command has effect only if you select polylines with three or more vertices. Use the mouse to select the vertex you wish to remove (except external vertices). The two segments that shared the vertex you removed are deleted and a new segment is created connecting the vertex that preceded and the one that followed the removed vertex.

Offset



[Modify Menu](#) [Offset](#)

Offsets polylines or lines.



The corresponding dialog box lets you enter the two offset values (right and left) with respect to the direction of the profile.

You can also activate the following options: “Analyze Knots” and “Close Trenches”.

Join



Modify Toolbar

Modify Menu Join

Joins two polylines at their end vertex into a single polyline. The two polylines must be previously drawn or obtained through vectorization.

This command has effect only on end vertices of polylines. These vertices must be almost superimposed to be joined by the program.

To join two vertices, select the two polylines and invoke the command. When possible, the two polylines are joined into one.

Break



Modify Toolbar

Modify Menu Break

Breaks a polyline at the intermediate vertex nearest the point where you selected the polyline.

Delete Short Polylines



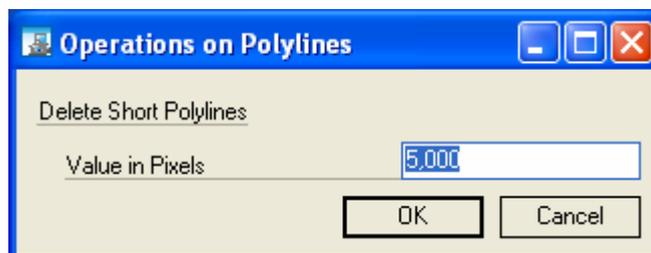
Modify Toolbar

Modify Menu Delete Short Polylines

Automatically deletes short polylines.

This command is used to automatically delete short polylines from the drawing.

You set the size of short polylines to delete in the corresponding dialog box.



This command will delete all segments that are shorter than the set value.

Close Polyline

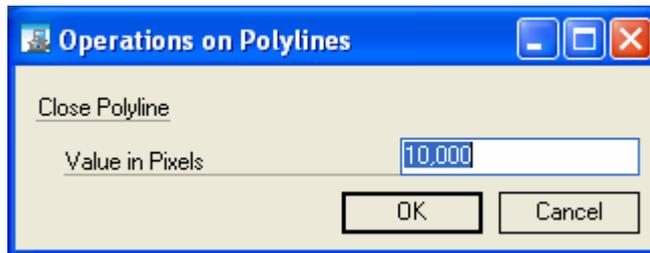


Modify Toolbar

Modify Menu

Close Polyline

Closes an open polyline.



If applied to an open polyline, this command closes it by creating a segment that connects end vertices.

Move Origin



Modify Toolbar

Modify Menu

Move Origin

Moves the origin of the selected polyline to the specified point.

Show Open/Closed Polylines



Modify Toolbar

Modify Menu

Show Open/Closed Polylines

Shows open and closed polylines.

Marks open and closed polylines with a different color. To restore the original color, just click the right mouse button.

Reduce Points



Modify Toolbar

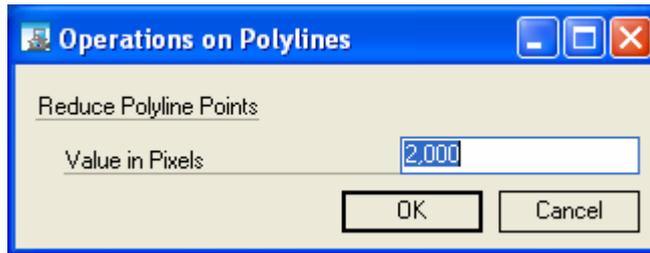
Modify Menu

Reduce Points

Removes unnecessary points from polylines.

This command analyzes all polylines present in the file and removes those points that are not necessary for polyline representation.

Obviously, the original polylines are replaced with polylines that approximate them. The approximation accuracy is determined by the Reduce Polyline Points parameter in the following dialog box.



In particular, the new polyline deviates from the original polyline by a distance not greater than the accuracy setting indicated in pixels.

To considerably reduce the points in the polyline, you need to use a high accuracy value (for instance 5). On the contrary, use a low accuracy value (for instance 1).

The greater the value you set, the more the resulting polyline will deviate from the original polyline.

It is recommended to gradually decrease the number of polyline points, starting from low values, check the results obtained and then increase them, if required.

Because it deletes some intermediate polyline vertices, this command creates simpler polylines with longer segments.

Rebuild

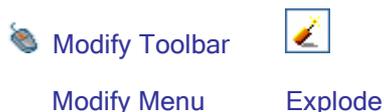


Produces longer polylines.

This command is used to create longer polylines by joining polylines whose endpoints fall within the tolerance specified in the corresponding dialog box:



Explode



Explodes.

This command converts a polyline having n sides into n polylines with a single side.

Create



Modify Toolbar

Modify Menu

Create

Creates a polyline starting from segments.

Polyline > Segments



Modify Toolbar

Modify Menu

Polyline > Segments

Converts a polyline into segments.

9 - VECTORIZATION

Vectorize

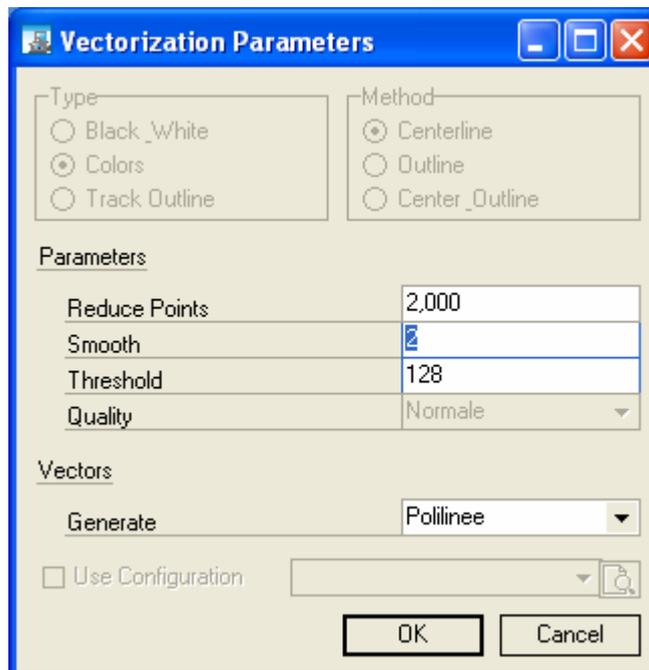


Vectorize Menu Vectorize

Shortcut Key Ctrl+W

This command is used to set the parameters the program utilizes in the vectorization process.

When you invoke the command, the dialog box illustrated in Figure appears.



Vectorization parameter settings dialog box.

The dialog box includes three different vectorization methods.

As you can see in the picture, the dialog box is divided into three sections: Vectorization Parameters, Morphology and General Data. The following is a detailed description of the three sections.

Vectorization Type and Method

The “Black & White” or “Colors” type is preset depending on the image. The “Track Outline” option allows you to create a polyline around a profile for black & white images. You just need to pick a point with the pointer next to the profile.

The Method has been described above. See [Vectorization Methods](#).

Vectorization Parameters

Vectorization Parameters can be set to a specific quality level, using the selection buttons (High, Standard, Low), and manually, typing the desired values in the corresponding fields.

The three quality configurations, High, Standard and Low, can be used to handle most of the vectorization cases.

Setting the parameters manually is recommended only for experienced users who need to meet special vectorization requirements.

- ◆ **High** quality produces the best results for drawings with sharp curves or for drawings in good condition with constant-width lines. Polylines obtained through the vectorization process will be very faithful to the original image with a minimum deviation between the raster entity and vectorized polylines. These, however, will have a great number of vertices.
- ◆ **Standard** quality. Polylines obtained through the vectorization process will have an average number of vertices, which is surely lower than the number resulting from the utilization of the High quality setting. Polylines will still be quite faithful to the raster image. Standard quality can be used for most vectorization operations, but it is particularly useful for vectorizing artistic drawings.
- ◆ **Low** quality. Polylines obtained through the vectorization process will have a limited number of vertices, which is still enough to guarantee good correspondence with the original image. Low quality is useful for drawings consisting mainly of straight lines.

Vectors

Scan-Way will create a vector file using polylines or points.

A blue Progress Bar appears on Scan-Way status bar showing the progress of the vectorization process. Several Progress Bars may be needed to complete the vectorization.

You can abort a vectorization process being carried out by pressing the ESC key on the keyboard.

An unlimited number of vectorization processes can be carried out on the same raster file, at the same position or at different positions. Each vectorization process replaces the previous process. Therefore, to avoid losing the vectorization results, you need to save vectorized entities before vectorizing again.

Photo-Vinyl

Photo-Vinyl Parameters



Rubbersheet Toolbar



Rubbersheet Menu

Photo-Vinyl

This feature allows you to create a series of lines starting from an image. Once cut on vinyl and possibly sandblasted, these lines will result in a photo-like image.



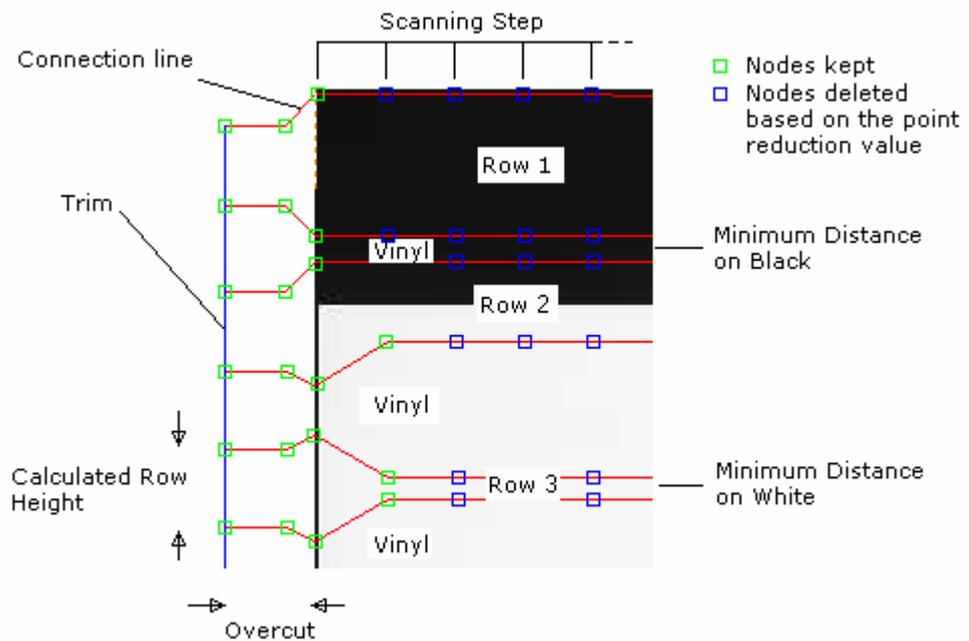
Attributi di Disegno	
Larghezza Output	533,203 mm
Altezza Output	650,000 mm
Numero di Righe	150
Distanza Minima sul Bianco	0,200 mm
Distanza Minima sul Nero	0,200 mm
Altezza Calcolata della Riga	2,167 mm
Parametri Scansione	
Passo Scansione	2,000 mm
Riduzione Punti Polilinee	0,050 mm
<input checked="" type="checkbox"/> Sviluppo Zig-Zag <input checked="" type="checkbox"/> Rifilo Sinistro <input type="checkbox"/> Rifilo Destro	
Parametri Extracorsa	
<input checked="" type="checkbox"/> Extracorsa Sinistro <input type="checkbox"/> Extracorsa Destra	
Lunghezza Extracorsa	30,000 mm
Lunghezza Raccordo	10,000 mm
<input type="button" value="OK"/> <input type="button" value="Annulla"/>	



- ◆ **Output Width** and **Output Height** refer to the real dimensions of the image to be created.
- ◆ **Number of Rows** refers to the number of rectangular islands that the command creates using the Output Width and a height calculated based on the Output Height. Changing this value will change the Calculated Row Height and vice versa.
- ◆ **Minimum Distance on Black/White** define the minimum distance between rows when the RGB value is 0 (zero) or 255. These values are used to make the result lighter or darker.
- ◆ **Calculated Row Height** This value is automatically calculated if you enter the Number of Rows or you can enter it, in which case the Number of Rows changes accordingly.
- ◆ **Scanning Step** is the RGB value check step over the image width.
- ◆ **Polyline Point Reduction** allows you to remove from created polylines all those nodes that no longer deviate by the specified value, which makes the

- file “lighter” and thus easier to handle.
- ◆ **Zigzag Path** creates a connection between islands for a higher cutting speed. In this case, you can define a Right or Left Trim to close the created islands.
 - ◆ **Overcut Parameters** Overcut means that islands are lengthened to the right or to the left (using the calculated height and the specified length) and a connection segment is created, which has a length corresponding to the Connection Line Length.

Graphical representation of the parameters described above.



Convert Polyline to Arcs

Create Tangent Entities



Vectorize Toolbar

Vectorize Menu Tangent Entities

Calculates tangent entities in a vector file.

This command is used to replace vectorization results consisting of polylines with a series of arcs and lines that are perfectly tangent to each other. It is particularly useful when the file to vectorize contains curved parts.

Obviously, using this command increases the number of vector entities.

When you invoke the command, the dialog box illustrated in Figure 7.71 appears.

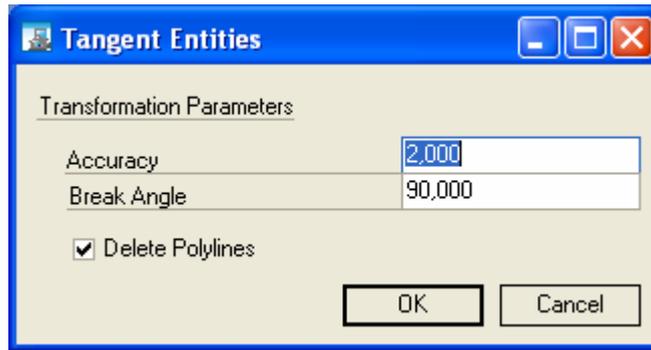


Figure 7.71: Tangent Entities creation dialog box.

In this dialog box, you need to set two parameters: Accuracy and Break Angle.

The Accuracy parameter, measured in pixels, determines the maximum deviation of the created tangent entities with respect to the corresponding raster entities from which they are derived. The lower the Accuracy, the more precise the vector representation, but the greater the number of vector entities. The user must set the Accuracy parameter according to the file being processed, the accuracy to be achieved and the number of end entities.

Generally, use high accuracy for raster files with straight-line entities and few arcs (thus obtaining a few polylines), and low accuracy when very sharp arcs are present.

The Break Angle parameter, measured in degrees, indicates the maximum angle between two adjacent segments (or segment extensions) of a polyline, above which the polyline will be broken.

When angle α is greater than the value specified by the user, the two adjacent segments will be broken. Vice versa, the polyline will not be broken.

It should be recalled that this command is a post-processor of the results from a vectorization process, i.e. on-screen polylines are processed.

Create Long Arcs

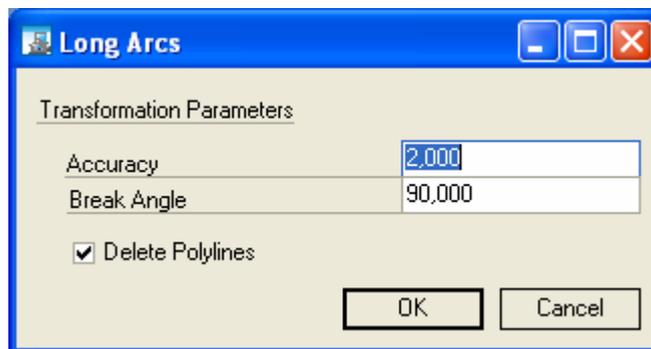


Vectorize Menu Long Arcs

Converts polylines obtained through the vectorization into lines, arcs and circles that are as long/large as possible.

This command replaces polylines obtained through the vectorization with non-tangent arcs and lines, because the program tries to optimize the arc length and, as a consequence, the number of entities.

When you invoke the command, the dialog box below appears.



Long Arcs creation dialog box.

In this dialog box, you need to set two parameters: “Accuracy” and “Break Angle”, as for the “Create Tangent Entities” command.

10 - CALIBRATION

Scan-Way PRO

General Concepts

Rubbersheeting is an automatic operation to correct distortions in the raster file.

Any paper support is subject to anisotropic distortions in various directions caused by stretching due to carelessness or obsolescence. Especially in drawings with a high scale (for instance 1:2000), this distortion may produce non-negligible errors.

The same distortions may appear in images acquired from a digital camera. These depend on the optics and the position of the camera.

To correct these errors, Scan-Way provides four different rubbersheeting methods, each with different prerequisites and effects.

The fundamental elements of a rubbersheeting process are the control points.

Control Points

Control Points can be added to an image:

- ◆ 1) by manually adding them using the Point draw option from the CAD menu.
- ◆ 2) by loading a previously saved INQ file containing those points.
- ◆ 3) by activating the Automatic Reference Recognition, if the picture contains references.
- ◆ The following is a detailed description of the three different methods.

Manual Insertion



Inserts a point on the screen.

When you invoke the command, you are prompted to select a point on the screen where you want the point to be inserted.

You can insert several points one after the other or end the command by pressing the right mouse button.

This method can be used when the image includes the reference grid supplied with the product. Use the Zoom options to increase the accuracy in picking points.



Now, invoke the  control point editor to enter metric coordinates.

Note: set the proper resolution with  before starting the rubbersheeting process with .

Control Point Editor



ID	X Pixel	Y Pixel	X Metrico	Y Metrico
1	251,77	201,66	0,00	0,00
2	431,87	131,93	0,00	0,00
3	578,97	145,12	0,00	0,00
4	662,89	270,45	0,00	0,00
5	614,80	434,41	0,00	0,00
6	465,82	516,40	0,00	0,00
7	352,66	508,86	0,00	0,00
8	195,19	390,12	0,00	0,00
9	188,59	374,10	0,00	0,00

Width: 2200,0 mm Height: 1200,0 mm

Buttons: Recalculate, Save Points, OK, Cancel

X Pixel and Y Pixel indicate the coordinates of the pixel on the screen. These values cannot be changed.

Now, metric coordinates, Metric X and Metric Y, must be set.

For practical reasons, it is recommended to work with partial coordinates. This means you assume the origin of the axes to be at the lower-left point of coordinates $X=0.00$ and $Y=0.00$ and calculate the coordinates of the other points as delta X and delta Y.

To make entry easier, you can use the Width and Height fields, which will fill up the table automatically. If you modify one of these values, you must activate the Recalculate option.

The Save Points option will prompt you for a name under which to store the INQ file.

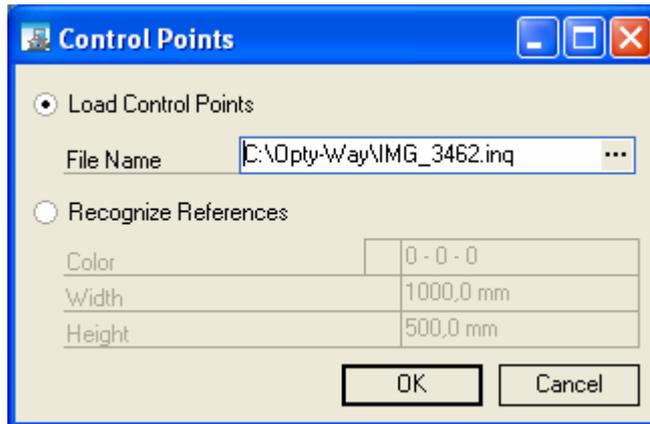
This is useful when you want to use the current network of control points for future processes.

Load Control Points

 Rubbersheet Toolbar 

Rubbersheet Menu Control Points

Loads a point file (INQ) or recognizes references automatically.

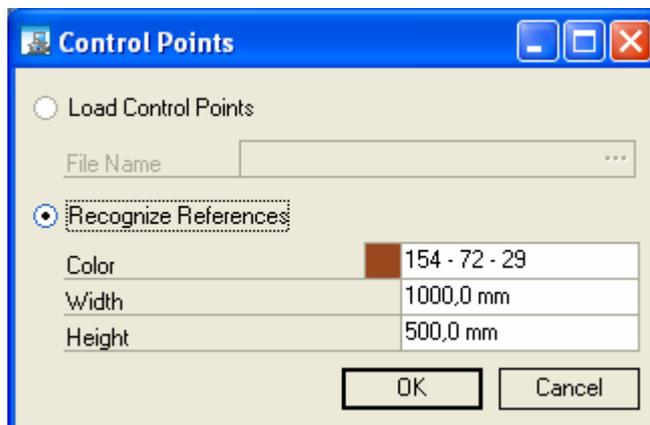


When you invoke the command, the points contained in the INQ file are inserted into the image and the entire point table is filled up (both pixel coordinates and metric coordinates).

This method can be used to rubbersheet various images acquired without moving the camera or modifying its settings (focus, zoom, etc.).

Note: set the proper resolution with  before starting the rubbersheeting process with .

Recognize References



This option can be used when the image includes the references supplied with Scan-Way.

The color must be previously recognized using the  Reference Color option.

Now, the software will recognize areas of the pre-set color and insert a point in the middle of them. Furthermore, it will fill up the point table with pixel and metric coordinates.

Using this method, the resolution is set to the proper value automatically, so you can start the rubbersheeting process with .

Reference Color



Rubbersheet Toolbar



Rubbersheet Menu

Select Reference Color

Allows you to select the color of references from the screen.

Set Resolution



Rubbersheet Toolbar



Rubbersheet Menu

Set Resolution

Sets the resolution measuring the distance between two control points.

This command allows you to force the distance along X and Y between two control points.

Distances	
Distance	14,0 mm
X	10,1 mm
Y	9,7 mm
Distance in Pixels	165,355
X	119,755
Y	114,022
Ratio	11,81102

OK Cancel

Check that the selected control points are those required, because the program performs the automatic selection based on a proximity criterion. If control points are too close, errors might occur. In this case, use a zoom to get closer to the selection area.

Calibration

Calibration Method

- ◆ **Eight-point homographic transformation** requires just eight control points. It is based on an exact eight-parameter function. It produces a translation-rotation with anisotropic scale variation. This rubbersheeting method is useful to correct both small and large distortions in the raster and is very accurate.

Calibration



When you invoke the Rubbersheet command, the program will check that the number and positions of the control points are correct, and then Rubbersheet.

A Progress Bar will show the progress of the operation, which can be aborted with the ESC key on the keyboard.

Control points are moved from their original location as a result of rubbersheeting.

Points resulting from rubbersheeting cannot be used for a subsequent rubbersheeting process.

Correct Thickness



When the object to photograph has a thickness, using the flash lamp of the digital camera may produce a shadow around its profile. Though minimal, this shading affects the vectorization accuracy.

To correct this, the command analyzes the existing profile (or profiles) in the form of a polyline based on the template thickness, distance and position of the camera, and then offsets the profile(s).

The necessary data is entered using the following dialog box.

Correct Thickness

Template Parameters

Width	1000,000
Height	1200,000
Distance	2500,000
Thickness	5,000

OK Cancel

Merge Images

Select Image 1



Rubbersheet Toolbar



Rubbersheet Menu

Select Image 1

Select Image 2



Rubbersheet Toolbar



Rubbersheet Menu

Select Image 2

Merge Images



Rubbersheet Toolbar



Rubbersheet Menu

Merge Images

11 - TOOLS

Operations on Selected Objects

Erase

 Tools Toolbar	
Tools Menu	Erase
 Shortcut Key	Ctrl+D

Erases a vector entity.

This command lets you select any vector entity on the screen, and then erase it if you confirm when prompted.

This command has effect on polylines resulting from the vectorization process and all the entities drawn by the user with the standard Scan-Way draw commands (lines, arcs, circles, texts, etc.).

Move

 Tools Toolbar	
Tools Menu	Move

Moves selected entities.

This command lets you move any vector entity in the drawing that was previously selected.

After you activate the command, select the source point and the destination point for the movement.

Copy

 Tools Toolbar	
Tools Menu	Copy

Copies selected entities.

This command lets you copy any vector entity in the drawing that was

previously selected.

After you activate the command, select the source point and the destination point for the copy.

Copy Multiple



Tools Toolbar

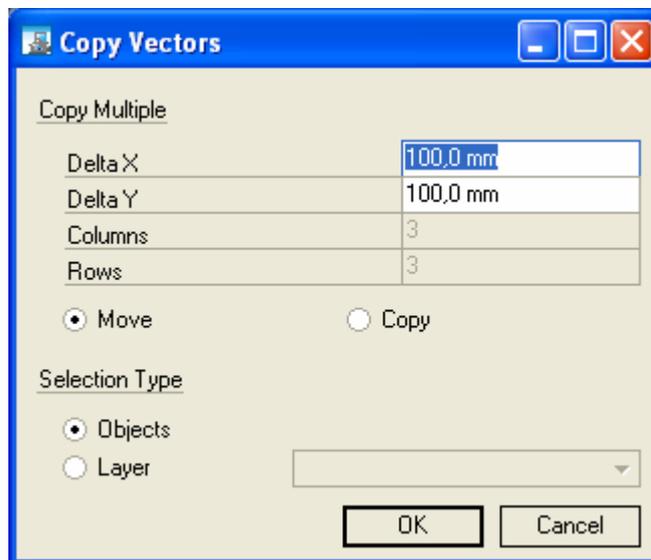


Tools Menu

Copy Multiple

Copies selected vector entities creating a grid.

This command lets you move or copy any vector entity in the drawing that was previously selected, creating a grid with a given Delta X and Y and the number of rows and columns specified in the following dialog box.



The grid develops to the right for the X value and to the bottom for the Y value.

Selection Type. If you activate the selection by Layer, you can move or copy objects selected on the specified Layer.

Rasterize Polylines



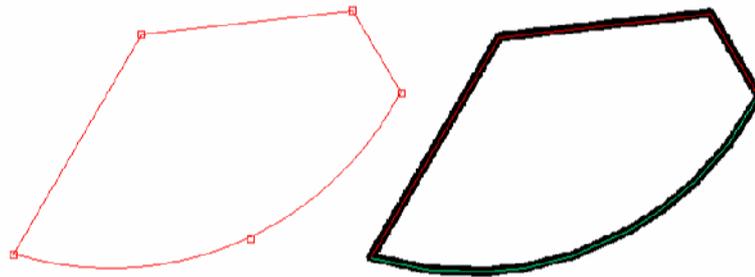
Tools Toolbar



Tools Menu

Rasterize Polylines

Allows you to convert polylines, once selected, into rasters.



Note: the width corresponds to the diameter set for the pen.

Place Toolbar



The place toolbar lets you move and rotate selected objects based on a given vector and at a given angle.

To rotate, you can set the center of rotation. To do so, you first must draw and select a point.

Operations on Texts

Edit Text

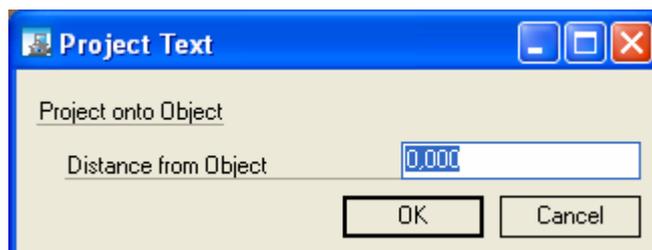


Allows you to edit and modify a text.

Project Text



Allows you to project a text onto an object.



Rasterize Text



Tools Menu Rasterize Text

Allows you to convert a text into the raster format.

Snap

When picking a point for drawing, and checking measures and distances, you can use snap options to make placement easier.

- ◆ No Snap. No snap option is active.
- ◆ Midpoint. Snaps to the midpoint of a raster line width.
- ◆ Edges. Snaps to a raster edge.
- ◆ Orthogonal. Snaps to orthogonal lines.
- ◆ Vectors. Snaps to vector objects.

No Snap



Snap Menu No Snap

Deactivates any snap option.

Snap to Midpoint



Snap Menu Snap to Midpoint

Activates the Snap to Midpoint option to snap to the midpoint of raster entities.

The Snap to Midpoint option lets you draw vector entities snapping to the midpoint of the raster line you are working on.

Although the points you clicked on the screen do not perfectly match with the raster, the program moves the pointer to the exact point.

Snap to Edges



Snap Menu Snap to Edges

Activates the Snaps to edges option to snap to the edges of raster entities.

The Snap to Edges option lets you snap to the edges of raster entities to draw vector entities, such as lines and polylines, more easily.

When you use Scan-Way CAD commands, you may need to snap the vertices

of the new entity to precise points of the raster. By activating the Snap to Edges option, for instance, you can draw a polyline bounding a dark area using the same automatic vectorization criterion. Although the points you clicked on the screen do not perfectly match with the edge, the program moves the pointer to the exact point.

Orthogonal Snap



Snap Menu Orthogonal Snap

Activates the orthogonal snap option.

This command forces the cursor to move parallel to the Cartesian axes. If you use it to draw lines or polylines, they will consist of only 90-degree angles.

The Orthogonal command can be activated and deactivated also while drawing an entity on the screen. This lets you handle orthogonal lines, and then move across the sheet to define another point, without ending the command.

Snap to Vectors



Snap Menu Snap to Vectors

While drawing vector entities, this is used to snap to end and midpoints of other vector entities (lines and polylines) in the drawing.

The radius used by the program to localize dark spots around the selected point is the value you set for the Snap Sensitivity using the Preferences command.

Mirror

Mirrors the box resulting from the selected objects.

Horizontally



Tools Menu Mirror Horizontally

Vertically



Tools Menu Mirror Vertically

Options

Language

This command allows you to define the language used by Scan-Way.

If you change Language, you need to close and restart Scan-Way to activate the selected language.

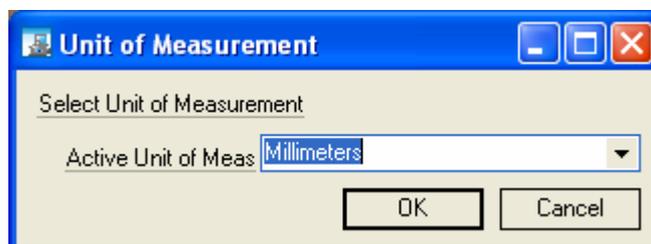


If you change the language, you need to close and restart Scan-Way to activate the selected language.



Unit of Measurement

This command allows you to define the unit of measurement.



The program allows you to work with:

Millimeters	American Inches
Centimeters	American Fractional Inches
Tenths of a Millimeter	American CNC Inches
Hundredths of a Millimeter	American Milli-Inches
Linear Meters	

Taiwan Inches

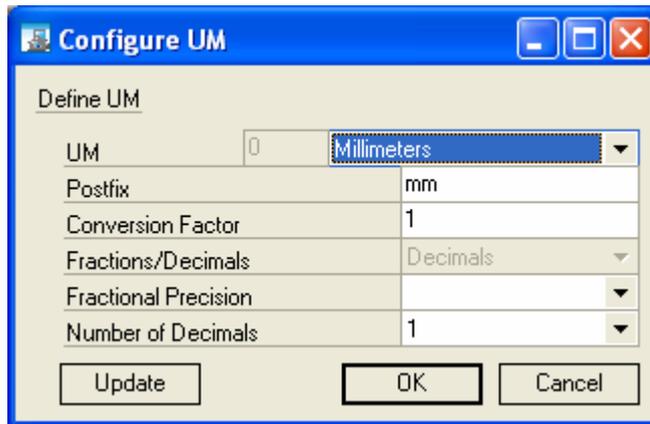
Taiwan CNC Inches

Taiwan Feet

Refer to Configure Unit of Measurement.

Configure Unit of Measurement

This command allows you to define the unit of measurement.



Specifically, you can define:

- ◆ Postfix. It is the code displayed in the coordinates.
- ◆ Conversion Factor with respect to the millimeter system.
- ◆ Fractional Precision for fractional Units of Measurement.
- ◆ Number of Decimals to Display.

Customize

Allows you to modify the program interface.

The main Scan-Way commands are located on various toolbars. At start-up, the program presents the toolbars of the last configuration used. You can modify this configuration.

You can close or reopen a toolbar by checking or unchecking the toolbar name in the list.

12 - ASSIST

Info

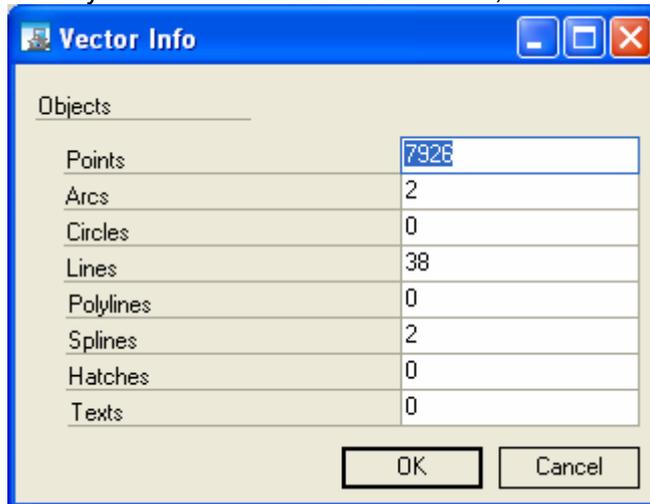
Vector Info



Assist Menu Vector Info

Provides information about the selected objects.

Once you have evoked the command, the following dialog box appears:



Measure Distance



Assist Toolbar



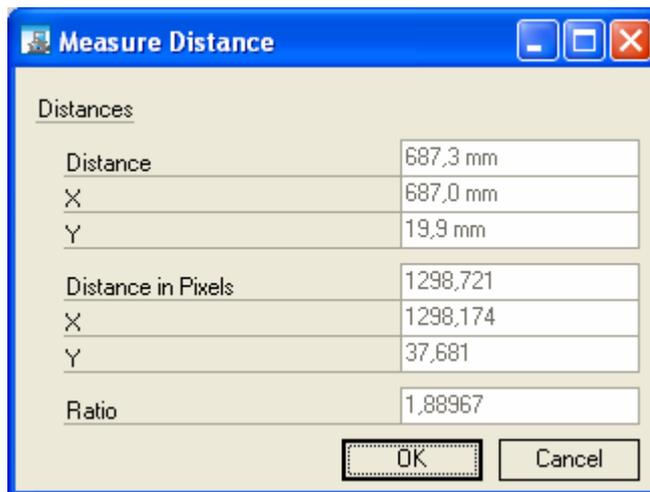
Assist Menu

Measure Distance

Measures the distance between two points clicked on the screen.

After you activate the command, pick 2 points in the graphic area.

A window will open with distance info.



Measure Distance dialog box.

Scan-Way shows the values of the real distance between the selected points and their delta X and delta Y values.

The first area displays the values in the unit of measurement (millimeters, centimeters or meters) you set.

The second area displays the values in pixel coordinates.

The info contained in this dialog box can be used to:

- ◆ measure or check the distance between two entities.
- ◆ measure the size of a known entity in the raster file to check that the Scale and Resolution parameters used for the vectorization process were correctly set.
- ◆ determine the scale of a drawing, when it is unknown, by measuring the size of a known entity, to properly set vectorization parameters.

Number Objects



Assist Toolbar



Assist Menu

Number Objects



Shortcut Key

Ctrl+T

Numbers selected objects.

Object Direction



Assist Toolbar

Assist Menu

Object Direction

Shows the direction of the selected objects.

Invert Direction



Assist Toolbar

Assist Menu

Invert Direction

◆ Inverts the direction of the selected objects.

13 - WINDOWS

Window Display

Arrange

 Windows Toolbar 
Windows Menu Arrange

Tile Horizontally

 Windows Toolbar 
Windows Menu Tile Horizontally

Tile Vertically

 Windows Toolbar 
Windows Menu Tile Vertically

14 - HELP

Help



Standard Toolbar



Help Menu

Help

Allows you to access the Scan-Way manual in the PDF format.

About Scan-Way



Help Menu

About

Provides information about Scan-Way.



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