

VisualLaserMarker

User's Manual

Version 4.9

rofin
ROFIN-SINAR LASER

THE MARK OF EXCELLENCE

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1 Introduction

This user's manual describes how to use the graphic editor of the VisualLaserMarker. VisualLaserMarker is a flexible and powerful software package for laser marking, for use on the Microsoft Windows XP (Professional or Embedded) Microsoft Windows 7 (32-bit) operating systems.

Drawing files are generated by mouse click using the modern object-oriented VLM graphic editor. The draft of your drawing appears directly in the graphic window of the editor on the drawing area corresponding to the marking field. Your drawing is composed of graphical objects. A wide variety of object types is available in the VLM. In order to exactly position the inserted objects, either the coordinates can be entered or the snap function can be used.

The drawing is always shown in exactly as much detail as it will be output with the laser. At the same time, you also allocate the parameters that control the output with the laser to the graphical objects.

The usual operating elements and application-specific tools ensure a convenient and productive mode of operation. Numerous import functions and the definition of drawing templates enable the use of objects that have already been created. Additional graphic editor layout functions – such as scaling, grouping, alignment and working with layers – support efficient operation.

1.1 System requirements

The following software and hardware is required and must be supported so that VisualLaserMarker will run on your computer:

Recommended equipment	
Computer system:	PC with a Pentium 600 MHz (or more) CPU
Main memory:	≥ 512 MB RAM
Hard disk capacity:	approx. 500 MB free hard disk space
Operating system:	Windows XP Professional Windows XP Embedded Windows 7, 32-Bit
Monitor:	Resolution 800 x 600 or greater for editing stations
Two free PCI slots	for the ALI board (laser station only)
Interface to the laser hardware	ALI board (laser station only)
Free USB port or serial port	for the ROFIN-SINAR-Dongle *
Hardware lock (dongle):	ROFIN-SINAR dongle *

- * VisualLaserMarker uses a hardware lock (dongle) as security against pirate copying. The lock is connected to the computer's parallel (printer interface or LPT 1) or USB port. If the computer system has multiple hardware locks, they can be connected in sequence. Should a conflict arise between the different hardware locks, change the sequence.

A special USB dongle is needed for enhanced VLM functions (IIC matrix, Grayscale Bitmap, AI (PDF) Import, HK Interface, VMC2-MJC Communication and SECS/Gem interface. Various settings for these functions can be carried out in the PC Configuration.

- i** Please note that Windows NT 4.0, Windows 2000 and earlier versions, as well as the PCLD interface card, are no longer supported.

1.2 Explanations of Symbols and Fonts

The following symbols and fonts are used in this manual:

 Pay particular attention to texts marked with this symbol. Failure to observe may lead to loss of data.

 This symbol is followed by supplementary information, remarks and tips.

 **The texts that follow contain the instructions for performing certain operations.**

- indicates a step that must be carried out.

» *a detailed description of the topic can be found in the specified section.*

Menu names and menu functions appear in bold. The '>' sign is used to separate the name from the function, e.g. File > Open.



The icons on the left of the paragraphs can be retrieved in the corresponding toolbars of the VLM's graphic editor.

1.3 Requesting information on the VisualLaserMarker

In addition to this user's manual that describes how to use the graphic editor in the VisualLaserMarker, the following information sources are also at your disposal:

When the pointing device is held over a tool icon, a *tooltip* displays the name of the tool and a help text appears in the status bar.

In the VisualLaserMarker graphic editor Help menu ? / Scripting help, open the online help providing information on special Visual Basic-Script commands for VisualLaserMarker including appropriate examples.

By selecting the menu ? > Info... or by clicking the Info icon , you will open a window containing information on the current VisualLaserMarker version and the Build Level.

The following options are also available for accessing the current online PDF user's manual for VisualLaserMarker:

- ⇒ Using the ? > Help topics menu option,
- ⇒ By clicking on the [Help (F1)] button on the dialog field pages,
- ⇒ by pressing [F1]
- ⇒ by clicking on the Help icon .

In the Windows Start menu  under VisualLaserMarker > Documentation / you can access the following online help topics:

Configuration

⇒ **ALI and PCLD IO Table**

Comparison of designations, and in some cases assignment of inputs and outputs, between the ALI and PCLD boards.

⇒ **FFM Documentation**

Description of the use of a focusing axis (FFM; Fast Focusing Module)

⇒ **InstallProblems ALI-PCLD**

Tips and solutions for ALI or PCLD board installation problems can be found here.

⇒ **Setup and Tools Documentation**

Information on the Power Configuration, on the PC configuration and on the Laser Control program.

⇒ **User Manager Documentation**

Definition of access rights and user rights for individual users and user groups.

- i** This document is only displayed if you have installed the User Manager program.

⇒ **VMC_HK Documentation**

Information on the remote control executionprogram for VLM drawings.

⇒ **VMC2 Online Help**

Online help for VisualMarkingController.

⇒ **VMC2 User's Manual**

User's Manual for VisualMarkingController.

⇒ **Lmos Automation Documentation**

Description of special Visual Basic Script Commands for the VisualLaserMarker, including examples.

⇒ **LmosActX Documentation**

Visual Basic Interface Description for the Visual Laser Marker.

⇒ **VB-Script Documentation**

General Microsoft Visual Basic Script description.

⇒ **Communication Spy Documentation**

Description of communication between the MICO controller and the VisualLaserMarker, between the host and the VMC_HK and between the handling unit and the Visual Laser Marker.

⇒ **Logger Documentation**

Information on using the Logger program.

Production Tools

⇒ **VMC_HK Documentation**

Information on the remote control executionprogram for VLM drawings.

⇒ **VMC2 Online Help**

Online help for VisualMarkingController.

⇒ **VMC2 User's Manual**

User's Manual for VisualMarkingController.

Programming

⇒ **Lmos Automation Documentation**

Description of special Visual Basic Script Commands for the VisualLaserMarker, including examples.

⇒ **LmosActX Documentation**

Visual Basic Interface Description for the Visual Laser Marker.

⇒ **VB-Script Documentation**

General Microsoft Visual Basic Script description.

Tools

⇒ **Communication Spy Documentation**

Description of communication between the MICO controller and the VisualLaserMarker, between the host and the VMC_HK and between the handling unit and the Visual Laser Marker.

⇒ **Logger Documentation**

Information on using the Logger program.

- VisualLaserMarker**
- ⇒ **Import and export of different file formats**
Contains detailed explanations of how to import and export various file formats.
 - ⇒ **Step & Repeat Documentation**
Information on the VisualLaserMarker Step & Repeat function.
 - ⇒ **VisualLaserMarker Documentation**
Current online User's Manual for the VisualLaserMarker, in PDF format.
 - ⇒ **XML import**
This document defines the syntax and semantics of an XML drawing in the form of marking data in structured text format. This data can be automatically converted into a VLM drawing.
 - ⇒ **Surface**
Online help for the workpiece and axes settings.
 - ⇒ **Marking on the Fly Documentation**
Contains detailed information on marking on-the-fly.
 - ⇒ **On-the-fly**
Online help for marking on-the-fly.
 - ⇒ **Workpiece and Axes Documentation**
Contains detailed information on the workpiece and axes settings.
 - ⇒ **Application wizard**
Contains detailed information on the application wizard.

2 The VisualLaserMarker user interface

When starting the VisualLaserMarker's editor, the graphic window, menu bar, status bar, the standard functions bar as well as other toolbars are displayed on the screen.

The user interface can be custom-configured to suit the user or according to the application. You can open and arrange multiple windows on the screen, show and hide the toolbars and reposition them in the graphic window as desired.

Texts, logos and images are created on the drawing surface in the graphic window.

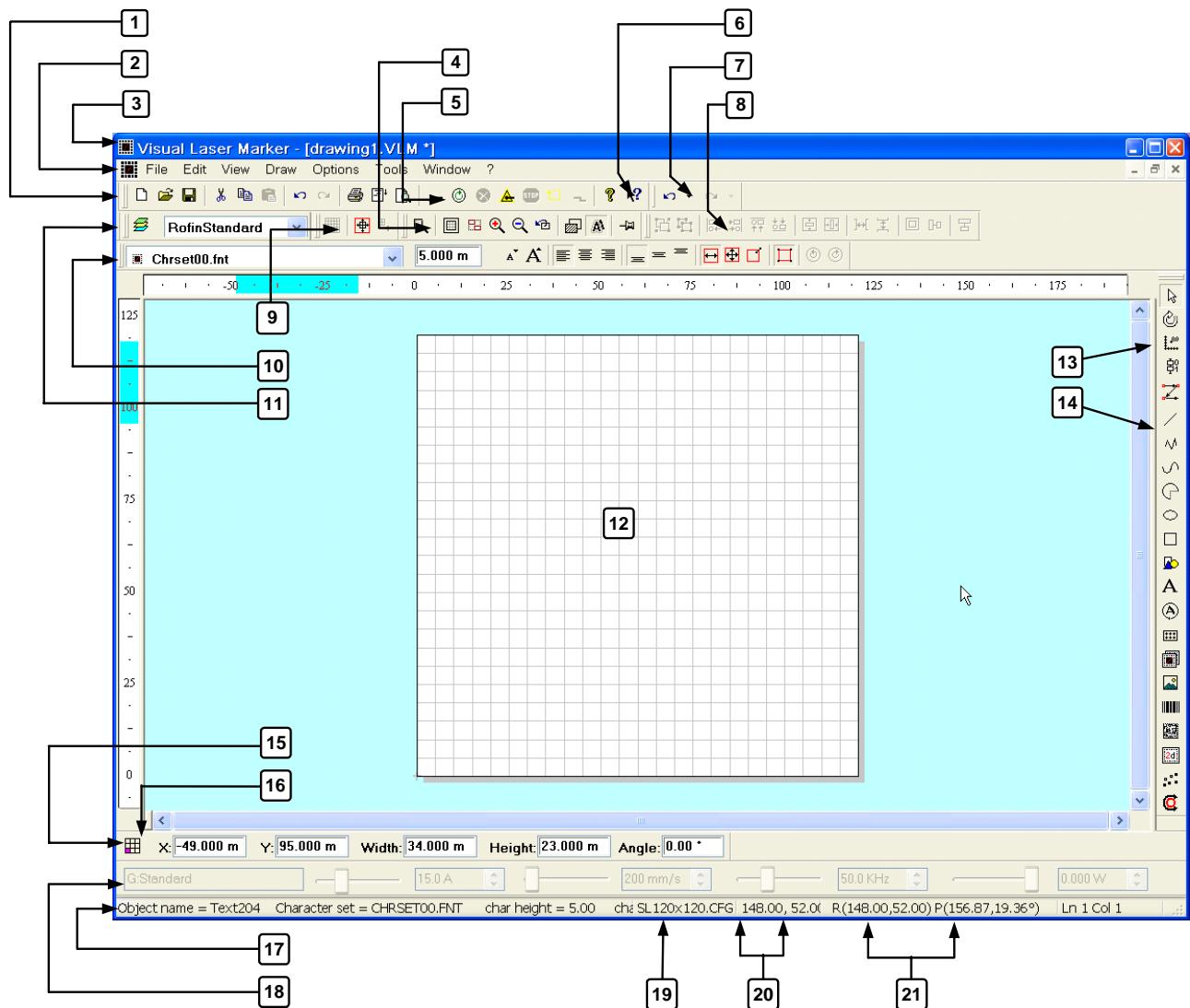


Fig. 2/1 VisualLaserMarker editor's main window

- | | |
|---------------------------|--|
| [1] Standard function bar | [12] Drawing area |
| [2] Menu bar | [13] Editing tools |
| [3] Title bar | [14] Drawing tools |
| [4] Zoom functions | [15] Positioning bar |
| [5] Execution tools | [16] Selecting the reference point |
| [6] Help / About | [17] Status bar |
| [7] Undo - Redo | [18] Laser parameters |
| [8] Alignment functions | [19] Active machine configuration file |
| [9] Change drawing view | [20] Current cursor coordinates |
| [10] Text attributes | [21] Coordinates for the starting point (R) and end point (P) of the spacing measurement |
| [11] Layer | |

Arranging windows on the screen

If you have several drawing windows and the message window open, you can arrange the windows using the Show Windows menu option and using the layout options in the Window menu option from the drop-down menu, or by dragging them with the mouse.

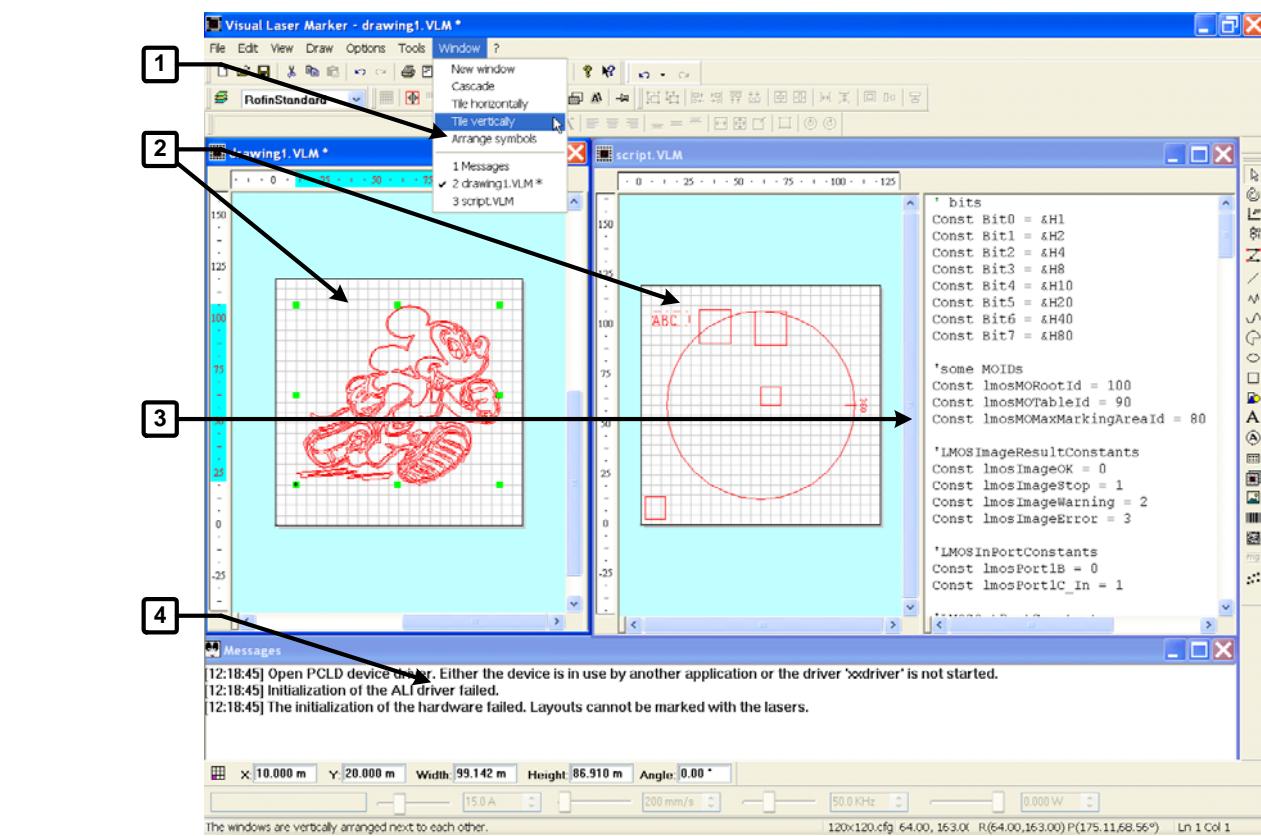


Fig. 2/2 Windows on the VisualLaserMarker editor screen

- [1] Alignment options in the Window menu option
 [2] Drawing window

- [3] Script window
 [4] Message window

Inserting a script into the drawing

☞ If you want to insert a script into the drawing, or if you want to edit an existing script, open the script window as follows:

- Position the mouse pointer on the window frame at the right-hand edge of the image. The mouse pointer turns into a line with arrows on each end .
- Left-click and drag to the left until the required window size is achieved.
- » For more information on the 'Script' topic; refer to the VisualLaserMarker online help in the ? menu under Lmos Automation Documentation, and in the Windows start menu  under VisualLaserMarker > Documentation > VBScript Documentation.
- » Section 'The script include file'.

Message window option

The VLM graphic editor permits error messages to be displayed in a message window. The message window displays status messages, error messages and provide help info. If a required action cannot be carried out, the messages in the Message window on the cause of the error can be closed.

The message window is displayed by selecting the Message window option in the View menu, or using the key combination [Ctrl] + [M].

Showing and hiding the toolbars

Any toolbars not in use can be hidden. The position of the toolbars can be set by moving them in the graphic window.

☞ How to show or hide toolbars:

- Select the Toolbar settings option in the View menu...
- Click the checkbox next to the name of the toolbar to be shown or hidden, then click the [Close] button.

☞ How to move a toolbar:

- Move the mouse pointer to the edge of the toolbar to be moved.
- Hold down the left mouse button and drag the toolbar to the required position.

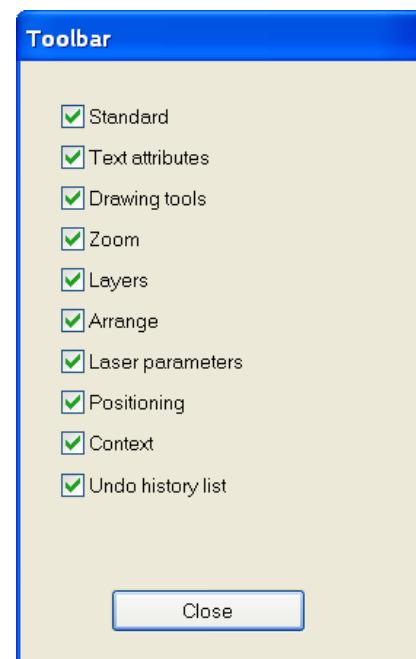


Fig. 2/3 Toolbar settings dialog box

2.1 Using commands and tools

The VisualLaserMarker offers different options for selecting commands:

- ⇒ Via **pull-down menus**, accessed from the menu bar.
- ⇒ Via the **tool icons** in the toolbars.
- ⇒ Via the **context menu** displayed by right-clicking.

How to access commands and tools:

- Click on the required menu option in the menu bar to view a list of commands in the pull-down menu.
- Then left-click the command required.

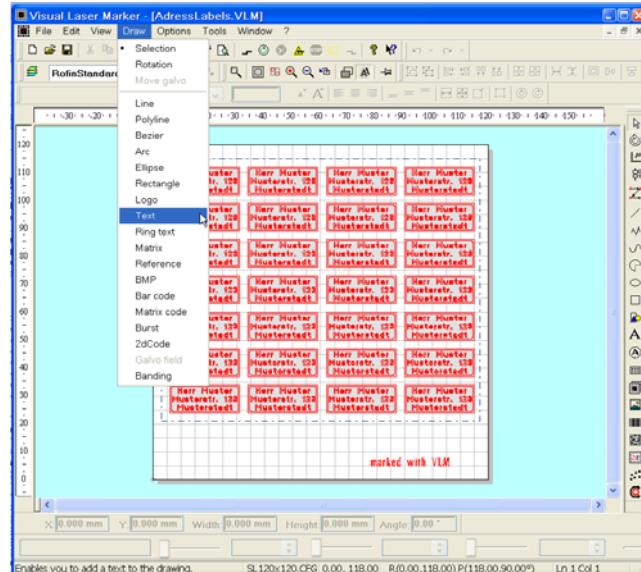


Fig. 2.1/1 Menu bar with expanded pull-down menus

Or:

- Left-click on an icon in one of the toolbars.

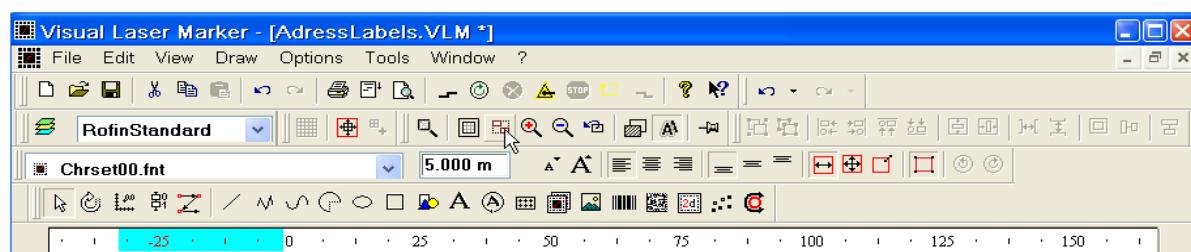


Fig. 2.1/2 Calling a command via the toolbars

Or:

- Hold the mouse pointer next to a drawing object and right-click.
- Select the required command from the context menu displayed.

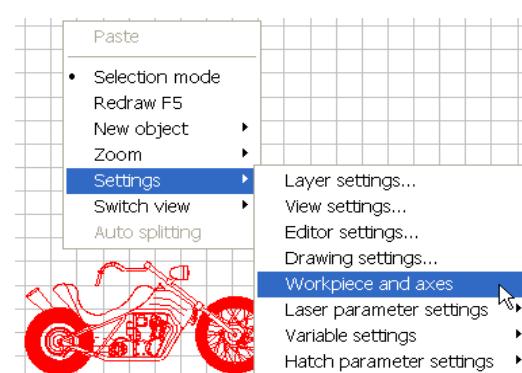


Fig. 2.1/3 Calling a command via the context menu

Assignment of the function keys

The function keys are assigned the following VLM commands:

[F1]	Open the help topics	[F9]	Start marking
[F5]	Update drawing	[F10]	Stop marking
[F7]	Open positioning help	[Alt] + [F4]	Close VisualLaserMarker

2.2 Beginning a drawing using a drawing template

The drawing type you need can be quickly created by beginning your drawing with a drawing template file (*.vlt). A template contains all components required to create a drawing, from the settings for the drawing surface, to the layer settings and the settings for the drawing objects. Any drawing can be used as a template. All the information it contains is included in the new drawing.

☞ How to begin a new drawing:

- Start the VisualLaserMarker graphic editor.

On starting the program, a new, unnamed drawing is created automatically. This uses the template stored as the default template in the Options > Editor settings... menu.

- Create your drawing and then save it.

☞ How to create a new drawing:

- Select the New > Document option in the File menu.

Or:

- Click the  icon.
- Select a template from the dialog box displayed.

☞ How to open an existing drawing:

- Select the option Open... in the menu File.

Or:

- Click the  icon.
- Select the desired drawing from the dialog box displayed.

2.3 Creating a job

In version 4.8 and above of VisualLaserMarker, a VLM job can be created containing one or more drawings. Each drawing is created on a page that is displayed on a tab. All pages are then grouped to form a job that can then be saved in a file with the extension *.vlj. This means that various steps in processing a complex workpiece can be combined in a single job. The drawings in a VLM job can each contain an individual script or there can be a global script for all drawings contained in the job.

Application example:

In the first work step, a cylinder marking on a cylindrical surface is set up on the first page in » Section 'Marking with axes'. In the second work step, the workpiece is pivoted by means of a script command and a flat surface is marked. A flat marking is created on the second page to do this.

- » For more information on script commands, see the ? > Scripting help menu option, or if you are in the Script window, press the [F1] function key.

Open a job as follows:

- Select the New > Job options in the File menu.
A new job (Job.vlj) is created with one page.

Open an existing job as follows:

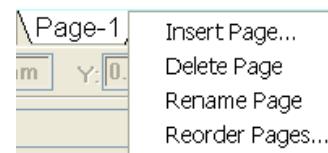
- Select the Open... option in the File menu.

Or:

- Click the  icon.
- Select a job from the shown Drawing dialog box.

To manage the pages in a job:

- Position the cursor over the tab (here: Page-1) and select the required option from the context menu.



-  How to insert a script into a drawing is described in Section 'Inserting a script into the drawing'.

2.4 Setting the default template

VLM provides the option of setting a frequently used template as the default template.

☞ **Set the default template as follows:**

- Create the drawing to be used as the default template.
- Click on Save as in the File menu.
- From the list in the Save as dialog box, select the Templates folder from the list box. Also set the file type to template (*.vlt).
- Assign a unique name and save the drawing.
- Click on Editor settings... in the Options menu and select your file in the Default template list box.

2.5 Saving the drawing

When saving the drawing, the drawing itself and the drawing environment settings – such as the layer, drawing settings and the local laser parameters – are saved. The drawing environment settings can be defined in the Options menu.

» *Section 'Drawing settings'.*

☞ **How to save the drawing:**

- Select the Save option from the File menu.

Or:

- Click the  icon.
- Assign a unique file name in the Save as dialog box displayed, and click the [Save] button.

3 Working with drawing objects

VisualLaserMarker provides effective tools for editing objects. These can be used to change the shape, size and position of an object, as well as display, change and apply the properties of selected objects. Hovering the mouse pointer over a tool icon displays a *tooltip* with the name of the tool, and a help text appears in the status bar.

This section describes how to insert objects into a drawing and how to edit and align objects. The standard editing commands such as Cut, Copy, Select all, Undo, Redo, etc. are found in the Edit pull-down menu, via the corresponding tool icons in the toolbars or in the context menus.

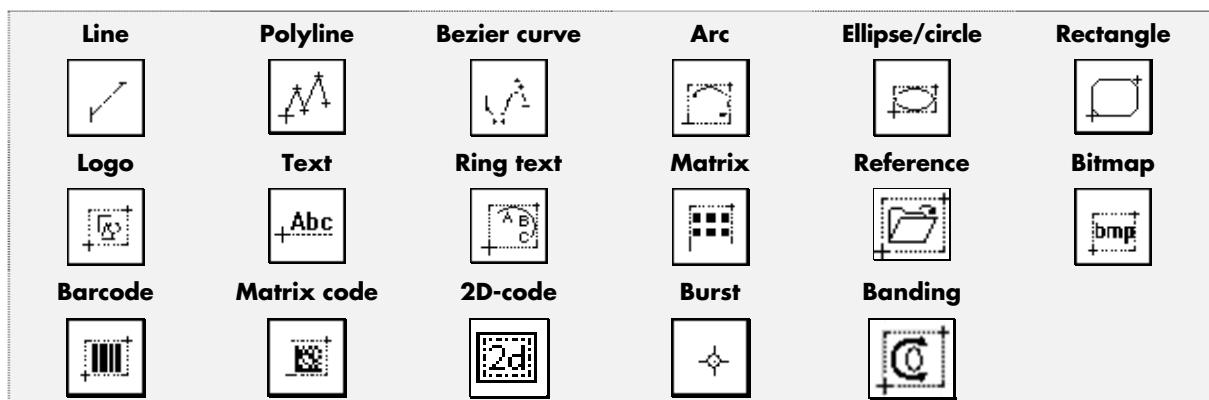
3.1 Inserting objects into the drawing

- Click on the required object type icon in the drawing toolbar.

Or:

- Select the desired object from the Draw menu.

The mouse pointer assumes the shape of the following symbols for the selected object:



- Move the mouse pointer to the required position in the graphic window.

The process for inserting drawing objects varies depending on the object type. Essentially, an object can be inserted by selecting one or more points and/or by dragging out an object frame. The object is then fitted into this frame.

The following table shows the options on inserting an object (* = recommended mode):

Drawing object	Select point(s)	Drag frame	Drawing object	Select point(s)	Drag frame
Line/polyline	✓	–	Text	✓ *	✓
Bezier curve	✓	–	Ring text	–	✓
Arc	–	✓	Matrix	✓ *	✓
Ellipse/circle	–	✓	Barcode	✓ *	✓
Rectangle	–	✓	Matrix code	✓ *	✓
Logo	✓ *	✓	2D-code	✓ *	✓
Reference	✓ *	✓	Burst	✓	–
Bitmap	✓ *	✓	Banding	✓	–

i How to insert the banding object into the drawing is described in Section 'Inserting the banding object into a VLM drawing'.

Line object type:

- Hold down the left mouse button and drag the line up to the required end point.
- Fix the end point of the line by releasing the mouse button.

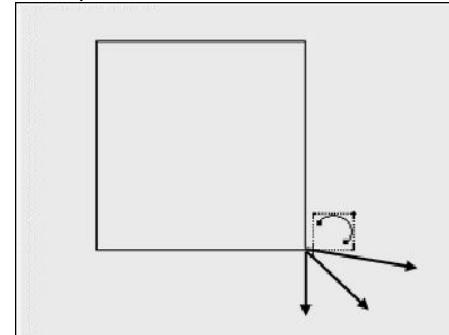
Polyline, Bezier curve and burst object types:

- Left-click on the point in the graphic window where you want to position the starting point of the line or curve, or the first burst point.
- Move the cursor to the end point of the line or curve, or the second burst point in the graphic window, and left-click.
- Right-click once all the lines, curves or points have been defined.

Arc object type:

- Hold down the left mouse button and drag the object frame upwards to the required size (see Example 1).
- Move the mouse pointer over the End point, hold down the left mouse button and drag the end point clockwise or counter clockwise until the required arc length is achieved (see example 2).
- Move the mouse pointer over the Start point, hold down the left mouse button and drag the start point clockwise or counter clockwise until the required position of the arc is achieved.

Example 1



Example 2

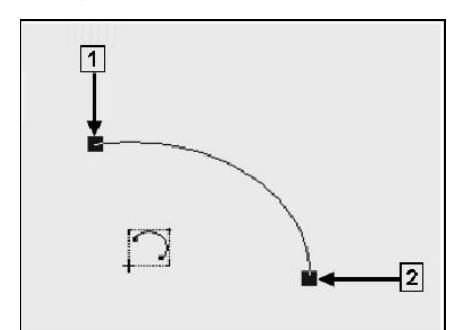


Fig. 3.1/1 Inserting an arc object

1	End point
2	Starting point

Ellipse, circle and rectangle object types:

- Hold down the left mouse button and drag the object frame upwards to the required size.

Logo and bitmap object types:

The object types logo, VLM and bitmap can be inserted by selecting a point or by dragging out an object frame. When inserting by selecting a point, the object is inserted in its original size at the predefined position in the graphic window. When you drag out a frame, the object is fitted into this frame.

☞ How to insert the object in its original size:

- Left-click, select the required file in the dialog box displayed, and click the [Open] button.

☞ How to insert the object in any size:

- Hold down the left mouse button and drag the object frame out to the required size.
- Select the required file from the dialog box displayed, and click the [Open] button.

Text object type:

The text object can be inserted by selecting a point or by dragging out a frame.

☞ How to insert the text object by selecting a point:

- Left-click and set the parameters for the text object, such as the text height or the width to height ratio, in the Text properties page displayed.

The frame is automatically adjusted to the size of the text object.

☞ How to insert the text object by dragging out a frame:

- Hold down the left mouse button and drag the object frame out to the required size.

The predefined size of the frame constitutes the outer delimitation for the text. This prevents the text from exceeding the size of the given frame if additional characters are inserted or characters are enlarged.

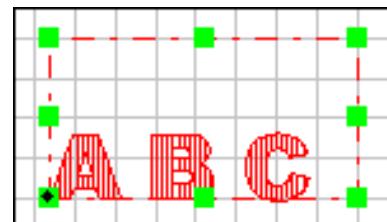


Fig. 3.1/2 Inserting a text object by dragging out an object frame

Ring text object type:

The center of a circle is set by left-clicking.

- Hold down the left mouse button and drag the radius of the circle to the required size.
- Keep the mouse button pressed down and move the mouse button along the circle to the required start angle.

Matrix, reference, barcode, matrix code and 2D-code object types:

The object types matrix, barcode, matrix code and 2E-code can be inserted by selecting a point or by dragging out an object frame. When inserting by selecting a point, the object is inserted with default values for the height and the size of the element on the predefined position in the graphic window. When dragging out an object frame, the height and size of an element is automatically fitted to the frame.

-  For the reference object, the Insert file reference selection dialog is first shown.

3.2 Selecting an object



An object already defined in a drawing has to be selected for the following operation. This tool activates the selection mode.

- Move the mouse pointer to an object and press the left mouse button. The object is selected when the green selection handles appear.

-  The default color of the selection handles is green.

» *Section 'Graphic editor settings'.*

It is also possible to select multiple objects.

» *Information on multiple selection can be found in Section 'Multiple selection'.*

It is also possible to select objects or groups via the contextual object tree. The object tree is displayed with the key combination [Ctrl] + [T] or in the menu option View > Object tree.

3.3 Scaling objects

By clicking on and moving a single selection handle, objects can be stretched or compressed. When the object is stretched or compressed by moving a corner handle, the size of the object changes in the X and Y directions (Example 1). If the object is stretched or compressed at the sides by moving a handle, the size of the object changes either in the X or Y direction (Example 2).

The values for the selected object's height and width can be read in the positioning bar or in the properties page Position > Size (Size DX/DY) and can also be changed there.

» Section 'The Pos./Size properties page' and Fig. 2/1.

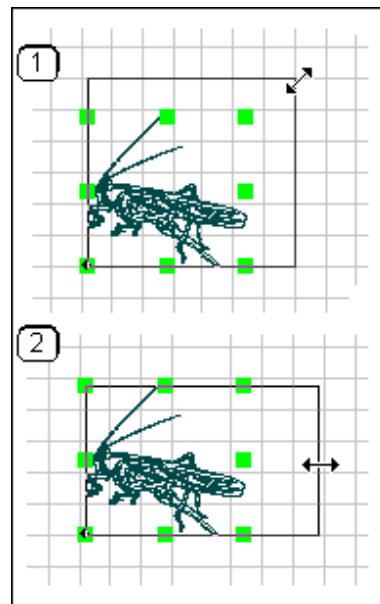


Fig. 3.3/1 Scaling an object

3.4 Moving an object

In the selection mode, the position of the selected drawing object can be changed by clicking on and moving the selection handles of the frame. The values for the position (position X/Y) of the selected object can be read in the positioning bar or in the Position/Size properties page and can also be changed there.

» Section 'The Pos./Size properties page' and Fig. 2/1.

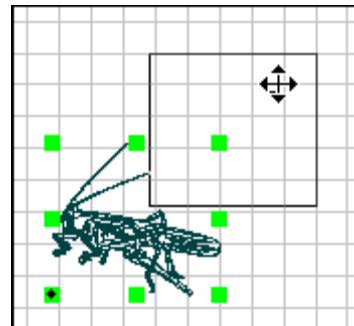


Fig. 3.4/1 Moving an object

3.5 Rotating an object



The selected object is rotated around its reference point with this tool. The exact rotary angle and the position of the reference point can be set in the properties page Pos./Size of the object. Alternatively, the reference point and the rotary angle can also be entered directly in the positioning bar.

» Section 'The Pos./Size properties page' and Fig. 2/1.

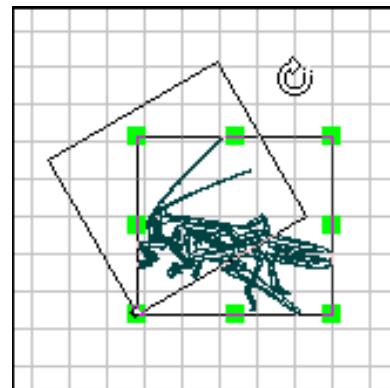


Fig. 3.5/1 Rotating an object

3.6 Multiple selection

It is possible to select several objects all at once by placing a frame around several objects in the selection mode. All objects completely positioned inside the frame are thus selected at the same time.

How to select multiple objects:

- Drag a selection frame around the objects to be selected.

Or:

- Hold down the shift key and, using the mouse, select all objects, one after the other.

The object that was selected first (reference object) is identified by the filled selection handles.

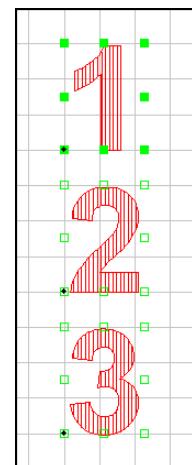


Fig. 3.6/1 Multiple selection

In the properties of the Multiple selection, only the values of the fields are shown which are the same for all objects. If the values differ, the field remains empty. If a value is assigned to the selected objects, this value applies to all objects in the multiple selection.

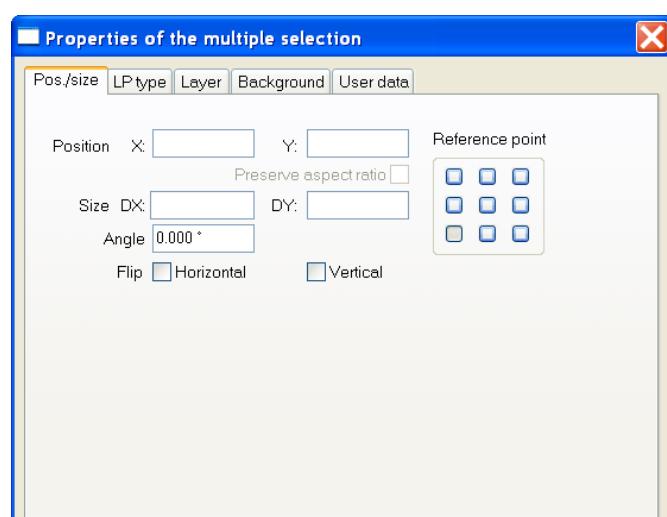


Fig. 3.6/2 Properties dialog for multiple selection

3.7 Spacing measurement



This tool is a design aid. It can be used to measure the spacing between primitive shapes, for example.

☞ How to measure the spacing between two objects:

- Click the icon. Having selected this mode, the cursor (arrow-shaped in normal drawing mode) changes to a small blue square .
- Move the cursor to the starting point of the spacing measurement and left-click. A crosshair will now appear at this point.
- Move the cursor to the end point of the spacing measurement.

The coordinates for this end point are then displayed in the status bar.



- 1 Cursor position relating to the drawing's zero point ($X=0; Y=0$)
- 2 R = Starting point coordinates (X/Y) for the spacing measurement
- 3 P = Distance of the cursor from the starting point of the spacing measurement, and the angle in relation to the X-axis

3.8 Determining the execution order



To reduce the marking time, this tool can be used to determine the order in which the objects should be executed with the laser.

☞ How to determine the execution order:

- Click on the Execution order icon.

Or:

- Select the Execution order option in the Edit menu.
- Hold down the mouse key and move the mouse over the individual objects in the required order.

Or:

- Click on the objects in the order of the required execution.

In the object, the order digit is displayed.

To determine the optimum execution order, it is useful to display the laser moves and marking direction on the screen. Both options are activated in the View menu. » Section 'Laser moves option' and section 'Marking direction option'.

Auto-arrange



This tool is used to automatically set the marking sequence of objects on the same level in the object tree. The order is defined to minimize the number of moves.

3.9 Aligning objects

If several objects have been selected (multiple selection), use these tools to align the object frames with one another. The selected objects are each aligned to the reference object. The object that was selected first (reference object) is identified by the filled selection handles.

The tools for aligning the objects are in the Alignment toolbar and in the Edit > Align menu.

Symbol	Command	Explanation
	Flush left	Aligns the selected objects to the left.
	Flush right	Aligns the selected objects to the right.
	Align top	Aligns the selected objects upwards.
	Align bottom	Aligns the selected objects downwards.
	Assign same height	Assigns all the selected objects the same height.
	Assign same width	Assigns all the selected objects the same width.
	Make row	Positions all the selected objects in a horizontal row.
	Make column	Positions all selected objects in a vertical row.
	Center	Aligns all selected objects around a common central point.
	Center horizontally	Aligns the center points of all the selected objects in a horizontal line.
	Center vertically	Aligns the center points of all the selected objects in a vertical line.

4 The properties dialog

All the properties of selected objects can be displayed and altered with the aid of the properties dialog. The properties of the selected object are displayed in the form of values in the properties pages of the dialog. Changes to these values take effect immediately. If graphical properties are changed, then the object is redrawn immediately in the graphic editor.

☞ How to open the properties dialog for an object:

- Select the required object by moving the mouse pointer in selection mode to an object line and press the **left** mouse button.
The object will be surrounded by a rectangle with colored selection handles.
- Now press the **right** mouse button and then select the Properties... option in the context menu shown.

The properties dialog associated with the object pops up.

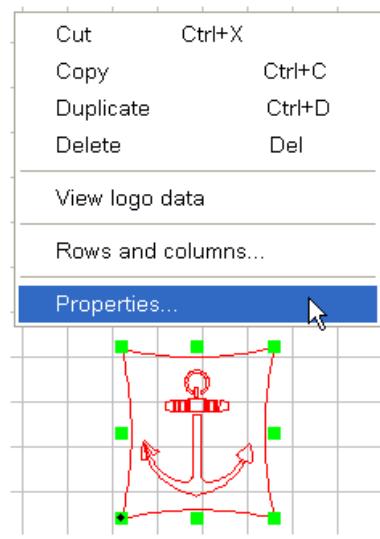


Fig. 4/1 Opening the properties dialog

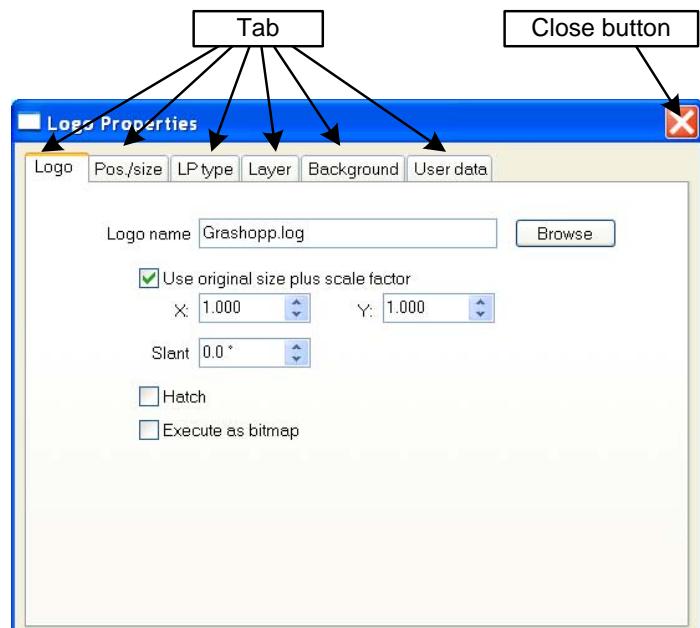


Fig. 4/2 Properties dialog - e.g. for a logo

The properties which are common to all objects are displayed below. You will find out how to change the shape, size, and position of a drawing object.

- » Section 'Working with laser parameter sets' describes the properties page **LP type**; section 'Adjusting object positions' describes the **Galvo control** properties page. All other properties depend on the object type and are explained in Chapter 'Description of drawing objects'.

4.1 The Pos./Size properties page

The Pos./Size properties page is used to set the size of the drawing object and the position of the reference point in the drawing, and the position of the object relative to the reference point.

Alternatively, the X and Y coordinate values for the drawing object can also be entered in the Positioning bar or the mouse can be used to drag the selection frame of the object to the required position.

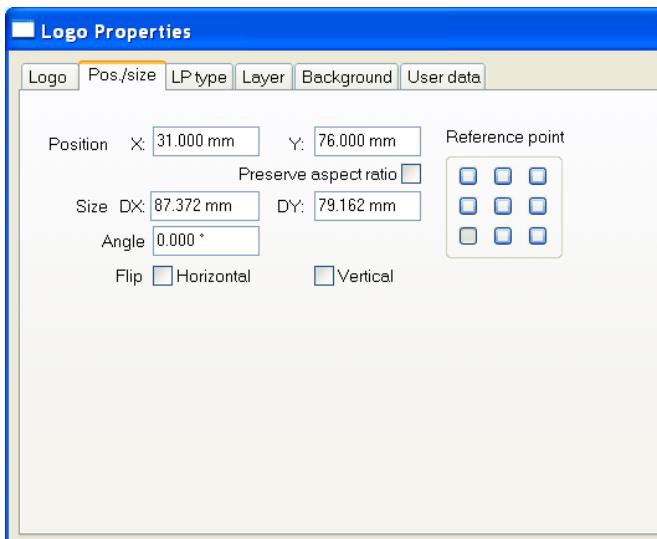


Fig. 4.1/1 Pos./Size properties page - e.g. for a logo

The following settings are given on the Position/Size properties page:

Position X:	Position X [mm] of the reference point in the drawing.
Position Y:	Position Y [mm] of the reference point in the drawing.
Preserve aspect ratio:	By clicking on the checkbox <input checked="" type="checkbox"/> , the ratio between width and height of the object remains unchanged. This function ensures that after changing the value in the input field Size: DX, the value in the input field Size: DY is recalculated to maintain the ratio between width and height.
Size DX:	Width of the drawing object [mm].
Size DY:	Height of the drawing object [mm].
Angle:	Rotational angle in degrees.
Flip horizontally / vertically:	Horizontal or vertical mirroring (flipping) of the object in relation to the reference point.
Reference point:	Changes the position of the reference point in the object.

Selecting the reference point

A object is positioned in the drawing by means of the reference point. The object is always aligned with the reference point. If an object is rotated or flipped, or the height or width of the object changes, then the object is realigned with the reference point. The position of the reference point in the drawing remains constant.

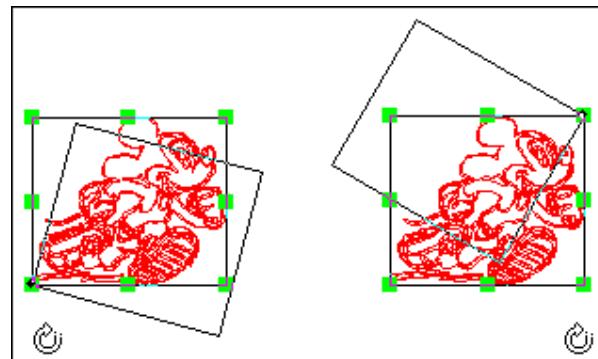


Fig. 4.1/2 Rotation of an object around its reference point

The reference point takes up one of nine predefined positions in the object. In the adjacent object, the reference point is at the bottom left and can be identified by the black diamond in the selection handle.

- i** Alternatively, the position of the reference point can be set by clicking on the icon in the positioning bar.

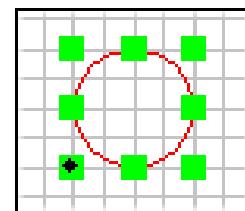


Fig. 4.1/3 Position of the reference point

4.2 The Layer properties page

Layers are comparable to transparency sheets, which can be placed on top of each other when drawing. The Layer properties page can be used to position individual objects within your drawing on different layers.

- i** Objects can only be assigned to existing layers.

- » The function of the layer, how new layers are generated, and how to modify existing layers is described in Section 'Working with layers'.

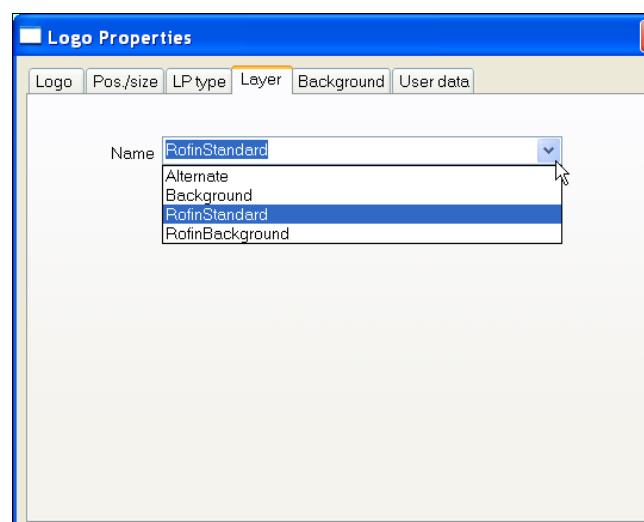


Fig. 4.2/1 Layer properties page

How to assign a different layer to an object:

- Select the required drawing object.
- » If the object is part of a group, then please read Section 'The group object'.
- Open the Layer properties page and select the required Layer from the list box.
- Close the properties dialog by clicking the Close button .

4.3 The Background properties page

The Background properties page provides the option of adding a background bitmap image to an object.

These background bitmaps serve as visual orientation aids. The drawing is output without the background bitmap.

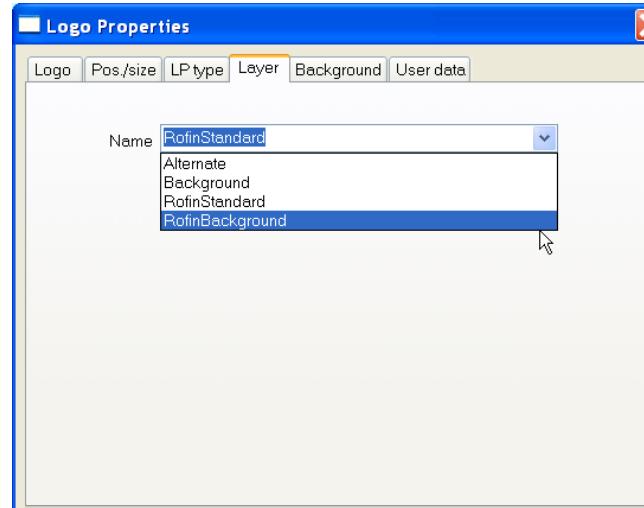


Fig. 4.3/1 Background properties page

The Background properties page includes the following options:

Show frame:	Clicking the checkbox (<input checked="" type="checkbox"/>) displays a broken frame around the object; this is not executed with the laser.
Draw frame:	Clicking the checkbox (<input checked="" type="checkbox"/>) will display a continuous line around the object, which is executed with the laser.
Background bitmap:	Clicking the checkbox (<input checked="" type="checkbox"/>) saves an object with a background bitmap. The [Browse] button opens a dialog field to select the bitmap file to be referenced.
Background color:	Clicking on checkbox (<input checked="" type="checkbox"/>) adds a colored background to the object. The [Color] button opens a color selection dialog.

4.4 The User Data properties page

To provide a drawing object at execution time with varying content, the object must be addressable with a name. This object name is assigned in the Object name field.

In the Description field, additional information on the object is saved as text with the object.

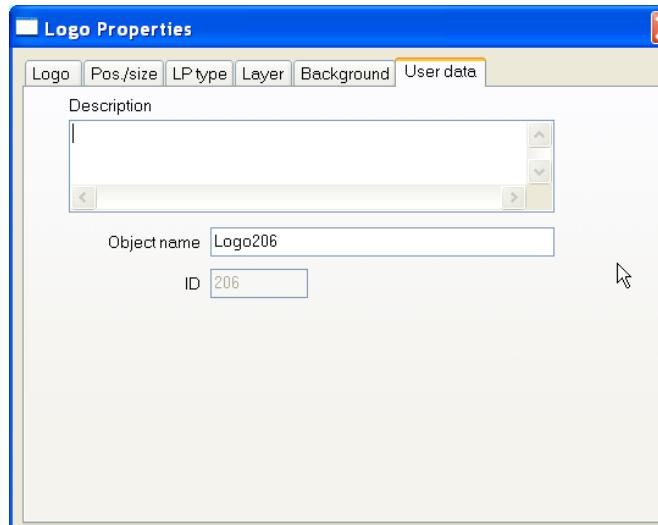
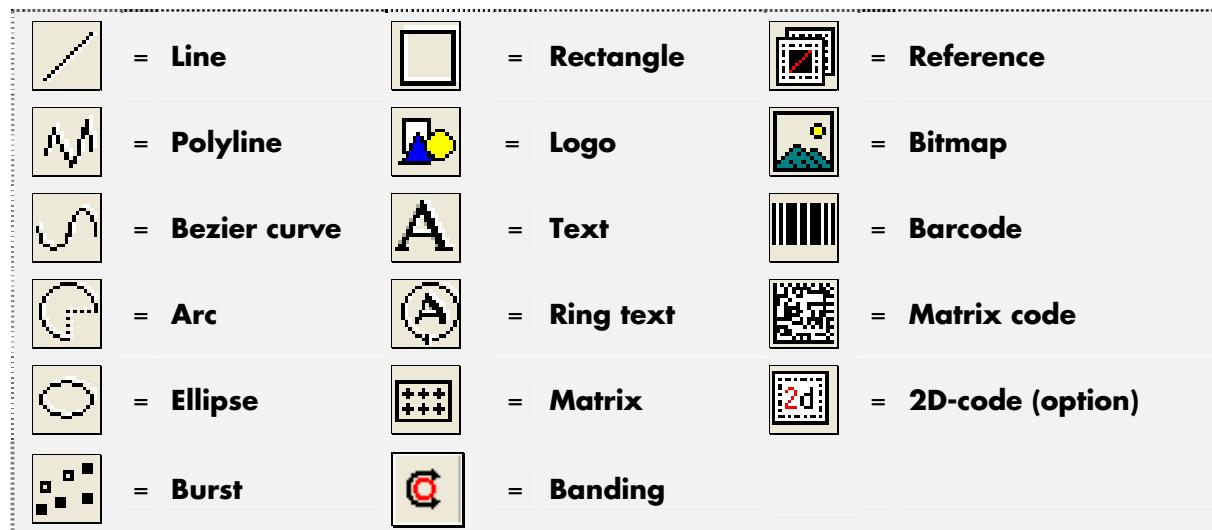


Fig. 4.4/1 User Data properties page

5 Description of drawing objects

Objects are individual, standalone elements of a drawing. An object may consist of one single line or a rectangle or of a logo, a bitmap or various grouped objects. This section introduces all object types with their specific properties.

The following object types are available in the Drawing tools toolbar and also in the Draw menu option:



- i** How to insert objects into a drawing is described in Section '*Inserting objects into the drawing*'. How to insert the banding object into the drawing is described in Section '*Inserting the banding object into a VLM drawing*'.

5.1 The line object



The start and end point of the line object are defined on the Points properties page in the Polyline Properties dialog.

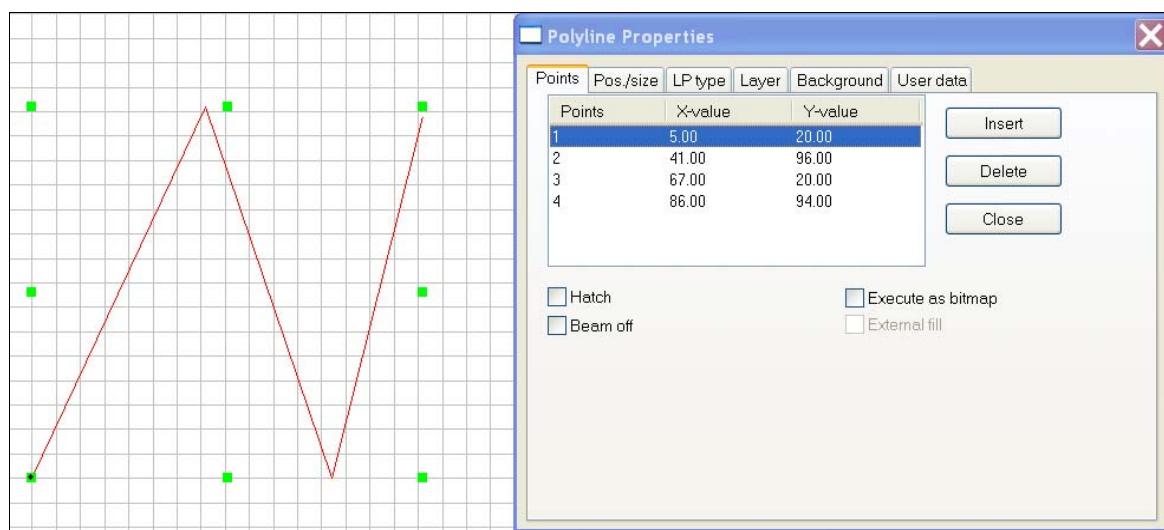


Fig. 5.1/1 Points properties page

[Insert]	You can draw additional lines, by inserting more points into your drawing. Click on the [Insert] button and define the X and Y values for the new points.
[Delete]	If you want to remove points, select them and click on the [Delete] button.
[Close]	When this button is clicked, the polyline between the end point and the starting point is closed and an additional line segment is inserted (» Fig. 5.2/2).
Beam off	By clicking on the checkbox <input checked="" type="checkbox"/> a line can be defined which moves the marking head when the laser beam is switched off. The line is shown dotted on the drawing area.
Execute as a bitmap	The line object is executed as a bitmap by clicking the <input checked="" type="checkbox"/> checkbox. The bitmap properties page, which comprises all options for executing a bitmap, is entered in the (» Section 'The bitmap object') properties dialog.

5.2 The polyline object



The polyline is a connecting series of line segments. The start and end points of the individual line segments are listed in the Points properties page and can be altered there. By inserting more points, you can draw additional segments.

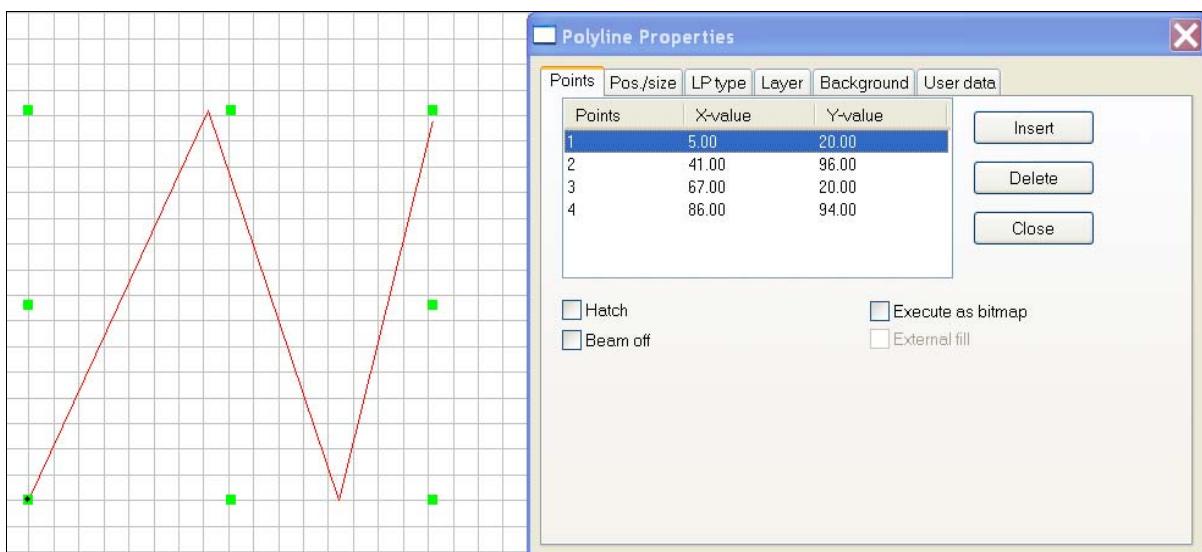


Fig. 5.2/1 Points properties page

The Points properties page contains the following options:

[Insert]	You can draw additional lines, by inserting more points into your drawing. Click on the [Insert] button and define the X and Y values for the new points.
[Delete]	If you want to remove points, select them and click on the [Delete] button.

[Close]

When this button is clicked, the polyline between the end point and the starting point is closed and an additional line segment is inserted (» Fig. 5.2/2).

- 1** Starting point
- 2** End point
- 3** Additional line segment

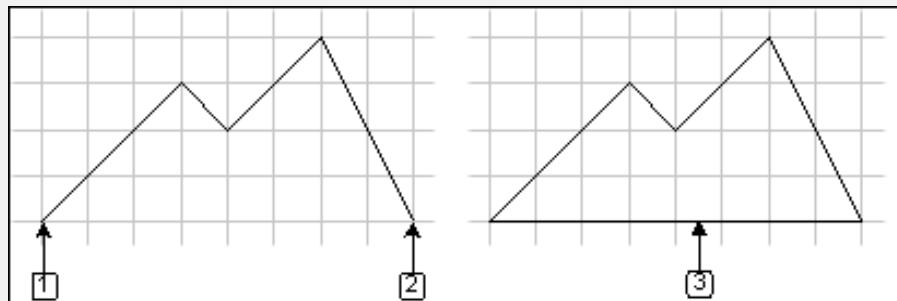


Fig. 5.2/2 Polyline object before and after closing

Hatching

Clicking on the Hatching checkbox adds hatching to the polyline object.
 » *The hatching options are described in Section 'Hatching'.*

Beam off

Clicking on the checkbox defines a line that the marking head follows when the laser beam is switched off. The line is shown dotted on the drawing area.

Execute as a bitmap

The polyline object is executed as a bitmap by clicking the checkbox. The bitmap properties page, which comprises all options for executing a bitmap, is entered in the (» Section 'The bitmap object') properties dialog.

Alternatively, the segment end points can be moved directly in the graphic window when a polyline object is selected while holding down the [Ctrl] key. To end the editing process again directly in the graphic window, click beside a selection handle in the free area of the graphic window.

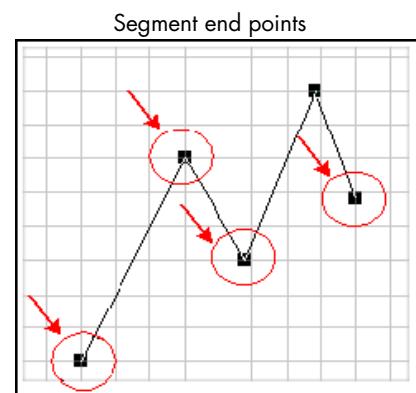


Fig. 5.2/3 Polyline object selected by holding down the [Ctrl] key

5.3 The Bezier curve object



Bezier curves can be drawn with this tool. Bezier is a method for calculating curves. This procedure serves to easily create any bent curves. The Bezier curve is determined by at least two node points and two control points (» Fig. 5.3/3). The curve can be set by using the control points. The node and control points can be set in the Points properties page in the Bezier curve properties dialog.

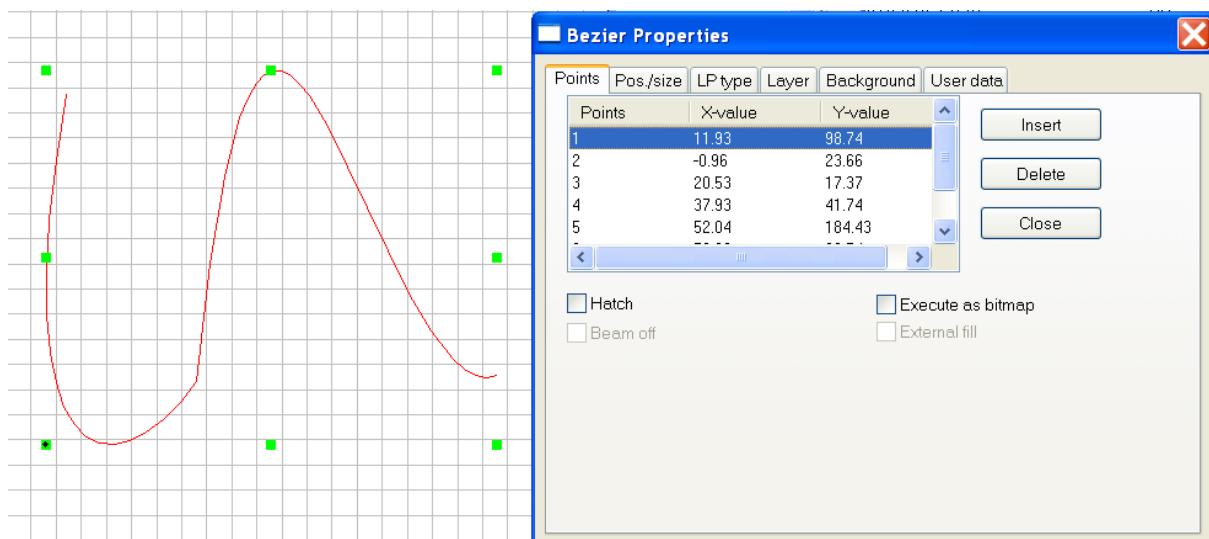


Fig. 5.3/1 Points properties page

The Points properties page contains the following options:

Insert	You can continue the line, by inserting more points into your drawing. Click on the [Insert] button and define the X and Y values for the new points.
Delete	If you want to remove points, select them and click on the [Delete] button.
Close	When this button is clicked, the Bezier curve between the end point and the starting point is closed by inserting an additional line segment.
Hatching	Clicking the <input checked="" type="checkbox"/> checkbox will add hatching to the Bezier curve object. » <i>The hatching options are described in Section 'Hatching'.</i>
Beam off	Clicking on the checkbox <input type="checkbox"/> defines a line which moves the marking head when the laser beam is switched off. The line is shown dotted on the drawing area.
Execute as a bitmap	The Bezier curve object is executed as a bitmap by clicking the <input checked="" type="checkbox"/> checkbox. The bitmap properties page, which comprises all options for executing a bitmap, is entered in the (» Section 'The bitmap object') properties dialog.

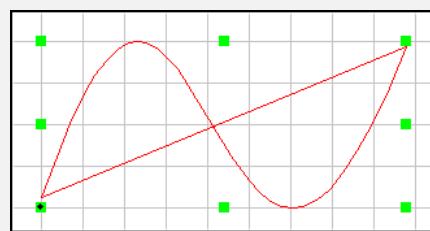
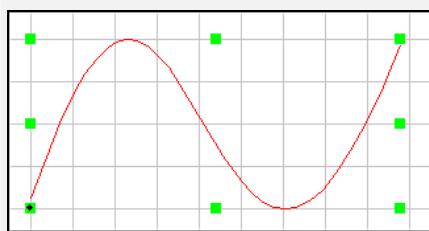


Fig. 5.3/2 Bezier curve object before and after closing

Alternatively the node and control points can be moved directly in the graphic window when the Bezier curve object is selected and the [Ctrl] key pressed. The curvature of the curve is set via the node and control points. The connecting line between the node and control point defines the direction of the curve, and the line length defines the slope of the curve (» fig. 5.3/3).

To end the editing process again directly in the graphic window, click next to a selection handle in the free area of the graphic window.

- [1] Control points
- [2] Node points
- [3] Connecting line

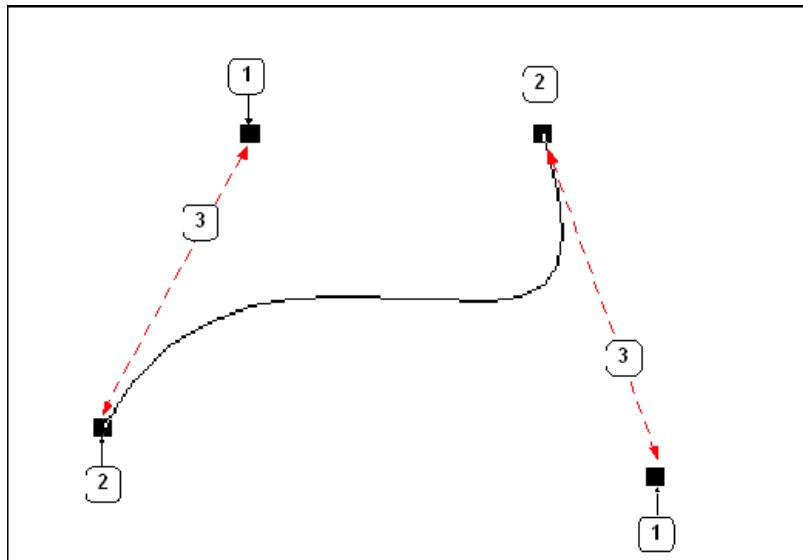


Fig. 5.3/3 Example of a Bezier curve object, selected by holding down the [Ctrl] key

5.4 The ellipse/circle object and the arc object



The semi-axes for the ellipse and the circle diameter are set in the Ellipse&circle properties page of the Ellipse Properties dialog.

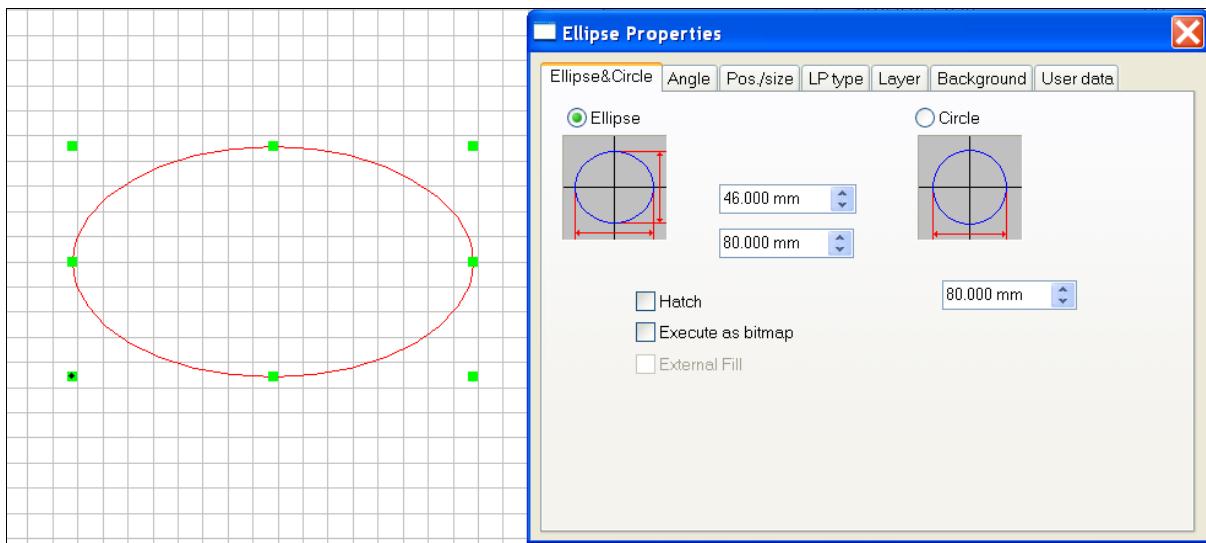


Fig. 5.4/1 Ellipse/circle properties page

The Ellipse&circle properties page contains the following options:

Hatching	Clicking the <input checked="" type="checkbox"/> checkbox adds the hatching of the Bezier curve object. » <i>The hatching options are described in Section 'Hatching'.</i>
Execute as a bitmap	The Ellipse/circle object or arc object is executed as a bitmap by clicking the <input checked="" type="checkbox"/> checkbox. The bitmap properties page containing all the options for executing a bitmap, is entered in the (» Section 'The bitmap object') properties dialog.



The arc follows the circumference of an imaginary ellipse or an imaginary circle. The flection of an arc can be edited by stretching or compressing the selection handles at the sides or by carrying out the corresponding settings for the elliptical and circular arcs in the Ellipse/circle properties page of the Ellipse properties dialog.

In the Angle properties page you can switch between the Full circle / Full ellipse (\odot Full) and Circle segment / Ellipse segment (\odot Part) settings. The Start angle and the End angle for an arc segment can be set in degrees; this determines the position of the arc on the imaginary ellipse or the imaginary circle. It is possible to set that the angle of rotation is measured from the start angle clockwise or counter clockwise.

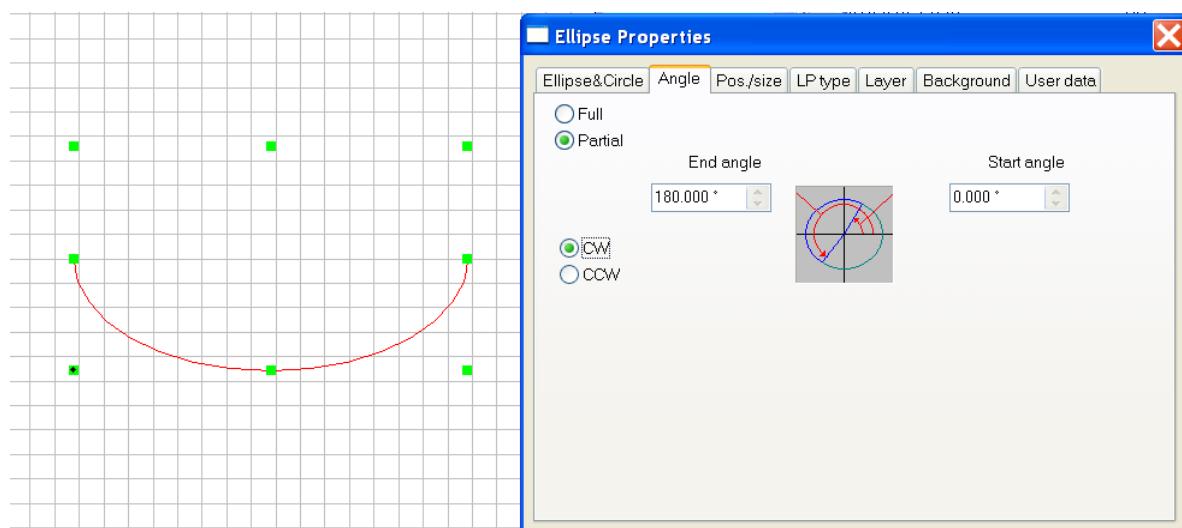


Fig. 5.4/2 Angle properties page

5.5 The rectangle object



Three layout options for the corners of the rectangle are available in the Rectangle properties page of the Rectangle Properties dialog. The corners can be sloped or rounded off, and the associated radius specified using the Sloped and Rounded off options.

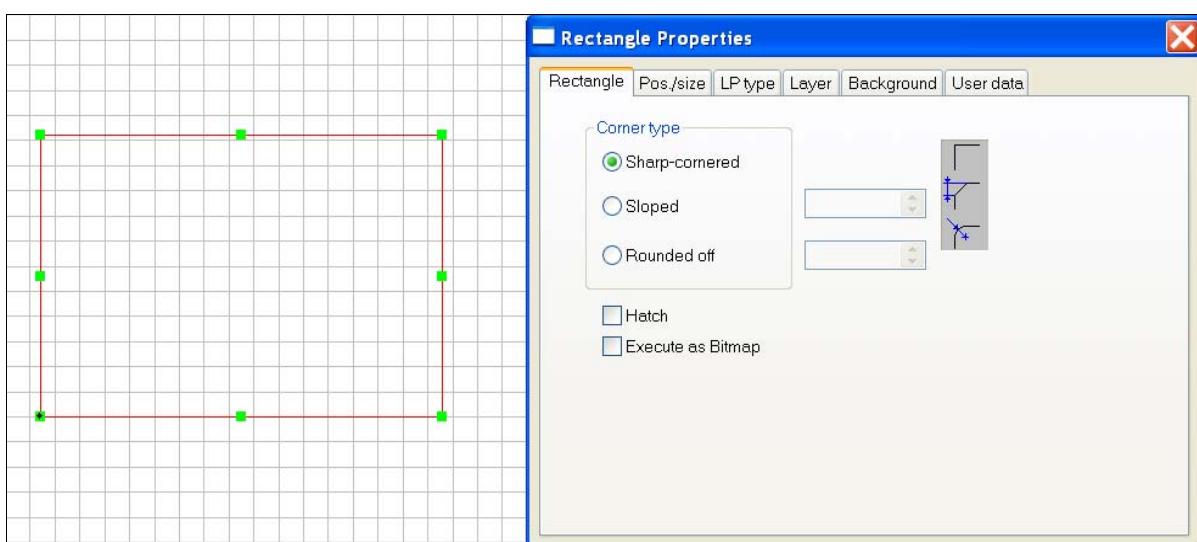


Fig. 5.5/1 Rectangle properties page

The Rectangle properties page contains the following options:

Hatching	Clicking the checkbox <input checked="" type="checkbox"/> adds hatching to the Bezier curve object. » <i>The hatching options are described in Section 'Hatching'.</i>
Execute as a bitmap	The rectangle object is executed as a bitmap by clicking the <input checked="" type="checkbox"/> checkbox. The bitmap properties page containing all the options for executing a bitmap, is entered in the (» Section 'The bitmap object') properties dialog.

5.6 The logo object



Logos are files that contain a vector format defined by Rofin Sinar. They represent a closed geometric unit comprising primitive shapes such as lines, circles, ellipses and arcs, which are completely marked with a laser parameter set.

Using this tool, logos can be inserted into the VLM drawing as reference objects.

Logos must be imported before you can edit them.

- » Import / export various file formats in the Windows Start Menu under VisualLaserMarker > Documentation > VisualLaserMarker.

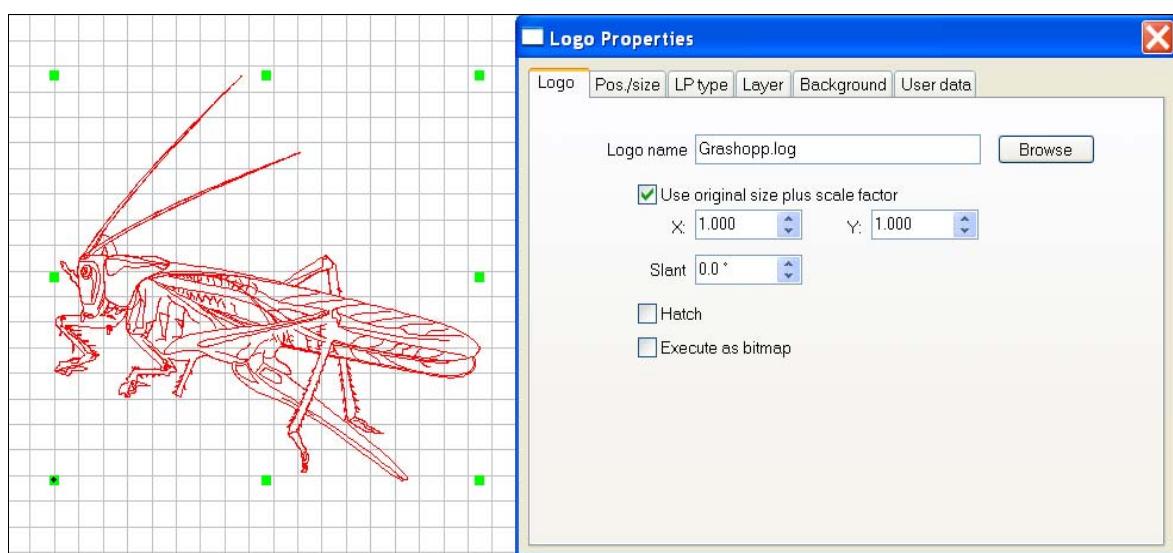


Fig. 5.6/1 Logo properties page

The Logo properties page contains the following options:

Name:	Specifies the name of the referenced logo file. The [Browse] button opens the Logo dialog, from which you can select a different logo file.
Use original size plus scale factor:	The logo will be inserted in its original size with the scale factor entered under X and Y.
Slant:	You can define the tilt of the logo here by entering a value between -90° and 90°.
Hatching:	Hatching the logo. » Section 'Hatching'.
Execute as a bitmap	The logo object is executed as a bitmap by clicking the <input checked="" type="checkbox"/> checkbox. The Bitmap properties page, which comprises all options for executing a bitmap, is entered in the » Section 'The bitmap object' properties dialog.

-  VLM drawings can be saved as logos.

Display of the logo file in text form

It is possible to display the contents of a logo file in text form.

- To do this, select the logo object and right-click.

The logo file data is displayed in a separate window.

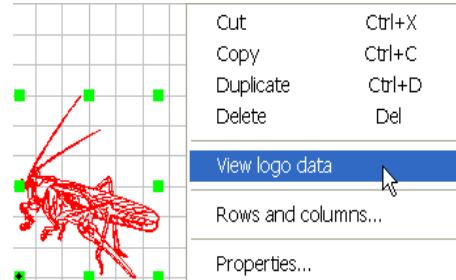


Fig. 5.6/2 Display logo data in text form

5.7 The text object



Text information can be output using the text object. The text object is also capable of outputting several lines of text. Text images can be designed individually by specifying letter height, line distance and character spacing. Additionally, all laser and TrueType fonts installed on the PC are available and can also be displayed in italics.

The characters of the text object are formatted in the Text properties page in the Text Properties dialog.

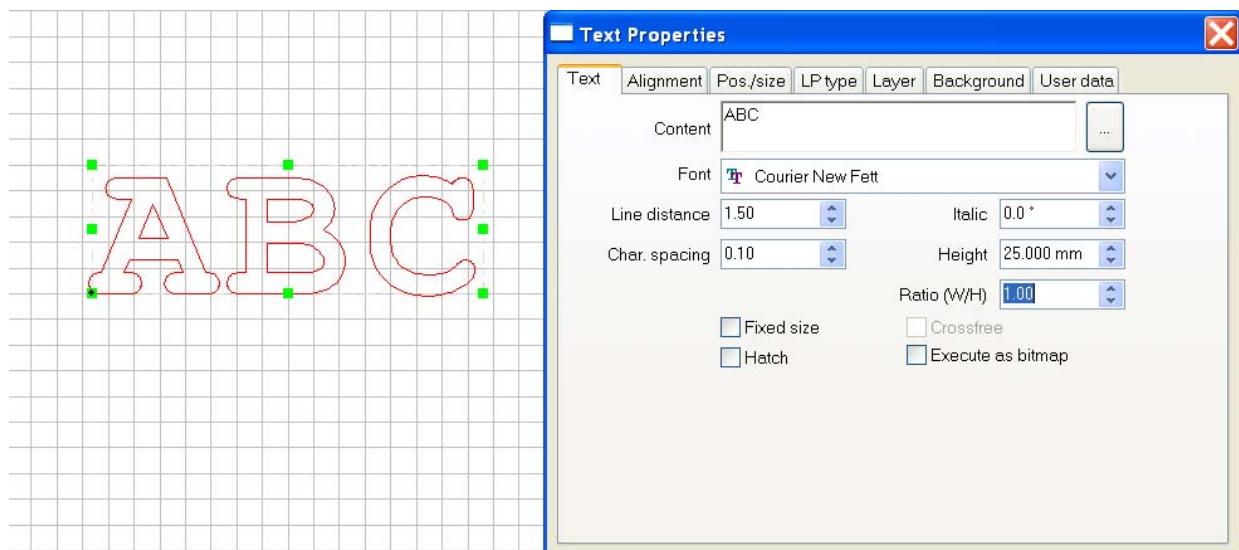


Fig. 5.7/1 Text properties page

The Text properties page

The Text properties page contains the following options:

Contents:	Enter the text in this input field. To change lines, press [Ctrl] + [↓].
[...]	<p>Clicking this button opens the Variables dialog for inserting and creating local and global variables.</p> <p>» <i>Section 'Working with variables'.</i></p> <p>UniCode is supported by the text and ring text objects of the VisualLaserMarker. Various east Asian characters can therefore also be output.</p>
Line distance:	The line distance can be altered in this input box.
Character spacing:	The spacing between letter pairs can be adapted in this input field.
Fixed size:	Clicking on the (<input checked="" type="checkbox"/>) checkbox keeps the spacing between the middle of the letters the same.
Italic:	The letters' angle of inclination can be determined in this input field, i.e. how much the text should lean forward or backward.
Height:	The height of the letters is set in this input box. If the size of the letters is changed, the Fixed Frame option that may be activated, is deactivated. » <i>Alignment properties page, Fig. 5.7/2.</i>
H/W ratio:	The height to width ratio of the letters is set in this input field. The Fixed Frame option must be deactivated. » <i>Alignment properties page, Fig. 5.7/2.</i>
Hatching:	Clicking the (<input checked="" type="checkbox"/>) checkbox will add hatching to TrueType fonts. » <i>Section 'Hatching'.</i>
Cross free:	By activating the (<input checked="" type="checkbox"/>) checkbox, the laser fonts are displayed without crosses and the Cross free (» Fig. 5.7/9) properties page added to the Text properties dialog.
Execute as a bitmap	The text object is executed as a bitmap by clicking the <input checked="" type="checkbox"/> checkbox. The Bitmap properties page, which comprises all options for executing a bitmap, is entered in the » <i>Section 'The bitmap object'</i> properties dialog.

The Alignment properties page

The Alignment properties page of the Text Properties dialog consists of two parts. In the upper part are the options for aligning single- or multiple-line text objects within their frame. The lower part determines the dynamic behavior of the text object. When the content of a text object is extended or shortened, with this option it is possible to determine whether the text height or the height-to-width ratio is retained, or whether the text content is scaled to frame size.

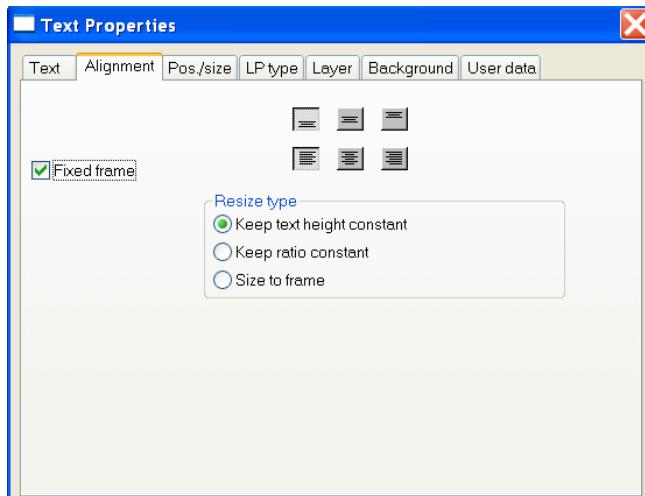


Fig. 5.7/2 Alignment properties page

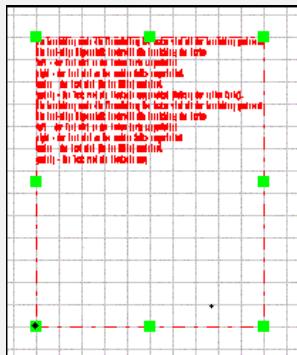
The frame's dashed line can be made visible by activating the appropriate checkbox, in the Background properties page, or by clicking the icon in the Text attributes toolbar.

The following options determine whether the text height or the height-to-width ratio is retained, or whether the text content is scaled to frame size.

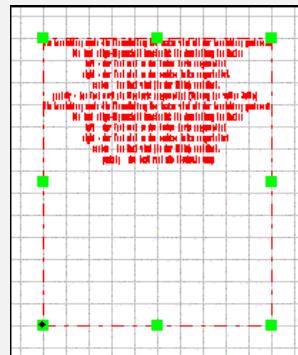
Fixed frame:	<p>When the checkbox (<input type="checkbox"/>) remains empty, the frame adapts to the text, i.e. the frame size is based on the size and width of the font and the character and line spacing.</p> <p>By activating the (<input checked="" type="checkbox"/>) checkbox, the specified frame size displays the outer delimitation for the text. This prevents the text from exceeding the size of the given frame if additional characters are inserted or characters are enlarged.</p>
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The options for adapting the font to the frame can also be accessed using the icons in the Text attributes toolbar. The Fixed frame option must be activated for this.

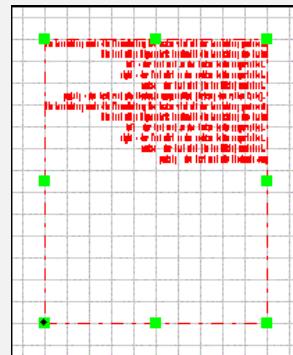
The alignment of the text within the frame is controlled by the following options:



Flush left



Centered



Flush right

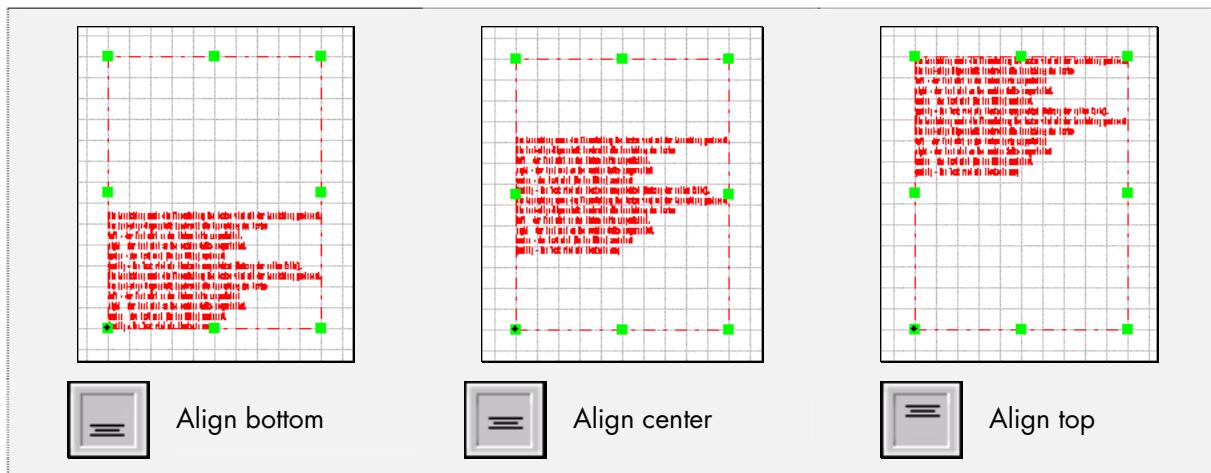


Fig. 5.7/4 Alignment options

Resize type

The following options are available to adapt the font to the frame:



Keep text height constant:

The text can be aligned within the given frame using the appropriate options. If the text size is greater than the frame size, the text is compressed; the size of the font remains constant.

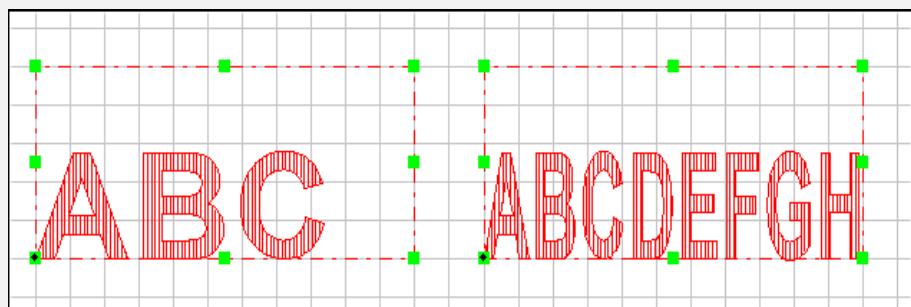


Fig. 5.7/5 Adapting text to frame – Keep text height constant option



Keep ratio constant:

The text can be aligned within the given frame using the appropriate options. If the text size is greater than the frame size, the text is shrunk. This alters the font size and width.

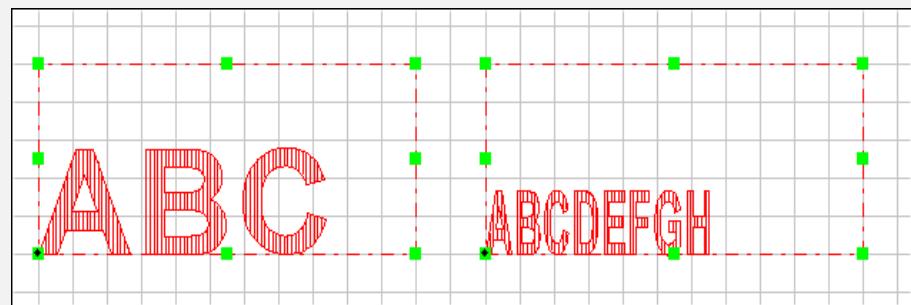


Fig. 5.7/6 Adapting text to frame – Keep ratio constant option



Size to frame:

The text size is adapted to the frame size. This way the text can be enlarged as well as shrunk.

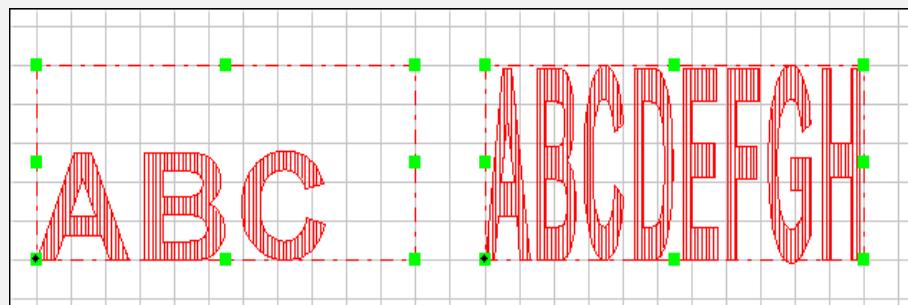


Fig. 5.7/7 Adapting text to frame – Size to frame option

Cross free font

Marking very sensitive materials leads to unwanted results with standard fonts when the laser beam crosses several times. To avoid this, with VLM graphic editor it is possible to convert single-line laser fonts to cross free and optimize the calculated gaps in the width.

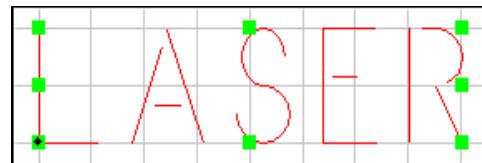


Fig. 5.7/8 Example of cross free font
(font size 1mm)

Click in the Text properties page on the Cross free checkbox (☒).

The Cross free properties page is inserted into the Text properties dialog.

The following options can be found in this dialog field page:

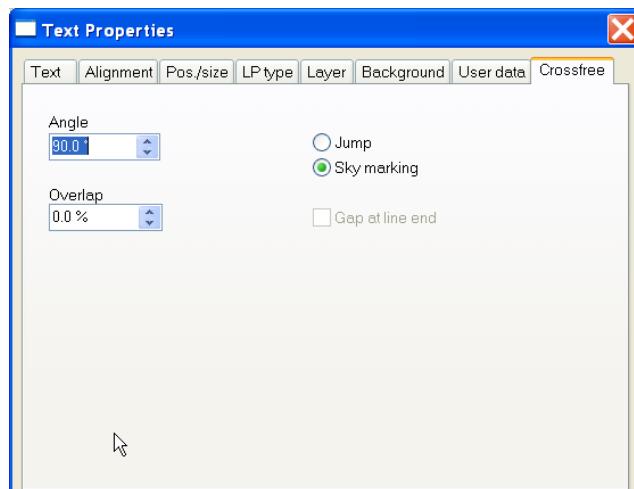


Fig. 5.7/9 Cross free properties page

Angle:	A gap is inserted as of this angle between two successive primitive shapes (ellipse, line).
Overlap factor:	The gap size aligns itself with the line width of the laser (set in the parameter sets). To achieve an optimum gap size, the gap can be scaled with the overlap.
Jump:	The laser beam moves over the calculated gaps.
Sky marking:	The calculated gaps are executed with the laser as lines with the laser beam turned off. In the editor, this mode is visible by dashed lines in the gaps.

5.8 The ring text object



This tool allows ring marking. The options for the ring text on the Text properties page are identical to the options for text objects, » Fig. 5.7/1. Additionally, the circle radius and starting angle of the ring text object can be set in the Ring marking properties page. Activate the Fit into angle sector option, if the ring text is to fit into a certain angle sector. It is possible to choose whether the characters are output clockwise or counter-clockwise.

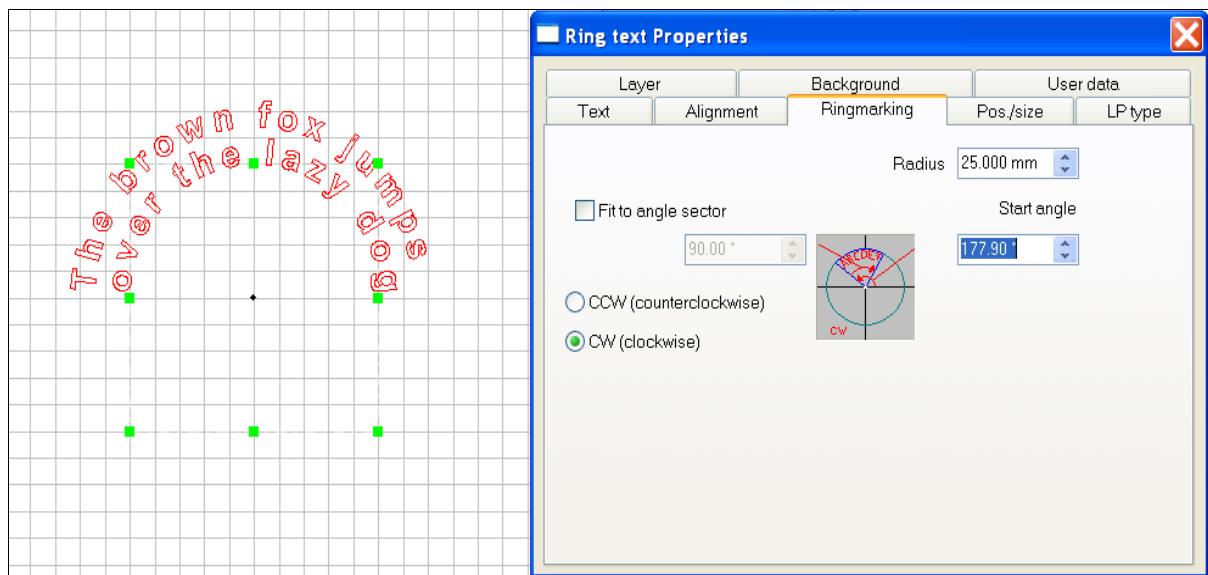


Fig. 5.8/1 Ring marking properties page

If a ring text with several lines is to be generated, change lines by pressing [Ctrl] + [←].

5.9 The matrix object



Matrix marking means the repeated marking of a layout on workpieces arranged in an array, which means in rows and/or columns. The Matrix drawing object arranges a number of identical elements in rows and columns with a fixed geometric position relative to each other. The layout of all matrix elements is the same and is generated only once using drawing tools (lines, logos, bitmaps, etc.). The matrix is used especially in the marking of components with a regular layout, such as ICs (integrated circuits) in tray applications.

When the option package is installed, the Leadframe wizard will be available. Using the wizard, the "Trays" and "Leadframes" workpiece carriers standard in the semiconductor industry can be entered interactively. It is possible to select one of the predefined matrix types or to create any matrix.

The matrix object is inserted with the default values two rows with three columns. The size and position of the individual matrix cells are set in the Matrix Properties dialog in the Cells properties page displayed.

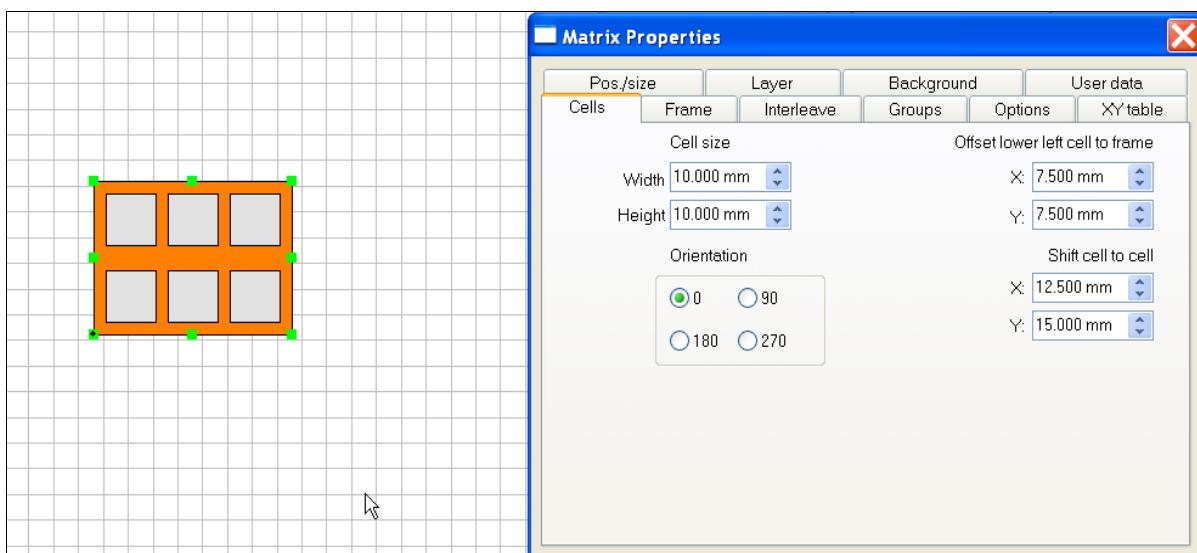


Fig. 5.9/1 Cells properties page

The Cells properties page contains the following options:

Cell size:	Defines the cell width and height of the individual cells [mm].
Orientation:	Clicking on these option fields <input checked="" type="radio"/> sets the cell orientation [in degrees] in the frame.
Offset of lower left cell to frame:	Spacing of the central point of the lower left cell to the lower left corner of the frame.
Shift cell to cell:	Spacing between the individual cells.

The Frame properties page can be used to select the number of rows and columns. The resulting width and height of the matrix object is displayed.

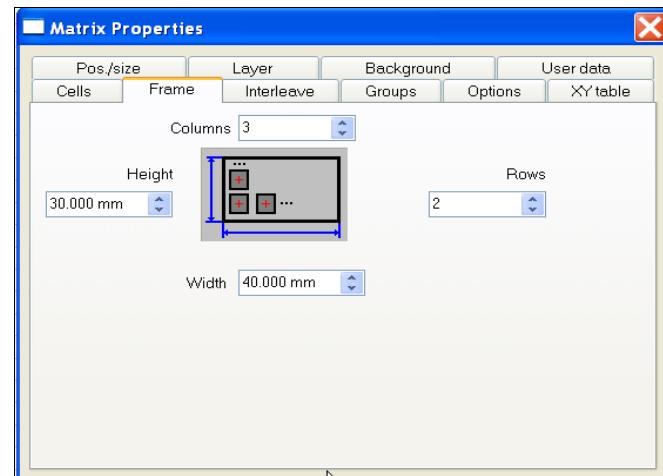


Fig. 5.9/2 Frame property page

Every second element of a row or column can be interleaved around the given value in the Interleave properties page.

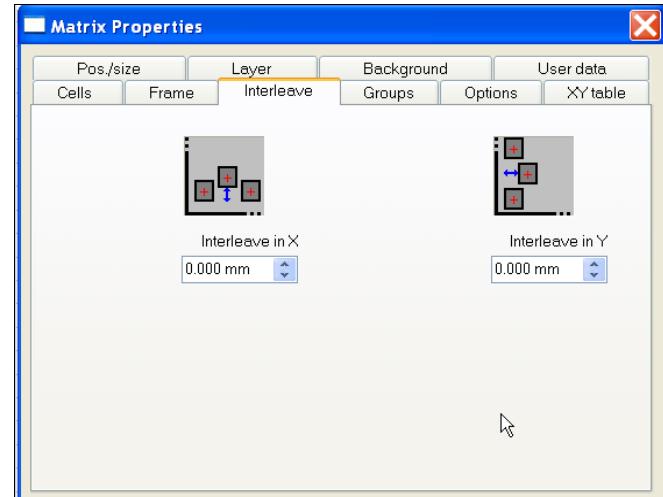


Fig. 5.9/3 Interleave properties page

Groups of individual matrix elements within a matrix with variable spacing between the groups can be formed in the Groups properties page.

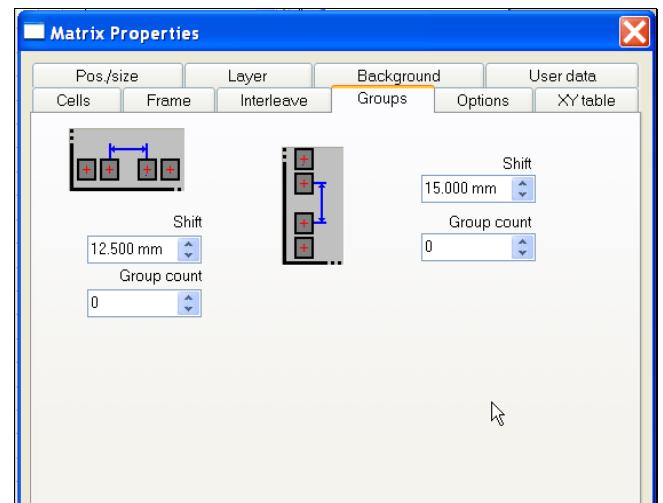


Fig. 5.9/4 Groups properties page

The Groups properties page contains the following options:

Shift:	Spacing between the groups.
Elements per group:	Number of matrix elements in a group.

The Options properties page offers two further options, Show reference IC only and Colored Cell that are used to influence the visual display of the matrix.

The Binning option permits the selection of a layout from a pool of predefined layouts and to assign them to a bin number.

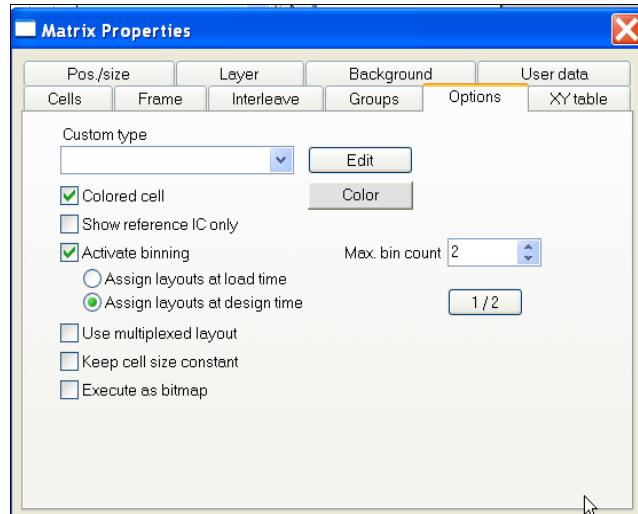


Fig. 5.9/5 Options properties page

The Options properties page contains the following options:

Custom type:	Enter a user-defined character string. The user-defined character string is used interactively with customer-specific tools to detect workpieces. Clicking on the [Edit] button opens an input window where frequently recurring character strings can be stored in a text file. These can then be selected in the drop-down list field.
Colored cell:	By clicking on the <input checked="" type="checkbox"/> checkbox will add a colored background to the cells. The [Color] button opens a color selection dialog.
Show reference IC only:	Clicking this <input checked="" type="checkbox"/> checkbox means that only the reference IC (reference matrix cell) will be visible in the editor. All other cells appear empty on the screen. This function avoids loss of time through building up images of large matrices with many elements.
Activate binning:	The Binning option is activated by clicking the checkbox <input checked="" type="checkbox"/> . Using a customer-specific tool, it is possible to select a layout from a pool of predefined layouts at run time.
Max. bin count:	The maximum number of layouts is set here.
Assign layouts at load time:	A layout is assigned to every bin number at load time of a marking job. Each layout is stored as a separate file.
Assign layouts at design time:	A layout is assigned to every bin number while the matrix is created. In this case, the layouts are part of the matrix. Clicking on the [1/n] button makes it possible to browse through the layouts created.

Use multiplexed layout:	<p>In systems with two galvo heads, this function provides the option of combining the execution modes 'simultaneous marking' and 'multiplexing' within a layout. When marking simultaneously, the content of all cells of a matrix that extends over both marking windows is executed simultaneously with both heads. In multiplexed mode, the content of the cells of a matrix that are located in the marking field of the first head is executed, while the head that is not active is in a dump-position. After the marking of all matrix cells in the marking field of the first head has been processed, the first head assumes the dump-position; then, the execution of the content of all matrix cells that are located in marking field of the second head will start. In these two execution modes, the marking of matrix cells with different contents is possible.</p> <p>If the simultaneous marking is combined with multiplexing, the marking objects are executed in two steps: first the content of all multiplexed cells is executed sequentially, then the content of all remaining cells will be executed simultaneously with both heads.</p> <p>To execute this function, the Preferred execution behavior for matrix objects has to be set to Simultaneous marking (in the Galvo control dialog field page of the machine configuration) and in Options, under Drawing settings... > Optimizations, the <input checked="" type="checkbox"/> No optimization option must be selected.</p> <p>» Section 'Options for executing the drawing'.</p>
Keep cell size constant:	<p>By clicking on the <input type="checkbox"/> checkbox, the size of the cells and their positions remains constant, when dragging the frame of the matrix.</p>
Execute as a bitmap	<p>The matrix object is executed as a bitmap by clicking the <input checked="" type="checkbox"/> checkbox. The Bitmap properties page, which comprises all options for executing a bitmap, is entered in the » Section 'The bitmap object' properties dialog.</p>

The properties page XY table is inserted in the matrix dialog if both an X axis and a Y axis are activated and are installed in the system.

Here, you can define and save the required X or Y offset from the center of the galvo head to the center of the cell. The XY table movement for each cell checkbox must be activated () for the set parameters to be effective for the output with the laser. This means that each individual cell in the matrix is marked by a table movement.

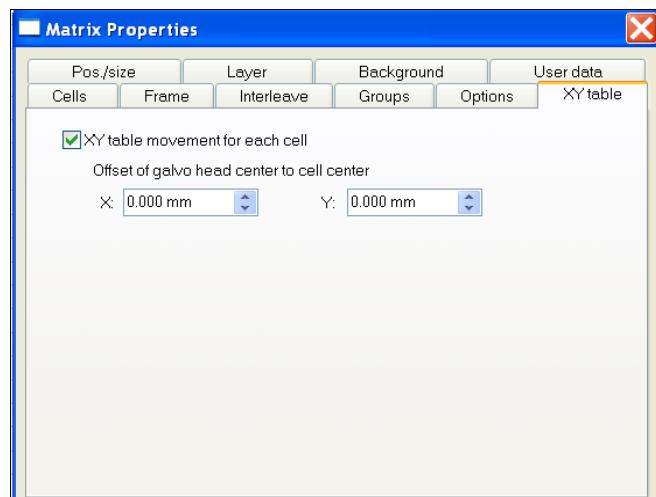


Fig. 5.9/6 XY table properties page

☞ How to generate or alter the layout of matrix elements:

- Select the matrix and right-click.
- Select the Edit layout option from the context menu shown.
- Make the changes and close the window using File > Close editing window or by clicking the Close  button.

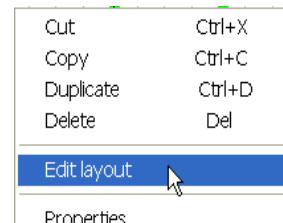


Fig. 5.9/7 Edit layout

The alterations in the layout take effect in the total view of the matrix.

- i** If the Binning or Use multiplexed layout options are activated, select Edit Bin or Use multiplexed layout from the context menu shown.

5.10 The reference object



The reference object facilitates shared use of a complex drawing unit in different drawings. An existing drawing is linked with the current drawing, which is automatically updated when the changes are made in the original drawing.

All properties of the referenced drawing, such as layer settings or laser parameter sets, remain unchanged in the reference object.

Alternatively, the reference object can also be inserted as a copy. The link with the original file is lost after the copy process.

When you click on the Reference  tool, the Insert file reference selection dialog appears.

In addition to VLM files, Adobe PDF and Illustrator files, Encapsulated Postscript and Postscript files, as well as Autodesk files, can be referenced or copied.

If you insert a file as a copy, it is inserted into the drawing as a group object. When the group object ungroups, the contents can be further edited.

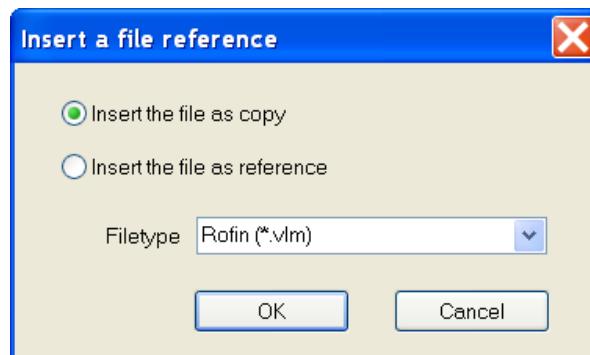


Fig. 5.10/1 Inserting a reference object

The referenced file can be edited by clicking the right mouse button and selecting **Properties** from the context menu.

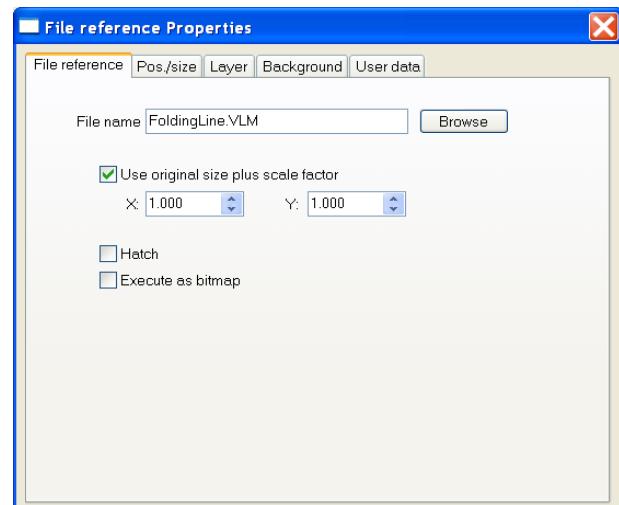


Fig. 5.10/2 Reference object properties page

File name:	Specifies the name of the referenced file.
[Browse]	Opens the Drawing dialog. Here, another VLM file can be assigned.
Use original size plus scale factor:	The newly assigned VLM reference is displayed in its original size with the scale factor entered under X and Y.
Hatching:	Hatching the VLM reference object. » <i>Section 'Hatching'</i> .
Execute as a bitmap	The VLM reference object is executed as a bitmap by clicking the <input checked="" type="checkbox"/> checkbox. The Bitmap properties page, which comprises all options for executing a bitmap, is entered in the » <i>Section 'The bitmap object'</i> properties dialog.

5.11 The bitmap object



The bitmap object can be used to output images with the laser. Images in *.bmp, *.jpg, *.jpeg, *.gif, *.tiff, and *.png formats are supported. All supported image formats are converted into the Windows bitmap format and can be shown and/or executed in monochrome and gray-scale mode.

- i** The grayscale mode can only be used if your PC is equipped with an ALI card and if your computer has the corresponding license. The ALI card is activated in the machine configurations.

The vertical and horizontal image resolution can be set in the Bitmap properties page on the Bitmap Properties dialog, altering the image size.

- i** Although bitmaps can be executed with the laser rotationally, the rotation in the editor is only indicated by a rotated frame. The bitmap image itself in the editor remains unrotated.

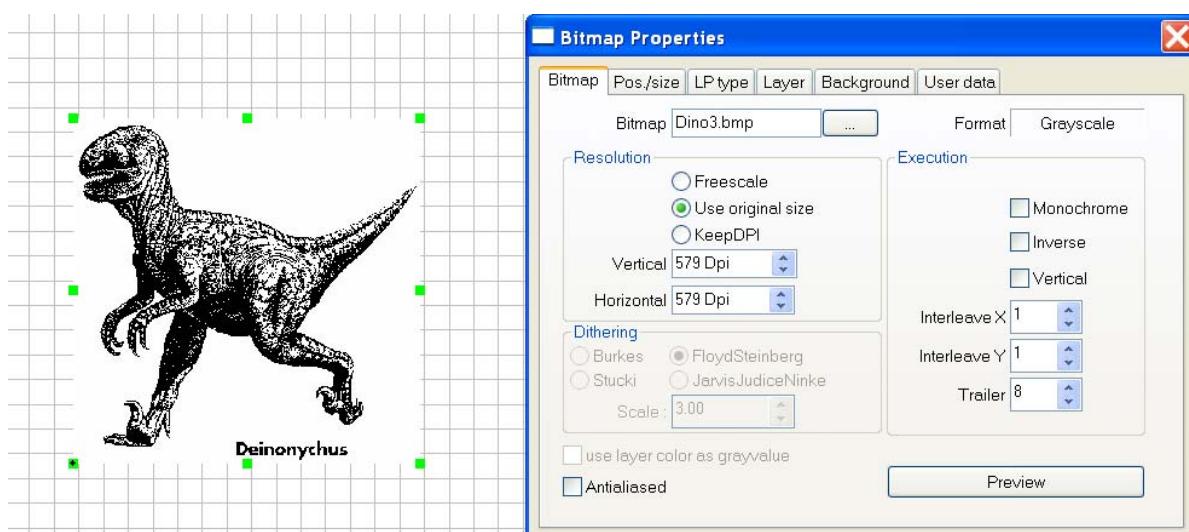


Fig. 5.11/1 Bitmap properties page

The Bitmap properties page contains the following options:

Bitmap:	Specifies the filename of the referenced bitmap file.
[...]	Opens the bitmap file selection dialog. Here another bitmap file can be assigned.
Format:	Format of the bitmap (grayscale/monochrome). The number of pixels per line or column of a bitmap cannot be altered in VisualLaserMarker. Alterations in the resolution in the Bitmap properties page (horizontal/vertical) therefore lead to a change of size in the display of the bitmap.
Resolution	
Free scale factor	If this option (◎) is selected, the scale factor when inserting the bitmap can be freely selected.
Original size	When this option (◎) is selected, the referenced bitmap is inserted in original size.
Keep DPI	When this option (◎) is selected, the DPI can be changed when inserting a bitmap, without altering the bitmap dimensions.

Vertical:	Vertical resolution of the bitmap in DPI (dots per inch).
Horizontal:	Horizontal resolution of the bitmap in DPI (dots per inch).
Dithering	In the Dithering group, an algorithm can be selected which is used to convert a grayscale bitmap into a monochrome bitmap.
Burkes Stucki Jarvis Floyd- Steinberg	Select an algorithm for the dithering in order to achieve a finer representation.
Scale	This parameter increases the resolution of the calculated black-and-white image.
Execution	
Monochrome	By clicking on the checkbox (<input checked="" type="checkbox"/>) the bitmap monochrome is shown or executed.
Inverse	By clicking on the checkbox (<input checked="" type="checkbox"/>) the bitmap is executed inversely with the laser.
Vertical	By clicking on the (<input checked="" type="checkbox"/>) checkbox, the bitmap is executed vertically with the laser.
X/Y interleave	With the X/Y interleave the energy entry on a workpiece can be regulated. The bitmap is issued in several passes.
Pre-run:	Pre-run for acceleration of the galvo (in dots).
Use the color of the layer as a gray value	Clicking on the (<input checked="" type="checkbox"/>) checkbox determines that the colors of the drawing object, which have been defined by the color of the respective layer, are replaced by gray values.
Anti-aliasing	By clicking on the (<input checked="" type="checkbox"/>) a method known as edge smoothing is used to reduce step effects at the edges by means of gray levels, making the graphics display appear realistic.
Preview	If you click on this button a preview window is shown. Clicking on the button again closes the window.

Grayscale bitmaps

Adjustments to the gray value settings can be made in the Raster properties page. This properties screen can be opened using the [Edit] button on the LP type properties screen or in the Options > Laser parameter settings...> menu.

A value between 0=black and 255=white is assigned to each pixel of a grayscale bitmap. This gray value is reproduced by the laser via control of the pulse energy.

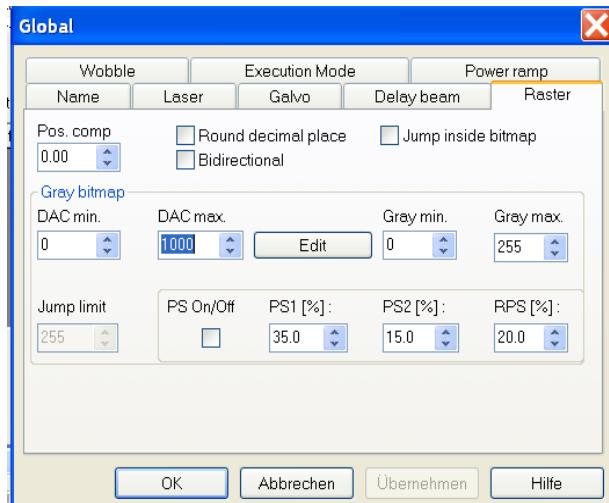


Fig. 5.11/2 Raster properties page

First-pulse suppression prevents power bursts of the first pulse. Two different methods of first-pulse suppression can be implemented for grayscale bitmaps:

- ⇒ Via the First-pulse suppression option on the Laser properties page
- » Section '*Description of parameters contained in the laser parameter set*'.
- ⇒ Via the PS ON/OFF option on the Raster properties page.

The Grid of lines properties page contains the following options for monochrome and grayscale bitmaps:

Positional correction	Depending on the frequency set, minor positional errors may arise when executing bitmaps. The inaccuracies can be corrected by inputting a corresponding positional compensation value. A common value is approx. 3. i With bidirectional versions, a correction is absolutely necessary; otherwise, the lines are moved to each other.
Rounding decimal places	When executing bitmaps on very sensitive materials, very fine grid structures sometimes appear which are undesirable. If you round the decimal places after the point on the galvo steps (in the X and Y direction), this will have a positive effect on the result; the image size is then slightly changed. In case of rotated images, the rounding of the decimal places causes small distortions.
Bidirectional	The bitmap will be processed bidirectionally, when this checkbox <input checked="" type="checkbox"/> is clicked on. This execution process reduces the execution time.
Jump	The execution time can be reduced by activating the option Jump (<input checked="" type="checkbox"/>). This option ensures that white areas in the bitmap are skipped over.

All other options on the Grid of lines properties page are reserved for grayscale bitmaps.

Grayscale bitmaps	
DAC maximum: (Digital Analog Converter)	Corresponds to the white gray value. The higher the given value, the lower the pulse energy and the larger the white level value is.
DAC minimum:	Corresponds to the black gray value. The lower the given value, the higher the pulse energy and the larger the black level value is.
Gray minimum:	This value specifies the grayscale at which the minimum DAC applies.
Gray maximum:	This value specifies the grayscale at which the maximum DAC applies.
Jump limit:	All pixels above the value set here will not be processed. On execution, this operation reduces the marking time.
PS ON / OFF	By activating the option (<input checked="" type="checkbox"/>) increased pulses even within the grayscale bitmap will be suppressed, e.g. transitional areas from white to dark. The Limit value from the standard first pulse suppression (» Laser properties page) also has an effect at the beginning of the bitmap line. If this option is not checked (<input type="checkbox"/>) the standard first pulse suppression is effective.
PS1 [%]:	Factor 1 for controlling the pulse suppression within the bitmap.
PS2 [%]:	Factor 2 for controlling the pulse suppression within the bitmap.
RPS [%]: (Reverse pulse suppression)	Effect of pulse suppression for transitions from dark to light, in %.
Edit	This button opens the Edit gray table dialog field page.

In the Edit gray value table dialog field page, you can adjust the grade of the gray values to adapt them to any material being used. To adjust the gray values, a minimum and a maximum DAC value has to be set, » Fig. 5.11/2. The DAC values can be changed by moving the nodes with the mouse along the DAC axis. If the minimum or maximum range of the DAC values of a curve which is already defined has been modified, the changed DAC values will be adjusted at every existing node on the curve.

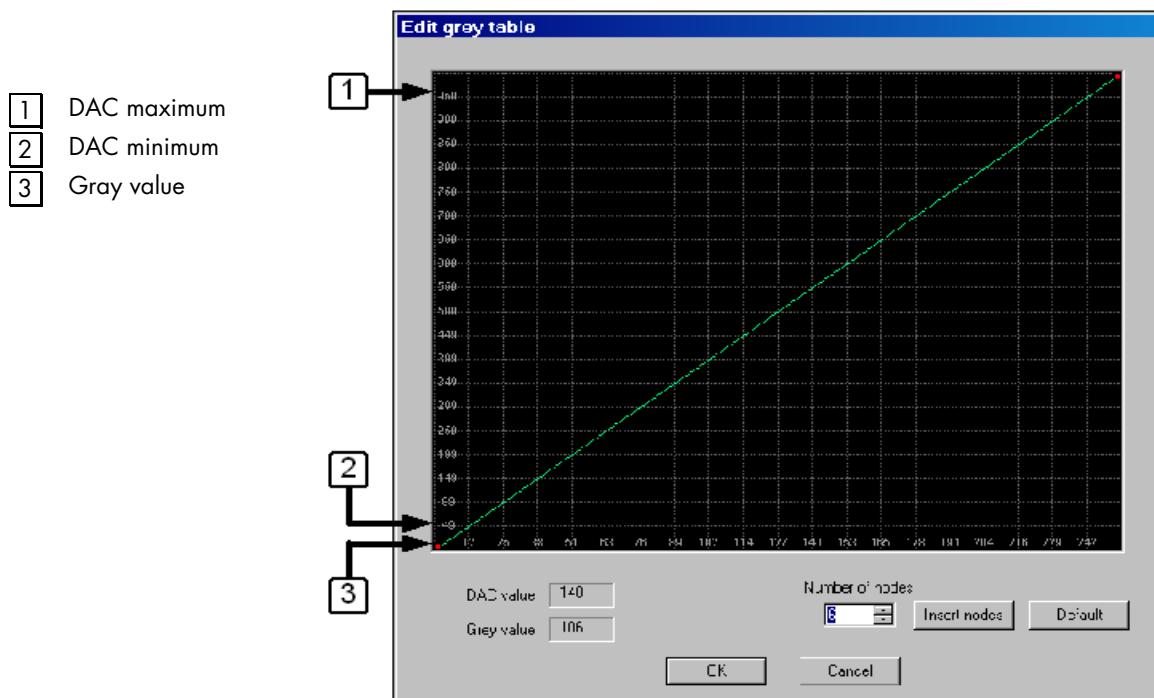


Fig. 5.11/3 Edit gray value table

The Edit gray value table dialog field page contains the following options:

DAC value:	} These fields display the current position of the cursor.
Gray value:	
Number of nodes:	Up to 32 nodes can be defined. When you click the [Nodes] button, the nodes are inserted equidistantly into the curve. When adding new nodes, the curve remains unchanged. When reducing the number of nodes only the remaining nodes will be taken into account when computing the curve. This will straighten out the curve. The DAC and the gray values can be changed by dragging the nodes with the mouse.
[Nodes]	By clicking on this button, the defined nodes are inserted equidistantly into the line or curve or when reducing the number of nodes they are removed from the line or curve.
[Standard]	By clicking on this button, a line without any nodes will be created between DAC minimum and DAC maximum.

5.12 The barcode object



This tool can be used to generate barcodes. A barcode normally contains, depending on the barcode type, a different number of digits and characters and no describing data. A barcode reading device decodes a barcode.

The basic structure of a barcode consists of a leading and trailing quiet zone (1), a start (2) and a stop pattern (3), one or more data characters (4) and optionally one or two check characters (5).

According to application, the most common barcodes can be chosen from a selection, » section 'Barcode types' later in this section.

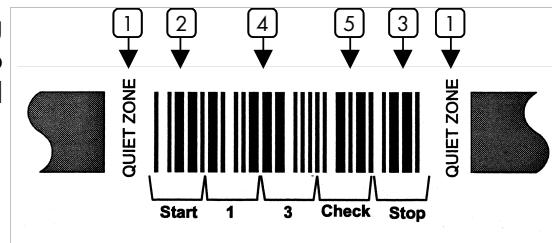


Fig. 5.12/1 Basic structure of a barcode

A barcode character set is clearly denoted by the following parameters:

- ⇒ Ratio of wide element to narrow
- ⇒ Module width X (width of the narrow element in millimeters)
- ⇒ The sequence of strokes and spaces that are predefined by the barcode
- ⇒ Character repertoire, the complete set of display characters

In the VLM, a separately purchased library is used to generate the barcode. The input parameters specified – character string, barcode type etc. – result in this library returning the sequence of gaps and bars in Windows Metafile Format.

i Books that also give a full account of the code structure should be consulted for a detailed examination

The laser parameter selection is also key to the readability of the barcode. Ensure that gaps and bars are the correct width. The line width of the laser track must be specified exactly.

» Section 'Description of parameters contained in the laser parameter set'.

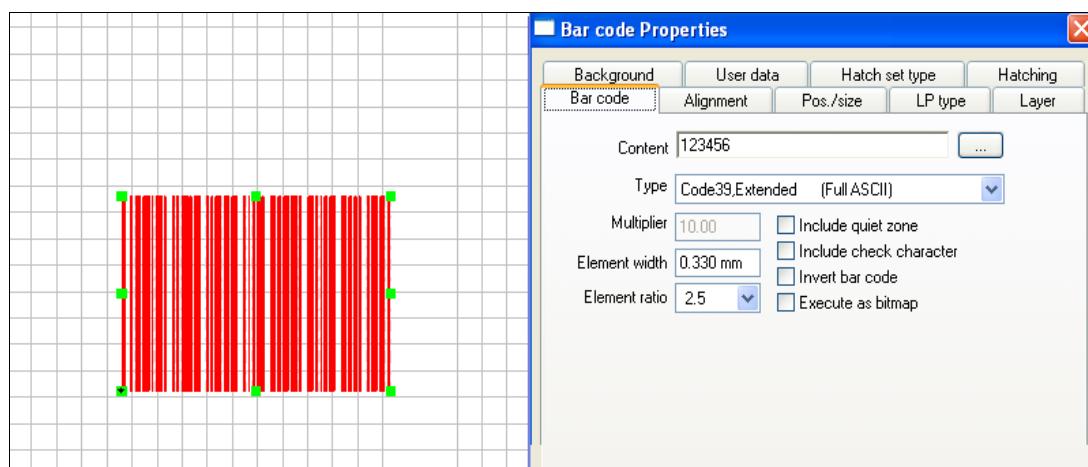


Fig. 5.12/2 Barcode properties page

The Barcode properties page contains the following options:

Contents:	Input field for the characters to be coded.
[...]	Clicking this button opens the Variables dialog for inserting and creating local and global variables.
Type:	Click on the arrow  to expand the pick list of the barcode types. Section ' <i>Barcode types</i> ' later in this section.
Multiplier:	In this input field, you can define the width of the quiet zone. It is equals 10 times the barcode's narrow element. This function takes effect when the Include quiet zone (<input checked="" type="checkbox"/>) checkbox has been activated.
Element width:	Specifies the width of the narrow element (= module) in millimeters. All other bar and space width dimensions are based on this width. This parameter as well as the number of characters to encode, effectively determines the total width of a barcode symbol. The larger the element width, the greater the reading reliability, but this requires more space.
Element ratio:	Ratio of the wide to narrow element when computing the code length.
Include quiet zone:	Clicking the checkbox (<input checked="" type="checkbox"/>) inserts a quiet zone before and after the bar coding to indicate the beginning and end of a barcode to the barcode reader. This option must generally be used with the Invert barcode option.
Include check digit:	With some barcode types, a check digit can also be added to make reading more secure.
Invert barcode:	Use this option for workpieces with black or dark surfaces. By clicking the checkbox (<input checked="" type="checkbox"/>) , the negative image of the barcode is marked on the workpiece. This option must generally be used with the Include quiet zone <input checked="" type="checkbox"/> option.

The Barcode properties page of barcode type PDF417 is different in the following options:

Module width:	The module width specifies the width of the narrow element (= module) in millimeters.
Module height:	The recommended value for the module height is approximately three times the value for the module width.
PDF417 truncated:	This code removes the right row indicator code words and the stop pattern on the right hand side of the symbol. They are replaced with a narrow bar one module wide.
[Advanced]	Clicking this button opens the PDF417 properties page: Advanced options.

The PDF417 properties page: advanced options contains the following options:

Datacompression mode:	<p>It's possible to select two auto modes as well as three pre-established data compaction modes for the PDF417 symbology:</p> <p>Auto EXC/Binary/Numeric (recommended mode): This mode allows full switching between the three standard data compaction modes and provides the maximum data compression possible.</p> <p>Auto EXC/Binary: This mode is similar to the first automatic mode, except that it does not allow switching to the numeric mode.</p> <p>Extended Alphanumeric Compaction (EXC) mode: This mode supports the encoding of all printable ASCII characters and can compress approximately two characters per code word.</p>
Error correction level:	<p>Binary/ASCII Plus mode: Binary mode supports encoding of the entire ASCII character set and can compress approximately 1.2 characters per code word.</p> <p>Numeric Compaction mode: in this mode, only the numeric characters 0 through 9 are encoded and can achieve data compression of approx. three characters per code word.</p>
Size control parameters:	<p>Nine error correction levels can be selected. The chosen error correction level is directly related to the size of the symbol. The higher the error correction level, the larger the symbol is. Additionally it is possible to activate the overhead function in the automatic mode (recommended mode). This permits an individual error correction (smaller code contents need less, larger more error correction).</p> <p>The size control parameters control the size of the PDF417 symbol. The standard setting is the maximum number of columns and rows.</p>

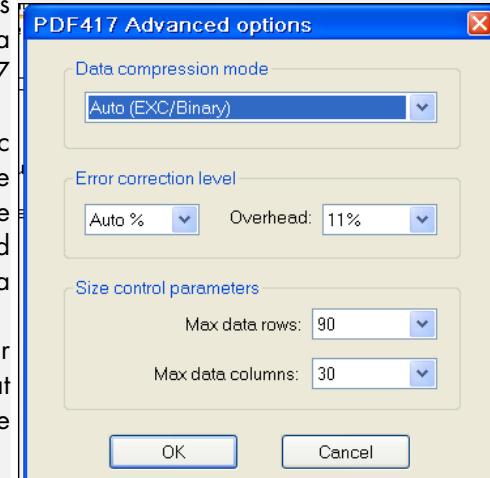


Fig. 5.12/3 PDF417: advanced options

The Alignment properties page

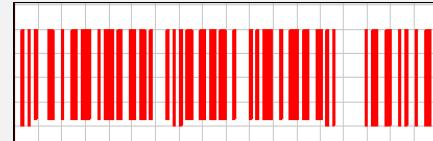
In the Alignment properties page of the Properties dialog it is possible to define whether the frame of the barcode is determined as a fixed size with an increasing or decreasing number of characters or whether the element width should be retained.

Keep frame size	By clicking this option field <input checked="" type="radio"/> the frame of the barcode is set to a fixed size. With an increasing or decreasing number of characters, the width of the elements is altered.
Keep element width	By clicking this option field <input type="radio"/> , the element width is retained. With an increasing or decreasing number of characters, the barcode frame size changes.

Barcode types

All barcodes can display digits, some allow the display of characters and special or control characters. By selecting a barcode type, the basic form of the character coding is invoked (i.e. the sequence of gaps and bars of various width and number). The following barcode types are available:

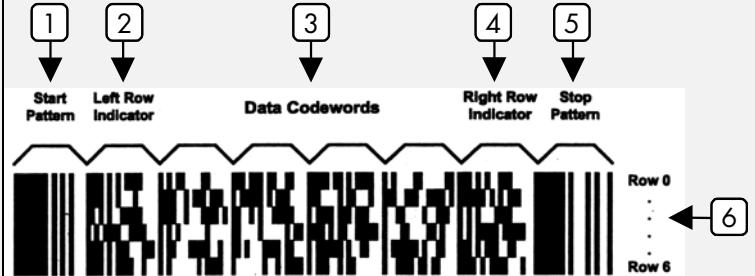
Code 39, extended	With the extended code 39 up to 128 characters from the ASCII character set can be displayed.
Code 39	Code 39 is a two digit code with the following character repertoire: ten numbers, 26 letters, seven special characters and a space. The start and the stop pattern correspond to the ASCII character 42 (2AH), the '*'. Check digits are not required. The barcode length is variable. A character consists of nine elements; three of the elements are wide and six are narrow.
Code 93	With the extended code 93 up to 128 characters from the ASCII character set can be displayed. The length of this code is variable; the usage of check digits is required. Four element widths are used. Each character consists of nine modules which generate six elements. Three of these elements are strokes.
EAN8, EAN13, UPC A, UPC E, BookLan	<p>The barcodes EAN8, EAN13, UPCA and UPCE are very similar. All of them can display only digits and the use of check digits is specified for all of them. The checkbox for the check digit therefore has no function.</p> <p>EAN8 has 7 usable digits, UPC A has 11 usable digits, EAN13 has 12 usable digits, UPC E has 6 usable digits.</p> <p>i Exactly this number of digits must be entered.</p> <p>The check digit is calculated by the software and is added as a barcode digit. It is not returned as an ASCII character.</p> <p>With all four types, an additional digit can be added to the entry line. However, this is detected as check digits, is discarded and another check digit calculated.</p> <p>If two or five digits are entered separated by a comma, an additional code is added; e.g. 1425723123456,12</p>
EAN-8	<p>There are two character sets A and C with ten digits respectively. The EAN-8 is an eight-digit code. This barcode is intended for items, which have only little space for printing the barcode. A character consists of seven elements. The usage of a check digits is required. One start pattern, one stop pattern and a field separator are used.</p>
EAN-13	<p>There are available three character sets with a character repertoire of ten digits respectively. The characters consist of four variable-length elements. Check digits are required; the barcode length is restricted to thirteen digits. One start pattern, one stop pattern and a field separator are used. The margin indicators serve here as start and stop patterns.</p> <p>i With EAN13, it is currently not possible to use a zero as the first digit, as this results in a completely incorrect code being generated.</p>



Barcode types – Continued

UPC-A	The structure of UPC-A is comparable to EAN 13 but not compatible with it. Only twelve instead of thirteen digits are used. The character repertoire comprises ten digits from two character sets, A and C. A start pattern, a stop pattern and a field separator are used.
UPC-E	The UPC version E is restricted to eight digits. Character sets A and B are used. The display of ten digits respectively is possible. The usage of a check digits is required. A field separator is not used.
BookLan	EAN-13 has been adopted as the standard in the publishing industry for encoding ISBN numbers on books. An ISBN or BookLan barcode is simply an EAN-13 symbol consisting of the ISBN number preceded and emulated by certain digits. Ten digits must be entered. Dashes between the digits are ignored. 978 is added to the barcode before the specified number. If additional codes are added, two digits result in a two-digit code while four-digit numbers are preceded by a 5; 90000 is also permitted.
Code128 and EAN128.	Both barcodes can be ASCII codes 0-127. Three coding tables are used for this purpose. The digits are coded in pairs in Table C as 00...99. You can switch between the tables using the escape character. A procedure has been implemented to reduce the length. This optimization is not standardized and is therefore triggered in different ways in various programs. A check digit is calculated and added automatically. The checkbox for the check digit therefore has no function. In terms of laser markers, the only difference between Code 128 and EAN128 is that the special EAN128 character is written as a second start pattern.
Code 128	Four element widths are used. With code 128 the full ASCII character set can be displayed as well as four control characters and four special characters. The usage of a check digit is required. A character of the code 128 consists of eleven modules (three strokes and three spaces). With the exception of the stop pattern, which consists of thirteen modules. The code length is variable. Activating the checkbox adds a Modulo10 check digit to the string before it is coded as EAN128. This is usual in the case of credit card numbers, for example. However, the consequence is that only digits can be coded in cases such as these.
EAN/UCC 128	The code EAN-128 is a subset of code 128. The full ASCII character set can be displayed with EAN-128. Other than the stop pattern, each element consists of eleven modules, the stop pattern consists of thirteen modules. The barcode contains what is known as a symbol check character which is not part of the data. This symbol check character is shown additionally to the check digits which are used in the data. EAN-128 allows to split large data blocks into several data fields and to link them.

Barcode types – Continued

Interleaved 2/5	Interleaved 2 of 5 is a numerical only symbology providing a character repertoire of ten digits. Any number of digits can be set. The usage of check digits is not required. One start and one stop pattern are used. The digits are displayed in pairs. A preceding zero is therefore used if necessary. The check digit is included when calculating the pairs.
Codabar	Codabar is numerical code with two line widths and six additional special characters (0..9 and - : . \$ / +). In addition, four different start and stop patterns (A, B, C or D) are also defined. They may be used only at the beginning and the end of a code and may be used additionally as information carriers. Each character of the codabar is displayed with seven elements (four strokes, three spaces). A check digit is not required. The barcode length is variable.
PDF417	PDF417 is a stacked, bidimensional barcode symbology, which is capable of encoding the entire ASCII character set (as many as 2000 data characters in a single barcode). Each character (code word) consists of 17 modules, split into four strokes and four spaces. A complete PDF417 symbol consists of at least three rows of up to 30 code words and may contain up to 90 code word rows. Each row consists of a leading quiet zone, start pattern, left row indicator character, one to thirty data characters, right row indicator character, stop pattern, and trailing quiet zone. A quiet zone must also be provided above and below the code. The barcode (a purely numerical barcode) supports different compression methods for text, digits or binary data. The maximum density is approx. 135 characters per square centimeter. This code is variable in length and height.
BC 412	 <p>The BC 412 is a sequential, alphanumeric barcode with digits and capital letters, without O (0-9, A-N, P-Z) and with obligatory test marks. Each character consists of 12 modules, divided into 4 narrow stripes of one module width each and four characters of varying width. The width of the gaps may vary from one to five module widths. The start and stop character is the exception and consists of 3 modules each. The code cannot be freely used. A license fee must be charged for each reading device.</p>

- » For more extensive information on specifications, refer to the company catalogs of the laser unit manufacturers.

5.13 The matrix code object



With this tool you can generate matrix codes. Matrix codes are ideal for displaying the maximum possible number of characters on the smallest area. Unlike stacked symbologies, matrix codes use graphical patterns and therefore the symbol can be reliably decoded only with special cameras. You can choose between the matrix coding types Data Matrix and QR-Code. Depending on which matrix coding type you have selected, the relevant properties page is inserted into the dialog.

Each individual cell of the matrix code object consists of hatched lines. The width of an individual laser-drawn line on a work piece is influenced by various external factors, such as e.g. the type and construction of the laser, the focusing distance of the material used. The readability of matrix codes can be optimized by taking into account the width of the laser stroke and any overlapping of the laser lines.

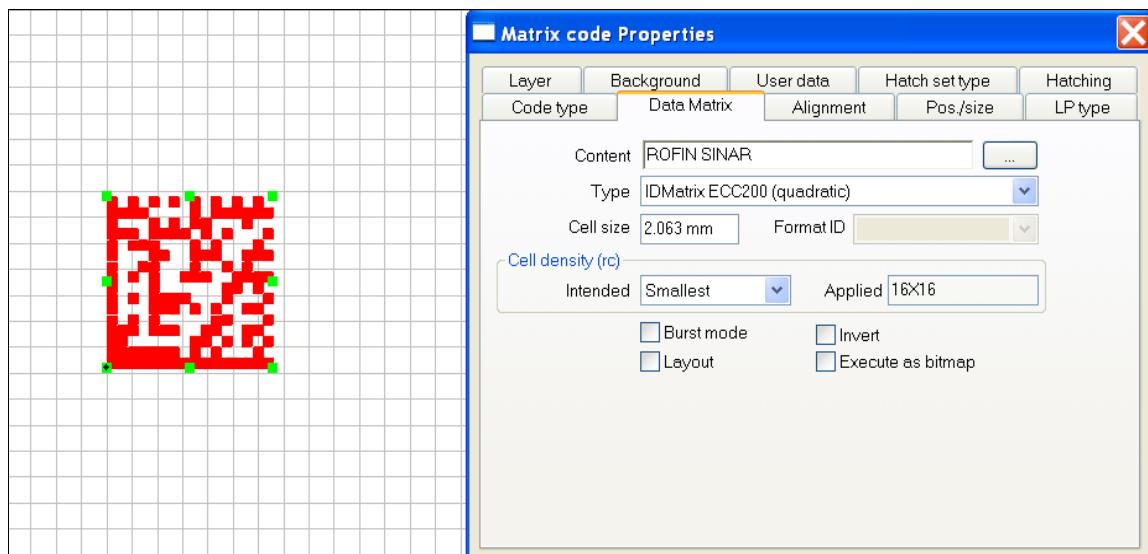


Fig. 5.13/1 Scaled-up depiction of the matrix code object

To achieve the desired marking result, it is necessary to measure the width of the lines on the marked work piece and enter this value in the laser parameters.

Depending on which laser parameter type (global, local or individual) is used, the measured value is entered in the properties dialog for the laser parameters of each laser type.

- » *The hatching options are described in Section 'Hatching'.*

The best marking result will be achieved, when the following options are activated in the Hatching properties page:

- ⇒ Bidirectional
- ⇒ No outline
- ⇒ From outline Auto (not activated)
- ⇒ Outline offset Auto (activated)
- » Section 'Hatching options'.

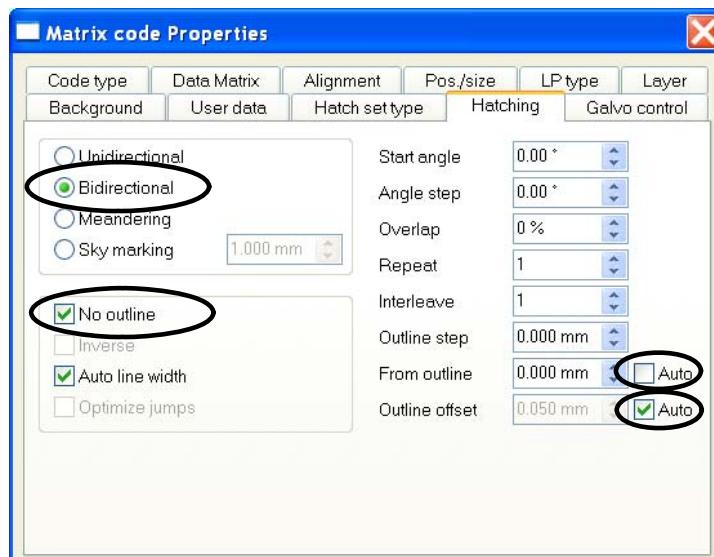


Fig. 5.13/2 Settings for optimum marking results

You are also able to change the marking result by using the Overlap option. If the effect of the laser on the marked work piece is too great, then you are able to achieve a bigger distance between the lines by entering a negative overlap factor. In this case, fewer lines per cell are used to fill up the cell area, which also leads to a reduction in the marking time.

If the effect of the laser on the marked work piece is too weak, then you are able to achieve a smaller distance between the lines by entering a positive overlap factor.

An overlap factor of 50% means that two adjacent laser lines overlap by one half of the laser stroke width. The higher you set the positive overlap factor, the more lines per cell will be used, which leads to an intense laser effect on executing.

- i** The matrix code parameter sets you have generated in the **LaserWorkBench** (a marking system by Rofin Sinar), are not compatible with the VisualLaserMarker.

The matrix coding type Data Matrix

Data Matrix is a bidimensional matrix code designed to pack a lot of information in a very small space. Different levels of development are available for the Data Matrix code (ECC 000 to ECC 200). Depending on the size, it is allowed to encode up to 2334 ASCII characters (seven bit), 1558 ASCII characters in the advanced mode (eight bit) or 3116 digits. For larger amounts of data, multiple Data Matrix codes can be combined. When using the most secure version (ECC 200), all characters are recoverable if the destruction of the code is below 25%.

For more extensive information on specifications, refer to the company catalogs of the laser unit manufacturers.

The Data Matrix properties page contains the following options:

Contents:	Input field for the characters to be coded.
[...]	Clicking this button opens the Variables dialog for inserting and creating local and global variables.
Type:	Matrix coding types ECC 000 to ECC 200 square and ECC 200 rectangular.

Cell size:	Input field for cell size [mm].	
Format ID:	For the five ECC levels ECC 000 - ECC 140 there is a user selectable option for a Data Format. The format identifier (format ID) specifies the particular subset of characters that may be encoded in a Data Matrix symbol.	
Cell density:	Intended:	Input field for the intended cell raster.
	Created:	Displays the applied cell raster.
Burst mode:	<p>Burst mode is activated by clicking the checkbox (<input checked="" type="checkbox"/>). This output mechanism is suited to smaller cell areas. Here 'small' means that a cell consists of only a few laser points. The burst parameter set with ID 1 is used as execution parameter for the matrix burst mode. As in the line mode, the readability of the matrix code is considerably affected by the hatch parameters line width and overlap factor.</p> <p>i The hatch parameters line width and overlap factor are described in more detail later in this section.</p>	
Layout	<p>If this checkbox has been clicked (<input checked="" type="checkbox"/>) this function enables you to fill matrix cells with primitive shapes or burst objects. The content of a matrix cell is created in a separate editing window and then inserted into all the cells of the matrix. You can access editing window by selecting the matrix code, pressing the right mouse key and choosing the option Edit layout from the context menu shown. The editing window is then closed by pressing the close button  in the menu bar.</p>	
	<p>i If you activate this function by clicking on the checkbox (<input checked="" type="checkbox"/>) then the Burst mode option will be deactivated.</p>	
Invert:	Use this option for workpieces with black or dark surfaces. By clicking the checkbox (<input checked="" type="checkbox"/>) the negative image of the matrix code is marked on the work piece.	
Execute as a bitmap	The matrix code object is executed as a bitmap by clicking the <input checked="" type="checkbox"/> checkbox. The bitmap properties page, which comprises all options for executing a bitmap, is entered in the properties dialog (» Section 'The bitmap object').	

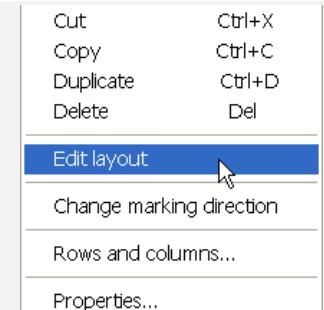


Fig. 5.13/3 Edit layout

GS1 (Global Standards one) data coding in the data matrix

GS1 formatted data matrix codes can also be marked with the laser. GS1 formatting is only supported in ECC200. Further information is available from the responsible GS1 office in your country.

To adapt the ECC200 symbologies to GS1, the "~1" characters must be placed in front of the GS1 data.

Example:

The following GS1 information is to be marked:

(01) 03453120000011

(17)091125

(10)ABCD1234

where:

01 = AL -> GTIN

03453120000011 = 14 GTIN number

17 = AL -> expiration date

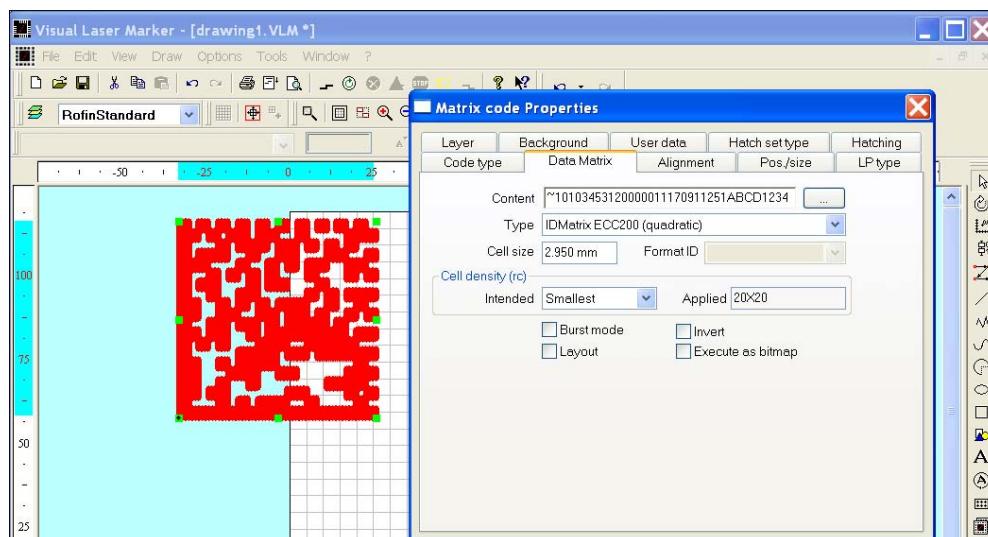
091125 = 6-digit date, YYMMDD

10 = AL -> Batch or lot number (1 – 20 alphanumeric characters)

ABCD1234 = 8-digit batch number

GS1-formatted information = 01034531200000111709112510ABCD1234

The prefix "~1" must still be appended in the data matrix object.



If FNC1 is used as the separator in the GS1 data, then <GS> (ASCII 29) must be entered as character string. This is done with the character string "\$C029\$".

Example:

The following GS1 information is to be marked:

(10)ABCD1234
(17)091125

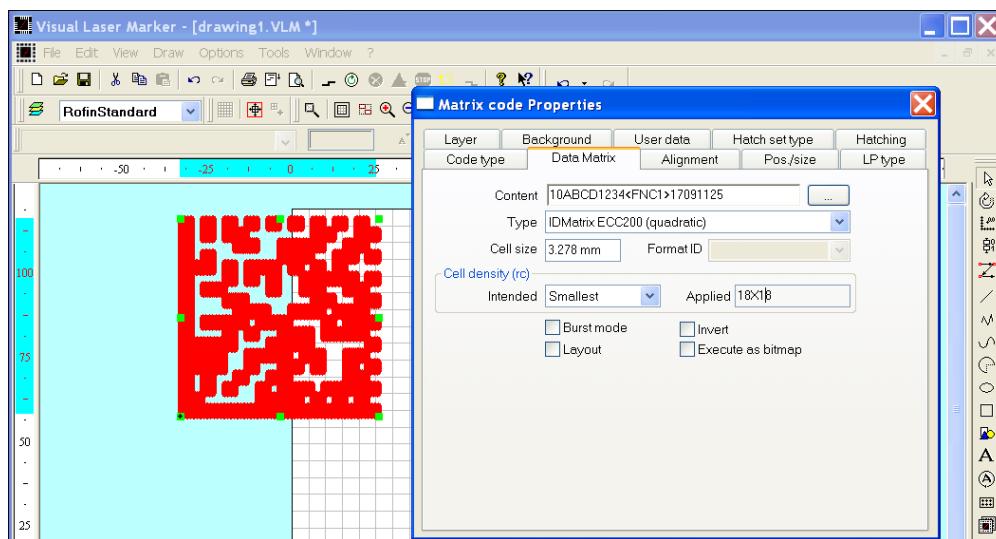
where:

10 = AL -> Batch or lot number (1 – 20 alphanumeric characters)
ABCD1234 = 8-digit batch number

17 = AL -> expiration date
091125 = 6-digit date, YYMMDD

<FNC1> must be used here as separator, because the length of the batch / lot number may be 1 – 20 characters.

GS1-formatted information = 10ABCD1234<FNC1>17091125



The matrix coding type QR code

The Quick Response code is a bidimensional matrix code capable of encoding 7366 numeric characters or 4464 alpha numeric characters. Alternatively, it is possible to encode directly 1817 Japanese Kanji and Kana characters. Model 1 and model 2 have a position detection pattern each in three corners, and Micro QR has it in one corner. The modules of the symbol are square in shape. They are arranged in a matrix 21 x 21 up to 177 x 177 cells. It is possible to combine up to 16 codes. Four selectable error correction levels make possible a maximum recoverable rate of up to 30%.



Fig. 5.13/6 QR code

For more extensive information on specifications, refer to the company catalogs of the laser unit manufacturers.

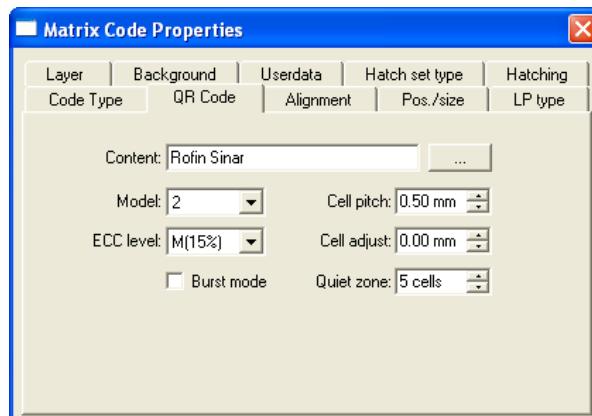


Fig. 5.13/7 QR-Code properties page

The QR code properties page contains the following options:

Contents:	Input field for the characters to be coded.
[...]	Clicking this button opens the Variables dialog for inserting and creating local and global variables.
Type:	Type 1 may contain 21x21 up to a maximum of 73x73 cells Type 2 may contain 21x21 up to a maximum of 177x177 cells MicroQR may contain 11x11 up to 17x17 cells.
ECC level:	Error Correction Code: The error correction level can be set here. According to the selected error correction code (error correction capabilities from L (7%) to H (30%) are available), up to 30% of a damaged code (Level H) is recoverable.
Burst mode:	» 'Data Matrix' properties page.
Cell pitch Z-Z:	You may set the desired center-to-center distance between adjacent cells. The cell pitch that is a nearest possible value to 0.5 mm is set by default.
Cell adjust:	If after the marking the size of black and white cells differs, the marking result may be corrected here. Setting a positive value will make black cells large; setting a negative value will make them small.
Quiet zone:	At the quiet zone property, you may specify the print-prohibited area surrounding a QR code in cell units. The quiet zone should be at least four cells for Model 1 and 2 and at least two cells for MicroQR (the default setting is five cells).

The Alignment properties page

In the Alignment properties page of the Matrix Properties dialog, it is possible to define whether the frame of the matrix code is determined as a fixed size with an increasing or decreasing number of characters or whether the cell size should be retained.

Keep frame size	By clicking this option field <input checked="" type="radio"/> , the matrix code frame is determined as a fixed size. The cell size is altered with an increasing or decreasing number of characters.
Keep cell size	By clicking this option field <input type="radio"/> the cell size is retained. The matrix code frame size changes with an increasing or decreasing number of characters.

5.14 The 2D code object



With this tool you can generate 2D code objects. 2D-codes are coded in the form a surface over two dimensions, where a high density of information per surface can be stored. The data in a 2D-code can be automatically read and further processed with optical readers, such as camera scanners. You can choose between the coding types ECCI and the optional MicroGlyph code. Depending on which matrix coding type you have selected, the relevant properties page is inserted into the dialog.

5.14.1 The ECCI code object

The license-free ECCI code (**E**rror **C**orrecting **C**ode **I**ndustrial) is a differential coding method developed by VisionTools that was developed especially to handle the requirements of industry. The readability is independent of the visual appearance, and thus virtually independent from geometric viewing and illumination factors. Accordingly, markings on cylindrical instruments can be read just as dependably as, for example, polycrystalline solar cells or markings on colorfully printed material.

The ECCI code properties page contains the following options:

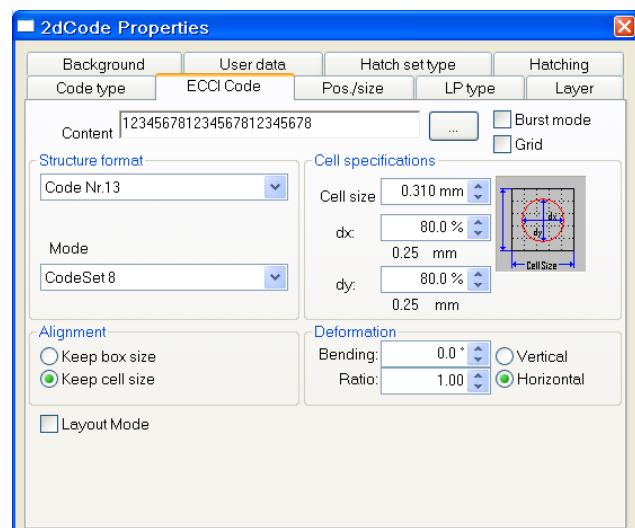
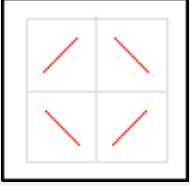
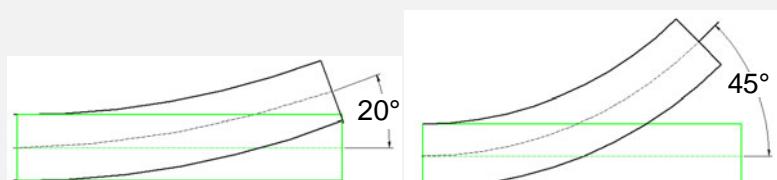
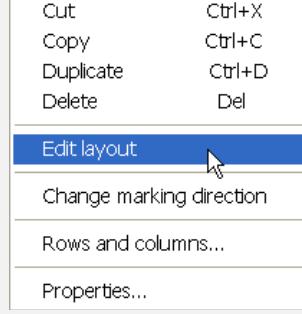


Fig. 5.14.1 ECCI code properties page

Contents	Input field for the characters to be coded.
[...]	Clicking this button opens the Variables dialog for inserting and creating local and global variables.
Burst mode	Burst mode is activated by clicking the checkbox <input checked="" type="checkbox"/> This output mechanism is suited to smaller cell areas. Here 'small' means that a cell consists of only a few laser points. As in the line mode, the readability of the ECCI codes is considerably affected by the hatching parameters line width and overlap factor.

Grid	By activating the <input checked="" type="checkbox"/> checkbox, you can cause a grid to be shown that displays the outline of each cell. This is an aid to help modify the width and length of cells.	
Structure format	Selection of the coding types to parameterize the geometric form and redundancy. Click on the arrow  in order to expand the pick list of the coding types.	
Mode:	The ECCI code's capacity can be influenced by the choice of code table. Depending on the bit depth of the code tables implemented, the volume of the code table will rise or fall together with the capacity of the ECCI code. You can see how much space (in bytes) is available for encoded information in the Capacity field. A code is currently available.	
Cell specification		
Cell size	Here, you can define the size of the individual cells in millimeters.	
DX / DY:	In the DX / DY input fields, you can define the length (DX) or the width (DY) of the individual cells as a percentage relative to the cell size.	
Alignment		
Keep box size	By clicking this <input checked="" type="radio"/> option field, the frame of the ECCI code is determined as a fixed size.	
Keep cell size	By clicking this <input type="radio"/> option field, the cell size is kept and influences the symbol, depending on the length and width, which determines the size of the ECCI code overall.	
Deformation		
Bending	With this option a cell can be deformed.	
Ratio	Entering a positive or negative value establishes the angle for the curve.	
Vertical / Horizontal	The cell height to width ratio is set in this input field.	
	The selection of <input checked="" type="radio"/> vertical or <input type="radio"/> horizontal determines the curvature along the X or Y axis. Setting a positive or negative value determines the direction.	
	Examples:	
		

<p>Layout</p> <p>If this checkbox has been clicked (<input checked="" type="checkbox"/>) , this function enables you to fill matrix cells with primitive shapes or burst objects. The content of a matrix cell is created in a separate editing window and then inserted into all the cells of the matrix. You can access editing window by selecting the matrix code, pressing the right mouse key and choosing the option Edit layout from the context menu shown. The editing window is then closed by pressing the close button  in the menu bar.</p>	
<p>i Activating this function by clicking on the checkbox (<input checked="" type="checkbox"/>) will deactivate the Burst mode option.</p> <p>If this checkbox has been clicked (<input checked="" type="checkbox"/>) , this function enables you to fill matrix cells with primitive shapes or burst objects. The content of a matrix cell is created in a separate editing window and then inserted into all the cells of the matrix. You can access editing window by selecting the matrix code, pressing the right mouse key and choosing the option Edit layout from the context menu shown. The editing window is then closed by pressing the close button  in the menu bar.</p>	

5.14.2 The MicroGlyph code object (option)

MicroGlyph code is a bidimensional code designed to pack a lot of information in a very small space. Depending on the size, up to 398 Bytes (four bit) can be encoded. The high character density enables the usage of high redundancies in MicroGlyph code. This enables high error correction, i.e. if the MicroGlyph code is output or damaged up to 90% incorrectly output, it can still be decoded.

i In order to use this tool in VisualLaserMarker, it is necessary to acquire a special license.

A cell in MicroGlyph code comprises a nucleus and a cell edge. The nucleus contains strokes either leaning to the left or right; the cell edge is empty and surrounds the nucleus. 10 x 10 cells are combined to form a block. The MicroGlyph code object comprises at least 2 x 2 up to a maximum of 7 x 4 blocks.

» For more extensive information on the specifications, refer to the manufacturer's company catalog.

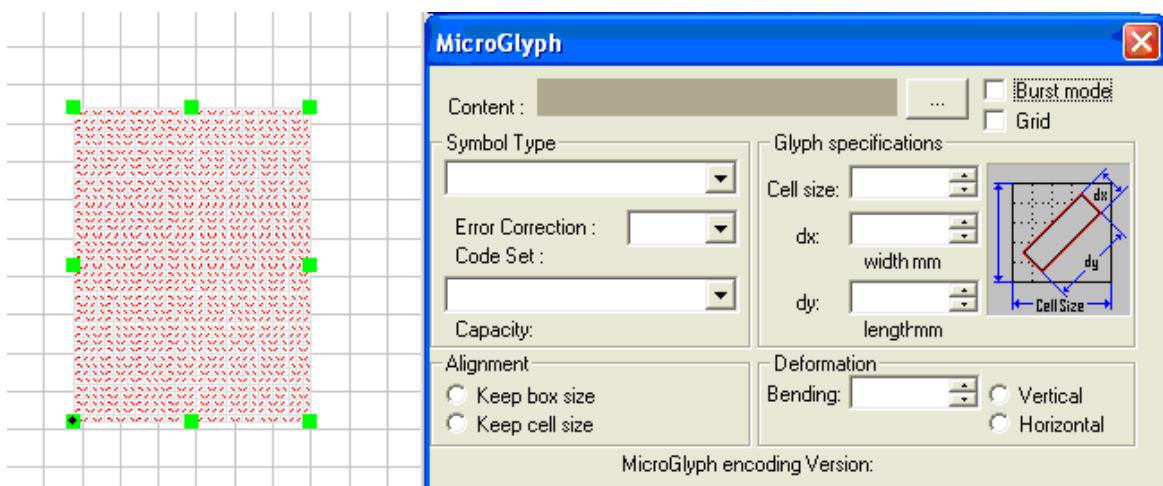
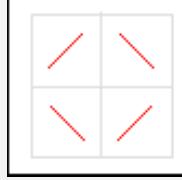


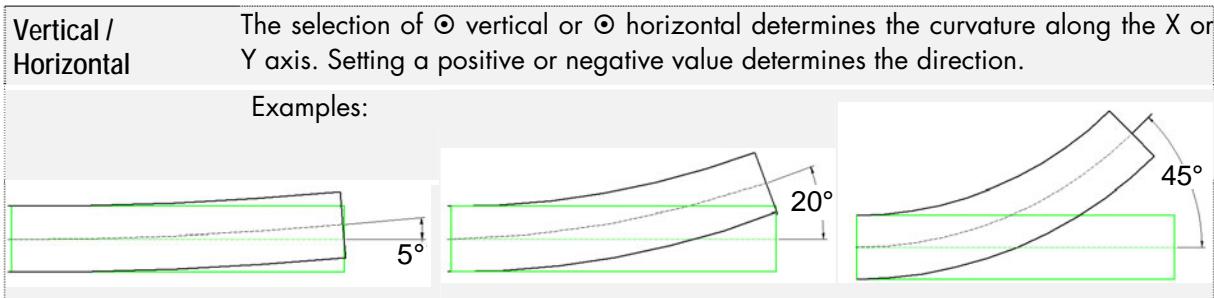
Fig. 5.14.2/1 MicroGlyphcode object

The width of individual laser-drawn lines on a work piece is influenced by various external factors, such as the type and construction of the laser, for example, and the focusing distance of the material used. The readability of MicroGlyph codes can be optimized by taking into account the width of the laser stroke and any overlapping of the laser lines.

» *The hatching options are described in Section 'Hatching'.*

The properties page MicroGlyph contains the following options:

Contents:	Input field for the characters to be coded.
[...]	By clicking on this button, you open the Variables dialog for inserting and creating local and global variables.
Burst mode:	Burst mode is activated by clicking the checkbox (<input checked="" type="checkbox"/>). This output mechanism is suited to smaller cell areas. Here 'small' means that a cell consists of only a few laser points. As in the line mode, the readability of the MicroGlyph code is considerably affected by the hatch parameters line width and overlap factor.
Grid	Activating the <input checked="" type="checkbox"/> checkbox displays a grid showing the outline of each glyph. This is an aid to help modify the width and length of glyphs. 
Encoding settings:	
Block size:	Input field for the number of blocks. The MicroGlyph code object comprises at least 2 x 2 up to a maximum of 7 x 4 blocks.
Error correction:	Error correction ensures that incorrectly output or damaged MicroGlyph codes can still be decoded. Error correction from 20% to 90% is possible. The error correction level chosen is directly related to the capacity of the MicroGlyph code. The higher the error correction level, the lower the available space for characters.
Code tables:	The MicroGlyph code's capacity can be influenced by the choice of code table. Depending on the bit width of the code tables implemented, the volume of the code table will rise or fall together with the capacity of the MicroGlyph code. You can see how much space (in bytes) is available for encoded information in the Capacity field. You can currently choose from 10 different code tables.
Glyph specification	
Cell size	Here, you can define the size of the individual cells in millimeters.
DX / DY:	In the DX / DY input fields, you can define the length (DX) or the width (DY) of the individual cells as a percentage relative to the cell size.
Alignment	
Keep box size	By clicking this option field <input checked="" type="radio"/> the frame of the MicroGlyph code is determined as a fixed size.
Keep cell size	By clicking this option field <input type="radio"/> the cell size is kept and influences the length and width of the glyph symbol, which determines the size of the MicroGlyph code overall.
Deformation	This option deforms the glyphs.
Bending	Entering a positive or negative value establishes the angle for the curve.



5.15 The group object



The group object combines several drawing objects into one unit. Generating group objects is particularly recommendable if certain drawing objects are frequently used together. Any combination of drawing objects can be used to form a group object. A group object can also contain other group objects.

☞ How to create a group object:

- Select all drawing objects which are to form a group object.
- Click on the Group icon .
- » Section 'Multiple selection'.

Or:

- Press the right mouse button and click on Group in the context menu shown.

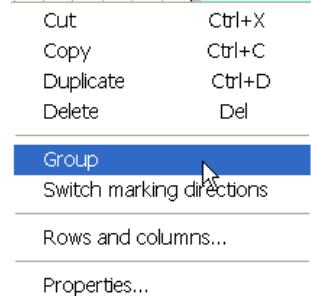


Fig. 5.15/1 Group

 The newly generated group object is assigned to the current applicable layer.

If the drawing objects which you want to combine are assigned to different layers you will be asked whether the resulting group should be placed in the current layer. When you confirm with [Yes], all selected objects are placed together in the current layer. The objects contained in the group retain their association with the corresponding layers. By clicking the [No] button, the transaction is stopped.

Group objects have the following properties:

When selected, the group appears as one object. The Position / Size specified in the properties page is related to the group.

- ⇒ The position of individual objects within the group is fixed.
- ⇒ The laser parameters of the individual objects in the group are retained.
- ⇒ Individual group objects still belong to one layer.
- ⇒ Groups can be interleaved several times (group in group).
- ⇒ Groups can be hatched.

The Group properties page:

The Group properties page contains the following options for group objects:

Keep size after editing:	The height and width of the group is determined by the rectangle which surrounds it (visible through colored selection handles during selection). If the group is edited, it is mapped with the exact size of this rectangle on a VLM drawing. If the Keep size after editing checkbox is activated <input checked="" type="checkbox"/> , the size of the rectangle is retained, even if the size of individual objects in the group is altered. If Keep size after editing has not been activated <input type="checkbox"/> , then the size of the surrounding rectangle is recalculated in the event of changes.
Hatch:	Hatching the group. » Section 'Hatching group objects'.
Execute as a bitmap	The group object is executed as a bitmap by clicking the <input checked="" type="checkbox"/> checkbox. The bitmap properties page, which comprises all options for executing a bitmap, is entered in the (» Section 'The bitmap object') properties dialog.

☞ How to edit a group:

- Select the group and right-click.
- Select the Edit group option from the context menu shown.

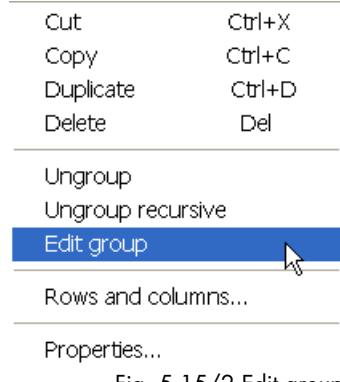


Fig. 5.15/2 Edit group

The content of the group is displayed in a separate VisualLaserMarker window.

- Now make the alterations to the individual objects within the group.

Close the window with the group contents by clicking on Close in the menu File or by clicking the close button .

☞ How to ungroup:

- Select the group.
- Click the Ungroup icon .

Or:

- Press the right mouse button and click on Ungroup in the context menu shown.

The group is ungrouped and all objects and groups it contains are again individually selectable.

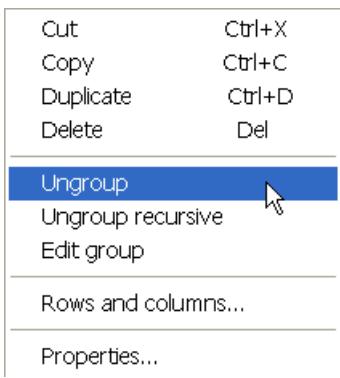


Fig. 5.15/3 Ungroup

The Ungroup recursive function ungroups the selected group and, recursively, all groups it contains.

How to ungroup recursively:

- Select the group.
- Press the right mouse button and click on Ungroup recursive in the context menu shown.

The group is ungrouped recursively and all objects and sub-groups it contains are again individually selectable.

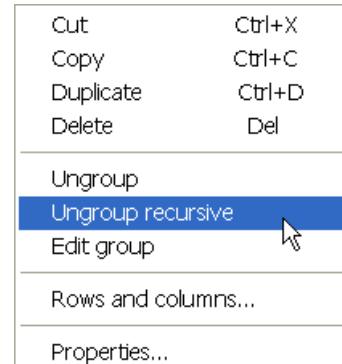


Fig. 5.15/4 Ungroup recursively

The layer properties page

When a new layer is assigned to the selected group or groups, a message window appears asking if the new layer should also be assigned to all drawing objects in the group or groups. If you confirm with [Yes], the new layer is assigned to all objects in the group. By clicking the [No] button, the group selected is assigned to the new layer and the elements contained in the group retain their association to the preselected layers.

The LP type properties page

Only one laser parameter is displayed when all objects in the group have the same laser parameter set. In all other cases, the Laser parameter field remains empty.

When a laser parameter set is assigned to a group, the assignment applies to all objects and sub-groups in the group.

5.16 The burst object



This tool can be used to define a laser pulse train which contains one burst point or a string of burst points. The burst parameter set ID refers to a burst parameter set. The burst parameter set contains the number of pulses for the laser pulse train. The frequency mode is controlled by a signal line from PCLD board.

A global and a local burst parameter set table is available for the burst object. If the burst object has an individual laser parameter set, a local burst parameter set is chosen.

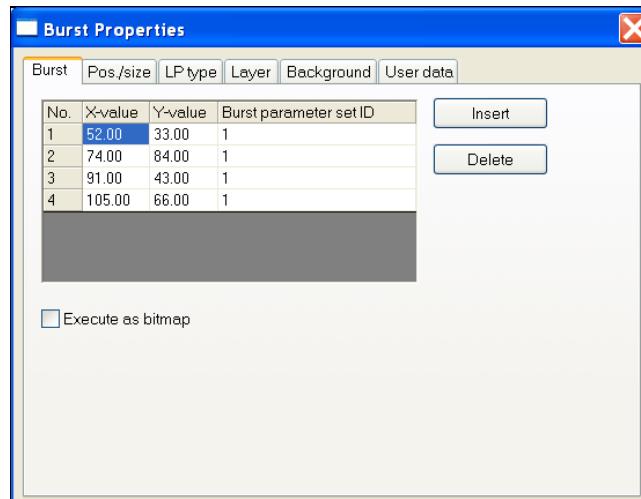


Fig. 5.16/1 Burst properties page

» *Section 'Description of parameters contained in the laser parameter set'.*

The meaning of the buttons on the Burst properties page is as follows:

[Insert]	If you want to insert more burst points, click on the [Paste] button and define the X and Y values for the new points.
[Delete]	If you want to remove points, select them and click on the [Delete] button.
Execute as a bitmap	The Burst object is executed as a bitmap by clicking the <input checked="" type="checkbox"/> checkbox. The bitmap properties page, which comprises all options for executing a bitmap, is entered in the (» <i>Section 'The bitmap object'</i>) properties dialog.

The burst parameter sets are listed at the bottom of the LP table dialog. In the Number of pulses field, you can define the pulse train, i.e. the number of pulses per burst point.

5.17 The banding object

The banding object permits the marking of cylindrical workpieces while they rotate. The W and Z axes are required for this. The W axis ensures the even rotation of the cylindrical workpiece during marking. The Z axis is used for height adjustment and ensures the correct distance of the workpiece to the laser. Both all-round markings (360° or more) and partial markings ($<360^\circ$) are possible. The marking of multiple rings can also be defined in a banding object.

 In this version, it is only possible to mark rings. No snaking lines, patterns or texts can be marked.

5.17.1 Ring and axis parameters

Open the window with the banding properties by double-clicking on the banding object or by right-clicking on the banding object and selecting **Properties**.

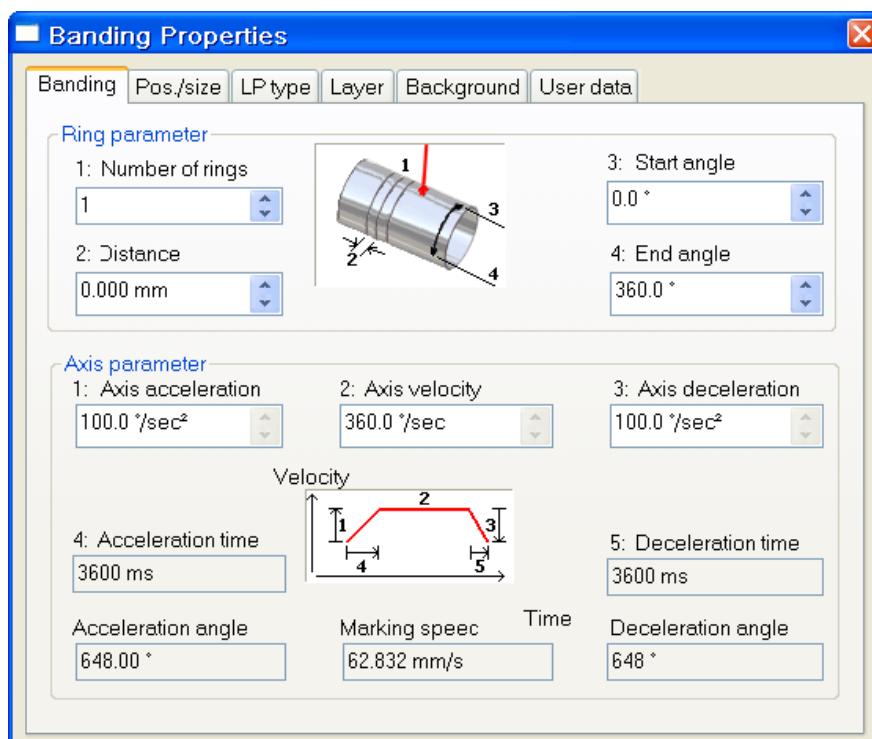


Fig. 5.17.1/1 Banding properties

Ring parameters

- | | | |
|---|-----------------|--|
| 1 | Number of rings | Specifies the number of rings to be marked. The distance between the individual rings is always the same size within a banding object. |
| 2 | Distance | Specifies the distance between the rings to be marked. This field is not relevant if only one ring is marked. With more than 2 rings, the distance between the different rings is always the same size. Different distances are only possible across multiple banding objects. |
| 3 | Start angle | Specifies the start point of the marking. A closed ring is marked with a marking of 0° to 360° . |
| 4 | End angle | Specifies the end point of the marking. A closed ring is marked with a marking of 0° to 360° . |

Axis parameters

1	Axis acceleration	Specifies the acceleration of the W axis from 0 to marking speed. The value is limited by the limit values for the acceleration specified in the laser configuration. If the value for the axis acceleration changes, the acceleration time and the acceleration angle also change. The higher the value for the acceleration, the faster the axis speed required for the marking. No marking is possible during the acceleration.
2	Axis velocity	Specifies the W axis speed during marking. This value is limited by the limit values for axis speed specified in the laser configuration. If the value for the axis speed is changed, the acceleration time, acceleration angle, braking time and the braking angle are also changed. The axis speed determines the marking speed.
3	Axis deceleration	Specifies the deceleration of the W axis from marking speed to 0. This value is limited by the limit values for the deceleration specified in the laser configuration. If the value for the deceleration is changed, the braking time and the braking angle also change. This field is grayed out if the Deceleration is identical to acceleration parameter in the laser console is activated. In this case, the value is transferred from the axis acceleration. No marking is possible during the deceleration.
4	Acceleration time	Displays the time required for the acceleration from 0 to the axis speed. This time is calculated from the values for the acceleration and axis speed. No marking is possible during this period.
5	Deceleration time	Displays the time required for the deceleration from the axis speed to 0. This time is calculated from the values for the deceleration and axis speed. No marking is possible during this period.
	Acceleration angle	Specifies the angle required for the acceleration. The value is calculated from the speed of the axis and the acceleration time. If the value for the acceleration is reduced, there is an extended acceleration time as well as a larger acceleration angle.
	Marking speed	The value displays the marking speed and is calculated from the speed of the axes and the diameter of the workpiece.
	Deceleration angle	Specifies the angle required for the deceleration. The value is calculated from the speed of the axis and the braking time. If the value for the deceleration is reduced, there is an extended braking time as well as a larger braking angle.

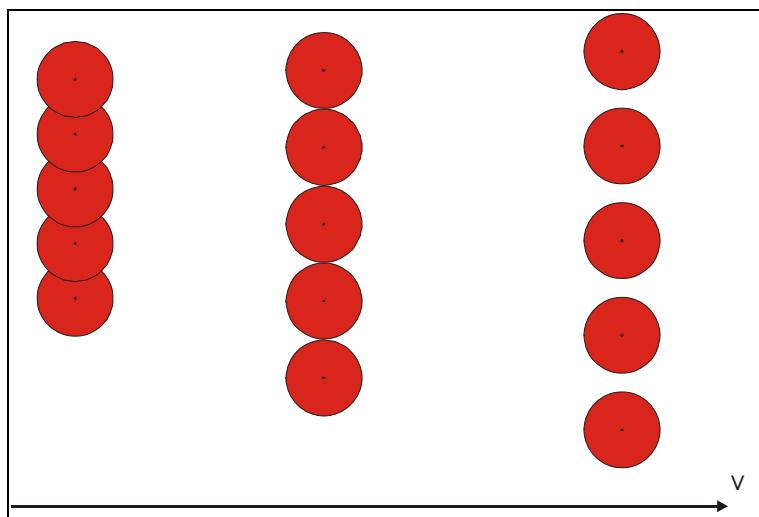
» The description of the remaining Banding properties tabs can be found in the sections 'The properties dialog' and 'Assigning of the laser parameter sets'.

5.17.2 Application examples

There is a close correlation between the laser parameters set on the "LP Parameter" tab, the settings on the "Banding" tab, and the workpiece diameter.

Example 1: Dependency of axis speed and frequency

If the axis speed is increased on the Banding tab, this affects the marking result. If the frequency remains the same, the individual marking points become further apart and a line is marked as a dotted line assuming there is no more overlapping of the individual points.



For a consistent marking result, the laser parameters for the frequency also need to be adjusted with a higher axis speed. When setting the laser parameter, the size of the distance between the individual points or the degree of overlap is immediately shown on the Laser tab. The "Speed" field must be used to transfer the calculated marking speed from the Banding tab.

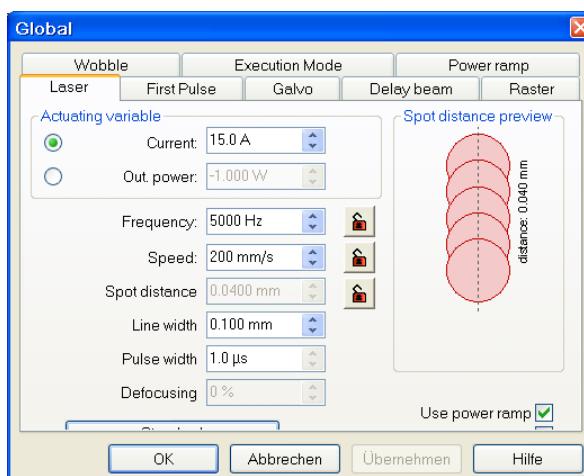


Fig. 5.17.2/1 Points spacing at a frequency of 5000 Hz

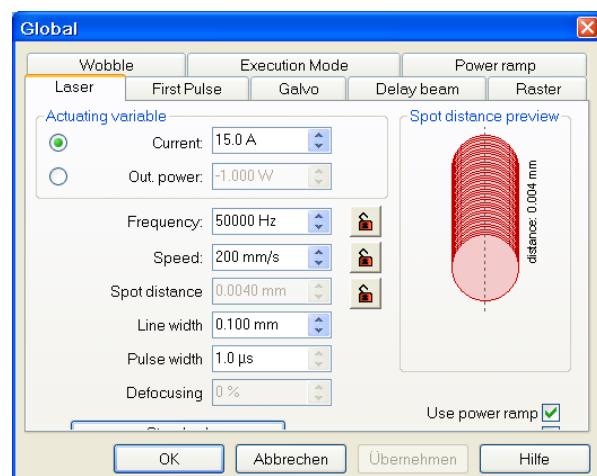
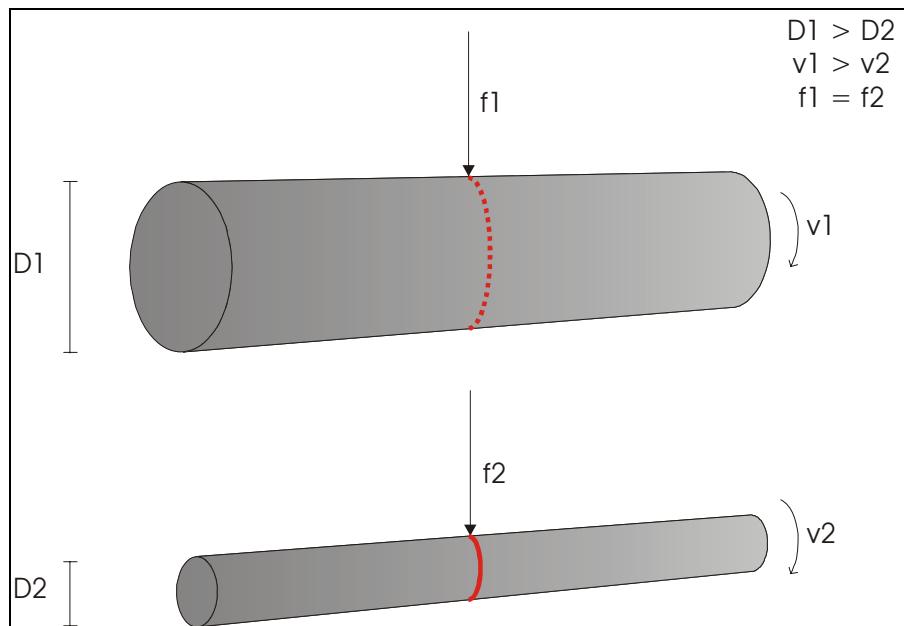


Fig. 5.17.2/2 Points spacing at a frequency of 50,000 Hz

Example 2: Dependence of diameter and frequency



If the diameter (D) for a workpiece increases, the W axis speed (v) also increases with a consistent marking period. This means that the individual laser points are set further apart with a consistent frequency, and instead of a continuous line, a dotted line is produced (see previous example). If the marking result is identical with the same marking time, the frequency must be increased for a larger diameter.

The Z axis also needs to be modified. The workpiece is closer to the laser with a larger diameter, and the marking is no longer optimally focussed. The distance to the laser must be re-set accordingly via the Z axis. The Z axis is automatically modified when Options > Workpiece and axes > Update Z value automatically is activated ().

5.17.3 Requirements

Several settings are necessary so that the banding object can be used:

- ◆ Settings in the laser console
- ◆ Settings in the VLM software

Settings in the laser console

Several parameters in the laser console need to be set to be able to use the banding object.

 The settings in the laser console can only be made by ROFIN service personnel.

The laser console is opened via Start > Programs > rcu > LaserConsole.

The laser console settings can be checked using the description below.

Motion	
Axis max move time [s]	30
Axis PTP acceleration (acc) [(1/min)/s]	1993
Axis PTP acceleration max [(1/min)/s]	3333
Axis PTP acceleration min [(1/min)/s]	156
Axis PTP deceleration (dec_Stop) [(1/min)/s]	1993
Axis PTP deceleration max [(1/min)/s]	2234
Axis PTP deceleration min [(1/min)/s]	123
Axis PTP velocity (v_target0) [1/min]	600
Axis PTP velocity max [1/min]	1890
Axis PTP velocity min [1/min]	189
Deceleration is identical as acceleration	<input checked="" type="checkbox"/>
Enable software limit protection	<input type="checkbox"/>
Inverted axis direction - !Switch off motor power after a change! (invertDir)	<input checked="" type="checkbox"/>
Max allowed position [mm]	360
Min allowed position [mm]	-360
Wait time after axis in position [ms]	200
Priority	
Axis priority, 1-7, 1 is highest	1
Program control	
Activate Z axis height in layers	<input type="checkbox"/>
Axis home position [mm]	0
Axis is used in program control	<input checked="" type="checkbox"/>
Axis position offset [mm]	0
Axis type	W-Axis
Is this axis a linear axis	<input type="checkbox"/>
Kinematic parameters aren't checked before executing layout.	<input type="checkbox"/>
Return axis back to home position	<input type="checkbox"/>

'Motion' section	
Axis PTP acceleration min	Defines the lower limit for the acceleration. This makes it impossible to enter values that could damage the material in the banding object properties. The value is above the lower limit of the lower limit defined for the motor by the manufacturer.
Axis PTP acceleration max	Defines the upper limit for the acceleration. This makes it impossible to enter values that could damage the material in the banding object properties. The value is below the upper limit of the upper limit defined for the motor by the manufacturer.
Axis PTP deceleration min	Defines the lower limit for the deceleration. This makes it impossible to enter values that could damage the material in the banding object properties. The value is above the lower limit of the lower limit defined for the motor by the manufacturer.
Axis PTP deceleration max	Defines the upper limit for the deceleration. This makes it impossible to enter values that could damage the material in the banding object properties. The value is below the upper limit of the upper limit defined for the motor by the manufacturer.
Axis PTP velocity min	Defines the lower limit for the speed. This makes it impossible to enter values that could damage the material in the banding object properties. The value is above the lower limit of the lower limit defined for the motor by the manufacturer.
Axis PTP velocity max	Defines the upper limit for the speed. This makes it impossible to enter values that could damage the material in the banding object properties. The value is below the upper limit of the upper limit defined for the motor by the manufacturer.
Deceleration is identical to acceleration	Must be deactivated to be able to specify different values for acceleration and deceleration. If the parameter is activated, the value for the deceleration is grayed out in the banding object properties and the value for the acceleration is used.
'Program control' section	
Axis is used in program control	Must be activated. This means that the W and Z axes can be selected under Options > Workpiece and axes. If this parameter is deactivated, the W and Z axes under Options > Workpiece and axes are grayed out.

Rotation	
Axis Position before Start [°]	0
Axis Position before Start Active	<input type="checkbox"/>
Direction of rotation axis	X-Axis parallel
Distance of rotation axis center to center of galvo [mm]	0
Distance of rotation axis center to focus plane [mm]	58
Position of rotation axis in X direction [mm]	0
Position of rotation axis in Y direction [mm]	0
Position of rotation axis in Z direction [mm]	0
Return rotation axis back to start	<input checked="" type="checkbox"/>
Rollover to zero	<input type="checkbox"/>

'Rotation' section

Axis Position before Start Active	Must be deactivated. If this parameter is activated, the axis is set to the defined position before every marking process. This can result in incorrect marking positions for the rings to be marked.
Rollover to zero	Must be deactivated. If this parameter is activated, the W axis always rotates in the direction in which the start point can be reached most quickly for the marking. In this application, however, they should always rotate in the same direction as the acceleration time is calculated so that this axis is at the correct position precisely at the start of the marking process.

» For more information on laser control, read the user's manual for your laser.

Settings in the VLM software

i To be able to use the banding object, a cylinder must be set for the workpiece and W and Z axes activated for the axis selection.

- Select Options > Workpiece and axes. The Settings for workpiece and axes window will open.
- In the Surface for the workpiece section, select 'Cylinder'.

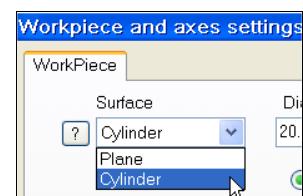


Fig. 5.17.3/1 Selecting the surface for the workpiece

- In the **Use axes** section, select the Z axis.
- In the **Use axes** section, select the W axis.

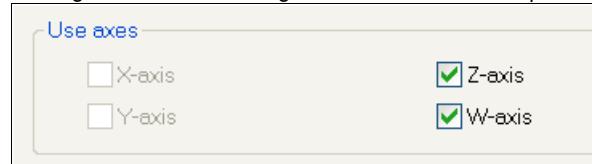


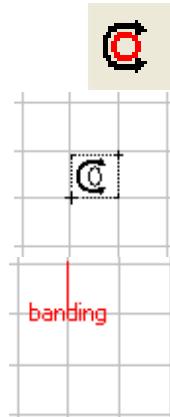
Fig. 5.17.3/1 Activate the Z and W axis

» For more information on workpieces and axes, please see the 'Workpieces and axes' documentation.

5.17.4 Inserting the banding object into a VLM drawing

Insert a banding object into the VLM drawing when a ring or multiple rings on a cylindrical workpiece are to be marked. In addition to a banding object or multiple banding objects, other drawing objects may also be included in the drawing.

- Use the icon on the right or Draw > Banding to select the drawing object for banding. The cursor will change.



- Click the cursor on the point where the banding object is to be inserted. The plus sign in the lower left corner shows the exact point where the object is inserted.

The banding object is displayed in the VLM drawing.

- Double-click on the banding object.

Or:

- Right-click on the banding object and select Properties. The dialog with the banding properties will open on the Banding tab.

» For the following settings, see Fig. 5.17.1/1 Banding properties.

- In the 1: Number of rings field, enter the number of rings to be marked with this banding object.
- In the 2: Distance field, enter the distance between the rings in millimetres. If you have only entered one ring for the number, the setting for the distance remains without consequences.
- In the 3: Start angle field, enter the angle at which the marking of the ring is to start.
- In the 4: End angle field, enter the angle at which the marking of the ring is to end.
- In the 1: Axis acceleration field, enter the acceleration of the W axis from 0 to the speed of the axis in °/sec². In the 2: Axis velocity field, enter the speed of the W axis in °/sec.

The speed entered here determines the marking speed.

- In the 3: Axis deceleration field, enter the deceleration of the W axis from the speed of the axis to 0 in °/sec². If it is defined in the laser console that the acceleration and deceleration are to be identical, this field will be grayed out. The value set in the 1: Axis acceleration field is transferred.
- Select the Pos./size tab.
- If necessary, enter values for positions X and Y for more accurate positioning of the banding object.

The size of the banding object comes from the details for the start and end angles on the Banding tab. Settings made on the Position/Size tab remain without consequences.

- Select the LP type tab.
- Assign a set of laser parameters to the banding object, as described in the 'Assigning of the laser parameter sets' section.
- Select the Layer tab.

- Assign a layer to the banding object, as described in the '*The Layer properties page*' section.
- Select the **Background** tab.
- If required, set a background to the banding object, as described in the '*The Background properties page*' section.
- Select the **User data** tab.
- Enter a description for the banding object as an option.
- Enter a unique name for the banding object.
- Close the window with the banding properties.

6 Extended functions for object editing

This section describes the extended functions for working with objects, such as arranging objects in rows and columns, working with layers, hatching and adjusting object positions (only for double head systems).

6.1 Arranging objects in rows and columns

A selected object can quickly be arranged in rows and columns using the command Rows/columns arrangement.

The dialog Rows/columns arrangement contains options to define the arrangement of rows and columns. To this end, select the Rows/columns... option from the Edit menu or click the right mouse button and select the Rows /columns...option from the context menu shown.

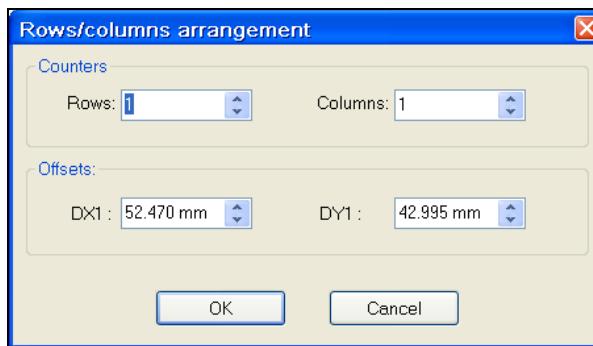


Fig. 6.1/1 Rows/columns arrangement dialog

The Rows/columns arrangement dialog shown contains the following options:

Counter	Rows:	In this input field, you can define the number of rows.
	Columns:	In this input field, you can define the number of columns.
Offsets	DX1 /DX2	Setting the spacing between the object reference points.

6.2 Working with layers



You can organize the objects contained in your drawing with the aid of the layers. For example you can:

- ⇒ show and hide individual objects of your drawing
- ⇒ prevent objects from being changed
- ⇒ define whether the object can be configured with the laser
- ⇒ can assign a depiction color to an object in order to be able to better identify it in the drawing.
- ⇒ The available layers are displayed in the layer dialog and can be set there. This dialog is opened via the Options > Settings for layer... menu or via the icon .

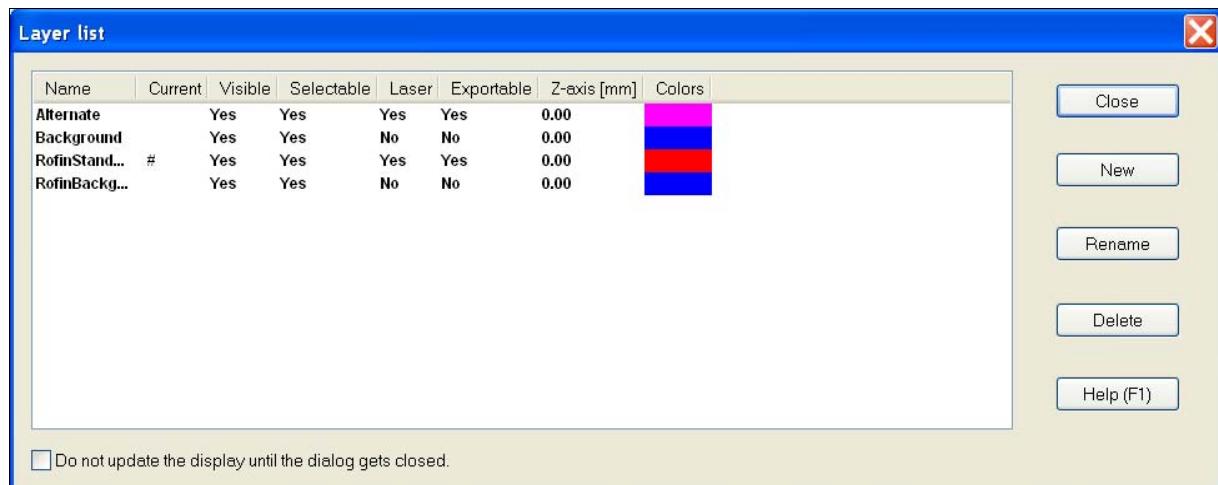


Fig. 6.2/1 Layer list

The following layer properties are displayed:

Name:	You can assign a freely selectable name and a certain status to any layer.
Active:	You can select one layer from the list of defined layers as an active one. Every object generated in the graphic editor is automatically placed on the current layer. The current layer is marked with "#" in the Current column of the Layer list.
Visible:	Objects on this layer can be made visible (Yes) or invisible (No).
Selectable:	Objects are switched between selectable (Yes) and non-selectable (No).
Laser:	Displays whether the objects on the layer will be executed along with the entire drawing (Yes) or not (No).
Exportable:	If the layer is switched to Yes, all exportable objects located on the layer will be exported (VIS and DXF files only). Import /export various file formats on the Windows Start Menu  under VisualLaserMarker / Documentation / VisualLaserMarker.
Color:	An individual color may be assigned to the objects on this layer. This will help to identify them in the drawing.

Do not update the display until the dialog is closed	With standard settings, objects which belong to one layer are updated on the screen each time a single layer properties is altered. With complex VLM files this can lead to long waiting times. By activating the <input checked="" type="checkbox"/> checkbox, the screen is only updated when the layer dialog is closed.
---	---

The meaning of the buttons on the dialog field page Layer list is as follows:

[Close]	With this button you close the layer dialog. The changes you have carried out will be taken over.
[New]	With this button you generate a new layer.
[Rename]	With this button you can rename the selected or current layer.
[Delete]	With this button you can remove the selected or current layer.
[Help (F1)]	With this button you open the current PDF-online user's manual of the VisualLaserMarker.

The Z-axis field is displayed if the settings for the Z-axis in the machine configuration **Used in VLM** and **Associated layer** are activated.

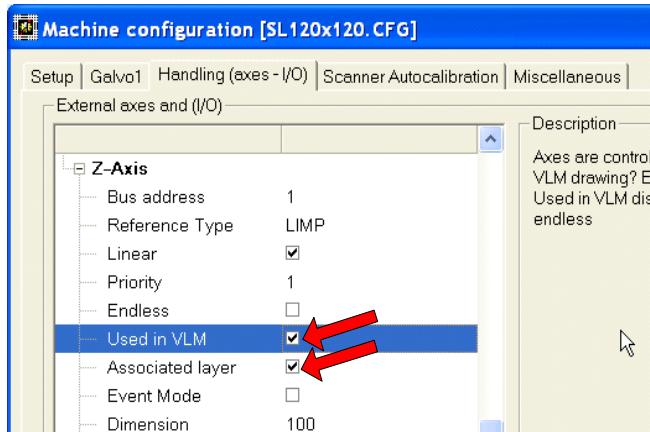


Fig. 6.2/2 MCF, Z-axis

The position of the layer in the Z-plane is shown in millimeters in the Z-axis field and can be changed to suit the requirements.

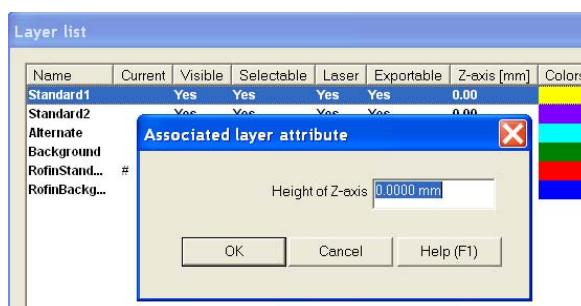


Fig. 6.2/3 Layer list, Z-axis

☛ How to modify layer properties:

- Click on the column with the properties to be modified in the layer line in the layer dialog.

How to alter the color of a layer:

- Click on the color icon of the layer.
The color selection dialog pops up.
- Select a color in the color dialog.
- Click [OK] to exit the color dialog.
The newly defined color icon is shown and the color of all objects on the layer is adapted.

Certain properties of the system layers RofinStandard and RofinBackground cannot be altered. Therefore, for example, the visibility of the RofinStandard layer cannot be turned off.

6.3 Hatching

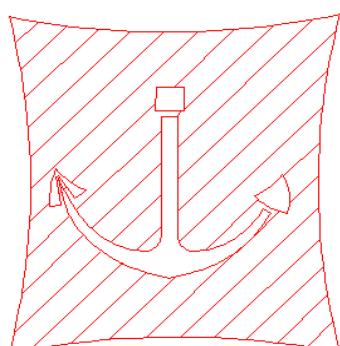
It is possible to hatch objects **online** with the VLM graphic editor. Surfaces are hatched automatically by generating parallel hatch lines which are limited by the contour of the surface to be marked. This facilitates e.g. the intensification of the type face or processing the surface of materials.

A contour can be defined by the following objects: polylines, ellipses and circles, arcs, rectangles, Bezier curves, logos, text and group objects. In addition, the rectangle serves as a base for creating barcodes and matrix codes.

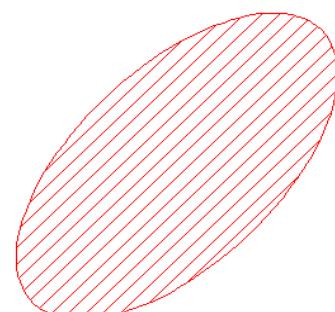
Rectangle objects are based on a simplified hatching algorithm, that's why partially different hatching options are available for the marking of different object types.

The **optimized online computation** is available for all hatchings. The hatching will be computed on-line only if a parameter that determines the hatching had been altered. This function reduces considerably the marking time when executing the same drawing repeatedly, since the output of the hatching is performed by using internal buffer memories.

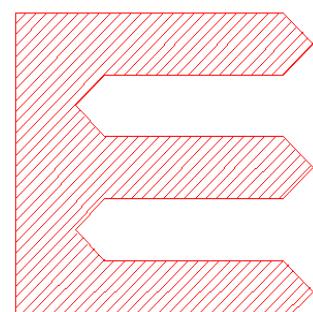
Example of hatched object types



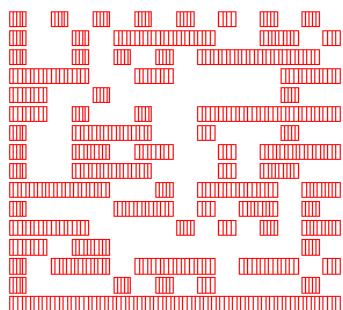
hatched logo



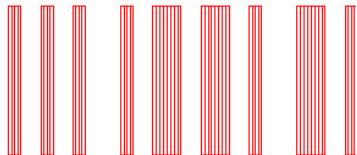
hatched ellipse



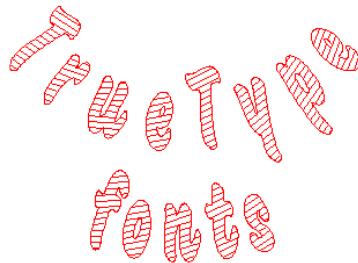
Hatched polyline



Hatched matrix code



hatched barcode



hatched text

i The on-line contour filling is not supported by the VisualLaserMarker.

6.3.1 Hatching parameter sets

Recurring hatching parameters can be stored in a table as hatching parameter sets with a name. This saves time and has the advantage that subsequent adaptations can be carried out once via a central location. The HS sets can be referenced via the name by the hatched objects.

In the VisualLaserMarker there are three hatch set types available: global, local and individual. They can be selected in the Hatch set type properties page. The global and local hatch parameter sets are organized in a separate hatch parameter table.

Global	There is only one table available here. It is valid for all drawings that can be found on your computer.
Local	There is only one table available per drawing. All objects contained in the VLM file can share these hatch parameter sets according to name reference. Hatch parameter settings can be quickly and centrally adapted (e.g. to different materials) using this referencing mechanism. Should the VLM file be sent via the network, for example, local parameter sets are automatically transmitted also as they are saved in the VLM file.
Individual	An HP set is created for each drawing object.

You access the laser parameter tables via the menu option Options / Settings for the laser parameters.../ Global HP table and Local HP table.

In the table, new hatching parameter sets can be created, existing hatching parameter sets can be duplicated or deleted. A hatching parameter set contains the hatching options, (» Fig. 6.3.2/1), which can be adapted directly in the table.

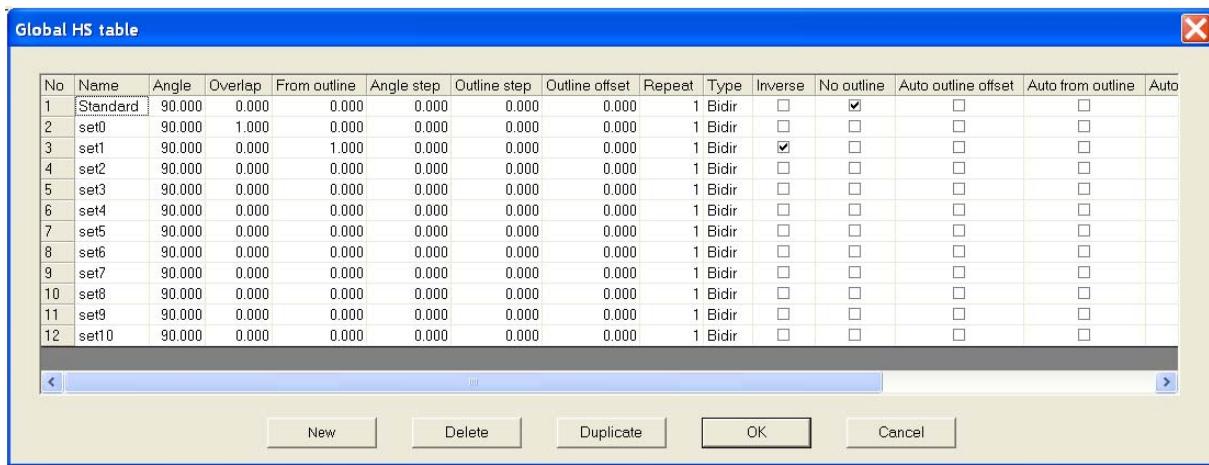


Fig. 6.3.1/1

The meaning of the buttons on this dialog field page is as follows:

[New]	Generating a new hatch parameter set.
[Delete]	Deleting the selected hatch parameter set.
[Duplicate]	Duplicate the selected hatch parameter set.
[OK]	Confirming the input and closing the table dialog.
[Cancel]	Discarding the input and closing the table dialog.

6.3.2 Hatching options

The hatching options which are available to rectangle objects, group objects or arbitrary formed contours are described in the following sections. Just which of the hatching options are used with the individual objects depends on each object type.

The Hatching property page is inserted into the properties dialog if the checkbox Hatch is activated for the relevant object in the property page. On the Hatch set type properties page that is then displayed, the Individual option is selected by default.

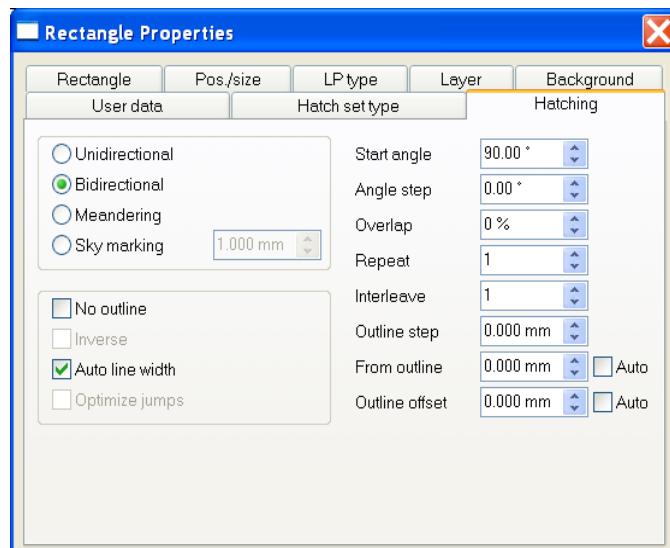
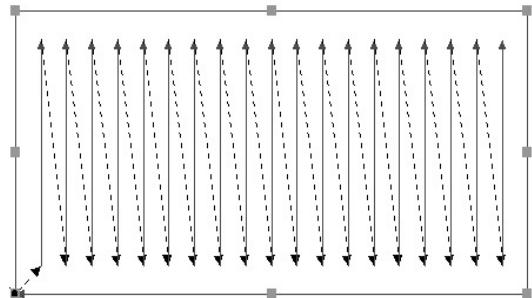


Fig. 6.3.2/1 Hatch properties page, e.g. for a rectangle object

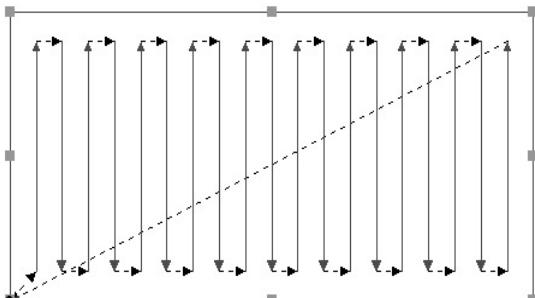
Unidirectional

The hatch lines will be executed in one direction only. While jumping back to the start point of the next line, the laser beam is switched off.



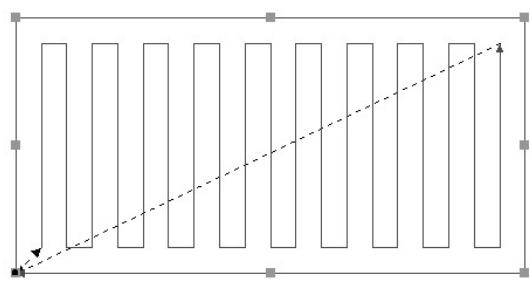
Bidirectional

The hatch lines will be executed alternately in both directions. While jumping across to the start point of the next line, the laser beam is switched off.



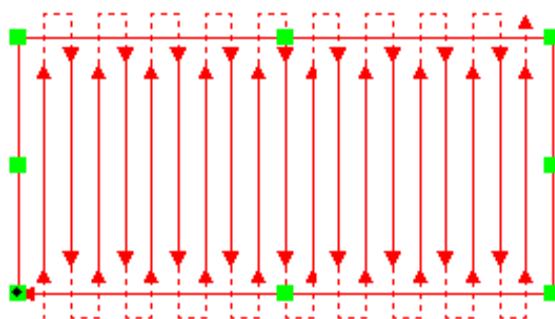
Meandering (for rectangles only)

Bidirectional hatch lines without interrupting the laser beam.



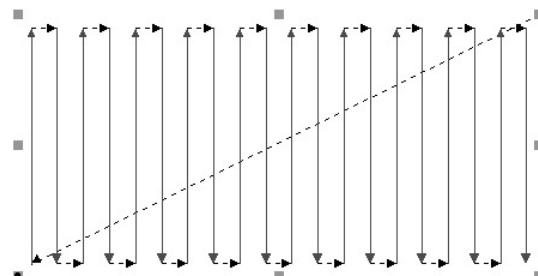
Sky marking (for rectangles only)

Bidirectional hatch lines with a constant path speed (no jumps) with interrupting the laser beam at the arrest points.



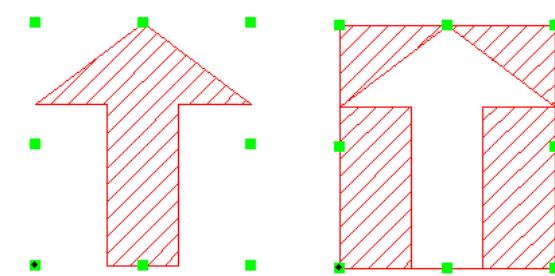
No outline

Only the hatching lines are marked, the outline is omitted.



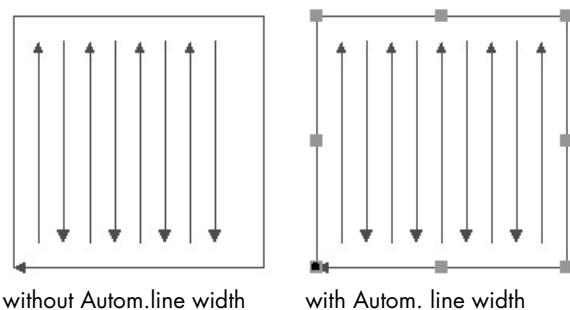
Inverse (not available for rectangles)

With this option, arbitrarily formed contours can be inversely marked. The initial position for the inverse hatching is the object frame.



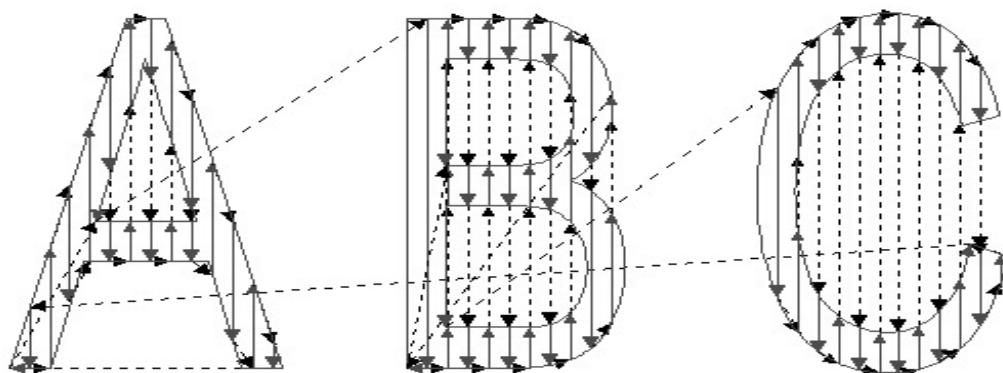
Autom. Line width

The option Automatic line width distributes the hatch lines equidistantly over the entire rectangle width.

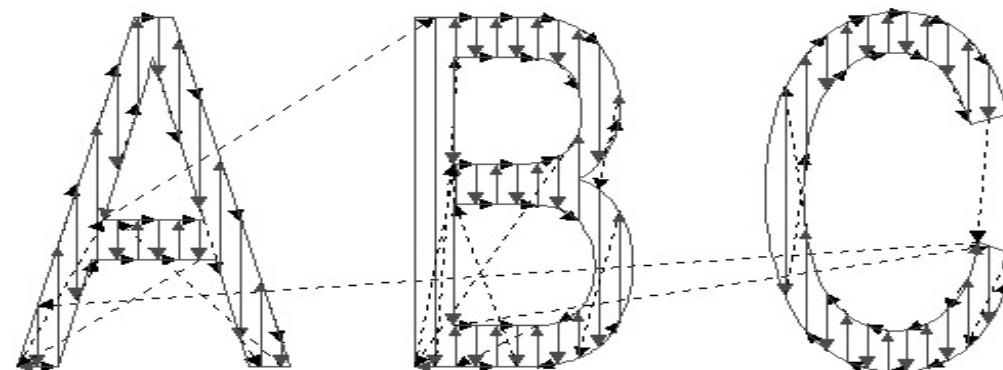


Optimize jumps (not available for rectangles)

The execution sequence of the hatch lines will be modified in order to minimize the number of jumps, see figure below. This operation reduces the marking time.



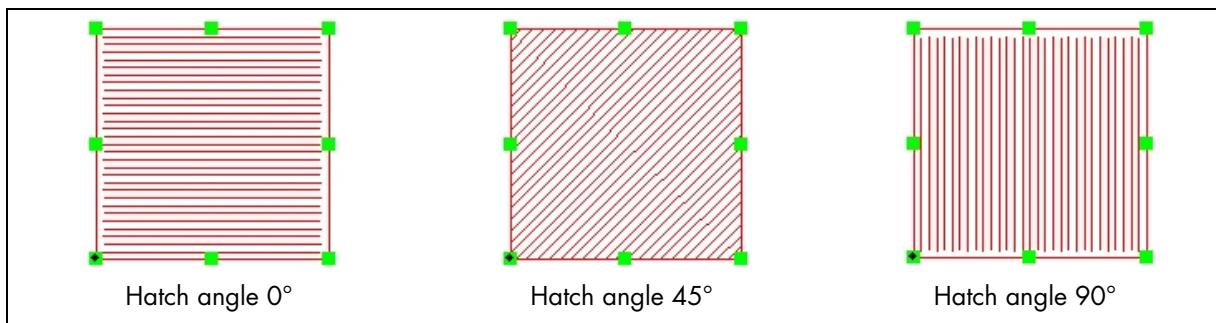
Bidirectional hatching without jump optimization



Bidirectional hatching with jump optimization

Start angle

Set the start angle in degrees, e.g. setting 90° creates vertical hatch lines and setting 0° creates horizontal hatch lines.



Angle step

The value specified here in degrees is added to the start angle for multiple hatching.

» Option 'Repeat'.

Overlap factor and line width

The basic setting for the hatch is the line width which together with the overlap factor determines the distance between the hatch lines.

The laser stroke width is influenced by different external factors such as laser type and construction, the mode aperture used, the laser current set, etc. The line width has to be measured on the marked work piece and this value has to be entered at the laser parameter settings.

Depending on which laser parameter type (global, local or individual) is used, the measured value is entered in the properties dialog for the laser parameters of each laser type. This value is the basic width for all filling operations.

» Section "Description of parameters contained in the laser parameter set".

The breakdown of hatching into a physical (line width) and logical (overlap factor) view is achieved using the Line width and Overlap options.

- i** Using the line width in combination with the local or global laser parameter table several hatchings can easily be adjusted to additional basic conditions (e.g. altered laser current or material change of the work piece).

The Overlap option can be used to alter the distance between the lines in order to achieve the required marking result. The Overlap settings and other hatching options have to be defined on the Hatching properties page.

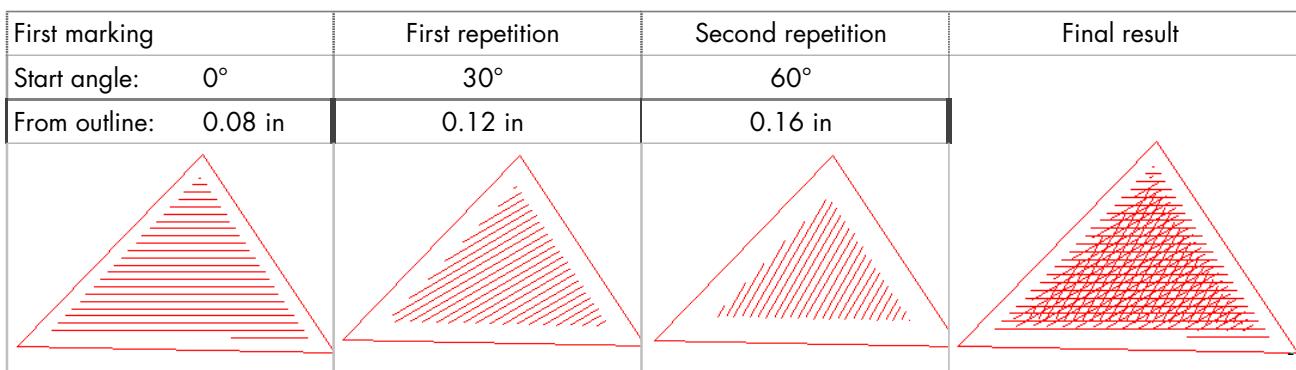
At a setting of 0%, the spacing corresponds to the line width. It's possible to enter a negative Overlap in order to extend the distance between the lines.

Repeat

Here it is possible to set how often hatching lines should be generated. With the two parameters hatching angle and from outline, the hatching can be changed with the multiple generation of hatching lines. Per repetition, there is a particular start angle and angle step.

Example with the following values:

Repetitions:	3		
Start angle:	0°	From outline:	0.08 in
Angle step:	30°	Outline step:	0.04 in



Offset

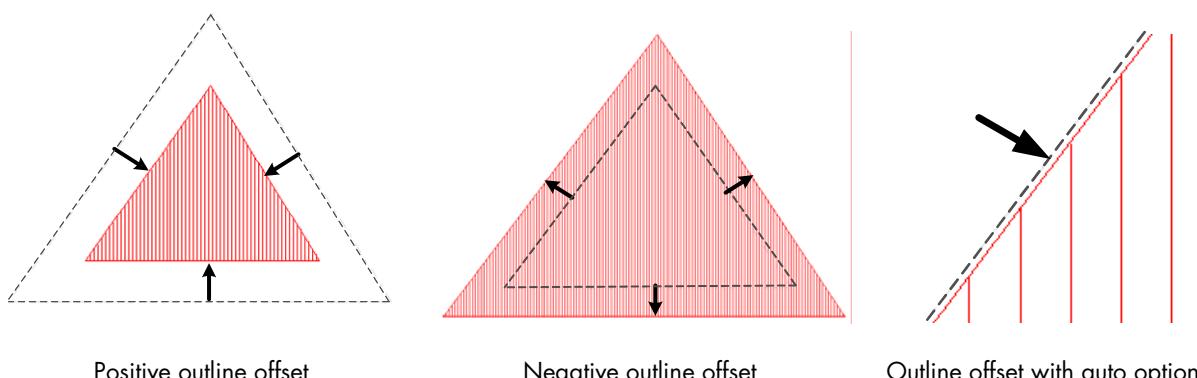
With interleave, the energy entry on a workpiece can be regulated. The hatch lines are executed in multiple passes.

Outline offset

With Outline offset, the original outline is changed by moving it parallel perpendicular to the edge towards the inside (positive value) or outside (negative value).

If the Auto option is activated, the line width of the laser beam is taken into account. The outline offset then amounts to precisely half a laser beam line.

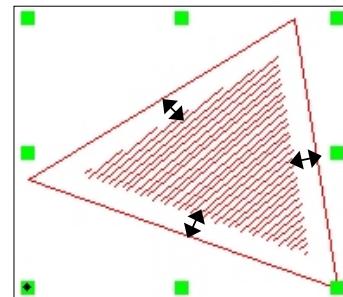
i This option is only available for hatched objects.



From outline

The hatching inside an object is created with the distance from the outline defined here.

If the Auto option is activated, the line width of the laser beam is taken into account and the hatching around the half laser line width is offset at a fixed distance perpendicular towards the inside.



Hatching with distance to the outside line

Outline step

The value specified here in millimeters is added to the distance to the outline in case of multiple hatching.

» Option 'Repeat'.

6.3.3 Hatching group objects

Combining different drawing objects to form a group increases the hatching design possibilities. It is possible to combine any objects as a group object in order to create a complex contour, e.g.:

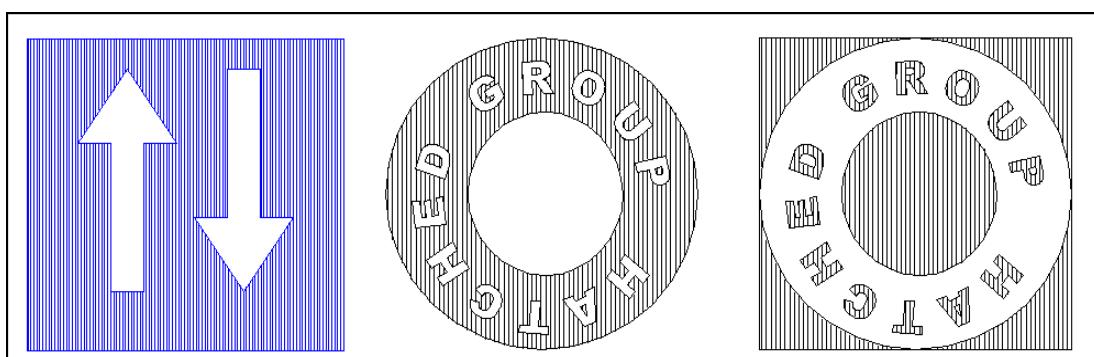


Fig. 6.3.3/1 Hatching group objects

Unlike unhatched group objects, hatched group objects are assigned laser parameters. All objects in the group are executed together with the generated hatch lines with the group laser parameter settings.

The hatching of a group that already contains a hatched group or hatched objects will be executed for the outer group only. The hatching of the included objects is suppressed.

Optimization

The following points can help you to reduce the marking time:

The hatching of rectangles at angles of 0°, 90°, 180° and 270°, i.e. horizontal or vertical hatching, requires less computing power and reduces the marking time.

Since there are no returns, the bidirectional hatching requires minor jumping distance which results in a reduction of marking time in comparison with the unidirectional.

A minimum marking time is achieved when using the bidirectional hatching plus activating the Optimize jumps option.

In order to increase the speed at which drawings which contain several complex hatches are built up on the screen, the screen display can be without hatching lines by means of (Options / Editor settings... / General dialog field page / Accelerate display view of hatched objects).

Activating this option when creating drawings during editing results in the screen being built up more quickly, thus permitting more smoothly running work.

This option is not available for the barcode object, the matrix code object and filled true type fonts. When activating the Accelerate display view of hatched objects option the first execution with the laser needs more time than the following since only the hatching of the first execution is calculated online and all the following executions are performed using a cache.

» *Section 'General settings'.*

6.4 Working with variables

Parts can be numbered, i.e. assigned count or identification numbers with the variables functionality. For this purpose, the referenced serial may or may not be added with or after the marking process in the counting stage. In addition, it is possible to mark the current date and the current time or also calculated values. The data are updated at the time the concerning layout is transmitted to the laser.

Variables can be used exclusively with text objects, ring text objects, matrix code objects and barcode objects.

Variables may be used several times in a drawing file. A drawing object can also refer to several variables.

Defining local and global variables is possible. The area referenced by the local variables is restricted to the corresponding drawing file. Global variables can be used to refer to several drawings.

The variables are not saved directly in the drawing file, they are saved in the variable files. All the variable files are saved by default in the direct subdirectory of the Variable installation path. The local variable files are named after the corresponding drawing file and are given the extension *.LTV. There is only one global variable file. It is named Global.GTV.

 It is easy to forget to add the variable files when transferring the drawing files. If this happens, then the variables references cannot be implemented by the recipient. On loading the drawings, an error message appears in the message window.

6.4.1 Using and generating variables

Text objects, ring text objects, matrix code objects and barcode objects work with a serial number if their content field contains a corresponding variables name.

☞ How to insert a variable which already exists:

- Click the [...] button next to the input field of the properties dialog for the respective object.

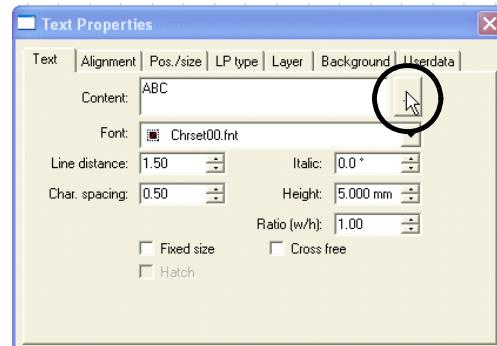


Fig. 6.4.1/1 Inserting variables

The adjoining variable dialog then opens:

- Select either the option Local variables or Global variables.

A local variable only applies to the current drawing. All parts which are marked with the current drawing are assigned count numbers. Use global variables when different drawings are to access the same variables.

- Select the desired variable from the list field which displays the local and global variables which are available and confirm the selection with [OK].

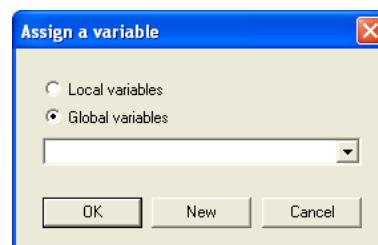


Fig. 6.4.1/2 Variables selection dialog

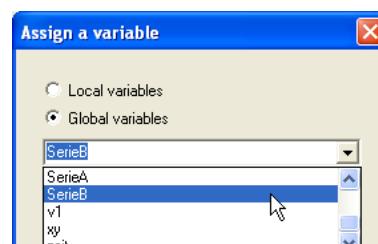


Fig. 6.4.1/3 List box of the variables

The variable selected is inserted into the content field of your object.

- The variable can also be entered in the text content field manually.

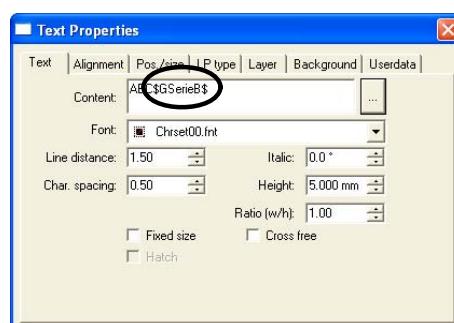


Fig. 6.4.1/4 Insertion of the variables

The variable is made up as follows:

\$	Introductory dollar symbol.
G / L	G stands for global variables, L for local variables.
<Name of the variable>	Name of the variable (in the example above "SerieB").
\$	Closing dollar symbol.

Examples of variables:

\$GSerno1\$	Referencing a global variable with the name "Serno1"
ABC\$GSerno2\$XYZ	Prefix Referencing a global variable with the name "Serno2" Postfix
\$LSerno1\$	Referencing a local variable with the name "Serno1"
111\$LSerno2\$999	Prefix Referencing a local variable with the name "Serno2" Postfix
AAA\$LSerno2\$BBB\$GSerno1 \$CCC	Prefix Referencing a local variable with the name "Serno2". Centerfix Referencing a global variable with the name "Serno1" Postfix

☛ How to generate a new variable:

- Select the option local variables or global variables in the variables dialog and click on the [New] button.

The following selection dialog pops up:

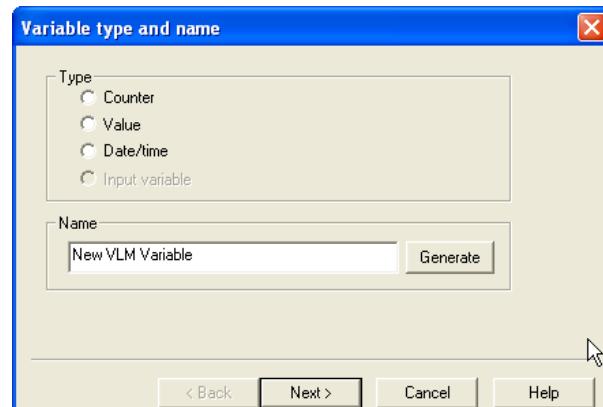


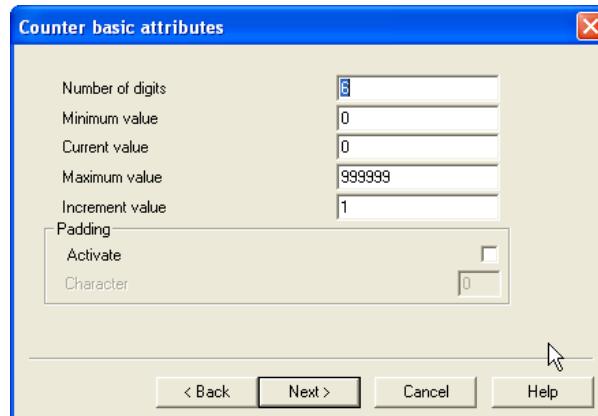
Fig. 6.4.1/5 Selection dialog Variable type and name

The properties page Variable type and name contains the following options:

Counter	Parts can be numbered, i.e. assigned count or identification numbers with this option. For this purpose, the referenced variable may or may not be added with or after the marking process in the counting stage.
Value	With this option a text variable can be referenced.
Date/Time	With option, it is possible to mark the current date and the current time. The data are updated at the time the concerning layout is transmitted to the laser.
Input variable	This option is not available in the current version.
Name	Input field for naming the variable.

- Select the variable type.
- Enter a name in the input field Name and click on the [Next >] button.

If a counter variable has been selected, the Counter attributes dialog opens.



This dialog contains the following options:

Fig. 6.4.1/6 Counter basic attributes dialog

Number of digits:	The maximum number of digits is 18.
Minimum value:	The lowest value at the start of incrementation.
Current value:	The current value shows which value is going to be used for marking next.
Maximum value:	The highest value at which incrementation can be carried out.
Increment value:	The positive and negative values can be entered here.
Activate padding:	By activating the (<input checked="" type="checkbox"/>) control box, you can use the entry field Character to enter the number of spaces which should be given a variable.

- Set the desired attributes and click the [Next >] button.

The following options are available in the pop-up dialog Counter extended attributes:

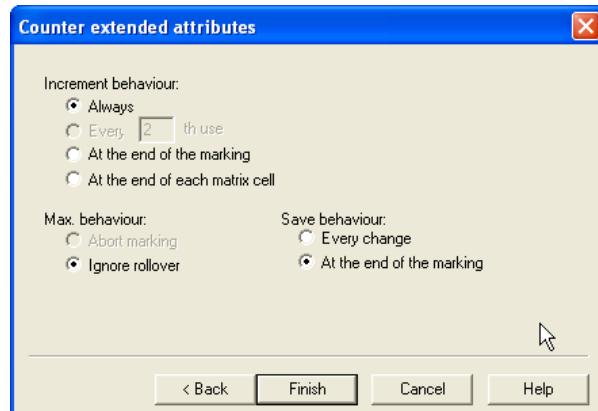


Fig. 6.4.1/7 Counter extended attributes dialog

Increment behaviour:	
Always	Every time the variable is called up, the count is continued.
At the end of marking	After marking, the whole drawing is counted. This enables, e.g. the edition of a serial number as a barcode and as an optical character.
At the end of each matrix cell	The counter is not increased within a matrix cell, but only at the end of the marking of the matrix cell.
Max. behaviour:	
Abort marking	This setting is not available in the current version.
Ignore rollover	For positive counting characters, as soon as the maximum value has been reached, the current value is automatically set back to the minimal value. For negative counting characters, as soon as the minimum value has been reached, the current value is automatically set back to the maximum value.
Save:	
Every change	After the variables have been called up, the updated variable value is saved on the drive.
At the end of marking	The updated variable value is only saved on the drive after marking the drawing.

- Set the desired attributes and click the [Finish] button.
 - Click [OK] on the pop-up variable dialog to confirm the settings.
- The newly generated variable is inserted into the content field of the object:

If a Value variable has been selected, it is possible to enter a constant text on the Variable value dialog.

- Enter the desired value and click the [Finish] button.

The newly generated variable is inserted into the content field of your object.

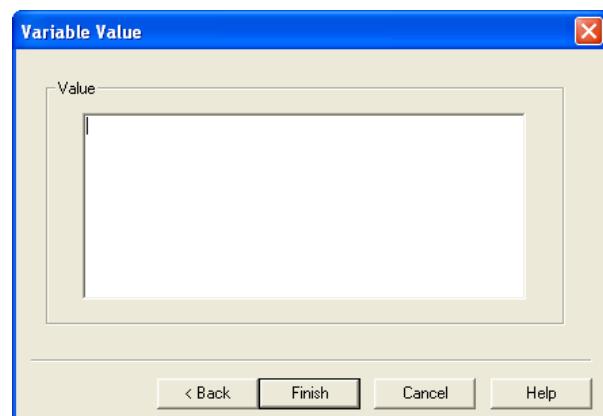


Fig. 6.4.1/8 Variable value dialog

If you have selected a Date/time variable, it is possible to enter a formatting string in the dialog which appears.

For example:

The String

%DD%MM%YYYY%

results in the current date, e.g. 2007.10.23

- Enter the desired formatting string and click the [Finish] button.

The newly generated variable is inserted into the content field of your object.

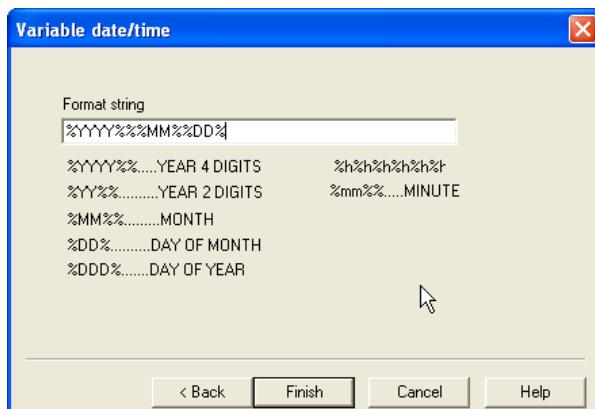


Fig. 6.4.1/9 Variable date/time dialog

6.4.2 Generating and editing variables

In the Options menu under Variable settings / Global variables... or Local variable... it is possible to call the Global or Local variable dialog. All the available local and global variables are listed in the pop-up dialog.

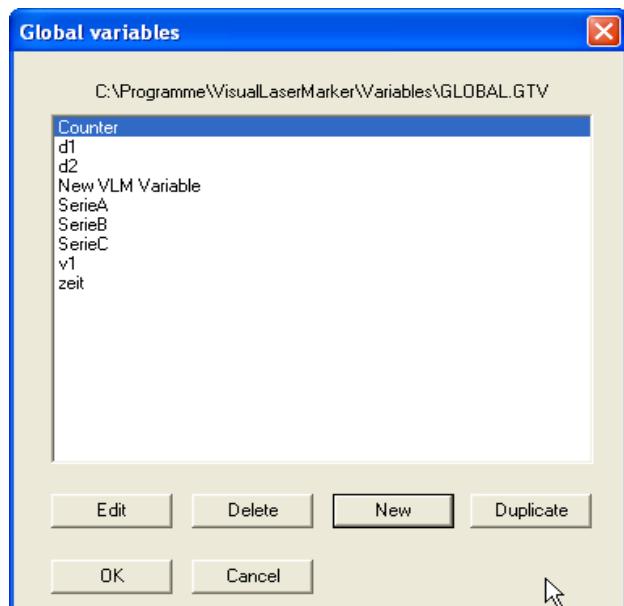


Fig. 6.4.2/1 Dialog for Generating and editing variables

The meaning of the buttons on this dialog field page is as follows:

[Edit]	Editing the variables selected.
[New]	Generating the variables selected.
[Delete]	Deleting the variables selected.
[Duplicate]	Duplicating the variables selected .
[OK]	Confirming the input and closing the variables dialog.
[Cancel]	Discarding the input and closing the variables dialog.

 **How to edit a variable:**

- Select the variable to be edited from the table of local and global variables and click the [Edit] button.
Depending on whether a counter or a date/time variable should be edited, the associated attribute dialog appears, » Fig. 6.4.1/5 to 6.4.1/9.
- Make the desired changes and click the [Next >] or [< Finish] button and then [OK] on the Local or Global variables dialog in order for the settings to take effect.

 **How to generate a new variable:**

- Click the [New] button on the Local variables or Global variables dialog.
The Type and name of the variables selection dialog (» Fig. 6.4.1/5) pops up. Proceed as described in Chapter 'Using and Generating Variables'!
- After all the changes have been made, return to the Local variables or Global Variables dialog.
- Click the [OK] button to implement the settings.

6.5 Adjusting object positions

If your laser system is fitted with a double head, the position of drawing objects between two heads can be offset by a specified value with the laser in simultaneous marking.

During machine configuration, **Simultaneous marking** must be selected for all other objects on the Galvo control unit page under Preferred execution behavior. The Galvo control unit property page is inserted on the properties dialog for the drawing objects.

On this page, you can define and save correction offsets for the drawing object that are to be output with the slave head. The head under which no drawing object appears in the drawing is the slave head. The **Use correction offsets for double head** checkbox must be activated () for the set parameters to be effective for the output with the laser.

i This option is not available for matrix, bitmap and VLM reference objects.

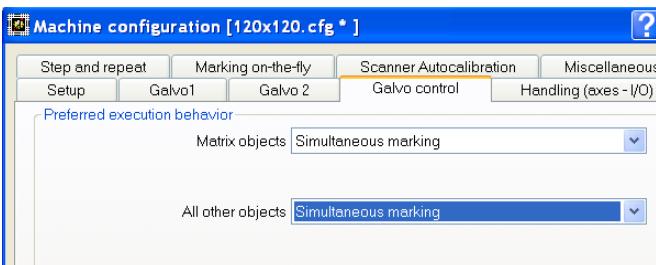


Fig. 6.5/1 Galvo control unit page in machine configuration

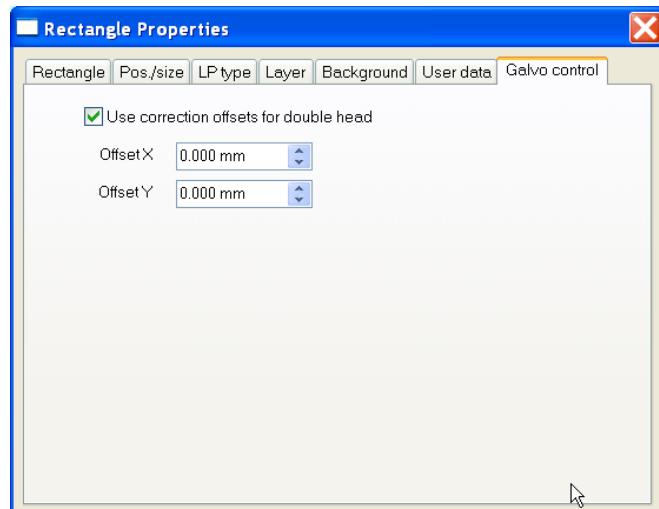


Fig. 6.5/2 Property page Galvo control unit

7 Drawing settings

The drawing settings described in the following sections are stored in the drawing file and therefore remain effective for the entire session and beyond. The Drawing view settings described subsequently remain effective at the most until the end of the session as they are not stored in the drawing file.

7.1 Options for the drawing area

In the Drawing area dialog field page, in the Options and drawings settings menu it is possible to set the size and position of the drawing area in the marking area. Additionally, the drawing area can be provided with a bitmap background.

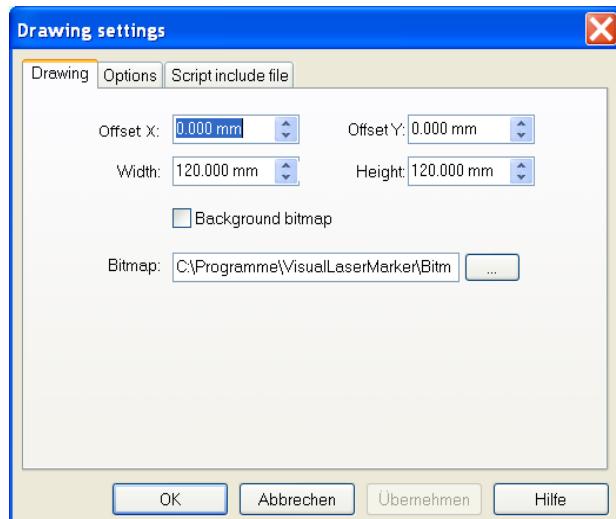


Fig. 7.1/1 Dialog field page Drawing area

The Drawing area dialog field page contains the following options:

Offset X:	X position of the drawing area in the marking area.
Offset Y:	Y position of the drawing area in the marking area. » <i>Section 'Changing the drawing view in the marking area view'.</i>
Width:	Width of the drawing area.
Height:	Height of the drawing area.
Background bitmap:	By clicking the <input checked="" type="checkbox"/> checkbox, background bitmaps are displayed.
Bitmap:	Name of the referenced bitmap file. The [...] button opens the Bitmap file selection dialog.

The Marking area depends on the laser configuration. If your laser system has neither a double head nor axes, the maximum marking area is the area covered by the marking window. The values for Offset X and Offset Y are then set to 0.00. If your laser system is equipped with a double head or with axes, the marking area is extended. With an X or Y offset, the drawing area can be moved into the marking area.

» *Section 'Marking with a double galvo head'.*

Moving a drawing area inside the marking area

If the program is in the drawing view of the graphic editor, change to the **Marking area** view via **View**, submenu **Change drawing view...**, then select the **Marking area** option or click the  icon. In the **Marking area** view, "Marking area" is shown in the title bar after the file name.

Return to the drawing view by selecting the **Drawing** option in the **View** menu, submenu **Change drawing view...**, or click on the  icon.

In the **Marking area** view, the position of the drawing area in the marking area can be displayed and altered.

How to set the position of the drawing area within the marking area:

- Select the drawing area and use the mouse to move it to the required position.

Or:

- Enter the appropriate parameters for X and Y in the positioning bar.

Or:

- Open the dialog field page **Drawing area** in the **Options / Drawing settings** menu.
- In the **Offset X** and **Offset Y** input fields, enter the corresponding values (» Fig. 7.1/1).

7.2 Options for executing the drawing

In the **Options** menu under **Drawing settings...**, on the **Options** dialog field page, settings are made in the drawing file that affect the subsequent output process.

If your laser is equipped with a double head or with axes, drawing objects that extend beyond the size of the marking window can be divided into several parts and output with the laser.

Depending on the hardware equipment, the marking time can be optimized by minimizing the axis movements in the X/Y and Z planes (systems with a Z axis or focusing axis) or by minimizing the number of beam switches (systems with a double head and beam switch).

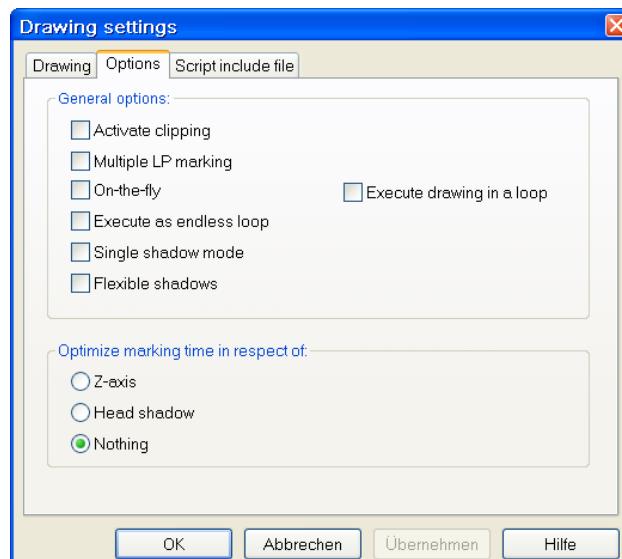


Fig. 7.2/1 Options dialog field page

The Options dialog field page contains the following options:

General options	
Activate clipping	By activating the <input checked="" type="checkbox"/> checkbox, drawing objects that extend beyond the size of the marking window can be divided into several parts and output with the laser. i Bitmap objects cannot be divided. » <i>Section 'Marking with a double galvo head'.</i>
Multiple LP marking	By activating the <input checked="" type="checkbox"/> checkbox, it is possible to execute a drawing object several times. » <i>Section 'The multiple marking process'.</i>
On-the-fly	On-the-fly marking is possible when the <input checked="" type="checkbox"/> checkbox is activated. » <i>Section 'Marking on-the-fly'.</i>
Execute in a loop	This function can only be activated if On-the-fly marking has been activated. If the <input checked="" type="checkbox"/> checkbox has been activated, then the drawing will be repeated in a loop until it is canceled.
Execute as endless loop	After activation of the <input checked="" type="checkbox"/> checkbox, then the drawing will be repeated in a loop until it is canceled.
Individual marking fields	If this checkbox has been activated <input checked="" type="checkbox"/> , in drawings – in which multiple marking fields have been defined – the marking fields can be individually selected via the LMOSActX interface. Only the content of the selected marking field is then output with the laser. In the Windows start menu under Visual-LaserMarker / Documentation / Programming / LMOSActX Documentation.
Flexible marking fields	All the marking windows in a VLM file share the same placement relative to the galvo field. It is not possible to change the window placement via the VLM editor or any programming interface (LMOSActX or LMOSAuto). If this checkbox has been activated <input checked="" type="checkbox"/> , the size and the position of a marking can be visualized and changed. i When the size of the marking field is changed, the axis positions linked to this window also change. ! This option should be used with care since it is easy to get the "Galvo overrun" error (if the marking window is bigger than the galvo field) or "Axis reached software limit" error (if the marking window position is wrong). The second problem can be alleviated by manually inspecting the axes positions of all the shadows in the shadow property dialog. In the Windows start menu under Visual-LaserMarker / Documentation / Visual Laser Marker / Workpiece and Axes.
Z-axis	Minimizing the number of axis movements in the Z plane. i This option is only available if your system is equipped with a Z axis.

Under **Optimize marking time in respect of:** it is possible to set whether the object output order should minimize the number of axis movements or the numbers of beam switches or whether there should be no optimization. When determining the marking sequence, make sure that the marking field sequence takes precedence over the object sequence.

Z-axis

Minimizing the number of axis movements in the Z plane.

i This option is only available if your system is equipped with a Z axis.

Marking field	Minimizing the number of axis movements in the X/Y plane or minimize the number of beam switches. Info: This option is only available if your system is equipped with a focusing axis or a double head and beam switch.
No optimization	No optimizations are to be performed.

7.3 The script include file

A drawing file may contain a script or a script include file. The script include file is either a complete file path or a file name with a default path.

The name of the script file can be changed on the Script include file dialog field page in the Options menu under Drawing settings...

The default path of the script file can be set in the Options / Editor Settings... menu / search path in the Include script input field.

» Section 'Path settings'.

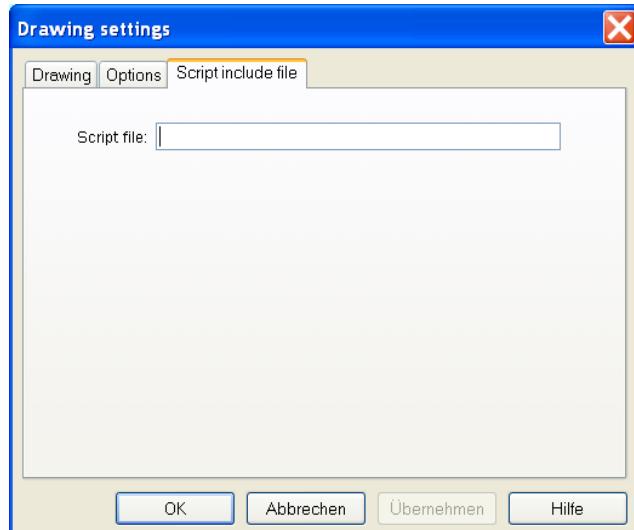


Fig. 7.3/1 Script include file dialog field page

7.4 Snap and grid function

Working with the grid is comparable to putting a piece of graph paper underneath the drawing. Using the grid, the object can be aligned and the spacing between them estimated. When a drawing is enlarged or reduced, it can be helpful to adapt the grid accordingly.

As the grid is only a guideline help, the snap is imperative for an exact positioning with the mouse.

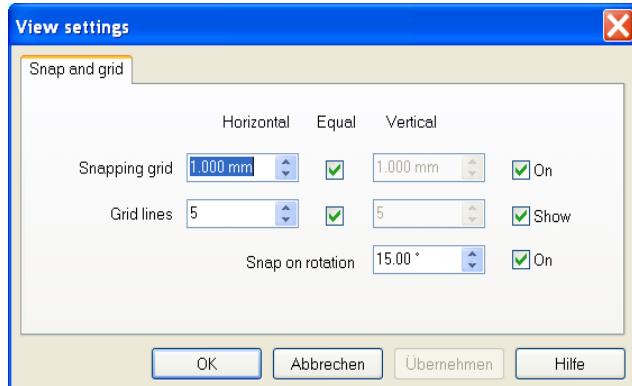


Fig. 7.4/1 Snap and grid dialog field page

It is possible to reach the **Snap and grid** dialog field page in the Options / View settings... menu. The following options can be found in this dialog field page:

Snap value:	Input of the snap value in millimeters. When the snap mode is active (<input checked="" type="checkbox"/> On), the cursor engages around the set value. The <input checked="" type="checkbox"/> Equally checkbox specifies identical values for the horizontal and vertical snap values.
Grid of lines:	The size of the grid is determined by the value entered here. This multiplies the grid of lines with the snap value. The <input checked="" type="checkbox"/> Equally checkbox specifies identical values for the horizontal and vertical snap values.
Show:	By clicking the <input checked="" type="checkbox"/> checkbox, the grid can be shown or hidden on the drawing area.
Grid origin:	Here the coordinates for the first grid point bottom left can be set.
Snap value on rotation:	Setting the engaging angle to rotate objects. This function is also activated by clicking the <input checked="" type="checkbox"/> checkbox On.

7.5 Setting the drawing view

Any section of the drawing file can be displayed in an almost limitless size in the graphic window of the VLM editor. The contents of the drawing are not altered. The drawing view can be changed to visualize the marking area. Additionally, the marking direction and laser moves can be visualized in the form of arrows when required in the graphic window.

7.5.1 Setting the zoom factor

The view of the drawing file is controlled with the following tools:

Symbol	Command	Explanation
	Zoom selection:	A section dragged with the mouse is displayed enlarged.
	Zoom in on drawing/marking area:	In the view Drawing the drawing surface is displayed independently of the size of the drawing. The Marking area view displays the total area reachable by the laser beam.
	Zoom to object limits:	All objects are displayed, even when working outside the marking area.
	Zoom in:	Step-by-step enlargement of the visible section.
	Zoom out:	Step-by-step reduction of the visible section.
	Accelerate display view of hatched objects:	<p>The hatching is not displayed on the screen to avoid waiting times while building up the screen.</p> <p>» <i>Section 'Hatching' and Section 'General settings'</i>.</p> <p> This option is not available for the barcode object, the matrix code object and filled true type fonts.</p>
	Freeze positions:	<p>The Freeze tool, which prevents unwanted moving of the position of all objects in the drawing by the mouse and cursor keys, can be used to protect a complex drawing. This function can also be activated on the General dialog field page.</p> <p>» <i>Section 'General settings'</i>.</p>

7.5.2 Changing the drawing view in the marking area view

With this option it is possible to switch between the drawing view and the marking area view. In the drawing view you can edit your drawing and insert drawing objects. The drawing view corresponds to the drawing area. It only contains drawing objects. The marking view corresponds to the maximum marking area. It depends on the laser configuration. If your laser system has neither a double head nor axes, the maximum marking area is the area covered by the marking window.

If your laser system is equipped with a double head or with axes, the marking area is extended.

» *Section 'Marking with a double galvo head' and Section 'Marking with axes'.*

How to switch to the marking area view:

- Select the Marking area option in the View menu in the Change drawing view... submenu

Or:

- Click the  icon.

How to switch to the drawing view:

- Select the Drawing option in the View menu in the Change drawing view... submenu

Or:

- Click the  icon.

7.5.3 Laser moves option

In the graphic window of the VLM editor the Laser moves (galvo mirror movement when the laser beam is turned off) can be visualized with black dotted arrows.

To turn the visualization on or off, click the Laser moves option in the View menu.

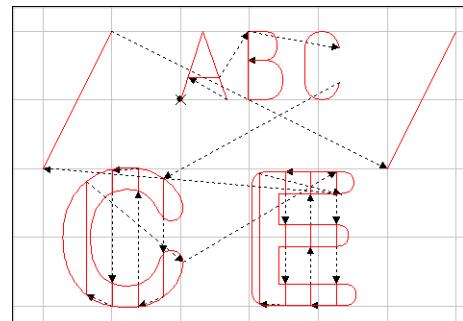


Fig. 7.5.3/1 Laser moves option

7.5.4 Marking direction option

The Marking direction can be visualized by arrows in the graphic window of the VLM editor.

To turn the visualization on or off, click the Marking direction option in the View menu.

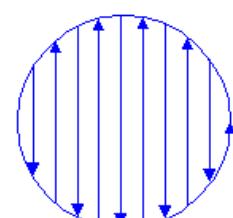


Fig. 7.5.4/1 Marking direction option

8 Executing a VLM drawing with the laser

The tools listed in the table for executing a VLM drawing with the laser are available in the VLM graphic editor: The execution tools can also be found via the tool symbol, in the menu File / Execution, or can be activated via keyboard input of the shortcuts.

Later on in this section you will discover how to execute a drawing with the laser several times, large drawing objects divided into several parts (only if your laser system has a double head or axes) and how non-planar surfaces such as cylinders can be marked (only if your laser system has a turning mechanism).

Additional topics in this section are on-the-fly marking, that is, marking while both the workpiece and the galvo are moving and the use of the optional positioning help.

8.1 Initializing the hardware or terminating the hardware access

As the hardware components, for example the Ali board, are available only once, the execution with a marking tool is not possible as long as another one accesses to the hardware components. For this reason the functions Initialize hardware and Terminate hardware access have been introduced in the graphic editor.



Initialize hardware

This icon activates the exclusive access to the hardware components.



Hardware access termination

This icon releases the hardware components which enables other execution tools to access to them.

If the function Initialize hardware is not activated explicitly by the user before starting the positioning help or the marking process, this is done implicitly by the software on starting the first application. If a hardware component is used by another execution tool an error message will be displayed on the message window.

8.2 Load and start marking job



Load job (for job files only)

The layout (*.vlj) is loaded as a marking job. A check is made as to whether the parameters defined in the layout match the settings in the machine configuration. Afterward, marking can begin.

- i** While Load job is activated, the editing possibilities are deactivated.



Delete job (for job files only)

The job sent will be deleted; it is possible to edit again.



Start marking

Activating this icon executes a marking with the laser. Alternatively, marking can be started by pressing the [F9] key.

The start of marking may be triggered also externally via hardware signal. To do this, the **Allow external start** option must be activated. » *Section 'General settings'*.



Activating this icon cancels the execution with the laser. Alternatively, the marking process can be cancelled by pressing the [F10] key.

8.3 The multiple marking process

Multiple marking is determined by a sequence of laser parameter sets. To this end, you must set up a list of laser parameter sets for an object. With each entry in the list, the drawing object is executed with the corresponding LP set once. This allows drawing objects even with alternating laser parameters to undergo the multiple marking process.

» *Section 'Assigning of the laser parameter sets'*.

- i** With the multiple marking of hatched groups, the hatching is executed completely before the contour is marked.

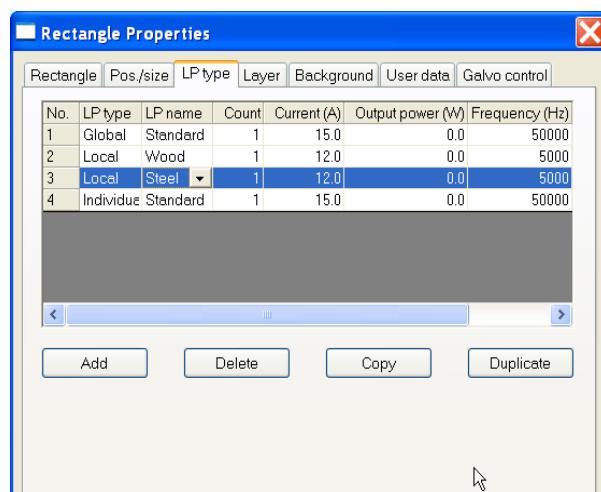


Fig. 8.3/1 Sequence of laser parameter sets

8.4 Marking with a double galvo head

The maximum marking area depends on the laser configuration. If your laser system has neither a double head nor axes, the maximum marking area is the area covered by the marking window. If your laser system is equipped with a double head or with axes, the marking area is extended.

In the example below (Fig. 8.4-1) a double galvo head has been defined in the machine configuration. The two marking windows are permanently linked to one another.

- [1] Drawing area and, at the same time, the maximum marking area
- [2] Two overlapping marking windows
- [3] Overlapping area
- [4] Maximum marking area in X direction
- [5] Maximum marking area in Y direction

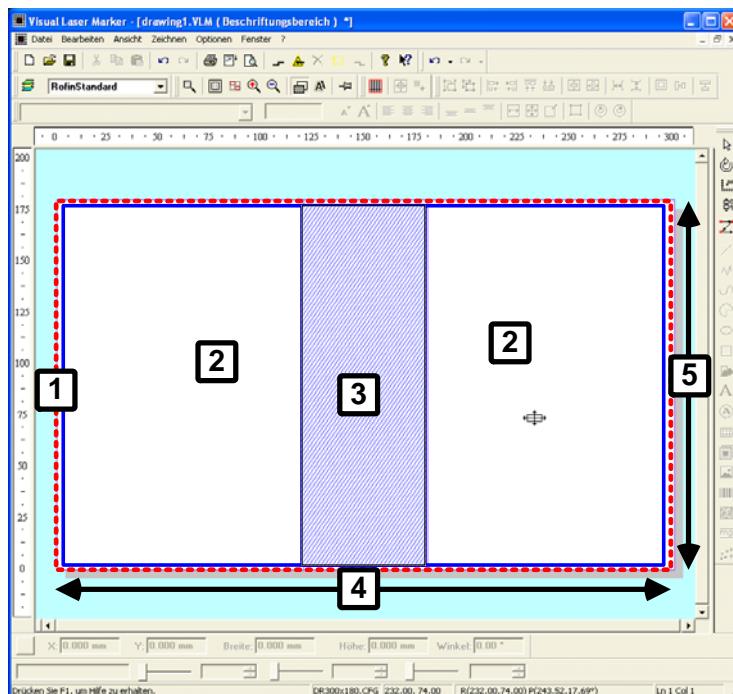


Fig. 8.4/1 Marking area for double head

8.5 Marking with axes

The maximum marking area can be enlarged by using axes. If the machine is equipped with one or more axes they are defined in the machine configuration.

If the Z axis is initialized during machine configuration, marking can take place on various levels. If the Z axis is activated, the height of the Z-axis is set in the layer list. If both the Z axis and the W axis are activated, VLM calculates the Z-axis positions from the settings of the cylinder in the Workpiece and cylinder dialog. The values for the height of the Z-axis which have been calculated from VLM can be viewed and adapted in the layer list (» section 'Working with layers').

In the example below (Fig. 8.5/1), a single head with an X axis with a traversing range of 600 mm and a Y axis with a traversing range of 400 mm have been defined during machine configuration. This results in a maximum marking area of 720 x 520 mm.

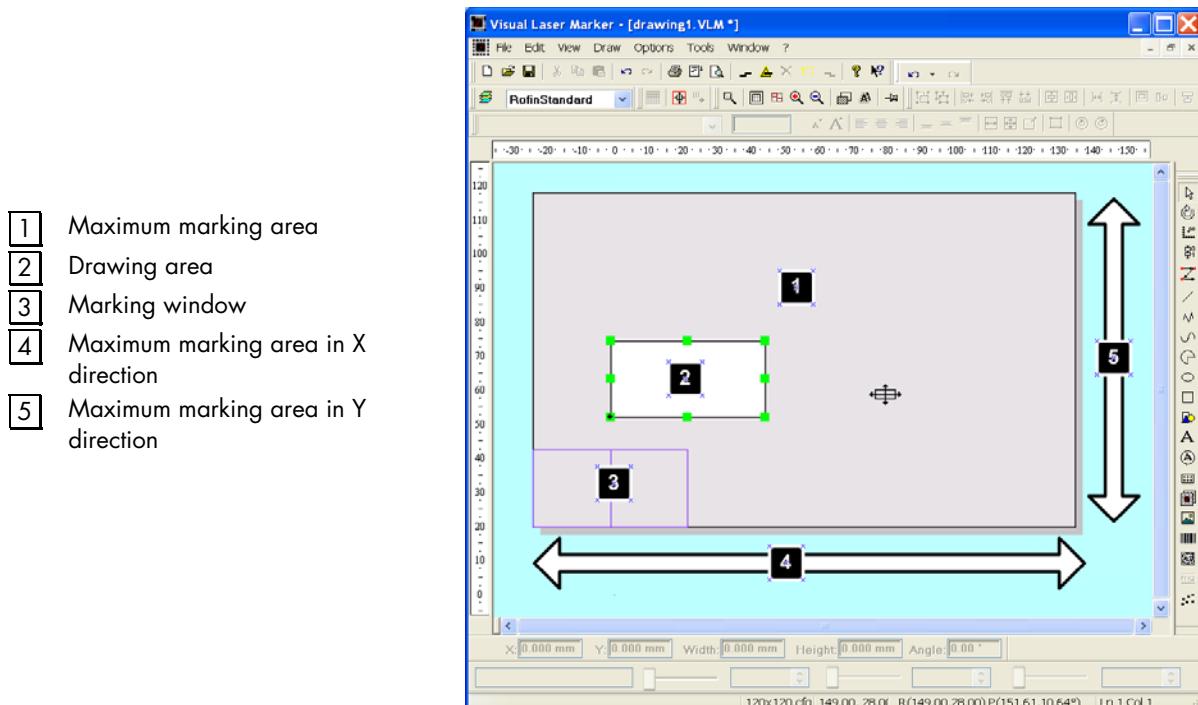


Fig. 8.5/1 Marking area when marking with axes

The Workpiece and axes settings dialog

It is possible to define the workpiece and its position relative to the galvo head for every drawing in the dialog **Workpiece and axes settings**. Here you can also set which of the available axes should be used in each drawing.

Depending on which surface you wish to mark – plane or cylinder – corresponding options are called up in the dialog.

» *Detailed information on marking with cylinder and axes is provided in the online documentation 'Workpiece and Axes'.*

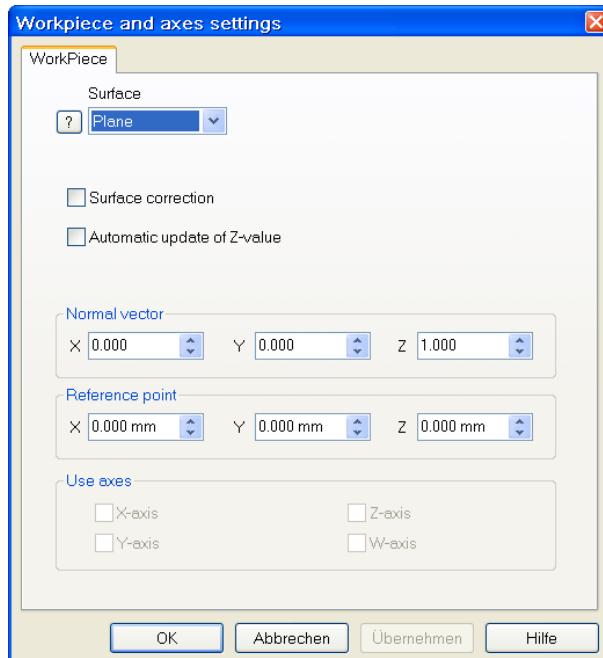


Fig. 8.5/2 Workpiece and axes for surfaces settings

The dialog for marking a surface contains the following options:

?	Click this button to open the Surface online Help file.
Surface	From the list box, select Plane or Cylinder. The options in the dialog field page change depending on the setting.
Surface correction	Activating the (☒) checkbox compensates for the distortion of the marking due to the surface.
Automatic update of Z-value	By activating the (☒), the Z-Axis position of the layer is automatically adjusted.
Normal vector	It is determined here whether the plane is inclined in the X, Y or Z direction.
Reference point	The reference point of the work piece is precomputed from VLM, starting from the position of the work piece.
Use axes	Selection of the linear axes (X, Y and Z-) and of the rotational axis (W).

The dialog for marking a cylinder contains the following options:

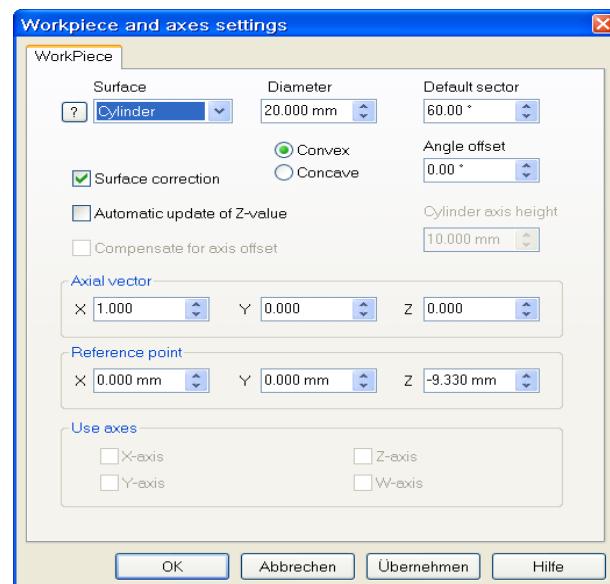


Fig. 8.5/3 Workpiece and axes for cylinders

Surface	From the list box, select Plane or Cylinder. The options in the dialog field page change depending on the setting.
Diameter	In the cylinder marking, enter the radius of the cylinder [in mm].
Default sector	If the axis is used, the default sector defined here corresponds to [in degrees] the circular sector in which the marking is executed without turning the cylinder. The size of the sector determines the width and height of the marking window.
Surface correction	By activating the (checkbox), the distortion of the marking, caused by the cylindrical surface, is compensated for.
Konvex / concave	With this radio button the inner and outer surface of the cylinder is selected.
Angle offset	The angle offset determines the rotation of the axis (W) around the specified value before the execution.
Automatic update of Z-value	By activating the (checkbox), the Z-Axis position of the layer is automatically adjusted.
Cylinder axis height	If the Z-axis, and no cylinder axis, is used for the cylinder marking and the cylinder is located on a mount, then the addition height of the mount is entered in this field. The Z-Axis position of the layer is automatically adjusted with this value. When the cylinder axis is activated, this option cannot be selected.
Vector of the axes	Direction vector of rotational axis of the cylinder.
Reference point	The reference point of the work piece is precomputed from VLM, starting from the position of the work piece.
Use axes	Selection of the linear axes (X, Y and Z) and of the rotational axis (W).

8.6 Marking large drawing objects

Drawing objects that extend beyond the size of a marking window can be divided into several parts and output with the laser.

- i** Bitmap objects cannot be divided.

To do this, the Activate clipping checkbox () must be activated in the Options menu under Drawing settings... on the Options dialog field page.

If the Head shadow option is checked () , the number of axis movements in the X/Y plane or the number of beam switches is minimized.

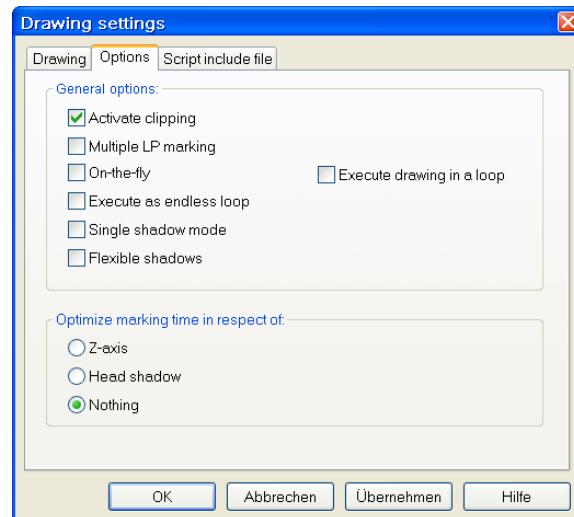


Fig. 8.6/1

- i** This option is only available if your system is equipped with a focusing axis or a double head and beam switch.

Division of drawing objects is controlled by the marking window, i.e. with an object that is divided over several marking windows, the part of the object that is inside the marking window in question is output with the laser. If the entire drawing object is within a marking window, it is output with the laser when this drawing window is executed. In the example (Fig. 8.6/2), a large logo is marked in six stages.

! Objects in overlapping marking windows are marked several times!

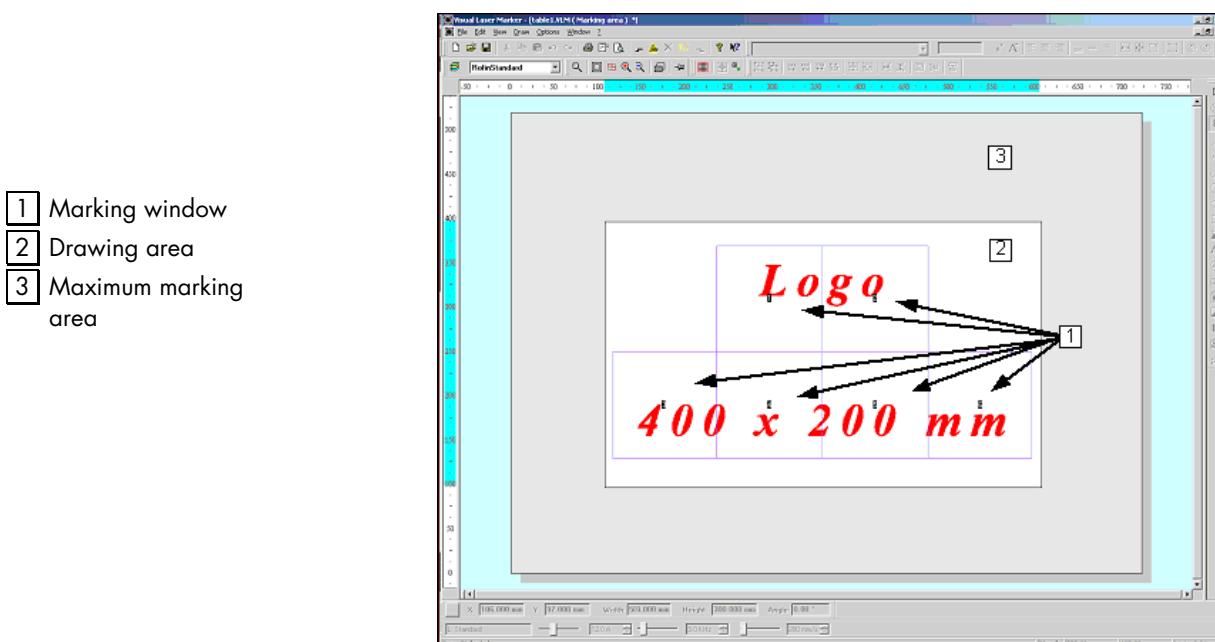


Fig. 8.6/2 Dividing large drawing objects
(XY table with a traversing range of 600x400mm)

8.6.1 Automatic generation of marking windows

VisualLaserMarker offers the opportunity to automatically generate marking windows. Here the required parameters are set automatically (» Fig. 8.6/1) and an optimal sequence of the marking windows and axis movements is defined. The precise number of marking windows are generated so that all objects in the drawing are marked. Manual re-working of the positions of the marking window is possible.

 Bitmap objects cannot be divided.

With automatic generation of marking windows, on the menu bar under Options / Editor settings, the following attributes can be adapted: » Fig. 10.1/1

Start position offset	Here it is possible to enter an offset for the first marking window in percent with respect to the size of the marking window. Positive and negative values can be entered here.
Shadow overlap of the marking windows	Here it is possible to enter that the marking windows should overlap one another. The input is a percent value with reference to the size of the marking window.  Objects in overlapping marking windows are marked several times!

 **This is how to generate marking windows automatically:**

- Click on the  icon to switch to the Marking area view.
- From the Edit menu, select the Automatic splitting option.

The Automatic splitting function is only activated in the Marking area view.

The marking windows are generated automatically.

» Fig. 8.6/2.

8.6.2 Manual generation of marking windows

If your laser system is equipped with an XY table, the tool for generating a new marking window is activated. In the marking area view several, even overlapping, marking windows can be generated and positioned by moving in the marking area by clicking the  icon. Every marking window represents a X/Y position.

Changing the sequence of marking windows will change the sequence of axis movements.

» Section 'Determining the execution order'.

 **How to create additional marking windows:**

Click on the  icon to switch to the Marking area view.

Click the  icon or select the Marking window option from the Drawing menu.

The new marking window will be inserted in the maximum marking area at the bottom left.

- Position the new marking window by dragging it with the mouse or by entering the X and Y values in the positioning bar.
- i** The marking windows can also be arranged using the alignment functions.
- Proceed in this way to create the number of marking windows required to completely cover your drawing object.

8.7 Marking of non-planar surfaces

Non-planar surfaces such as cylinders, for example, can be marked with the aid of a turning mechanism. This way the part is rotated around the w axis and the surface currently facing the laser is worked on. The W axis must lie parallel to the X or Y axis of the marking field. In the case of cylinder marking, the available marking area is limited by the workpiece surface or by the depth of focus of the laser. This results in smaller marking windows, depending on the diameter of the cylinder. They are created from VLM (» Automatic splitting) or manually with the icon  and must be positioned at the corresponding location.

In the example (Fig. 8.7/1), a diameter of 60 mm and the depth of focus of the laser result in a field size of approx. 120x27 mm. In order to be able to process the entire cylinder, seven fields are therefore required ($60 \text{ mm} * \pi = 188.5 \text{ mm}$; $188.5 \text{ mm} / 27 \text{ mm} = 6.98 \text{ fields}$).

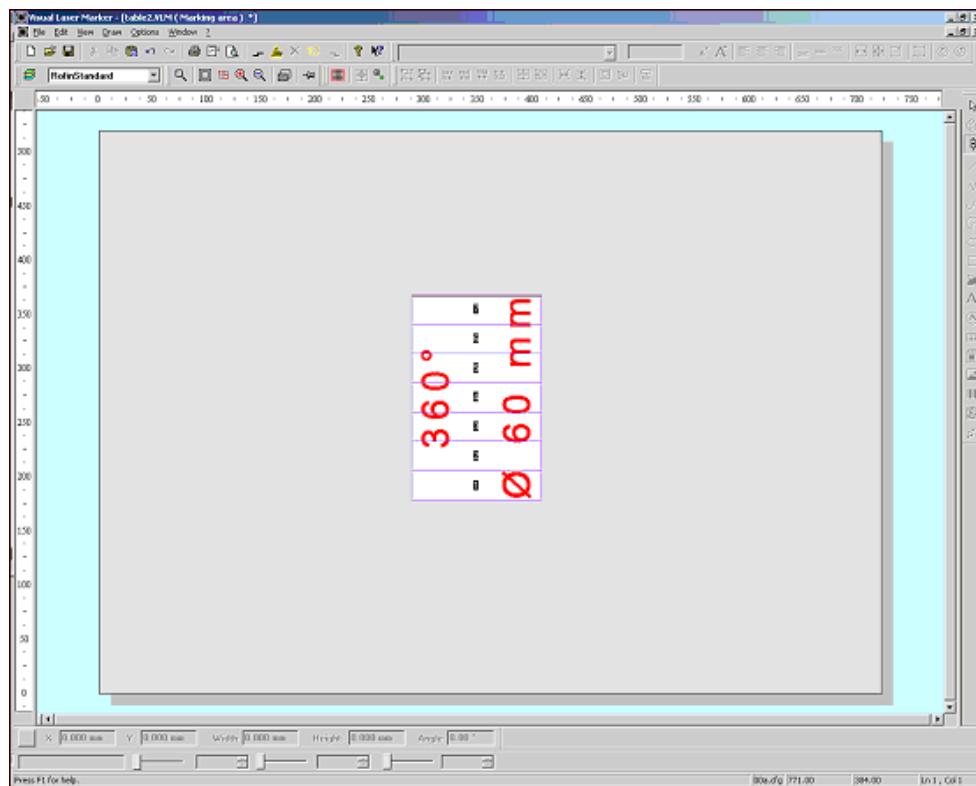


Fig. 8.7/1 Cylinder marking

- i** Calculations are in mm not degrees for cylinder processing.

If a machine has n-axes, you move in an n-dimensional space of possible axis positions. Including the layer, the VisualLaserMarker offers three dimensions. If only one layer is used, only two dimensions are

available, as the Z coordinate then remains constant. The two available coordinate axes must therefore be assigned to the reel machine axes. The X machine axis is usually assigned to the X coordinate and the Y machine axis is usually assigned to the Y coordinate.

With cylinder marking, one of the coordinate axes is assigned to the W machine axis depending on whether the W axis is parallel to the X axis or the Y axis. In the drawing area, therefore, the dot is on the cylinder area $X=0$, $\varphi=0^\circ$ or $\varphi=0^\circ$, $Y=0$.

8.8 Marking on-the-fly

For the on-the-fly marking (starting with VLM Version 4.3), the workpiece and the galvo are moved simultaneously. The marking is either started by the external trigger mode or the repetition trigger mode.

If the speed is measured by an encoder, the speed of the workpiece (e.g. on a conveyor belt) can be increased or braked steplessly without causing a distortion of the marking. Marking is only possible while the workpiece is within the galvo field. If the workpiece wanders out of the marking field, the marking is interrupted with an error message.

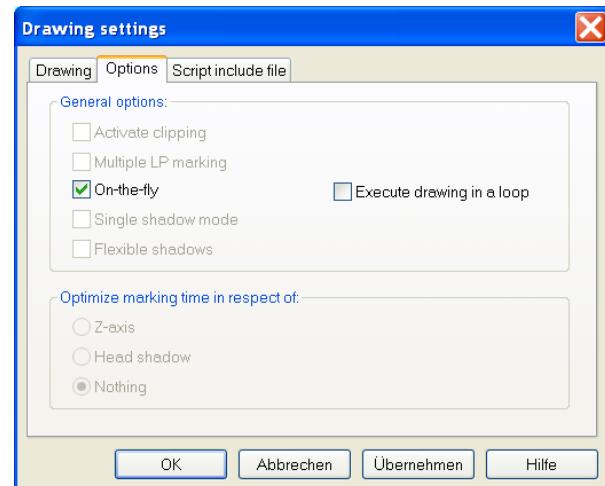


Fig. 8.8/1 Options dialog field page

The marking sequence and position of the marking data should be optimised in the VLM editor to the motion direction of the workpiece.

The On-the-fly functionality must be activated in the machine configuration on the Setup page. To do this, the **On-the-fly** checkbox must be activated in the Options menu under Drawing settings... in the Options dialog field page. If the Execute in a loop option () has been activated, then the drawing will be repeated in a loop until it is canceled.

The following modes (set in the machine configuration) are supported:

- » For additional information about the On-the-Fly marking parameters, see the 'Setup and Tools' online help and the 'On the Fly' documentation under VisualLaserMarker / Documentation / VisualLaser Marker.

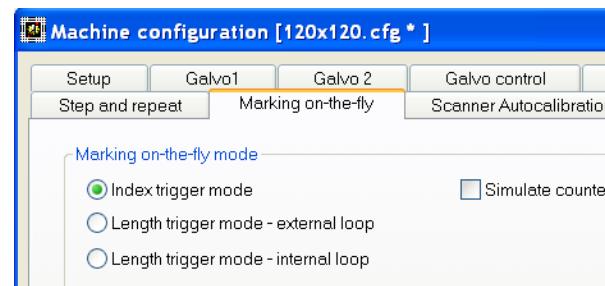


Fig. 8.8/2 Options dialog field page

Index trigger mode:

The workpiece is marked once after it has reached the galvo field. The marking starts with an index impulse at a parallel input on the All card, whereby a start offset [in millimeters] is awaited after the index impulse.

Length trigger mode external loop:	The workpiece is marked continuously after it has reached the galvo field. Between the markings, a path, the repetition trigger [in millimeters] is awaited. The marking data is calculated anew in this external loop mode with each pass in the VLM. If the repetition trigger has expired and the marking data from VLM comes too late, the next marking is interrupted with an error message. In this mode, for example, serial numbers can be marked.
Length trigger mode internal loop:	Functionality like that for the length trigger mode external loop, the marking data is kept internally and thus on each repetition, only identical content is marked.

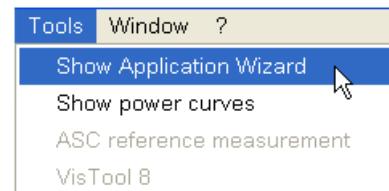
8.9 The application wizard

The application wizard assists in finding the correct laser parameters for the optimal marking result on the material to be marked.

In this process, a drawing with different laser parameters is generated in a test marking. The laser parameters can be graduated increasingly finely from test marking to test marking until an optimum result is achieved. The set of laser parameters with which the best marking result was achieved can then be saved and is therefore available for all drawings.

The application wizard is accessed via the Tools > Show application wizard menu.

» A more detailed description of the application wizard can be found in the online documentation, 'The application wizard'.



8.10 The positioning help (optional)

 With the positioning help, the size and the position of a marking can be visualized and changed, if desired, before its execution. For this purpose a laser diode is integrated in the beam path of the laser. A rectangle framing the current marking appears in the marking field.

i For using the positioning help a drawing must be open in the VLM graphic editor. If the positioning help is started without any selection, the bounding rectangle of the part of the current drawing that will be executed with the laser is gone over by the pilot beam.

Additionally it's possible to position single or various selected graphic objects by moving, scaling or rotating the objects when the positioning help is on. If one graphic object is selected its frame is gone over by the pilot beam. In case of multiple selection the paraxial bounding rectangle around all selected graphic objects is driven over by the pilot beam.

The speed with which the pilot beam travels over the rectangle can be set in the general settings for the editor, » Section 'General settings'.

9 Working with laser parameter sets

Laser parameter configurations for constantly recurring applications can be stored with a name as a laser parameter set. This saves time and has the advantage that subsequent adaptations can be carried out once via a central location. The laser parameter sets can be referenced via the name by the graphic objects.

A laser parameter set contains settings such as speed, lamp current or diode current, wait times, Q-switch frequency, first pulse suppression, etc. In addition, a drawing object can be executed multiple times with the laser by assigning multiple laser parameter sets (» Section 'The multiple marking process').

9.1 Laser parameter tables

In the VisualLaserMarker, there are three laser parameter types available: global, local and individual. The global and local laser parameter sets are organized in a separate laser parameter table.

Reach the laser parameter tables via the menu option Options > Settings for the laser parameters...> Global LP table and Local LP table.

Global	There is only one table available here. It is valid for all drawings that can be found on your computer. By using global laser parameter sets, a drawing can be kept free from concrete laser parameter values.
Local	There is only one table available per drawing. All objects contained in the VLM file can share these laser parameter sets according to name reference. Laser parameter settings can be quickly and centrally adapted (e.g. to different materials) using this referencing mechanism. Should the VLM file be sent via the network, for example, local parameter sets are automatically transmitted also as they are saved in the VLM file.
Individual	An LP set is created for each drawing object. ■ The individual laser parameter set is not available to the burst object. If the burst object has an individual laser parameter set, a local burst parameter set is chosen.

In the upper part of the LP table dialog, laser parameter sets can be edited, created, deleted and copied. Use the corresponding buttons to do so. Double-clicking on a laser parameter set also opens the laser parameter dialog.

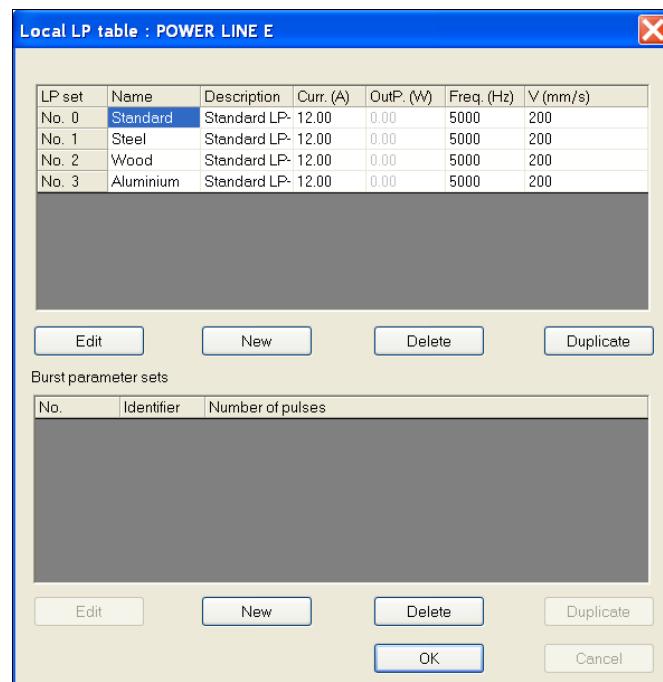


Fig. 9.1/1 Laser parameter table, e.g. global

The meaning of the buttons on this dialog field page is as follows:

[Edit]	Editing the selected laser parameter set.
[New]	Generating a new laser parameter set or a new burst parameter set.
[Delete]	Deleting the selected laser or burst parameter set.
[Duplicate]	Duplicating the selected laser parameter set.
[OK]	Confirming the input and closing the table dialog.
[Cancel]	Discarding the input and closing the table dialog.

9.2 Assigning of the laser parameter sets

The parameters for the global, local and individual laser parameter sets of your object or your drawing are set in several properties pages corresponding to the type of laser system you have. The following sections describes these properties pages.

Depending on whether a drawing object is to be executed once or multiple times, the laser parameter sets are assigned using various dialogs.

Single marking

With single marking it is possible to set the Laser Parameter Type for the object on the LP type properties page. Global and local laser parameter sets are referenced several times by their name. The name of the referenced LP set is shown on the list box of the LP-Type properties page. Other laser parameter sets can be assigned to the object from the list box.

i The global laser parameter set is set as the default.

When using the global or local laser parameter types, the associated laser parameter properties of the named laser parameter sets can be found in an extra dialog. This extra dialog (» Fig. 9.3/1) opens if the [Edit] button on the LP type property page of the object is clicked.

When using the individual LP type, the LP properties pages can be found directly in the object's properties dialog.

The LP type properties page contains the following options:

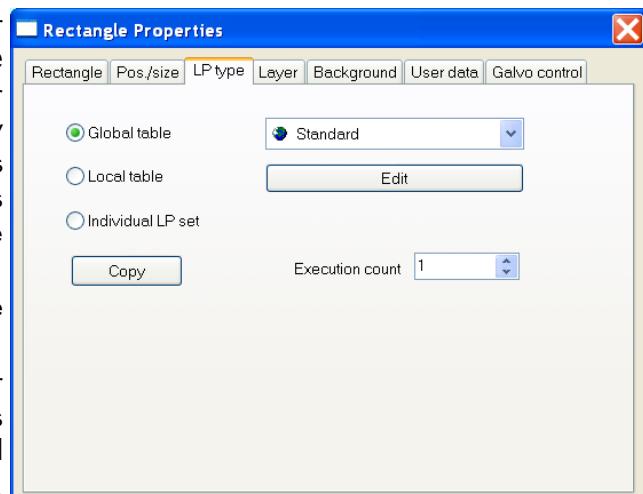


Fig. 9.2/1 Editing of laser parameter sets

Global table:	There is a table containing laser parameter sets designated by names for every laser type defined in the machine configuration. By using the names, the same laser parameter (LP) set can be assigned to any object – even different VLM drawings. By using global laser parameter sets, a drawing can be kept free from concrete laser parameter values.
Local table:	Each VLM file contains a table with named laser parameter sets. All objects contained in the VLM file can share these laser parameter sets according to name reference. Laser parameter settings can be quickly and centrally adapted (e.g. to different materials) using this referencing mechanism. Should the VLM file be sent via the network, for example, local parameter sets are automatically transmitted also as they are saved in the VLM file.
Individual LP set:	Assigns an individual laser parameter set to the object. Once you have selected the individual LP set, the property screens for the laser parameters are inserted into the properties dialog of the drawing object. i The individual laser parameter set is not available to the burst object. If the burst object has an individual laser parameter set, a local burst parameter set is chosen. » Section 'The burst object'.
Versions	In this field you can enter how often a drawing object should be executed.

The meaning of the buttons on this dialog field page is as follows:

[Copy]	Permits the copying of a laser parameter set. A laser parameter set from the global table can for example be copied into the local laser parameter table. An individual laser parameter set can be copied into the local or global laser parameter table.
[Edit]	Editing individual parameters of the displayed laser parameter set.

Multiple marking

For multiple markings, a drawing object is executed with a sequence of laser parameter sets. The individual parameters of the global, local and individual LP sets are listed on the LP-Type properties screen of the drawing object. On the LP-Type properties page, the available LP sets can be assigned to and edited for a drawing object.

When using global and local LP sets, it is also possible to open the global or local LP table via the Options > Laser parameter settings...> by clicking on the [Edit] button.

On the Laser parameter type properties page assigned to the drawing objects, the laser parameter sets are referenced via their name from the laser parameter tables.

The names of the referenced LP sets are displayed on the LP name list box of the LP type properties page. Other laser parameter sets from the list can be assigned to the object.

- i** The settings made remain in effect for all sessions.

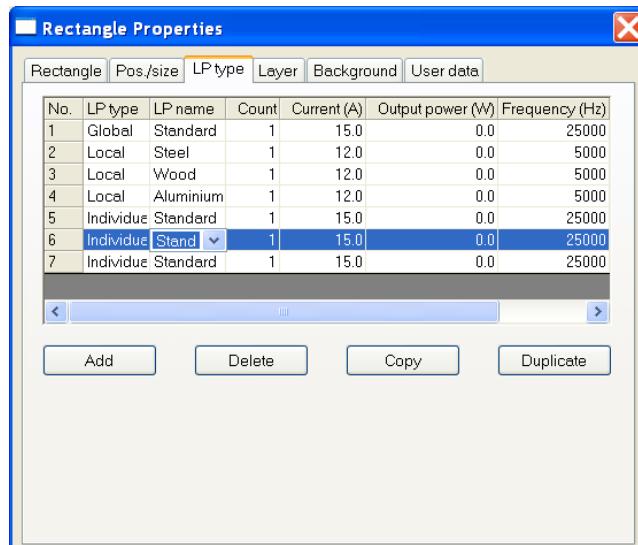


Fig. 9.2/2 Laser parameter sets

By holding the mouse pointer over the display bar and pressing the right mouse button, a context menu will appear from which it is possible to select the laser parameters that should be shown on the LP-Type properties page (✓).

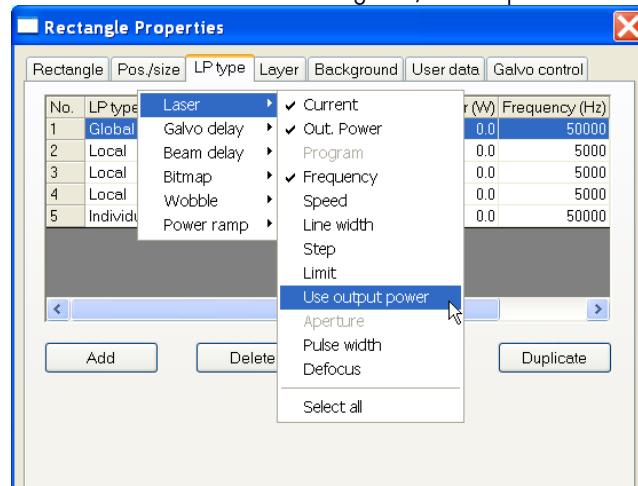


Fig. 9.2/3 Display laser parameter

If you wish to assign a different laser parameter type, then select the required laser parameter from the Laser parameter type list box. The arrow to open the list will be shown when you select the laser parameter type you wish to change.

If a laser parameter (LP) set from the LP table should be assigned, it is possible to select this set from the LP name list. The arrow to open the list will be shown when you select the laser parameter set you wish to change.

The other laser parameters (current, frequency, etc.) can be adjusted directly in the respective input field. You can make an entry by double-clicking on the value to be changed.

The limit values of the laser parameters are defined in the machine configuration on the Miscellaneous screen and cannot be exceeded on the LP type screen.

LP type	LP name
Global	Standard
Local	Steel
Global	Wood
Local	Aluminium
Individual	Standard

Fig. 9.2/4 Assign laser parameter type

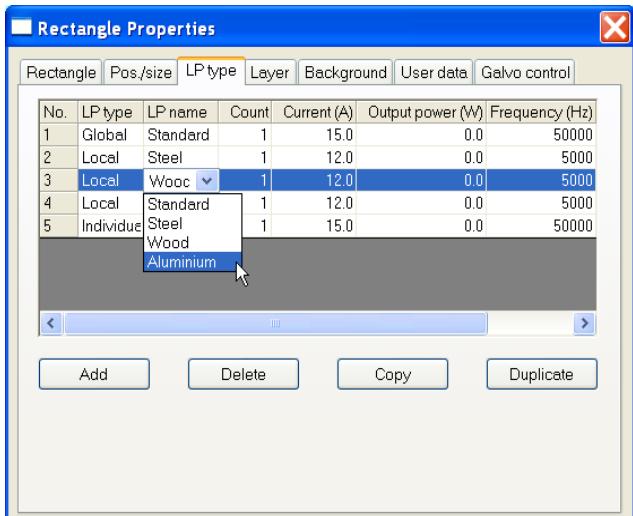


Fig. 9.2/5 Adjust laser parameter

- i** With each entry in the list, the drawing object is created with the relevant LP set once (» Section 'The multiple marking process').

The meaning of the buttons on this properties page is as follows:

[Add New]	With this button, you can add an available global or local laser parameter set from the global table.
[Delete]	With this button, you can delete the laser parameter type selected from the list.
[Copy]	Permits the copying of a laser parameter set. An individual laser parameter set can be copied into the local or global laser parameter table.

9.3 Description of parameters contained in the laser parameter set

The parameters contained in the laser parameter set depend on the type of laser system. The laser type can be set with the tool machine configuration.

The limits of the laser parameter are defined in the machine configuration on the Miscellaneous page. They cannot be exceeded.

You can access the dialog box containing the laser parameters for single marking by clicking on the [Edit] button on the LP-Type properties screen of the object.

For multiple marking, reach the dialog box via the menu Options > Laser parameter settings... > Global or Local LP table > [Edit].

9.3.1 The 'Laser properties page'

- [1] This display appears if an attempt is made to set a power value that is out of the range covered by the measured power curve.
- [2] Point spacing, speed and frequency are interdependent of each other. One of these three parameters can be (exclusively) "set" with these buttons.

On the Laser properties page, the following parameters can be set:

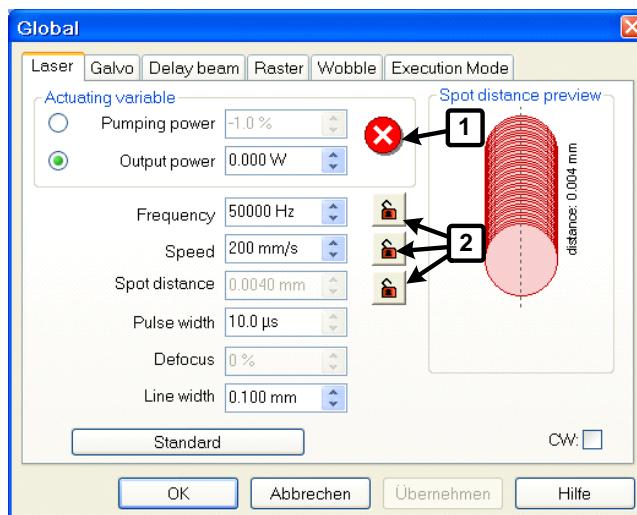


Fig. 9.3.1/1 Laser properties page

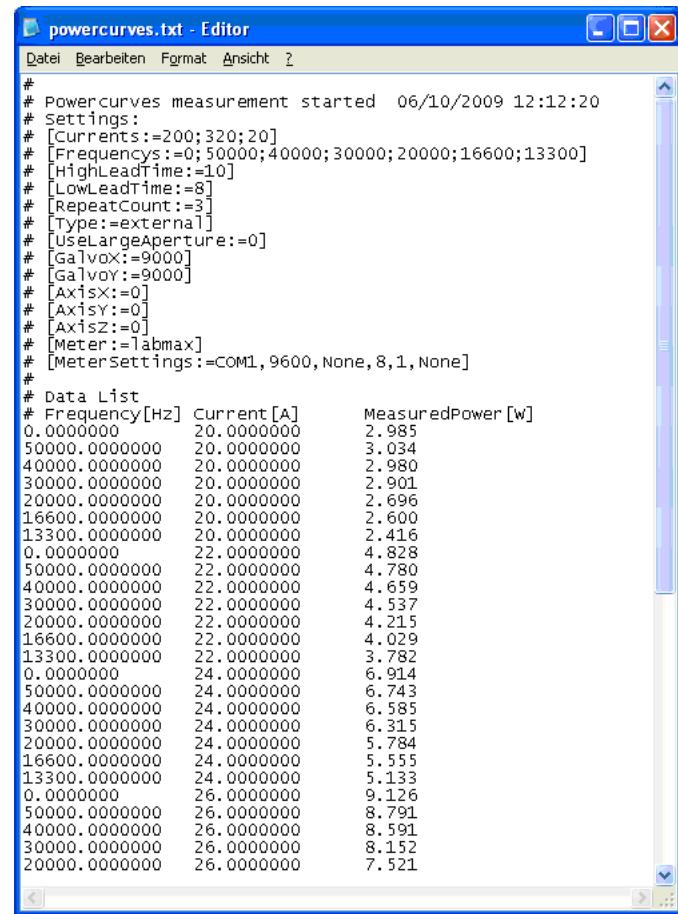
Actuating variable	Up to and including VLM 4.5, the output of the laser can be adjusted only via the current value in the laser parameter set. As of VLM 4.6 there is now the option to specify this also as a power value.
Pumping power	If the pumping power ☈ option has been selected, the laser power is set directly by means of the current value of the power supply unit. The current of the laser source is set in A (amperes).
Output power	If the power output ☈ option has been selected, the desired laser power is set directly in watts. The resulting current is shown comp. grayed out in the pumping capacity field.

As the laser or the laser power supply does not know any power as such, the respective current value must be calculated and displayed internally for each power that is specified in the laser parameters.

This is enabled by a table that is stored in the memory and which contains a set of curves of current values and power values over different frequencies.

Within this set of curves an associated power value can be interpolated with the given power and frequency.

The file for calculating current values and power values is generated in the Create Power Curves program. The calculated values will be written in the Powercurves.txt file. The Create Power Curves program can be found in the Windows start menu under VisualLaser Marker > Tools.



```

# Powercurves measurement started 06/10/2009 12:12:20
# Settings:
# [Currents:=200;320;20]
# [Frequencycys:=0;50000;40000;30000;20000;16600;13300]
# [HighLeadTime:=10]
# [LowLeadTime:=8]
# [RepeatCount:=3]
# [Type:=external]
# [UseLargeAperture:=0]
# [GalvoX:=9000]
# [GalvoY:=9000]
# [AxisX:=0]
# [AxisY:=0]
# [AxisZ:=0]
# [Meter:=Labmax]
# [MeterSettings:=COM1, 9600, None, 8,1, None]
#
# Data List
# Frequency[Hz] Current[A] MeasuredPower[W]
0.00000000 20.0000000 2.985
50000.000000 20.0000000 3.034
40000.000000 20.0000000 2.980
30000.000000 20.0000000 2.901
20000.000000 20.0000000 2.696
16600.000000 20.0000000 2.600
13300.000000 20.0000000 2.416
0.00000000 22.0000000 4.828
50000.000000 22.0000000 4.780
40000.000000 22.0000000 4.659
30000.000000 22.0000000 4.537
20000.000000 22.0000000 4.215
16600.000000 22.0000000 4.029
13300.000000 22.0000000 3.782
0.00000000 24.0000000 6.914
50000.000000 24.0000000 6.743
40000.000000 24.0000000 6.585
30000.000000 24.0000000 6.315
20000.000000 24.0000000 5.784
16600.000000 24.0000000 5.555
13300.000000 24.0000000 5.133
0.00000000 26.0000000 9.126
50000.000000 26.0000000 8.791
40000.000000 26.0000000 8.591
30000.000000 26.0000000 8.152
20000.000000 26.0000000 7.521

```

Fig. 9.3.1/2 Display set of curves in text form

The set of curves in graphic form, as it can be displayed from the VLM.

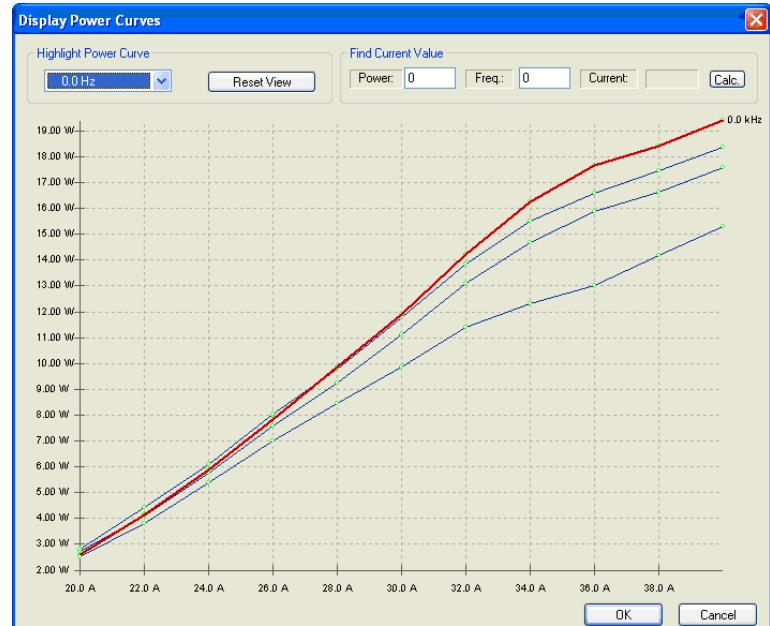


Fig. 9.3.1/3 Display set of curves in graphic form

The VLM can detect and display the plausibility of the individual curves in terms of negative slopes.

Curves with negative slopes are detected (displayed in dashed red).

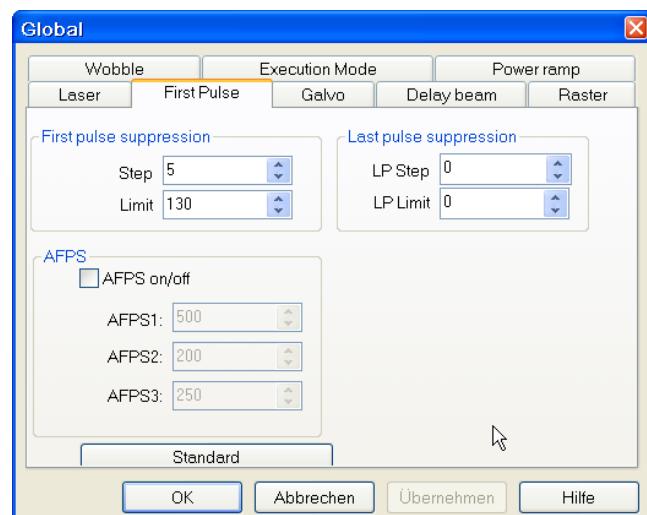


Fig. 9.3.1/4 figure of the set of curves

Frequency:	Q-switch frequency (frequency with which the laser pulses are generated). 0 Hz corresponds to CW operation.
Speed:	Marking speed on the work piece in [mm/s].
Point spacing	The calculated result of frequency and speed. i To receive exactly defined values, a value can be set with the locking buttons.
Line width:	Width of a line generated by the laser. The line width is influenced by different external factors such as laser type and construction, the mode aperture used, the laser current set, etc. The width is measured on the marked work piece and the measured value is entered in this position. This value is the basic width for all filling operations.
Use large aperture:	If your laser system is equipped with a switchable mode aperture and the <input checked="" type="checkbox"/> Switchable aperture option is activated in the machine configuration, in the Laser properties page the Use large aperture checkbox is shown. By activating the (<input checked="" type="checkbox"/>) checkbox it is possible to switch to the large mode aperture.
Pulse width	Duration of the blanking interval. ! The laser type must be taken into consideration when entering a value. i Please use the standard values. Changing the values can result in significantly worse marking results!

Defocusing	If the laser is equipped with a focusing axis (fast focusing module), the lens is moved up or down via the focusing axis by entering a factor in %, thus changing the focusing distance. As a result, the line width created by the laser is affected. In order to use this function, the Activate FFM  must be selected on the Focus movement screen in the machine configuration. This screen can be accessed by clicking on the [Advanced] button on the Galvo 1 screen.
Power ramp	By clicking on the  checkbox, the power ramp properties page is inserted in original size.
[Standard]	Assign the standard values that are defined in the machine configuration to the laser parameters.
CW	The CW mode (0 Hz) can be activated by clicking the  checkbox.

9.3.2 The 'First pulse properties page'



The following parameters can be set on the First pulse properties page:

Fig. 9.3.2/1 First pulse properties page

First pulse suppression	First pulse suppression prevents power bursts on the first laser pulses.	
	Step:	Level for the gradual removal of pulse suppression with each further pulse.
	Limit:	Proportion of the power which is suppressed with the first pulse.

Last pulse suppression	Last pulse suppression can prevent power bursts when braking the galvo head at the end of a line.	
	EP step	Amount for the gradual removal of pulse suppression before the end of pulsing.
	EP limit	Proportion of the power which is suppressed with the last pulse.
AFPS (Advanced First Pulse Suppression):	<p>The first pulse suppression can be performed alternatively by means of AFPS. This improved first pulse suppression results in low intensive laser emission before starting the marking process. The intensity can be altered with the AFPS2 parameter. The higher the value, the lower the intensity. Nevertheless, it may be necessary to use also the conventional first pulse suppression. Since the intensity of the first pulses is considerably reduced by AFPS, low values have to be set, e.g. upper limit 30 / step 20.</p> <p>This option only applies to laser types PowerLine E and PowerLine E SHG2 Long. The relevant laser type must be set in the Machine configuration on the Setup page.</p> <p>AFPS is activated by clicking the checkbox (AFPS On/Off <input checked="" type="checkbox"/>).</p> <p>Default value for AFPS1 is 550, for AFPS2 200 and for AFPS3 250.</p>	

9.3.3 The 'Galvo properties page'

The delay following a laser move is set on the Galvo properties page. The delay depends on the move distance and has a considerable effect on the marking time and the marking result. In order to achieve the shortest execution times possible, the shortest delays possible should be set. The delay rises in a linear fashion up to a variable move distance limit (approx. 5 mm). Afterwards it is constant and independent of the move distance.

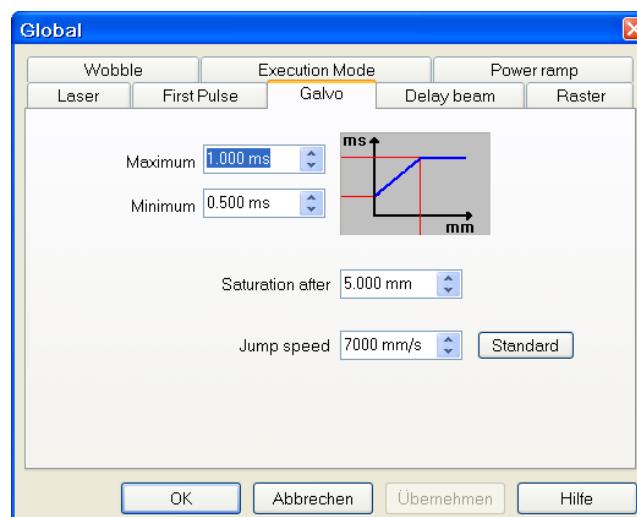


Fig. 9.3.3/1 Laser properties page

The Galvo properties page contains the following options:

Maximum:	Maximum delay following a move.
Minimum:	Minimum delay following a move.
Saturation after:	Move distance limit which achieves the maximum delay.
Jump speed	Speed at which the galvo head should move across areas that are not to be marked. The maximum speed depends on the type of galvo head.
[Standard]	Assign the standard values that are defined in the machine configuration to the laser parameters.

9.3.4 The 'Waiting time properties page

On the Delay beam properties page, the delays are set before the laser beam is turned on or off.

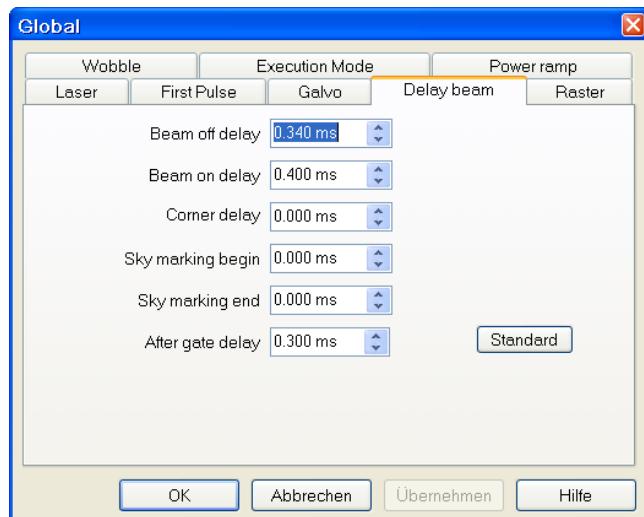


Fig. 9.3.4/1 Delay beam properties page

The Delay beam properties page contains the following options:

Beam off delay:	Delay [ms] which takes effect before Beam off in order to balance the inertia of the marking head at the end of line.
Beam on delay:	Waiting time [ms] which takes effect after Beam on until the beginning of the laser movement.
Corner delay:	Waiting time [ms] between two lines of a polyline. T [ms] is the maximum value, which takes effect when the direction changes by 180°. With smaller changes in direction it is reduced linearly as far as 0.00 [ms]. If 0.00 [ms] is set, the function will switch off.
Start sky marking	Delay [ms] beam on, in order to balance tracking errors. <small> ⓘ Only available for text and rectangle objects, if the options Cross free and On-the-fly have been selected.</small>
End sky marking	Beam off delay [ms]
After Gate delay	The RSM Pulsed Fiber Laser will generate some pulses after switching the gate. Before the next jump will be executed this delay [ms] will become

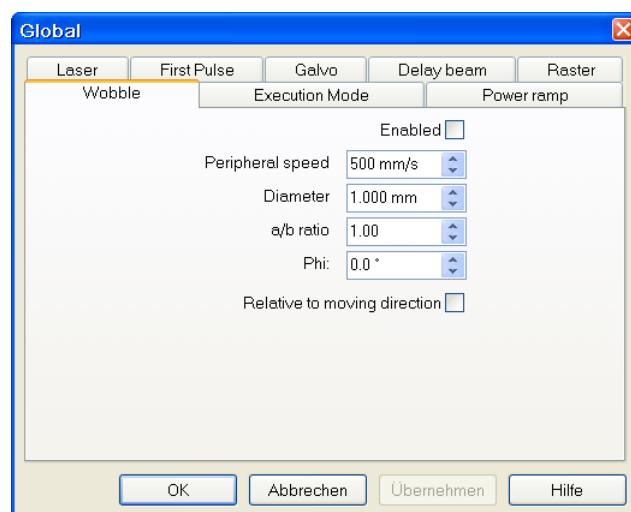
	effective. To minimize marking times, the beam off delay can be reduced. The proposed delay is 0.3 ms.
[Standard]	Assign the standard values that are defined in the machine configuration to the laser parameters.

9.3.5 The 'Grid properties page'

» The options included on the 'Grid' properties page are described in the 'The bitmap object' section.

9.3.6 The 'Wobble properties page'

The laser stroke width varies depending on different external factors such as laser type and construction, the mode aperture used, the laser current set, used material etc. The wobble mode serves to execute lines at any width with the laser. The laser beam moves in form of ellipses, which are determined by diameter and peripheral speed.



The following parameters can be set on the Wobble properties page:

Fig. 9.3.6/1 Wobble properties page

Enabled	The wobble mode is activated by clicking the checkbox <input checked="" type="checkbox"/> .
Peripheral speed:	Peripheral speed of the wobble ellipse.
Diameter:	Diameter of the wobble ellipse.
a/b ratio:	Ratio of axes of wobble ellipse. If the ratio a/b is equal to one, the laser beam moves in form of a circle.
Phi (angle):	Angle of wobble ellipse to the x axis.
Relative to the direction of motion	The alignment of the wobble ellipse changes relative to the direction of motion of the laser beam.

9.3.7 The 'Execution mode' properties page

A vector graphic element can either be output by the laser in burst mode, with continuous output laser beam or in the sky marking mode.

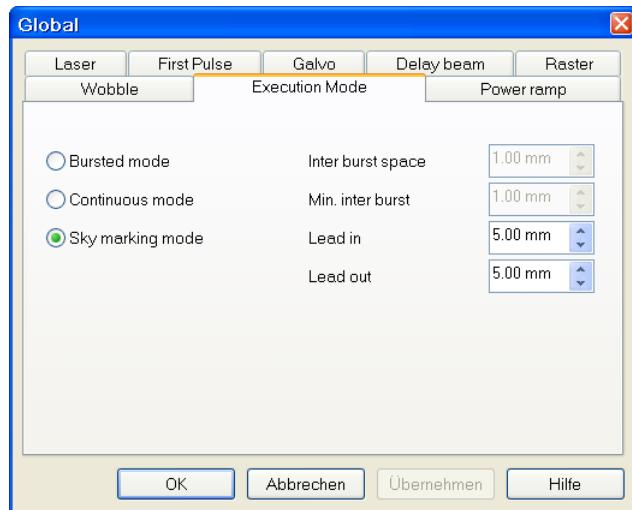
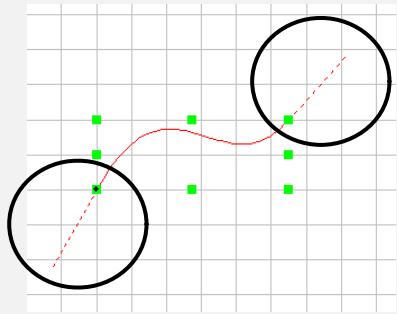


Fig. 9.3.7/1 Execution mode properties page

Burst mode	If this option (◎) has been selected, the respective burst spacing can be set to millimeters. Setting the min. burst spacing specifies that the last burst is always at the endpoint of the vector. The buffer for the burst is no smaller than the min. setting between the bursts.
Continuous mode	If this option (◎) has been selected, then a vector graphic element with continuous laser beam is emitted.
Sky marking mode	If this option (◎) has been selected, then a line is emitted at the beginning and end of a vector graphic element. The acceleration or braking of the Galvo head takes place during this hidden line. In the editor, this mode is visible by dashed lines in the gaps.
	 <p>i The waiting times for beam on / off are set in the Waiting Time properties page, » Section 'The 'Waiting time properties page'.</p>

9.3.8 The 'Power ramp' properties page

It is possible to determine in this properties page that the laser is only started up according to a defined path to 100%, and reduced to a specified percentage at the end of the defined path:

- i** This option is not available for lamp pumped laser systems.

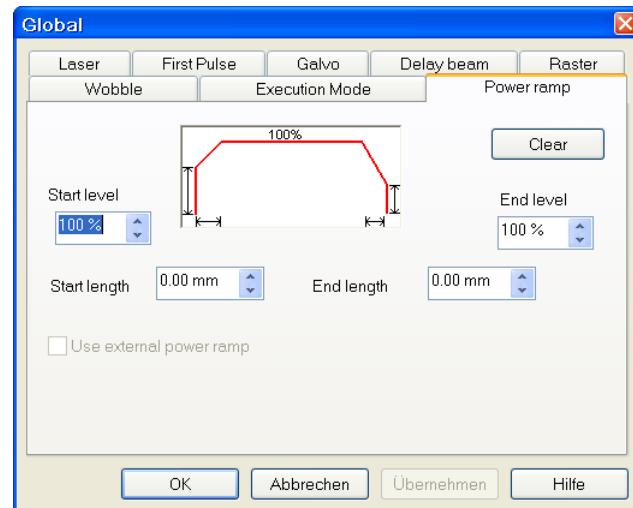


Fig. 9.3.8/1 Power ramp properties page

10 Graphic editor settings

Editor settings which were defined as default settings during installation can be changed in the menu Options under Editor settings...

10.1 General settings

Many of the settings for the VisualLaserMarker user interface and the drawing environment are located in the Dialog field General setting.

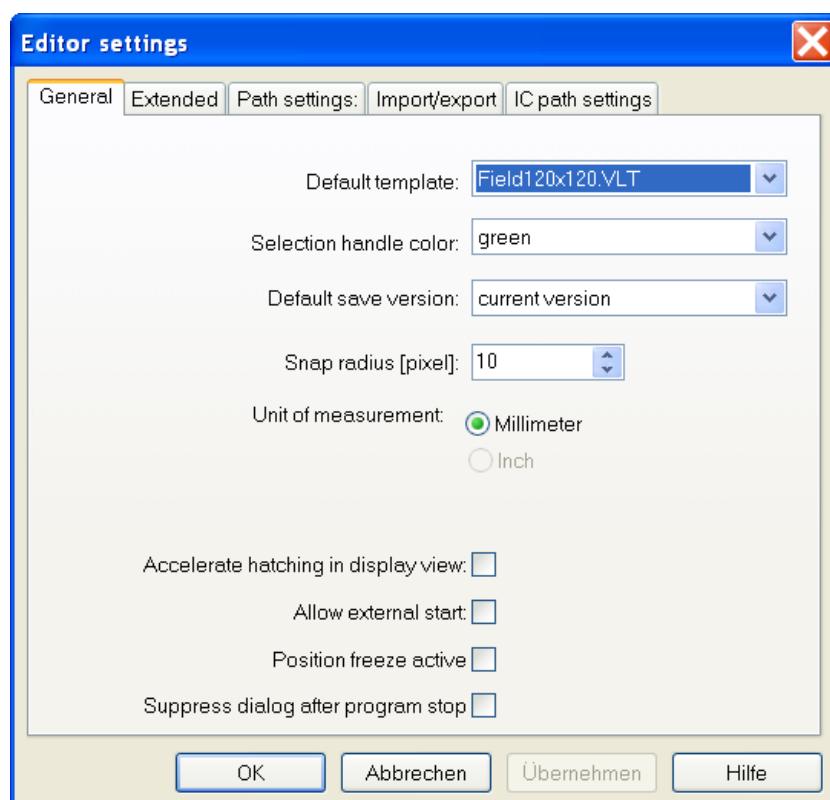


Fig. 10.1/1 General dialog field page

Default template:	Determines the default template.
Selection handle color:	Determines the color for the selection handles of a drawing object.
Default save version	This input field determines in which VLM version your drawings should be stored by default.
Snap radius:	This input field determines in which radius (measured in pixels) the selection of an object takes effect.
Show coordinates:	By clicking the <input checked="" type="checkbox"/> checkbox, the current coordinates of the cursor are displayed in the status bar.
Unit of measurement:	The unit of measurement is millimeter. The option <i>Inch</i> as a unit of measurement is not yet implemented in this version.

Accelerate display view of hatched objects:	In order to increase the speed at which the screen is built up by hatched objects, the hatch lines in the screen display can be suppressed by activating the <input checked="" type="checkbox"/> checkbox. This function can also be activated by clicking the  button; » Section 'Setting the zoom factor'.  This option is not available for the barcode object, the matrix code object and filled true type fonts.
Allow external start:	If this checkbox (<input checked="" type="checkbox"/>) is activated, the start of marking may be triggered externally via hardware signal.
Position freeze active:	By clicking on the <input checked="" type="checkbox"/> checkbox, the Freeze tool – which prevents unwanted moving of the position of all objects in the drawing with the mouse and with the arrow keys on the keyboard – can be used to protect a complex drawing. This function can also be activated by clicking the  button; » Section 'Setting the zoom factor'.

10.2 Advanced settings

The Extended dialog field page contains the following options:

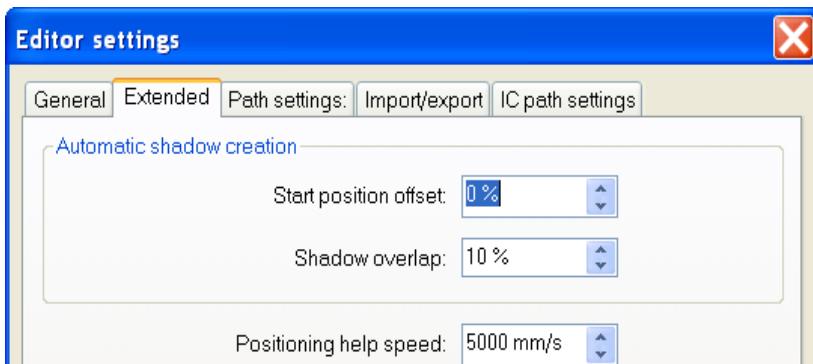


Fig. 10.2/1 Extended dialog field page

Automatic generation of marking windows	These options are attributes of the functionality 'Automatic generation of marking windows'. <input checked="" type="checkbox"/> <i>Start position offset:</i> <input checked="" type="checkbox"/> <i>Shadow overlap of the marking windows:</i> <input checked="" type="checkbox"/> <i>Positioning help speed:</i> <input checked="" type="checkbox"/> <i>Saving global laser parameters in text form</i>
--	--

10.3 Path settings

In the Options menu under Editor settings... it is possible to enter the standard search path for VisualLaserMarker.

- i** The default search paths for importing and exporting DXF files and PLO files can be set on the Import/Export dialog field page.
- i** The default path settings for importing and exporting VIS files and XML files can be entered on the IC path settings dialog field page.

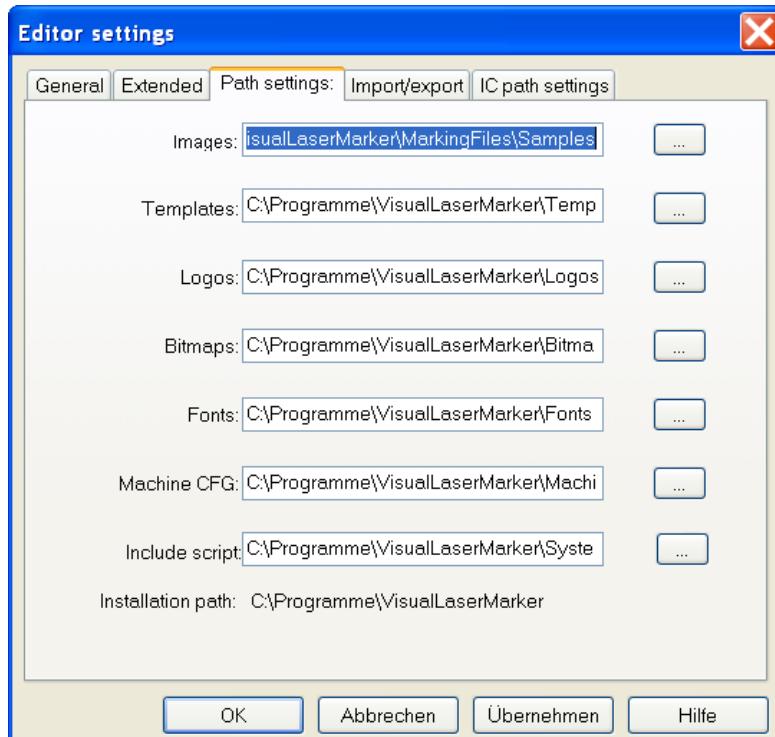


Fig. 10.3/1 Path settings dialog field page of the Editor settings dialog

The Path settings dialog field page contains the following options:

Drawings:	Enter default search path for drawing files.
Templates:	Enter default search path for drawing templates.
Logos:	Enter default search path for logos.
Bitmaps:	Enter default search path for bitmaps.
Fonts:	Enter default search path for font types.
Machine CFG:	Enter default search path of the machine configuration.
Include script:	Enter default search path of the script file. » <i>'The script include file'</i> .
Installation paths:	Shows the installation path of VisualLaserMarker.
[...]	By clicking on this button, the Search folder dialog box is opened, where the appropriate search paths can be set.

11 Import and export of different file formats

The VisualLaserMarker is provided with a number of commands for the import and export of different file formats. The online documentation *Import and export of different file formats* contains detailed explanations of how to import and export various file formats.

The following file formats can be used to importing and exporting:

Import	File format	Description
	PLO	Proprietary format (RofinSinar) which is used with the marking software LaserWorkBench (LWB).
	Logo	Proprietary format (RofinSinar) which is used with the marking software LaserWorkBench (LWB).
	DXF (R13)	AutoCAD format, release 13
	XML	Proprietary format (RofinSinar) for describing information on the layout.
	AI/PS/PDF	Importing Adobe Illustrator, Postscript and PDF files.

Export	File format	Description
	PLO	Proprietary format (RofinSinar) which is used with the marking software LaserWorkBench (LWB).
	Logo	Proprietary format (RofinSinar) which is used with the marking software LaserWorkBench (LWB).
	DXF (R13)	AutoCAD format, release 13
	VIS	Proprietary format (RofinSinar) which is preferentially used with a vision system. A detailed description according to the format is available on request.

The default directories for importing and exporting different file formats may be adapted in the Options > Editor settings... menu, on the Path settings dialog field pages for logo files, Import/Export for PLO and DXF files and IC path settings for VIS and XML files.

11.1 Importing files

There is a detailed list of all properties which cannot be imported in the online documentation '*Import and export of different file formats*'.

How to import a file:

- Create a new document.
- Select the file format to be imported in the menu File > Import.
The file select dialog for the relevant file format appears.
- Select the file to be imported and click the [Open] button.

After successful importing, the drawing generated is adjusted in size and displayed in the drawing view or in the view of the marking area (PLO file). The position of the drawing is shown by the file.

11.2 Exporting files

There is a detailed description of how to export different file formats in the online documentation *Import and export of different file formats*.

How to export a file:

- Select the required export format in the File > Export menu.
- Overwrite the original file or save the edited drawing under a different name.

An export dialog with different export options will appear and the export will be executed.

12 The font editor

The font editor is a tool integrated in the VisualLaserMarker with which character sets existing in the Rofin format *.fnt can be edited and new character sets can be created. It is also possible to copy characters from one character set to another. To facilitate copying of characters, multiple fonts sets can be loaded at the same time.

After opening the VisualLaserMarker you will find the following options in the File menu under Fonts:

New:	With this option you can create a new font. The font-editor opens by clicking on New and a new font file will be created in the font window. It is possible to display in the editing window the characters of the new font which are occupied by placeholders and to generate new characters in place of the placeholders.
[Open]	This option opens an existing font. After you have clicked on Open..., the following selection dialog appears, from which you can select the desired font set.
Save:	With this option, you can save the changes to your font.
Save as...:	With this option, you can save the font under another name.

When you open the font editor, the characters that are present in the font appear in the right half of the screen, while the selected character is displayed in an editing window in the left half of the screen.

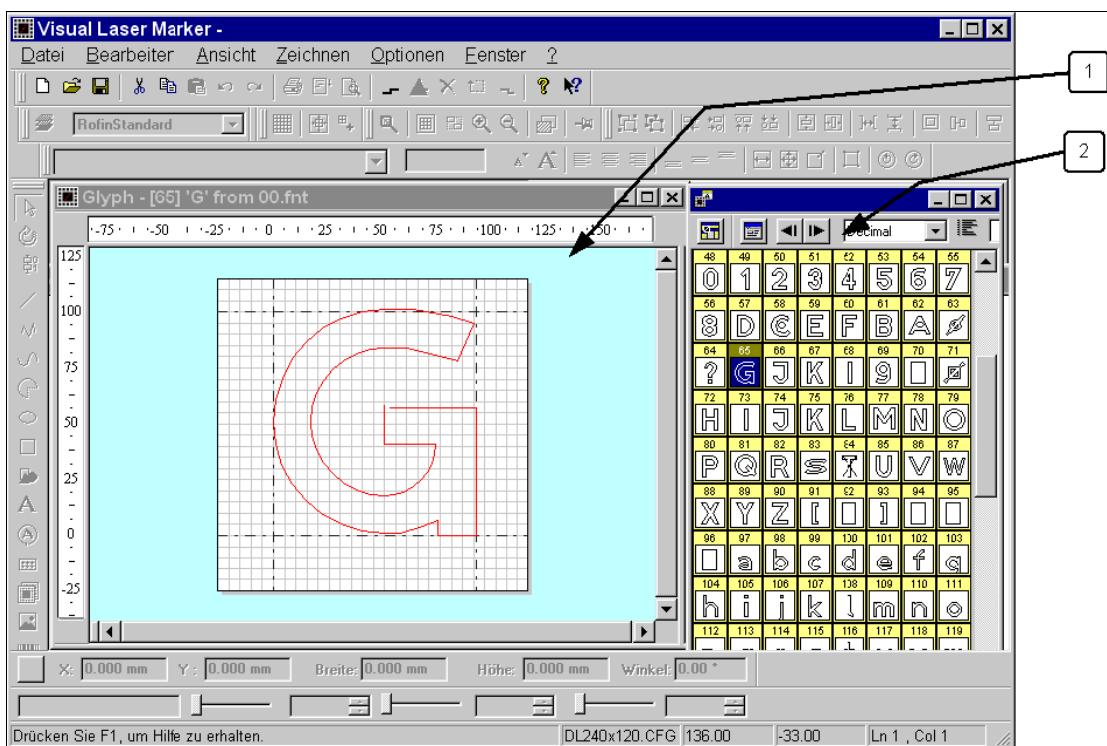


Fig. 12/1 Font-editor – editing and font window

1 = editing window

2 = font window

12.1 Editing and saving characters

You can work with characters directly in the editing window. This is done by using the character tools and editing commands of VisualLaserMarker the graphics editor.

- i** Inserted Bezier curves and bitmaps as well as information about layer and laser parameters cannot be saved in fonts.

☞ How to edit a character:

- Select the desired character from the font that is loaded by double-clicking on it in the font window. The character is displayed in the editing window.

A laser font (*.fnt) consists of a proprietary vector format defined by Rofin-Sinar. Lines, arcs of circles and ellipses, jumps and bursts can be used as character elements. You can select and edit all of these.

☞ How to save an edited character:

- Select any character in the font window by double-clicking on it. A message window appears asking you whether you would like to save the changes that have been made to the character. If you confirm the changes, the image of the edited character is correspondingly adjusted in the font window.
- i** If you close the font editor without saving the most recent changes, you will be asked if you want to save the changes that have been made to the character.

The Properties dialog box contains additional options for editing a character. Numeric values of character elements can be read from the Character data information page. The dialog field page Filtering moves and lines offers the opportunity of optimizing the marking time by filtering out small drawing units. To reach these dialog field pages, select the desired character in the font window and click with the right mouse button. Then select the desired option from the context menu that appears on the screen.

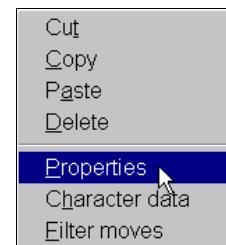


Fig. 12.1/1 Context menu

- i** ttf fonts can be saved in *.fnt format.

In the context menu for characters, you will find the standard editing commands Cut, Copy, Paste and Delete.

The context menu appears if you select a character in the font window and click with the right mouse button (» Fig. 12.1/1 context menu).

☞ How to copy a character:

- Select in the font window the required character and press the right mouse button.
- Select Copy from the context menu shown.
- Move the mouse pointer to the position at which you would like to insert the character and then click with the right mouse button.
- Select Paste from the context menu shown.

For example, if you want to copy between fonts, you can load multiple fonts and then arrange them with the Window pull-down menu.

Dialog field page Symbol

This dialog field page appears if you select a character in the font window and click with the right mouse button. Then select the Properties option from the context menu. The Character Properties dialog box contains the following options for editing a character:

Name:	Here you can assign an individual name to the character. In the list box of the character code available in the toolbar of the font window the coding or the individual name of the character can be set.
Width:	Here you can define the width of the character that is displayed in the editing window using the two dotted auxiliary lines. The character width is used for positioning the character in a text object. If the width of the character displayed in the editing window deviates from the width that was set for the character, you will be asked whether the width of the character should automatically be adjusted to the character elements.
Height:	This field serves only for viewing the character height. Character height can only be adjusted globally for the font. » <i>Section 'The dialog field page Font info'.</i>
Adjust character size to new width:	Clicking the <input checked="" type="checkbox"/> checkbox specifies that the character or symbol will be adjusted to the new width of its basic area. Example 1 The width of the character has been changed. The Adjust character to new width <input type="checkbox"/> checkbox was not activated. Example 2 The width of the character has been changed. The Adjust character to new width <input checked="" type="checkbox"/> checkbox was activated.

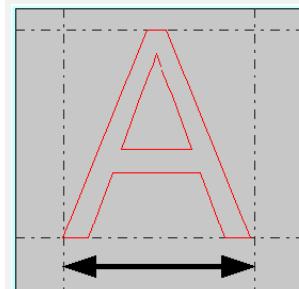
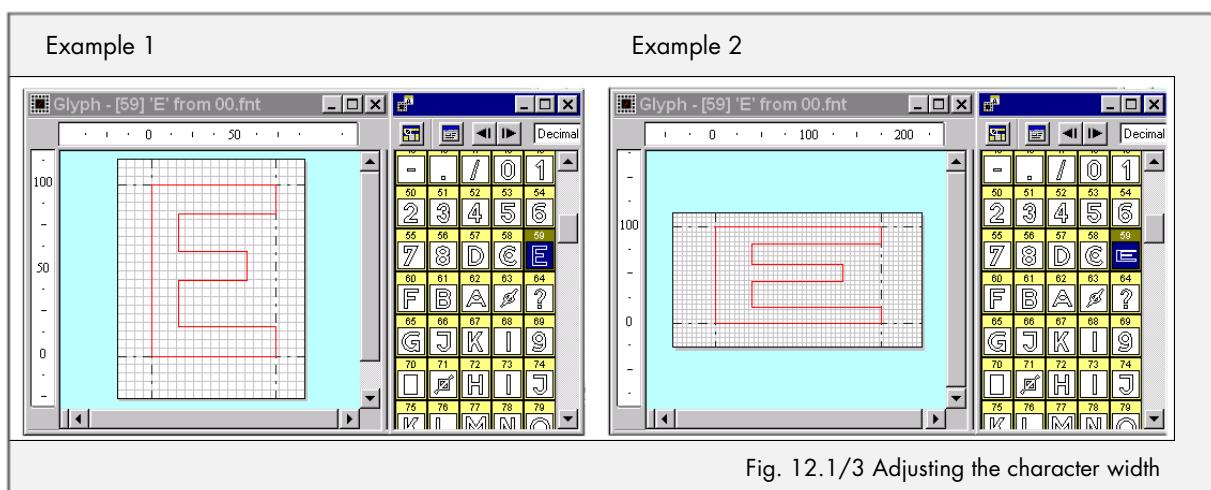


Fig. 12.1/2 Display of the character width



The Character Data information page

This dialog field page appears if you select a character in the font window and click with the right mouse button. Then select the Character Data option from the context menu.

» Fig. 12.1/1 context menu.

Numeric values can be read on the Character Data information page. This means that it is possible to track laser jumps and laser lines.

The dialog field page Filtering moves and lines

This dialog field page appears if you select a character in the font window and click with the right mouse button. Then select the option Filter jumps from the context menu.

» Fig. 12.1/1 context menu.

To minimize marking times, you can filter out certain smaller drawing units. It is possible to affect laser jumps and laser lines.

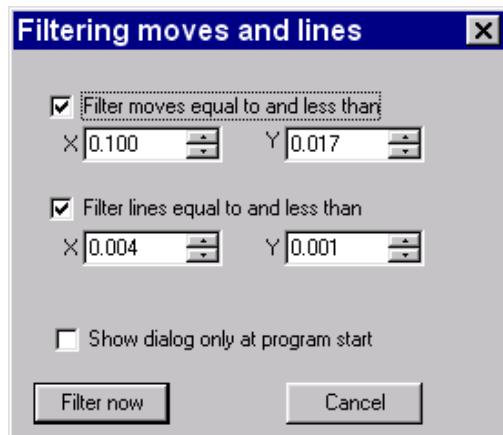


Fig. 12.1/4 Filtering jumps and lines dialog field page

Filter ... moves equal to and less than	Filters laser jumps in the X or Y direction that are less than or equal to the X and Y values specified here. Click on the [Filter] button to start the filtering procedure.
Filter ... lines less than or equal to	Filters laser jumps in the X or Y direction that are less than or equal to the X and Y values specified here. Click on the [Filter] button to start the filtering procedure.
Show dialog at program start only	Clicking the <input checked="" type="checkbox"/> checkbox hides the dialog box that asks about filter values until the next time the program starts.

12.2 The font window

The toolbar for the font window includes the following functions:

	Show editing window:	You can use this icon to cause the editing window to be shown on screen.
	Show font data:	With this icon, you can cause the dialog field pages Font info and Icon size to appear on screen.
	Previous / Next character:	You can select the previous or the next character with the corresponding arrow keys. If changes have been made to the character that is currently selected, a message window will appear asking you whether you would like to save the changes that have been made to the character.
Decimal	Character code:	In this list box you can select how the character code will be displayed; for example, whether it will be decimal or hexadecimal, or the individual character names or widths. » <i>Section 'Dialog field page Symbol'.</i>

The dialog field page Font info

The dialog field page Font info provides you with information about the current character set. You can also adjust the default character height in this dialog.

- Click the icon button in the menu bar of the font window.
- In the Font info dialog field page that appears, enter the desired character height and click on the [Apply] button.

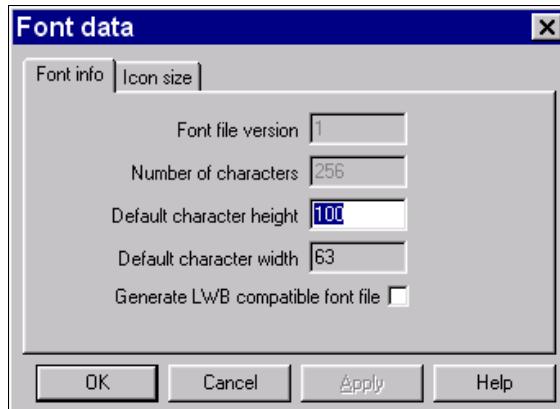


Fig. 12.2/1 Font info dialog field page

- The newly defined value for character height is valid for the entire font.

Default character height	Changing the default character height causes all characters in the font to be correspondingly scaled to the new default height.
Generate LWB-compatible font file	The LWB-compatible character format is limited in some cases to integer values between 32767 and 32768. The expanded font format also includes floating point values. If a font needs to be saved in LWB-compatible format, the precision is determined by the height of the font. You should not choose too large a number for this (about 5000), so as not to exceed the integer value range. If the value range is exceeded, a warning will be generated and the data will be stored in non-LWB-compatible format.

The Icon size dialog field page

To reach the Icon size dialog field page, click on the Font data button . Here you can adjust the size of the characters in the font window. This function provides you with either an overview of the entire font or a detailed view of the characters.

13 Printing VLM drawings

The VLM graphic editor can print drawing files. To select a printer, click the option Print in the menu File. The print dialog pops up.

The page settings can be defined in the dialog field Page setup. Select the Page setup option in the File menu.

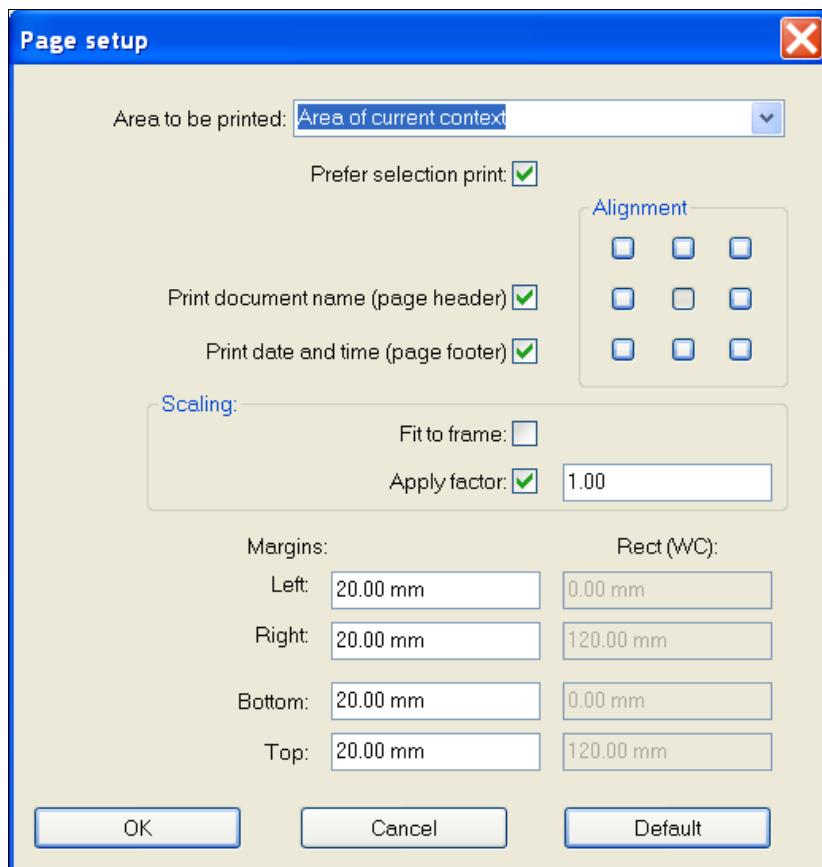


Fig. 13/1 Preview

The following options are available in the Page Setup dialog field that is shown:

Area to be printed:	Area of the current drawing view Drawing area Maximum marking area
	Area specified by rect (WC). Area defined by a rectangle. The size of the rectangle is entered under Rectangle.

Preferentially print selected objects:	Selected format objects are preferentially printed. If no object is selected, the area selected in the Area to be printed is printed.	
Print document name (pageheader):	Prints the document name in the page header.	
Print date and time (pagefooter):	Prints date and time in the page footer.	
Alignment:	Alignment of the drawing in the print area.	
Scaling:	Maximum scale factor:	Automatically calculates each scale factor which maps the print area to maximum size in the available space on the paper.
	Scale factor:	If a fixed mapping factor for the printout is preferred, this can be defined here.
Margins:	Setting the print area margins: left, bottom, right and top.	

Print Preview

Use the print preview to check to settings on the screen. Click on the Preview option in the File menu.

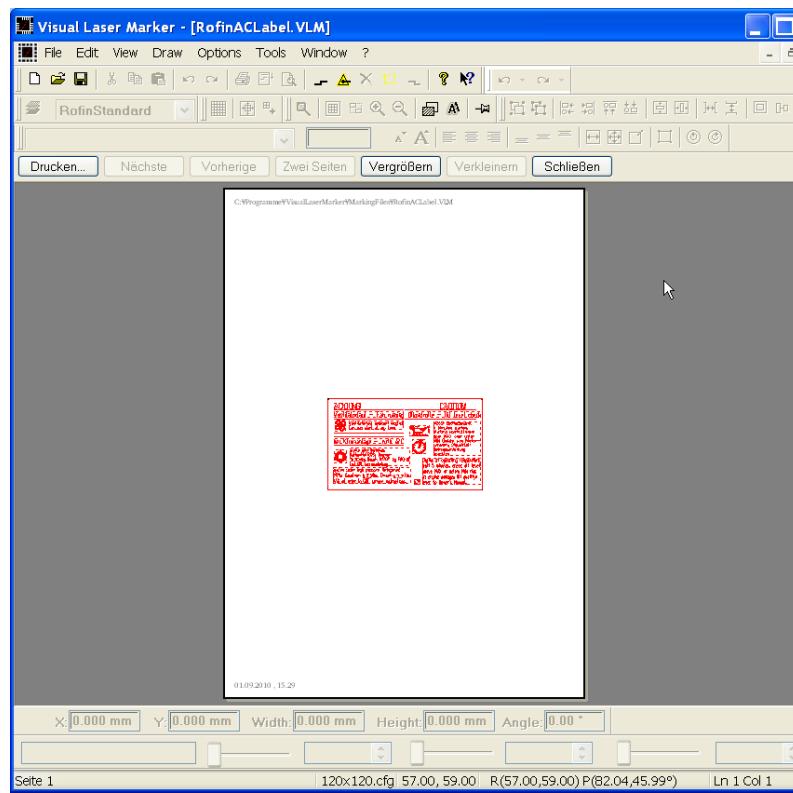


Fig. 13/2 Preview

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