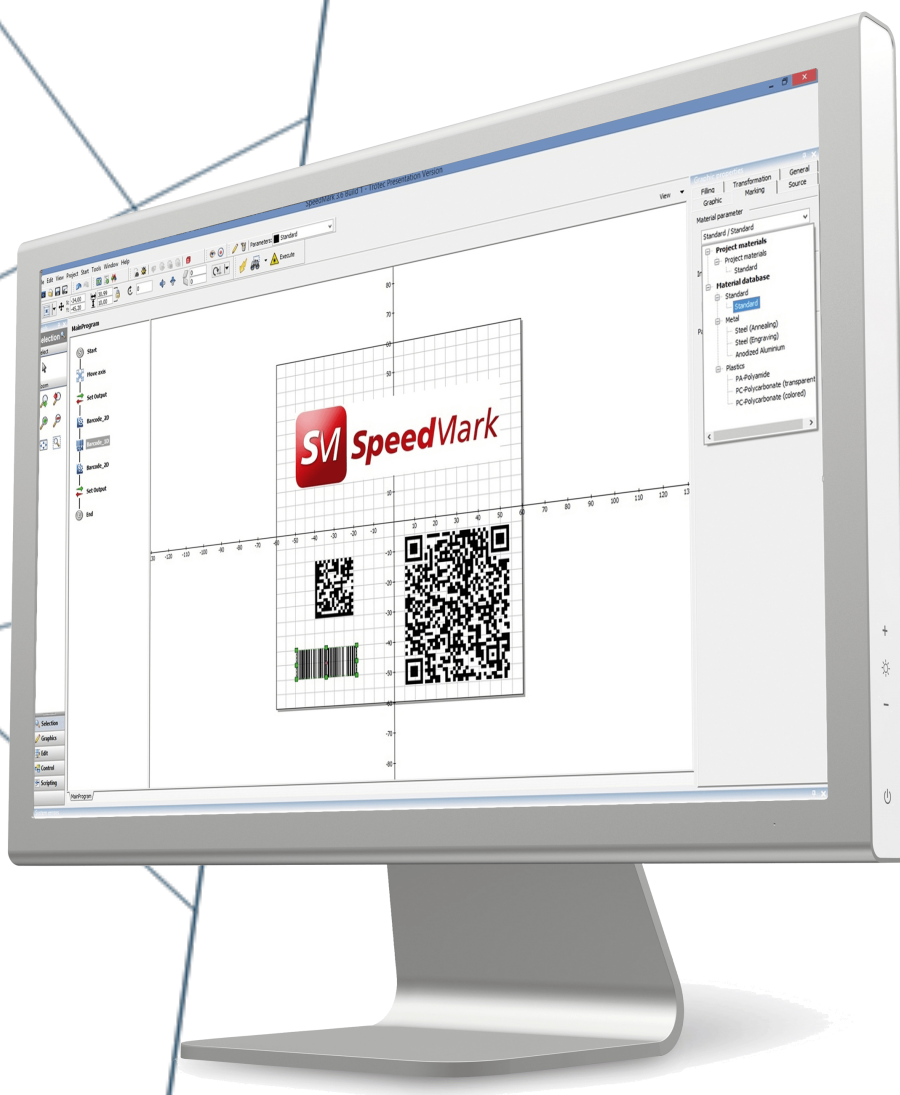


SpeedMark V4.4

Software manual



Software manual SpeedMark_2.7_EN (05/2023)
ENGLISH (Translation)

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1 General Information

For the sake of readability, gender-neutral endings are not used in this operation manual. It is hereby expressly stated that all parts of the text where natural persons or groups of persons are mentioned refer to people of all genders.

1.1 Information about this manual

**Before beginning any work on the machine, read this manual completely and carefully.
Keep the manual for further consultation close to the machine.**

This manual must be read and observed before commissioning and operating the software and the corresponding laser system. Failing to observe individual points listed in this manual may result in personal injury and/or material damage to property. This software may only be used to operate systems containing devices and spare parts included in the scope of supply or the replacement or wear and tear parts list. Ancillary devices must be calibrated to meet the safety and operational requirements of the base machine (please contact your dealer or the manufacturer with any queries).

1.2 Explanation of symbols

Important technical safety notes and instructions in this manual are indicated by symbols. It is important to observe and follow these notes and instructions on workplace safety. Avoid accidents, personal injury and material damage to property by acting with extreme caution.



Warning Laser

This symbol warns of potentially dangerous situations related to the laser beam. Failure to observe the safety instructions leads to risk of serious injury.



Caution

This symbol indicates a potentially hazardous situation which, if not avoided, could result in minor or moderate injury.



Notice

This symbol indicates potential risks of damage to the supported product (or to property).

In addition, non-observance may result in damage, malfunction or failure of the machine.



Information

This symbol indicates tips and information which must be observed for efficient and trouble-free handling of the product.

1.3 Liability and warranty

Warranty periods specified in the manufacturers "warranty terms and conditions" shall be binding for the buyer. If no warranty periods are specified, the general terms and conditions of sale, delivery and payment apply.

All information, illustrations, tables, specifications and diagrams contained in this operating manual have been carefully compiled according to the current state of technology. No liability is accepted with regard to errors, missing information and any resulting damage or consequential loss.

Strict compliance with the safety procedures described in this operating manual and extreme caution when using the equipment are essential for avoiding and reducing the possibility of personal injury or damage to the equipment. The manufacturer shall not be liable for any damage and or faults resulting from nonobservance of instructions in this manual.

Nonobservance of the operation, maintenance and service instructions described within this manual absolves Trotec Laser GmbH from any liability in case of a defect.

Furthermore, Trotec Laser GmbH shall accept no liability whatsoever for damage caused by the use of non-original parts and accessories.

Additionally, Trotec Laser GmbH shall not be held responsible for any personal injury or property damage, of an indirect or specific nature, consequential loss, loss of commercial profits, interruption to business, or loss of commercial information resulting from use of the equipment described in this manual.

It is strictly prohibited to make any alterations, to prepare translations, decompile, disassemble, reverse engineer or copy the software.

Trotec Laser GmbH reserves the right to update any of the information, illustrations, tables, specifications and diagrams contained in this operating manual with regard to technical developments at any time without notice.

1.4 Computer requirements

When using a more powerful computer, the graphics are generated and displayed faster, and the computing times and the times for data transfer to the laser are reduced.

The following recommendation represents the minimum requirements:

- Operating system:
Windows 7® 32/64-bit or Windows 10® 64-bit
- 1024 MB RAM, 200 MB hard disk
- Pentium® 1 GHz processor or AMD Athlon™ XP
- 1024 x 768 monitor resolution or greater
- 24-bit colour graphics card
- Serial port (COM port), (Alternatively a USB-to-COM converter is available)
- Computer mouse
- The requirements can vary depending on the type of laser system

COMPATIBILITY



Notice

Software with the same version number (first two digits) must be used for various Trotec software components to work together smoothly. The last digit of the version number is irrelevant (X.X.X). Example: SpeedMark 3.7.x will only function with TLC2 module 3.7.x.

2 Safety

TO AVOID POSSIBLE HARM READ AND FOLLOW THESE INSTRUCTIONS.

The SpeedMark software is at the current development status at the time of delivery with your Trotec laser system from the Galvo product line.

The machine is built at the time of its development and production according to applicable, established technical rules and is considered to be safe to operate.

Dangers can be caused by the machine if the machine:

- is operated by unqualified personnel,
- the personnel have not been trained,
- the machine is used improperly or not as intended,
- or if the machine is used for other intended purposes.



Notice

Always read and follow the operating instructions of the Trotec laser system you have purchased.

2.1 Intended use

The SpeedMark software described in this manual is used with Trotec laser systems of the Galvo product line.

The system must be operated, maintained and repaired only by trained personnel familiar with the designated field of use and the dangers of the machine!

The marking process may only be carried out when the machine is properly adjusted (see also the operating instructions of the Trotec laser system you have purchased).

The intended use of this machine also includes that all personnel involved in installation, set-up, operation maintenance and repair of the machine must have read and understood the operating manual and in particular the “Safety” section, and comply with the instructions.

Organisational measures:

- Personal protective equipment
- Inspection of the laser protection wall
- Laser safety instructions/laser safety training
- Monitoring by Laser Safety Officer

2.2 Not intended use

Use of the machine in areas other than those described in the intended use or in this document is considered contrary to the intended use and is prohibited. The manufacturer accepts no liability for any resulting personal injury and/or damage to property. The operator alone is liable for all damage caused by improper use.

Non-observance of the operating, maintenance and servicing instructions described by the manufacturer in the operating instructions excludes the manufacturer's liability in the event of a defect.

3 First Steps

3.1 Installation of the SpeedMark Software



Information

The SpeedMark software is designed to simplify the operation of your laser. It may be used to control all laser functions via the computer and set all parameters. Constant communication between the SpeedMark software and the laser ensure a smooth working process.

The following installation instructions provide a brief overview of the SpeedMark software installation process. Detailed operating instructions for Windows® can be found in the Windows® user guide.

1. Start Windows®
 2. Start the SpeedMark Setup-Program.
 3. The programme guides you through the menu-driven installation routine and then copies all the necessary files to your hard disk - for more information on upgrading and uninstalling the SpeedMark software, see "Installation Manual".
- ✓ The installation process is complete.

3.2 Starting the SpeedMark Software



Information

To start the SpeedMark software, the set-up program adds an icon to the Windows Desktop® and the Start menu. SpeedMark may be started using either of these.

FILE ASSOCIATIONS

On the first start SpeedMark will establish file associations with project files (.sprx). This will be visible in windows explorer by special file icons (SpeedMark logo). These files can then be opened in SpeedMark by simply double clicking them. If the program is already running and has an active project, SpeedMark will ask the user for a desired action (save, discard, cancel), if there are unsaved changes. Afterwards the current project is closed and the double-clicked one will get loaded.

LICENSING

Trotec SpeedMark will be delivered with a license key for the usage of this application. If you have not received the appropriate keys please contact the dealer of your laser system. The license codes can be registered after starting SpeedMark via menu point Help → Software registration.

INITIAL USER RIGHTS

By default SpeedMark is shipped with limited user rights to avoid accidental changes of the configuration.



Notice

SpeedMark is configured with an initial administrator password. Please change this password to protect your system from unauthorized access (see chapter Initial user rights).

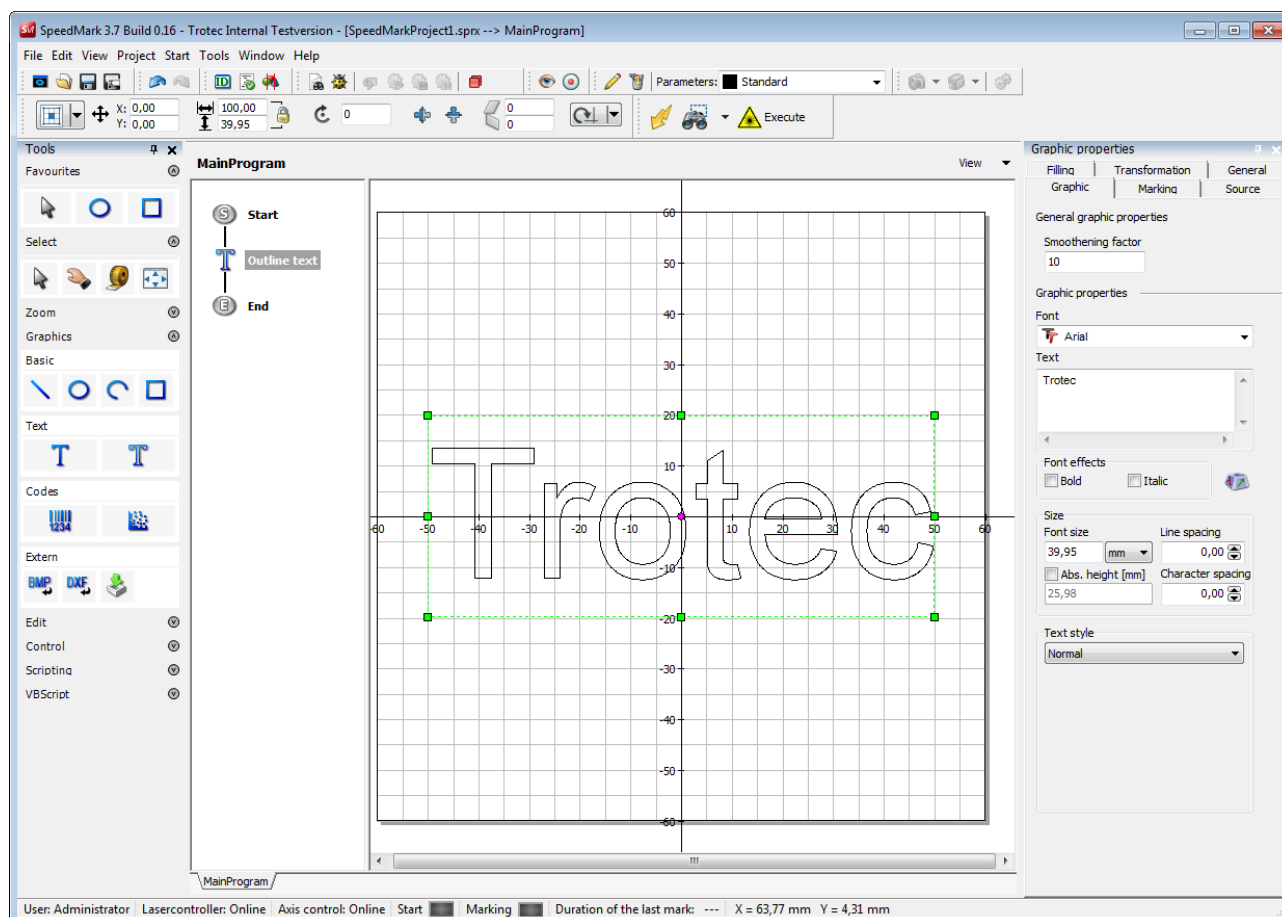
SCOPE OF APPLICATION OF SOFTWARE

The SpeedMark software may be used to:

- Control the supplied laser system.
- Mark vector and bitmap images.
- Create your own graphics.
- Create dynamic user programs.
- Implement user programs.
- Control external hardware.

4 User interface

This chapter of the user manual explains the design and structure of the SpeedMark user interface in detail. It includes all the functions controlled using the menus and toolbars.



The user interface pictured above represents a standard view of the SpeedMark software - for adjustment of various SpeedMark views see chapter "Desktops and User Rights Control".

It basically consists of the following areas:

- Main menu
- Toolbars
- Window for drawing and importing graphics.
- Window for editing the drawing and programming elements.

4.1 SpeedMark programs

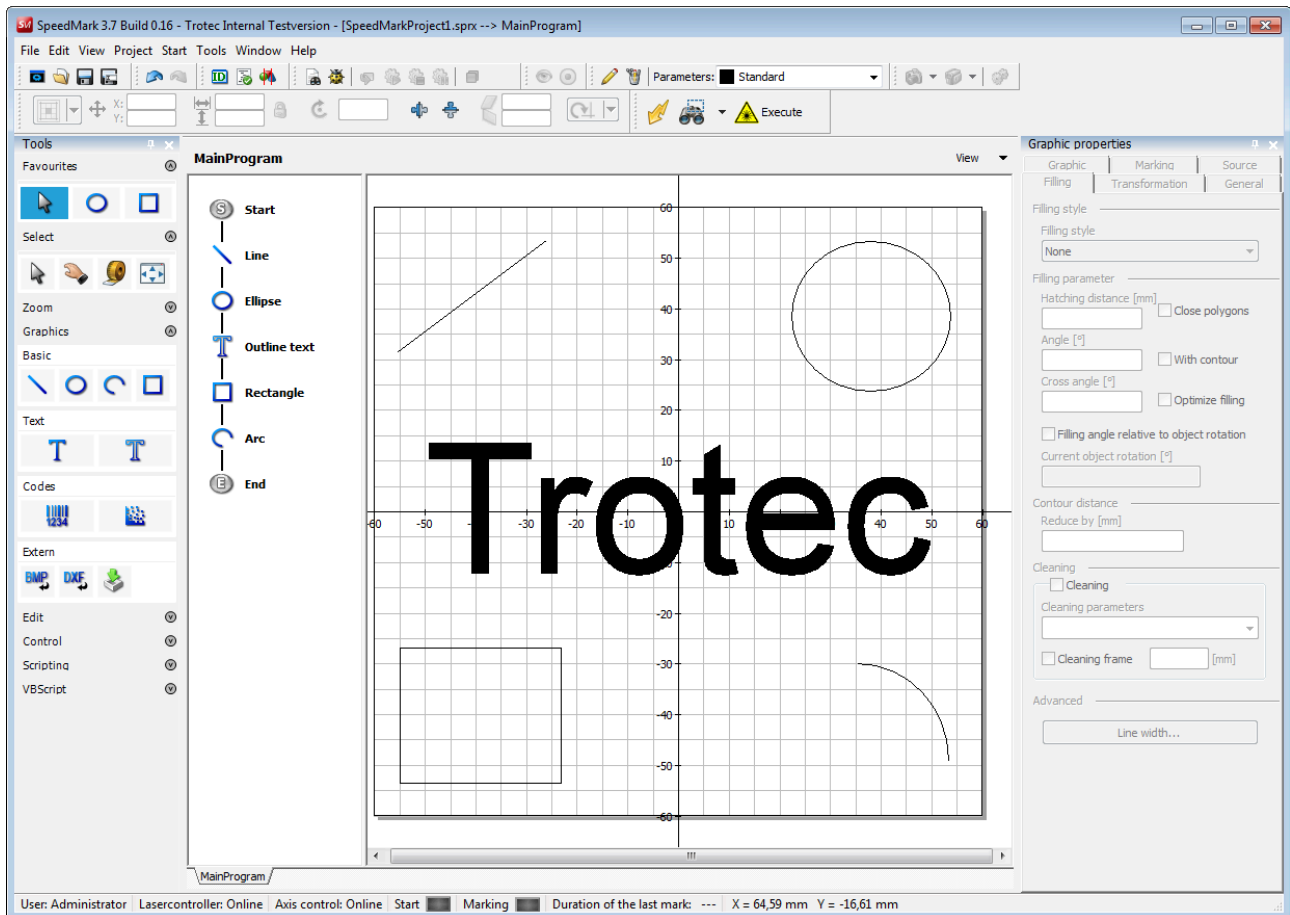
This chapter provides a brief introduction to the structure and design of the SpeedMark programs. A more detailed description of each concept is contained in the following chapters. Contrary to other laser marking applications,

User interface

SpeedMark files are known as programs. This name takes into account that within SpeedMark it is possible not only to specify the flow of marking processes in series, but also create a dynamic flow using the programming constructs.

4.1.1 Basic SpeedMark program for simple laser marking

The following example illustrates a basic SpeedMark program used to mark 4 graphics and a text with the laser.



As illustrated by the flow chart, the first the line and the circle are marked, followed by the text and then the rectangle and the arc. The flow may be adjusted by changing the order of the individual elements.

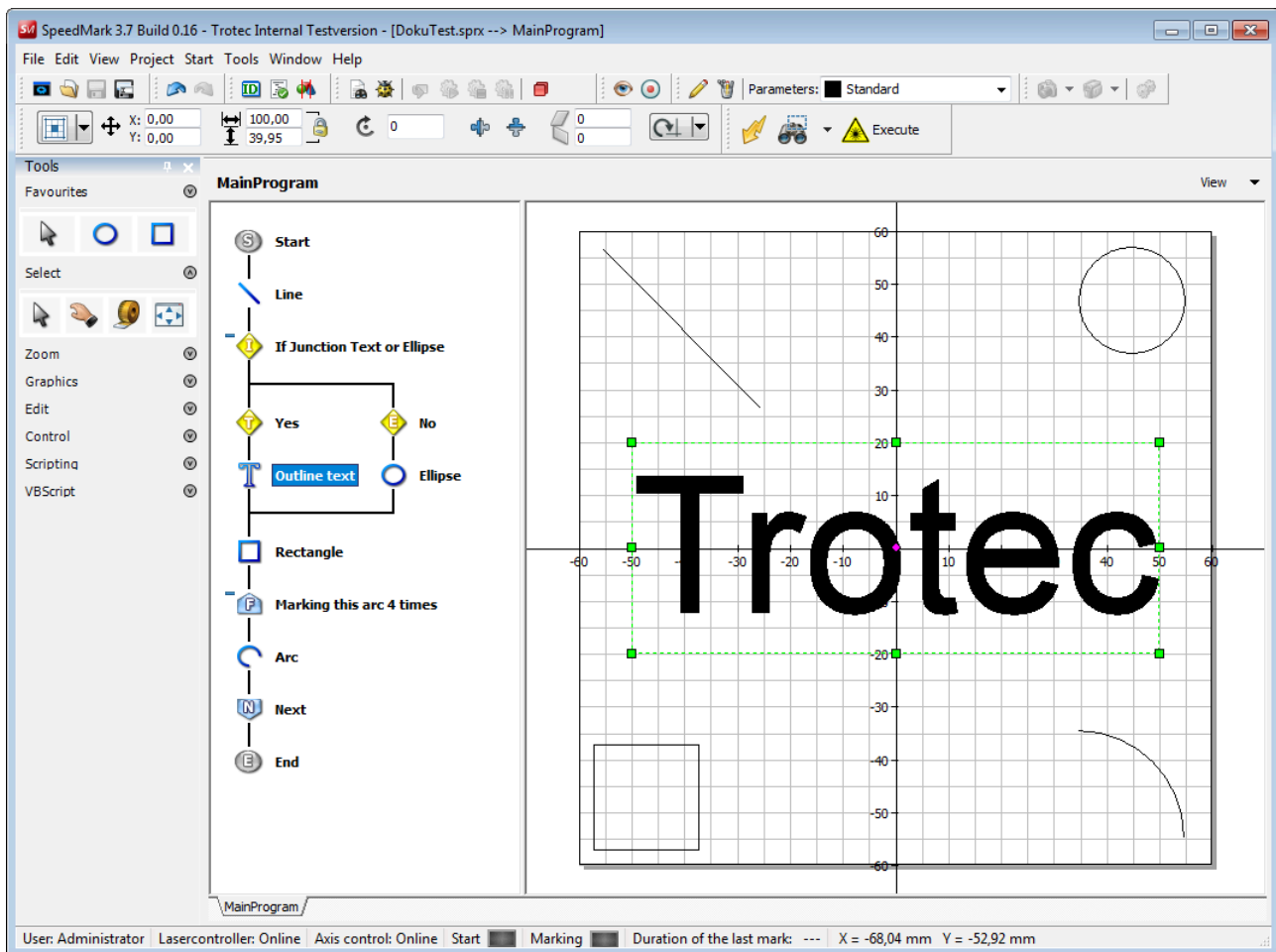


Information

The user does not require any programming knowledge to perform this type of laser marking. All steps can be carried out with confidence and ease using fixed, defined elements.

4.1.2 Dynamic SpeedMark program

The following example illustrates a dynamic SpeedMark program which uses settings to mark 4 lines and a text.



As illustrated by the flow chart, just one line is marked to start with. Then SpeedMark checks whether the text should be marked or not. Based on this decision, the text or the line is marked next. Then another line is marked. In the next grinding element, the line is then marked four times.



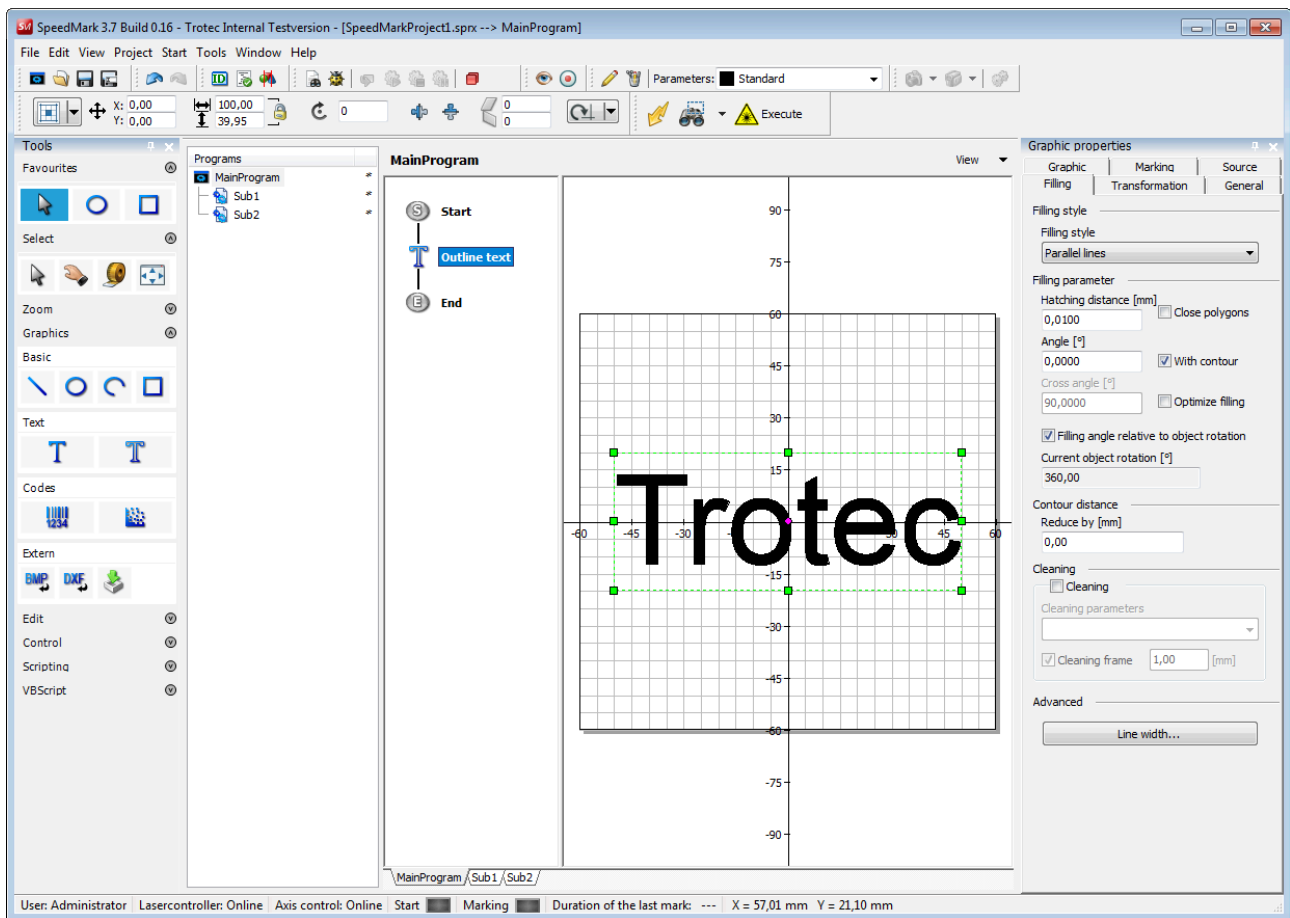
Notice

Rudimentary programming knowledge offers a distinct advantage with this type of laser marking. However, programming knowledge is not a requirement for the basic operation of the SpeedMark flow control.

More detailed descriptions of the use of dynamic programs can be found in Chapters "Basic flow chart programming" and "Simple Scripting".

4.1.3 Main-Program and associated sub-programs

In SpeedMark it is possible to store graphic markings and flows in sub-programs which not only help maintain clarity in the master program but also allow dynamic programming.



In this instance, the master program illustrated above has two sub-programs which may be used by the master program.



Information

Advanced programming knowledge offers an advantage with this type of laser marking. This type of programming is mainly used in industrial environments employing repetitive tasks of long duration.



More detailed descriptions of the use of master programs in combination with sub-programs can be found in Chapter "Simple Scripting".

4.2 User interface windows

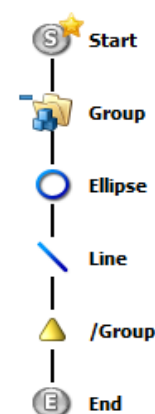
4.2.1 Flow diagram with Flow chart

The flow diagram illustrates the current flow chart of a SpeedMark program. Each program contains a start and at least one end node. It is possible to add as many graphic, control or programming elements in between as required.

This type of illustration provides a quick and simple overview of the way and order in which programs are processed and marked.

Elements containing sub-elements are marked with  and can be collapsed (e.g., to improve clarity on the flow chart). Collapsed elements are tagged with . Clicking on the respective items toggles the state.

Programming elements can be used to introduce a dynamic flow to programs.



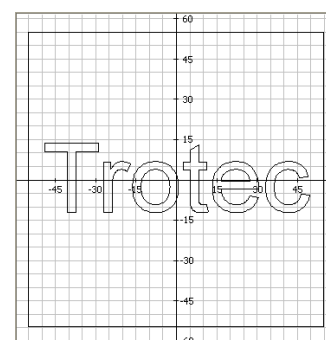
4.2.2 Drawing interface

The SpeedMark drawing interface stores all the graphic elements to be marked by the laser.

Graphics can be positioned easily using the grids and rulers.

The outer rectangular border indicates the actual working area and field size of the laser system. This border is determined by the calibration. Any graphics located outside this boarder cannot be marked by the laser.

All the graphic elements stored in the drawing interface can be edited using the mouse. A more detailed description of how to edit elements can be found in Chapter "Editing Graphic Elements".



4.2.3 Graphic properties

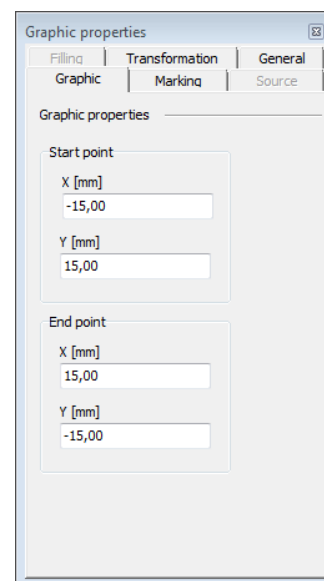
All SpeedMark graphic elements can be edited using the graphic properties in the Graphic properties window.

The properties of each individual element can be adjusted in the Graphic tab (the example on the right contains those of a linear element). The entries in the Graphic tab will therefore differ according to the graphic element selected.

The other tabs such as Marking, Source, Filling, Transformation and General contain common graphic element properties which remain the same for all elements.

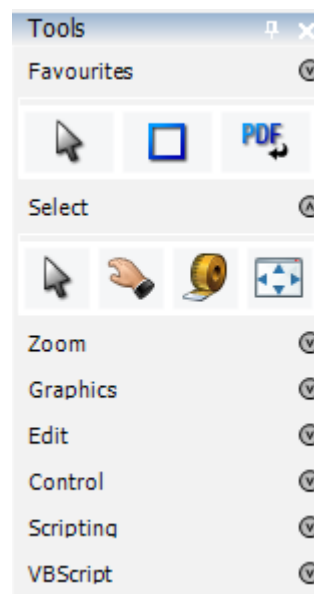
Any properties which cannot be applied to graphic elements (e.g., filling for lines) are greyed out.

All changes are confirmed by pressing “Enter” or on exit of the input field.












4.3 Tools toolbar functions

The Tools toolbar can be used to create new elements on the drawing interface and in the flow chart. The elements are grouped into categories.











4.3.1 Select and zoom tools

Mit Hilfe der Auswahlwerkzeuge können verschiedene Aktionen zur Veränderung der Ansicht der Zeichenoberfläche durchgeführt werden.





Werkzeug	Name	Beschreibung
	Select	Selects one or more elements
	Hand	Drags and drops the drawing interface into a new position
	Measure	Provides the possibility to measure objects on the drawing area
	Next View	Switches to the next zoom view. If there is no further zoom view, this will not function
	Previous View	Switches back to the previous zoom view
	Magnify	Magnifies the zoom on the drawing interface. This is referenced according to the centre of the drawing interface
	Demagnify	Demagnifies the zoom on the drawing interface. This is referenced according to the centre of the drawing interface
	Window Size	Zooms in to the drawing interface to display the entire editing field
	Selected	Zoom in on all selected graphic elements

4.3.2 Graphic elements

Graphic elements can be used to create a variety of graphical elements on the drawing interface. These elements can be generated in both the drawing interface as well as the flow chart. - More information on the editing and application of graphic elements can be found in Chapter "Editing Graphic Elements".




Element	Name	Description
	Line	Creates a line on the drawing interface.
	Ellipse/Circle	Creates a circle or an ellipse on the drawing interface.
	Curve	Creates a curve on the drawing interface.
	Rectangle	Creates a rectangle on the drawing interface.
	Text	Creates a text element on the drawing interface.
	Outlinetext	Creates an outline text element on the drawing interface.
	Barcode 1D	Creates a barcode on the drawing interface.
	Barcode 2D	Creates a data matrix on the drawing interface.

User interface

	Vector Graphic	Creates a vector graphic element imported from an existing file into the drawing interface.
	Vector Graphic from PDF (must be unlocked in the licenses)	Creates one or more vector graphic elements from an existing PDF file into the drawing interface.
	Raster Graphic	Creates a raster graphic element imported from an existing file.
	Import	Creates a raster graphic element imported from an existing import file. An import file may be one of several formats.






4.3.3 Graphic operations












The graphic operation tools are used to apply special operations on graphic elements.

Tool	Name	Description
	Graphic array	All graphics within this element are multiplied in a grid.
	Deep engraving	Allows the marking of a graphic multiple times inclusively rotation of the filling and adoption of the z-axis.
	Focus Shift	Allows the marking of graphics on different focus levels.

4.3.4 Control elements





SpeedMark programs use the control elements to react to external events such as I/O values, user inputs, etc. These elements can only be created in the flow chart - More information on the editing and application of control elements can be found in Chapter "Control elements".

Element	Name	Description
	Input Window	Allows the user to enter configurable input values via the keyboard or barcode scanner
	Dialog window	Information window to present user messages, inclusive Yes/No/Cancel queries.
	Value selection	Allows to select an entry from a configurable value list
	File selection	Selection of a filename
	Counter	Counter element to control the marking executions

Element	Name	Description
	Variable editor	Element for handling dynamic data
	Wait for Signal	Waits for a configured signal from an I/O input or the user to press a button.
	Set I/O Output	Sets an I/O output for a configured I/O card
	Serial (RS232)	Sends or receives data via a configured serial port component
	TCP communication	Sends or receives data via a configured TCP component
	Delay	Delays program execution for a set period
	Move axis	Moves selected axis
	Control exhaust	Controlling the exhaust
	Border marking	Starts border marking and waits for a signal from the operator
	Print	Prints the currently visible drawing area
	Reading codes	Code detection allows a simple detection of codes.

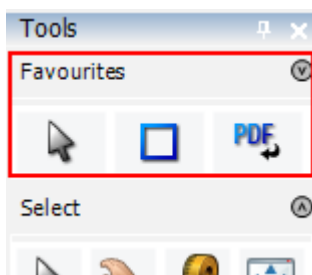
4.3.5 Programming elements

Programming elements give SpeedMark programs a dynamic component. These elements can only be created in the flow chart - More information on the editing and application of programming elements can be found in Chapter "Simple Scripting".

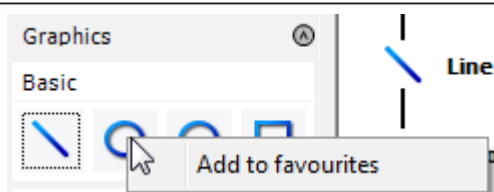
Element	Name	Beschreibung
	Calculation/Allocation	Enables the creation of program structures in the SpeedMark script language for the calculation and allocation of variables
	Comment/Note	Adds a comment to a program
	Program End	Jumps to the program end element
	Program abort	Aborts a program

Element	Name	Beschreibung
	Branch	Creates branches for adding alternative program flow
	Multiple branch	Evaluates a value and jumps depending on it to one of multiple program flows
	Incremental Loop	Creates loops with preset start and end values and increments
	Conditional Loop	Creates loops which end according to a specified condition
	Jump Label	Defines a jump label within a program
	Jump to Jump Label	Jumps to a jump label
	Jump to Sub-Routine	Carries out a sub-routine
	Jump Back out of Sub-Routine	Returns out of the sub-routine
	Sub-Program	Opens a sub-program
	External Program	Opens an external program

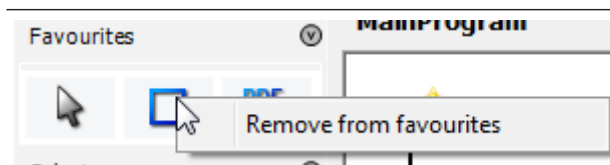
4.3.6 Favourites



Favourites are used to gain easy access to frequently used elements in the toolbar. This section will always be displayed as the first one in the toolbar.



To add an element to the favourites click on it with the right mouse button and select "add to favourites". If the element already exists in the favourites nothing will be done.



To remove an entry from the favourites section, right-click on it and select "remove from favourites"..

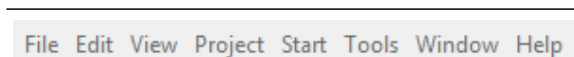
Entries in the Favourites section can be reordered by drag and drop.



Notice

Favourites are saved with the desktop! It is not done automatically. So be sure to save the according desktop each time they are altered. Another way to save them (if only one desktop is used) is to enable "save desktop on exit" in the program settings.

4.4 Menu and toolbar functions



The main menu is displayed at the very top of the program window by default.



The most often used functions can be accessed via the standard toolbars using the mouse.



The status bar contains the status of various programs.

4.4.1 File menu

Menu item	Symbol	Description
New/ New project		Creates a new master program in SpeedMark.
New/ New project from template...		Creates a new program based on a template file The calibration tools can also be found here.
New/ New Sub-Program		Adds a new sub-program to an existing master program.
Open		Opens a master program or sub-program
Save		Saves the current master or sub-program
Save As		Saves the current master or sub-program under another name or directory
Save as template		Saves the current program as a template file
Close		Closes the current program
Print		Prints the currently visible drawing area
Recently used		List of last 5 projects that were open in Speedmark, so they can be reloaded easily

User interface

Menu item	Symbol	Description
Quit		Quits SpeedMark and closes all open programs

4.4.2 Edit menu

Menu item	Symbol	Description
Undo		Undoes the last action performed on a graphic element.
Redo		Redoes the last Undo action performed on a graphic element.
Cut		Cuts an element from the flow chart or drawing interface and places it on the clipboard for future use.
Copy		Copies an element from the flow chart or drawing interface and placed it on the clipboard.
Einfügen		Insert
Delete		Deletes an element from the flow chart or drawing interface.
Select All		Selects all elements in the flow chart and the drawing interface.
Select All Graphics		Selects all graphic elements in the flow chart and the drawing interface.
Toggle visible		Toggles the state "Visible" for all selected graphics
Toggle active		Toggles the state "Active" for all selected graphics
Graphic position locked		Makes the graphic unselect able in the drawing area, thus preventing unwanted changes. (only in popup menu!)
Graphic operations/ Grid copy		Creates copies of all selected graphics in a grid.
Align/Left		Aligns all selected graphic elements to the left-hand most element.
Align/Centre		Aligns all selected graphic elements to the central vertical axis. The centre being the vertical centre of all selected elements.
Align/Right		Aligns all selected graphic elements to the right-hand most element.
Align/Top		Aligns all selected graphic elements to the upper most element.
Align/Centre		Aligns all selected graphic elements to the central horizontal axis. The centre being the horizontal centre of all selected elements.
Align/Bottom		Aligns all selected graphic elements to the bottom most element.
Properties		Opens the properties dialog of a selected element. A graphic element properties dialog is usually located at on the right-hand side of SpeedMark.

POPUP MENU

Most of these actions are also available in the popup menu (right click on an object). But some of them make only sense on certain elements or under special circumstances. Because of this it may happen, that some actions are only available





in the popup menu or are en-/disabled (e.g., creation of marking segments is only valid when segmentation is active at all).

4.4.3 View menu












Menu item	Description
Project admin	Displays the Project Management window containing the programs currently open.
Graphic properties	Displays the graphic properties for a selected graphic element
Flow chart	Displays the flow chart for the current selected program
Free Transformation	Displays the Free Transformation dialog for editing one or more selected graphic elements.
Project materials	Displays the material manager for the current project material parameters
Material database	Displays the material manager for the global material database
Tools	<p>Defines the layout and content to the tool selection bar (on the left):</p> <ul style="list-style-type: none"> • Favourites • Select • Zoom • Graphics • Edit • Control • Scripting • AdvancedScripting • Layout switches the design of the tool selection bar (outlook style or grouped style).
Toolbars	<p>The Toolbars menu item contains all tool bars available within SpeedMark:</p> <ul style="list-style-type: none"> • Standard • Execute • Debug • Marking parameters selection • Project • Undo/Redo • Graphic status • Vision • Measure
Debug windows	<p>The Debug Window menu item consists of several windows for controlling dynamic programs:</p> <ul style="list-style-type: none"> • Variable Monitoring • Error Messages • Compiler reports

Menu item	Description
Operator windows	<p>The Operator Window menu item contains all windows used during on-going operation:</p> <ul style="list-style-type: none"> • Execute Program • Internal RunScreen • Program Log • Program Messages • Execution counter • Execution info <p>These operator windows are supported by the windows of individual components, modules and program extensions.</p>
Program extensions	Displays a list of all windows of all installed program extensions
Vision	<p>Handles all options and settings regarding the camera module of SpeedMark (if installed):</p> <ul style="list-style-type: none"> • Toggle video background • Show main camera • Show secondary camera • camera snapshot • Hide captured image • Camera quick settings
Component windows	Displays a list of components and their available windows depending on the modules installed. This list depends on the configuration of SpeedMark.
System error	Displays the system error window
Fullscreen	Maximizes the Speedmark windows and removes the program border

4.4.4 Project menu

Menu item	Symbol	Description
Segmentation		Performs segmentation on the current graphic elements for usage with a movement axis.
Registration mark detection		Activates and defines the regmark detection of the current project. The regmarks help to align the graphics with the help of the camera images.
Variables list		In SpeedMark it is possible to set variables as place holders for use within dynamic programs - see also Chapter "Variables".
Syntaxprüfung		When dynamic programs are used, this menu item can determine whether the syntax of all dynamic components has been defined correctly - see also Chapter "Simple Scripting".
Pre- und Postprogramm		Enables additional pre- and postprogram for the current marking project.

4.4.5 Start menu

Menu item	Symbol	Description
Quick mark		Opens the Quick mark dialog for performing a one-off laser marking - see also "Border marking".
Mark borders		Draws a rectangular border round all graphic elements with the laser pointer.
Execute		Executes the master program and all associated sub-programs.
Simulate		Simulates the master program and all associated sub-programs.
Debug		Starts the program in debug mode. Interrupts the program flow at specified breakpoints.
Individual Instruction		Executes an individual program instruction.
Continue program		Continues the program until the next breakpoint without interruption.
Stop program		Stops the program.
Pause program		Pauses the program. The program can be continued using "Continue Program".
Switch Breakpoint		Sets or removes a breakpoint in a program instruction.
Remove All Breakpoints		Removes all breakpoints.




4.4.6 Tools menu

Menu item	Description
Switch User	Switches the current user using a login if the user rights control is activated.
Switch desktop	Switches between the saved desktop layouts and provides the possibility to save the current one.
User Rights and Desktops	Allows the configuration of user rights control - see "Desktops and User Rights Control".
Program Extensions	Opens the Program Extensions dialog for configuring the installed extensions - see "Extensions".
Laser system configuration	Opens the Components dialog to configure the installed modules and their associated components - see "Laser System Configuration".
Axis control	All configured axes can be reset or controlled.
Scripted RunScreen	Enables the user to create a user interface via advanced scripting that can be run afterwards.
Konfiguration sichern/wiederherstellen	Alle Konfigurationsdateien werden in einer Datei gesichert und können auch aus dieser wiederhergestellt werden.


User interface

Menu item	Description
Settings	Opens the SpeedMark configuration dialog - see "Configuring SpeedMark".
System profiles	Makes it possible to switch quickly between various system settings (profiles).

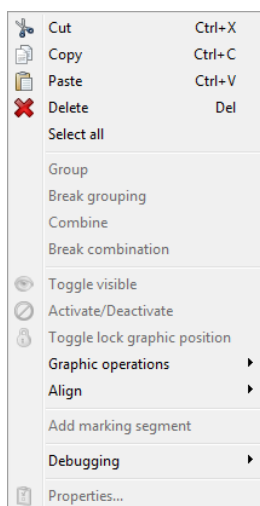
4.4.7 Windows menu

Menu item	Symbol	Description
Arrange Horizontally		Arranges the windows next to one another horizontally
Arrange Vertically		Arranges the windows under one another vertically
Cascade		Overlaps the windows on top of one another
Minimize All		Minimises all windows

4.4.8 Help menu

Menu item	Symbol	Description
Software registration		Registering of the SpeedMark software
Create service file		Generates a file with all the necessary data to examine a machines state (e.g., for bug analysis)
Start TeamViewer		Starts the external program TeamViewer to enable technical help through the Trotec support (Internet connection necessary)
About SpeedMark		Displays the start dialog containing the version of SpeedMark in use

4.5 Context menu functions



The SpeedMark context menu can be opened by clicking the right mouse button. This applies to elements selected in both the flow chart and the drawing interface. The individual functions are either activated or deactivated depending on the element selected.

4.6 Shortcuts

GENERAL

Ctrl+F4	Exit SpeedMark
Ctrl+L	Changing the user

PROJECTS

Ctrl+N	New project
Ctrl+Shift+N	New project from template
Ctrl+O	Open project
Ctrl+S	Save
Ctrl+Shift+S	Save as

LASER CONTROL

F8	Quick mark
F9	Border marking
F10	Border marking positioning graphics
F11	Border marking selected graphics
F12	Execute

EDIT GRAPHIC ELEMENTS

Ctrl+Z	Undo
Ctrl+Y	Redo
Ctrl+X	Cut
Ctrl+C	Copy
Ctrl+V	Paste
Del	Delete
Ctrl+A	Select all graphic elements
Alt+1	Switch to flow chart
Alt+2	Switch to drawing interface
Alt+3	Switch to free transformation
Alt+Enter	Switch to graphic properties
Pfeiltasten (Ablaufdiagramm)	Switch between the elements
Pfeiltasten (Zeichenoberfläche)	Move graphic element 1 mm
Ctrl+Pfeiltasten (Zeichenoberfläche)	Move graphic element 0,2 mm
Ctrl+T	Center selected graphic elements

CREATE GRAPHIC ELEMENTS

Alt+V	Create vector graphic
Alt+R	Create raster graphic
Alt+B	Create barcode 1D
Alt+D	Create barcode 2D
Alt+T	Create outline text

ZOOM GRAPHIC ELEMENTS

Ctrl+“+“	Zoom in
Ctrl+“-“	Zoom out
Ctrl+0 (Null)	Zoom to window
Alt+0 (Null)	Zoom to selected graphic elements

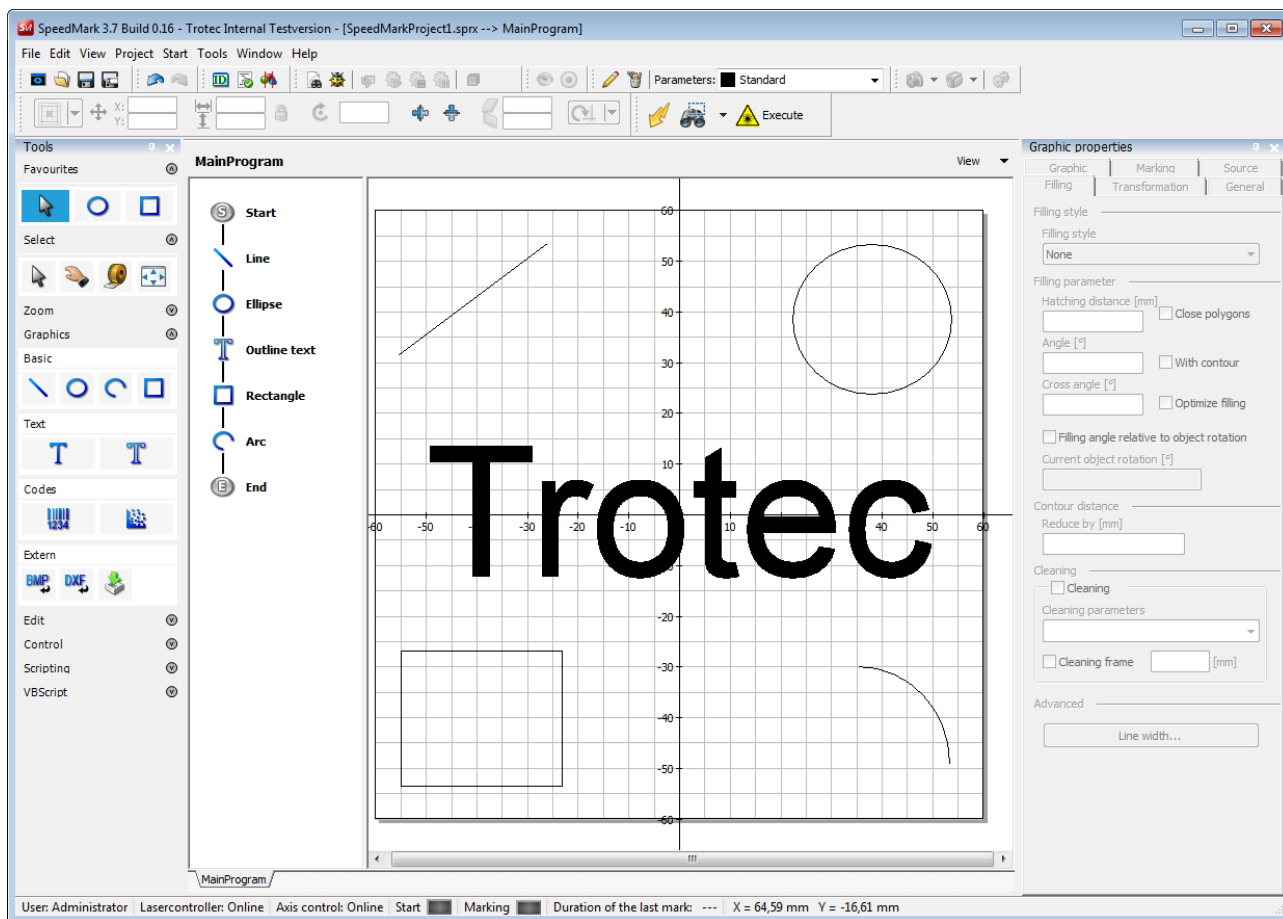
MARKIERPARAMETER

F2	Open material database
F3	Open project materials
F4	Open parameter selection

FUNCTION KEYS OVERVIEW

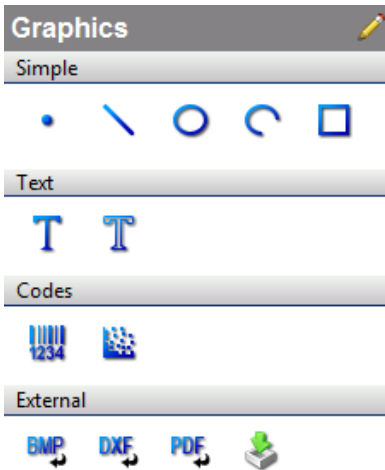
F1	F2	F3	F4	F5	F6	F7	F8	F9	F10	F11	F12
	Materialdatabase	Projectmaterials	Parametersselect				Quickmark	Bordermark (alle)	Bordermark (pos)	Bordermark (selek)	Execute

5 Editing graphic elements



5.1 General

5.1.1 Creating a graphic element



The Tools toolbar can be used to create new elements on the drawing interface and in the flow chart.

Clicking on section Graphics opens a list containing all the graphic elements available. A graphic element is selected by clicking on the respective element once with the mouse. The cursor then changes, and the element can be inserted in the flow chart or drawing interface.



Information

Double-clicking on a graphic element enables an element to be inserted several times on the drawing interface. Click once with the mouse and it immediately reverts to the Select tool once the element has been inserted in the drawing interface.

However, if you do not want to insert the selected element, simply reselect the Select tool.



CREATING AN ELEMENT IN THE FLOW CHART

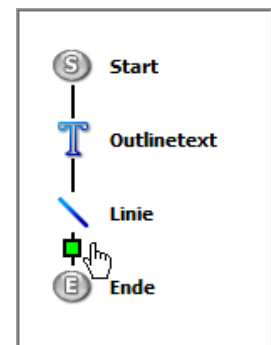
To create a graphic element in the flow chart, click on the graphic element to be created and move the mouse cursor to the place in the chart where the element should be inserted.

The currently selected insertion position will be marked by a green rectangle.

Areas containing an invalid insertion position are indicated by a mouse cursor in the form shown here.



Once the insertion position has been confirmed by a single click, a settings dialog opens for the respective graphic element in which the basic graphic properties may be adjusted before the element is inserted.



CREATING A GRAPHIC ELEMENT ON THE DRAWING INTERFACE

To create a graphic element on the drawing interface, click on the graphic element to be created and move the mouse cursor to the place where the element should be inserted. Once the insertion position has been confirmed, a single click opens the settings dialog for the respective graphic element in which the basic graphic properties may be adjusted before the element is inserted.


An additional insertion method (click-drag-drop) is available for the following graphic elements:



Example line:

1. Click on the start position of the line with the mouse on the drawing interface but do not release the mouse button.
2. Continue to move the mouse cursor to the end position of the line.
3. Then release the mouse button.

5.1.2 Selecting elements

The Select tool can be used to select elements in both the flow chart and the drawing interface. 









The Select tool provides several options for selecting elements in the flow chart and the drawing interface:

- Make a single selection by clicking on an element in the flow chart or drawing interface
- Make a multiple selection by dragging a selection rectangle over the drawing interface
- Make a multiple selection by selecting the individual graphic elements on the drawing interface while holding down the Shift key
- Make a multiple selection by selecting the individual graphic elements on the flow chart while holding down the Shift key

5.1.3 Changing the view in the drawing interface

To better edit the graphic elements, the drawing interface can be adjusted to suit the editing requirements using the Zoom and Drag functions.

THE TOOLS AND TOOLBARS DESCRIBED BELOW CAN BE USED FOR THIS PURPOSE:


	Hand	Drags and drops the drawing interface into a new position
	Zoom	Zooms in to an area selected with this tool
	Next view	Switches to the next zoom view. If there is no further zoom view, this will not function
	Previous view	Switches back to the previous zoom view
	Magnify	Magnifies the zoom on the drawing interface. This is referenced according to the centre of the drawing interface
	Demagnify	Demagnifies the zoom on the drawing interface. This is referenced according to the centre of the drawing interface.
	Window size	Zooms in to the drawing interface to display the entire editing field
	Selected	Zoom in on all selected graphic elements

5.1.4 Editing graphic elements

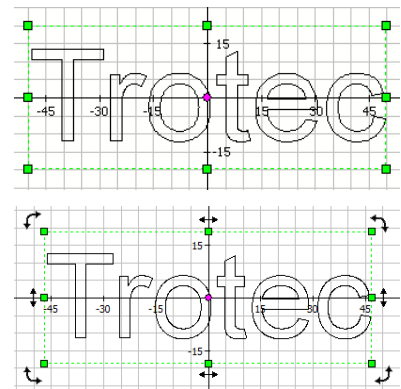
Selected graphic elements can be moved on the drawing area with the cursor keys. There are three possible combinations:

- Cursor keys: normal mode - moves objects 1mm by default
- CTRL+cursor keys: fine mode - moves objects 0,1mm by default
- SHIFT+cursor keys: fast mode - moves objects 10mm by default

5.1.5 Editing graphic elements with the mouse

The position, size, rotation angle and shearing of graphic elements can be adjusted directly using the mouse. This is done using the Select tool. Graphic elements must be selected before adjustments can be made. 

The illustration to the right shows a selected text element with the selection markers. Selecting an element automatically superimposes nine selection points (squares and a central circle) which are used in conjunction with the mouse cursor to adjust the element.



It is necessary to switch to rotation mode to rotate or shear an element. This is done by clicking an already selected graphics a second time. Rotation mode can be recognized easily by the arrows near the selection points depicting the underlying transformation operation. It is not possible to move the rotation point (the centre of the selection will always be used as the reference point of the rotation/shearing action). If needed this behaviour can be achieved via the transformation bar. Clicking on an element again, that is already in rotation mode, it will switch back to move mode.

DRAGGING GRAPHIC ELEMENTS

Graphic elements may be dragged by using the mouse cursor in conjunction with the element's central selection point. The mouse cursor then changes its form to the mouse drag cursor.

The graphic element can be moved to a new position by clicking and holding down the mouse button while dragging



the mouse. Releasing the mouse button confirms the new position.

ADJUSTING THE SIZE OF GRAPHIC ELEMENTS

It is possible to adjust the size of graphic elements by using the mouse cursor in conjunction with one of the outer selection points. The mouse cursor then changes accordingly to one of the following forms:



Editing graphic elements

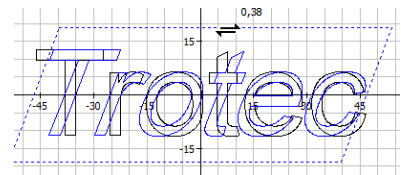
The size of the graphic element can be adjusted by clicking and holding down the mouse button while dragging the mouse. Releasing the mouse button confirms the new size.

ROTATING GRAPHIC ELEMENTS

Rotating an element is done by grabbing one of the edge selection points while in rotation mode. Hold the mouse button and rotate to the desired angle then release the mouse button to apply the change.

SHEARING GRAPHIC ELEMENTS

Shearing a selection is done like rotation. Grab one of the line selection points while in rotation mode. Keeping the mouse button pressed and moving the mouse performs the shearing. Release of the mouse button applies the change.



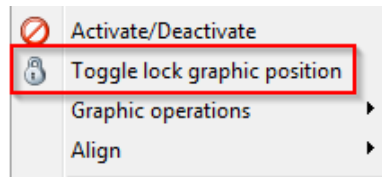
Notice

It is not possible to shear a radial text (will pop up an according message).

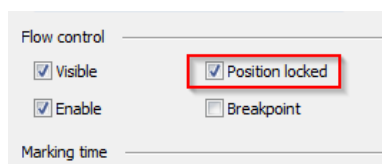
LOCKING OF GRAPHIC`S POSITION

To prevent unintended editing of certain graphics it is possible to lock their position on the drawing area. There are three possible ways to enable this mode.

Context menu (in the flow chart or in the drawing area)



Graphic properties (Tab General)

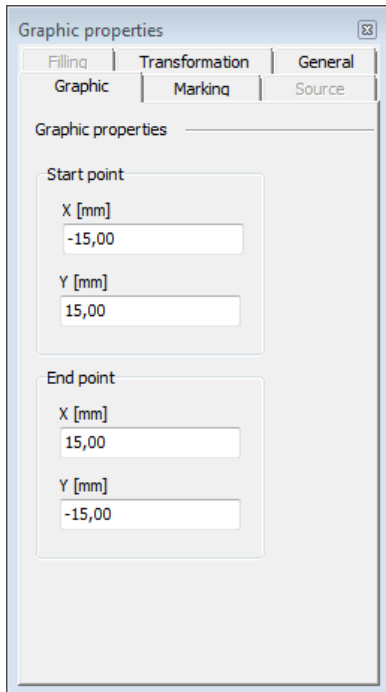


Toolbar



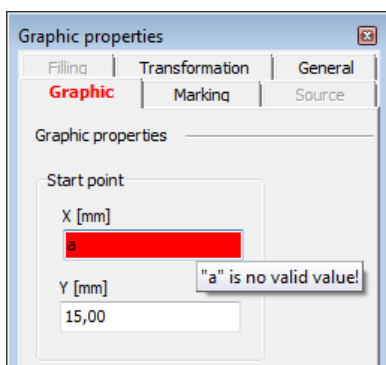
To remove such a lock, all affected graphics must be selected in the flowchart, then they can be unlocked via one of the three methods described above.

5.1.6 Graphic properties



In addition to using the mouse cursor to edit the graphic elements, it is also possible to adjusting the properties in the Graphic Properties window.

This window can be used to specify and adjust additional graphic element properties.



SpeedMark checks the plausibility of all changes made to the input values before they are applied. If an error is found, it will be displayed as in the illustration on the right.

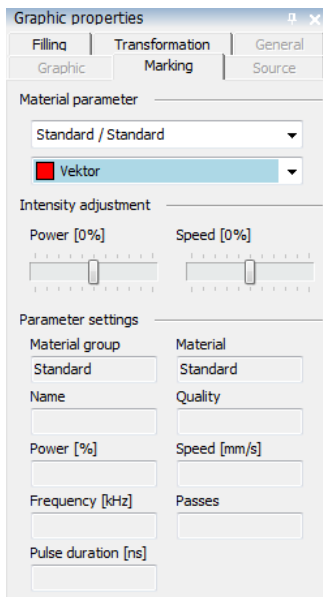
5.1.7 Graphic properties of multiple elements

Doing a multiselect of graphic elements restricts which fields can be set via the graphic properties dialog.

The following tabs will stay active and can be changed:

- Marking
- Filling
- Transformation (without "dynamic transformation")

Editing graphic elements



Properties that are equal in all selected elements will be displayed normally. Different values will be made visible depending on the field type:

Combobox empty or cyan background and shows value of first element

Edit/Labels empty or invalid value (e.g., NaN)

Checkbox filled box (not checked, filled as a whole)

Changes will be made on each selected graphic individually, if the affected property is supported by the element (e.g., filling will be ignored by a line).

5.1.8 Free transformation


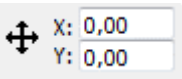
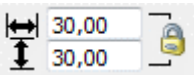
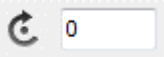

If not already open, the “Free Transformation” function can be opened using the View "Free transformation" menu item.

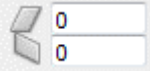

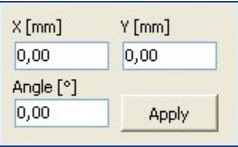


Information

The “Free transformation” function also supports the editing of multiple selections of graphic elements. It groups the elements together and applies all operations as if to one individual element.













The transformation functions are essentially divided into different groups:

	Anchor point	The anchor point defines from which point of a graphic transformation operation should be performed.
	Position	To adjust the position, the X and Y values simply need to be changed.
	Size	The size of the graphic elements can be adjusted in the Size section by adjusting the height and width values. The Proportional symbol is used to specify whether the entered values should be automatically recalculated according to the aspect ratio.
	Rotation	In order to adjust the rotation, the angle of rotation must be specified in Grad. It is also possible to enter negative angles.
	Mirroring	Graphic elements can be mirrored directly using the “Horizontal Mirroring” and “Vertical mirroring” buttons.

	Shearing	Adjusting the shearing simply requires the adjustment of the values in the Horizontal shear and Vertical shear input fields.
 	Advanced rotation	To adjust the rotation a Rotation Point must first be defined by specifying a value in the X and Y input fields. The angle of rotation is also specified. It is also possible to enter negative angles. Pressing the “Apply” button then applies these adjustments to the graphic elements.

5.2 Creating and editing graphic elements

The following graphic elements are available in SpeedMark:

Graphic element	Name
	Line
	Ellipse/Circle
	Arc
	Rectangle
	Text
	Outline text
	Barcode
	Data Matrix
	Vector graphic
	Vector graphic (from PDF) This entry is only available if the PDF-Import was activated in the licence keys.
	Raster graphic
	Import

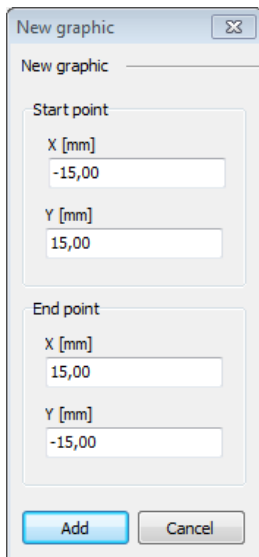


Information

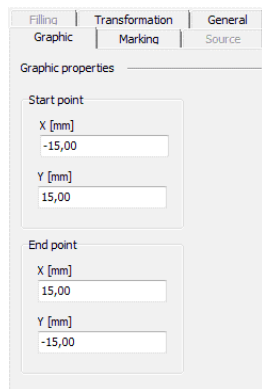
The following chapters contain descriptions of how to insert the graphic elements in the flow chart as this option contains the most settings. Graphic elements such as point, line, ellipse and rectangle may all be created directly on the drawing interface.

Complex graphics can be imported easily into SpeedMark using the Vector Graphics and Raster Graphic Elements.

5.2.1 Line



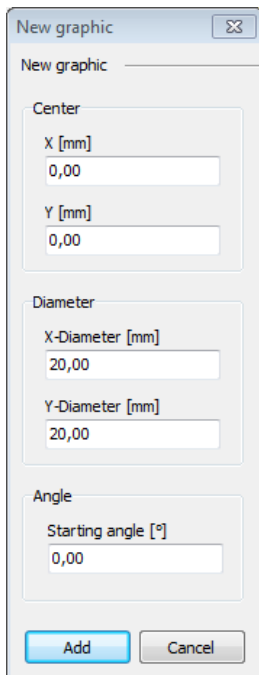
The "New graphic" dialog for a line. It has a title bar with a close button. The main area is titled "New graphic". It contains two sections: "Start point" and "End point". Each section has two input fields: "X [mm]" and "Y [mm]". The "Start point" fields contain "-15,00" and "15,00". The "End point" fields contain "15,00" and "-15,00". At the bottom, there are two buttons: "Add" and "Cancel".



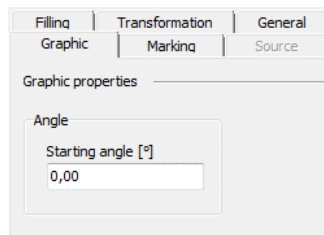
The "Graphic properties" window for a line. It has a title bar with tabs for "Filling", "Transformation", and "General". The "Graphic" tab is selected. The window is titled "Graphic properties". It contains two sections: "Start point" and "End point". Each section has two input fields: "X [mm]" and "Y [mm]". The "Start point" fields contain "-15,00" and "15,00". The "End point" fields contain "15,00" and "-15,00".

Inserting a line opens the “New Graphic” dialog in which it is possible to specify the exact start and end points. The Graphic Properties window may be used to adjust these values retrospectively.

5.2.2 Ellipse/Circle



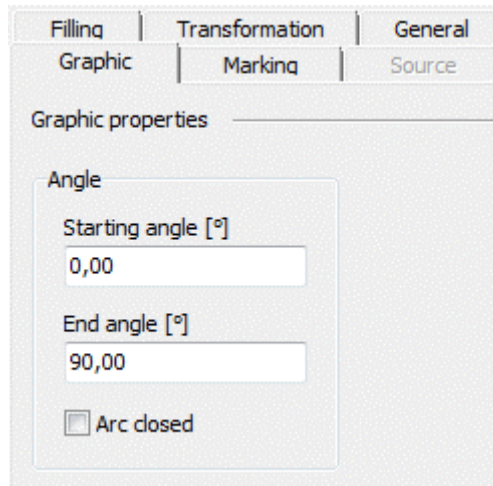
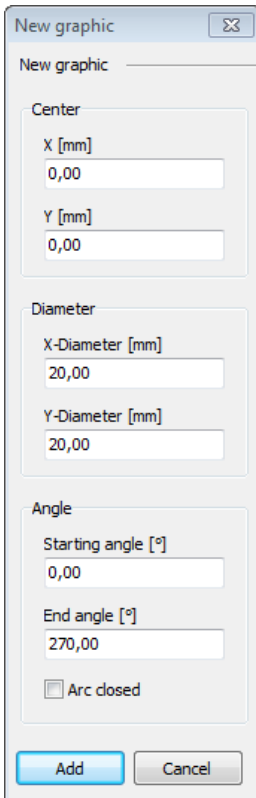
The "New graphic" dialog for an ellipse/circle. It has a title bar with a close button. The main area is titled "New graphic". It contains three sections: "Center", "Diameter", and "Angle". The "Center" section has two input fields: "X [mm]" and "Y [mm]", both containing "0,00". The "Diameter" section has two input fields: "X-Diameter [mm]" and "Y-Diameter [mm]", both containing "20,00". The "Angle" section has one input field: "Starting angle [°]", containing "0,00". At the bottom, there are two buttons: "Add" and "Cancel".



The "Graphic properties" window for an ellipse/circle. It has a title bar with tabs for "Filling", "Transformation", and "General". The "Graphic" tab is selected. The window is titled "Graphic properties". It contains one section: "Angle". It has one input field: "Starting angle [°]", containing "0,00".

Inserting an ellipse/circle opens the “New Graphic” dialog in which it is possible to specify the centre, the diameter, and the starting angle. The Graphic Properties window may be used to retrospectively adjust the starting angle only. The other properties may be adjusted via the Transformation window. The starting angle of the ellipse/circle element is used to specify the point from which the laser should begin marking the element. This can be essential in time-critical applications to optimise flow. The default setting of 0° is usually sufficient → represents the furthest right-hand point on the graphic element.

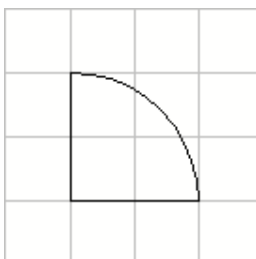
5.2.3 Arc



Inserting an arc opens the “New Graphic” dialog in which it is possible to specify the centre, diameter, starting/end angle, and the arc closure. The Graphic Properties window may be used to retrospectively adjust the starting/end angle and the arc closure only. The other properties may be adjusted via the Transformation window.

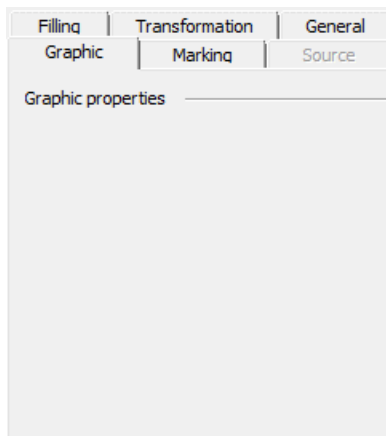
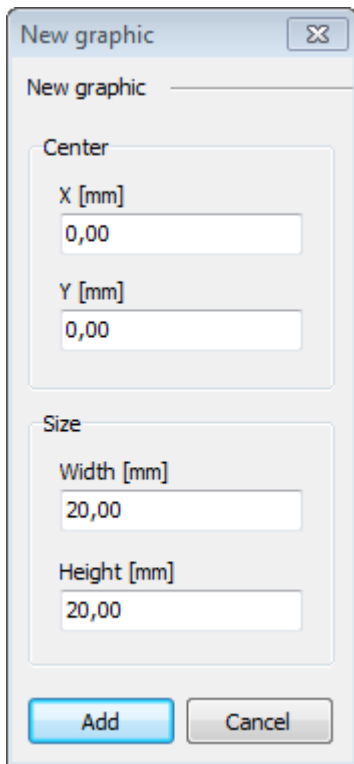


The starting angle of the arc element is used merely to specify the point from which the arc begins, and the end angle is used to specify the point where the arc ends (please refer to the illustration to the right with a starting angle of 0° and an end angle of 90°).



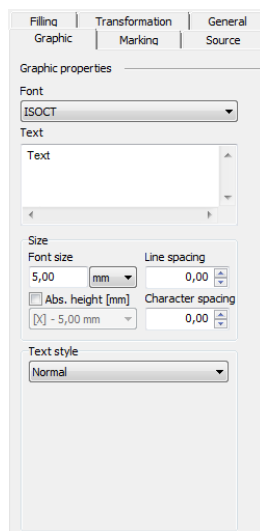
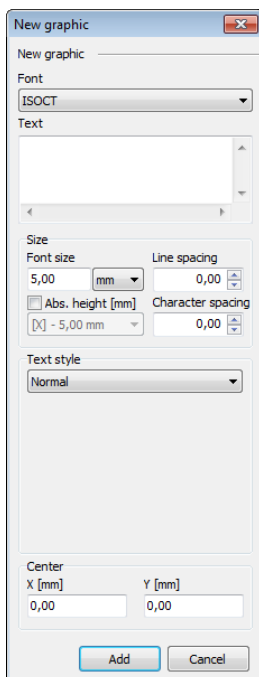
Activating the “Arc closed” checkbox specifies whether the arc is closed and therefore displayed as a segment. In this form a vector filling may also be applied to the arc. → when the arc closure is deactivated, so are all the filling settings.

5.2.4 Rectangle



Inserting a rectangle opens the “New Graphic” dialog in which it is possible to specify the centre and the size. The Graphic Properties window does not contain any specific properties although these may be adjusted via the Transformation window.

5.2.5 Text



Inserting text opens the “New Graphic” dialog in which it is possible to specify the various text parameters. All these parameters may likewise be adjusted retrospectively in the Graphic Properties window except for the Centre details (which can be adjusted via the Transformation window).

FONT

The text element font is a so-called single line font which produces the symbols using lines → Due to the use of single line fonts, text elements may not contain any filling.

The following fonts are available in SpeedMark:

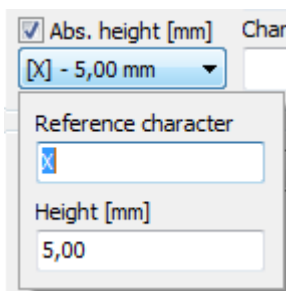
- ISOCT
- RomanS
- SOKOL

TEXT

The text to be displayed can be entered in the Text input field. It is also possible to enter multiple lines of text.

SIZE

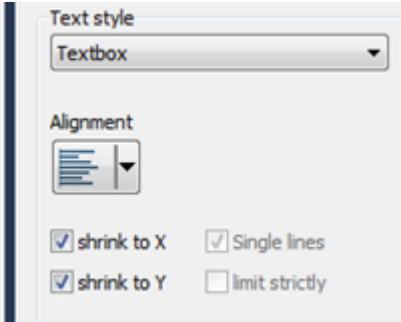
This is used to specify the font size, and the line and character spacing. When specifying the font size, it is also possible to specify the units used for the sizing parameters. The currently configured size units (in standard mm) and the font size units in points are available for selection. The selected units are used for the both the line and character spacing parameters.


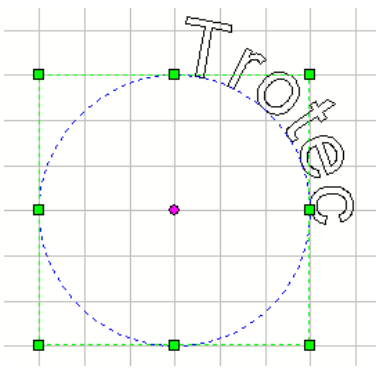

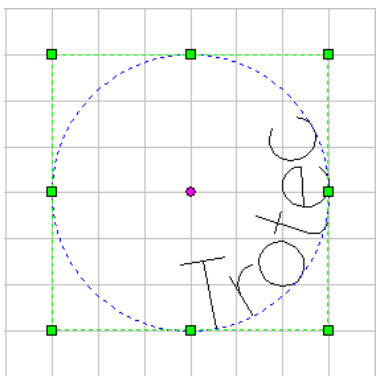

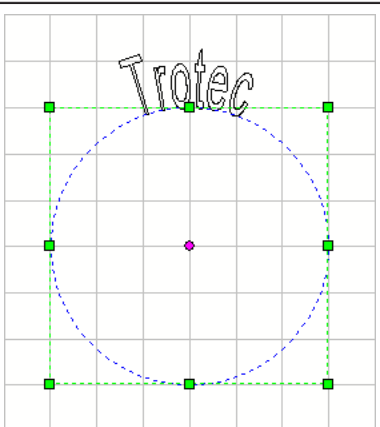


With the checkbox “Abs height” the exact text height can be defined. The reference character and the according height is the basis for the calculation of all other characters. When no reference character is defined, the height will be applied on the complete text of the text element.

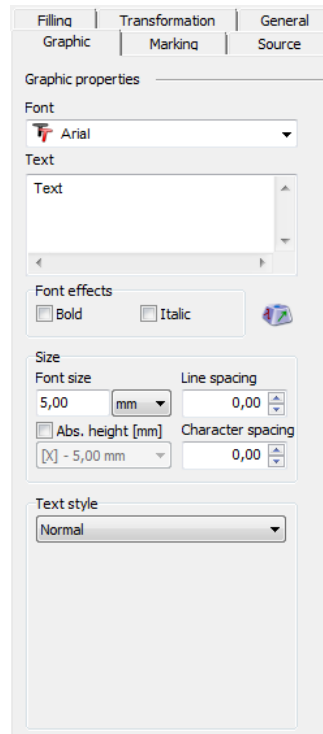
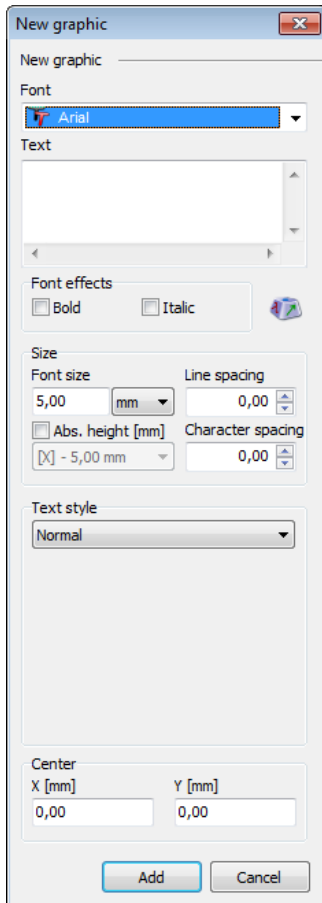
TEXT STYLE

A text element may be displayed in various direction styles incorporating various display format properties.

Normal	Text box
<p>The text is displayed using the specified font, text, and size parameters. These parameters also determine the behaviour of the element in relation to the overall size of the element and any transformations (i.e., when the size is adjusted, the size of the font adjusts itself automatically as the element itself has become larger otherwise the text will be distorted according to the scaling).</p>	 <p>In this instance, a text box is placed around the element when it is first created (or this style applied). From this point on, this text box represents the definitive border of the element. This border is also used to calculate the alignment (left, right, centred). The textbox offers a set of scaling options, for details see "Text box scaling options". This type of text style is mainly used for markings on a workpiece of a specific size.</p>

Radial text		
<p>The radial text style is used to display the text in the form of a virtual ring marking defined by the Radius parameter. Only the first line of multiple lines of text is displayed.</p>		
<p>Circle text style Outer The text is aligned on the outer side of the virtual ring.</p>	<p>Text style Radial text</p> <p>Radius [mm] 25,00 Angle [°] 90,00</p> <p>Circle text style Outer Orientation Clockwise</p> <p>Delta angle [°] 0,00</p> 	
<p>Circle text style Inner The text is aligned on the inner side of the virtual ring. Additionally, the orientation is set here to counterclockwise.</p>	<p>Text style Radial text</p> <p>Radius [mm] 25,00 Angle [°] 270,00</p> <p>Circle text style Inner Orientation Counterclockw</p> <p>Delta angle [°] 0,00</p> 	
<p>Option Deltawinkel The option delta angle allows the reduction of the text length to a specified angle. Becomes the text length greater, the text will be compressed. With an angle value of 0° this option is deactivated. Additionally, with the button alignment it is possible to define if the text should be aligned centred, left or right to the angle.</p>	<p>Text style Radial text</p> <p>Radius [mm] 15,00 Angle [°] 90,00</p> <p>Circle text style Outer Orientation Clockwise</p> <p>Delta angle [°] 45,00</p> 	

5.2.6 Outline text



Inserting text opens the “New Graphic” dialog in which it is possible to specify the various text parameters. All these parameters may likewise be adjusted retrospectively in the Graphic Properties window except for the Centre details (which can be adjusted via the Transformation window).

FONT

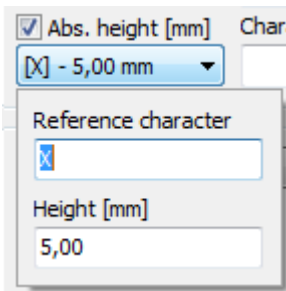
Outline Text elements may use any of the true type fonts available in your Windows® operating system.

TEXT

The text to be displayed can be entered in the Text input field. It is also possible to enter multiple lines of text.

SIZE

This is used to specify the font size, and the line and character spacing. When specifying the font size, it is also possible to specify the units used for the sizing parameters. The currently configured size units (in standard mm) and the font size units in are available for selection. The selected units are used for the both the line and character spacing parameters.

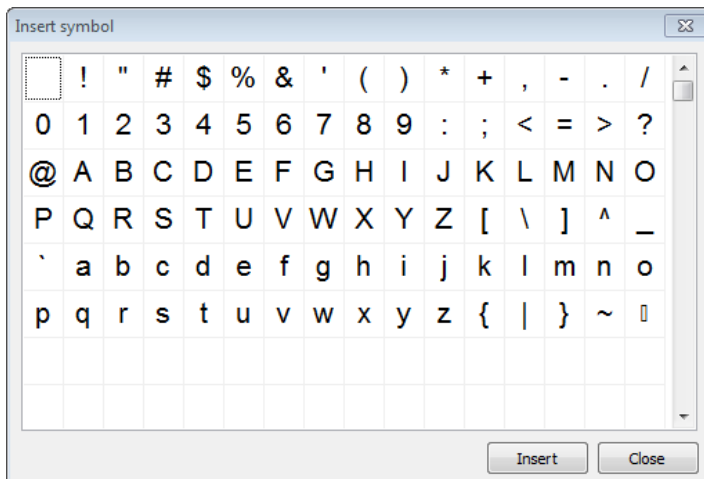


With the checkbox “Abs height” the exact text height can be defined. The reference character and the according height is the basis for the calculation of all other characters. When no reference character is defined, the height will be applied on the complete text of the text element.

FONT EFFECTS

Outline Text elements may use bold and italic font effects. However, in this instance, bold only means that the respective font parameter for this effect is applied. To actually make an Outline Text element bolder, this text must be shaded.

SYMBOLTABELLE



With the button right of the font effects it is possible to open the symbol table dialog to insert special characters into

the text field.



The amount and kind of available symbols depend on the chosen font.

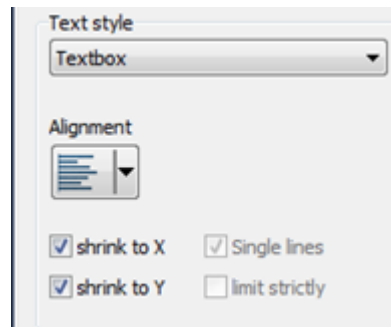
TEXT STYLE

A text element may be displayed in various direction styles incorporating various display format properties.

Normal

The text is displayed using the specified font, text and size parameters. These parameters also determine the behaviour of the element in relation to the overall size of the element and any transformations (i.e., when the size is adjusted, the size of the font adjusts itself automatically as the element itself has become larger otherwise the text will be distorted according to the scaling).

Textbox



In this instance, a text box is placed around the element when it is first created (or this style applied). From this point on, this text box represents the definitive border of the element. This border is also used to calculate the alignment (left, right, centred). This type of text style is mainly used for markings on a work piece of a specific size.

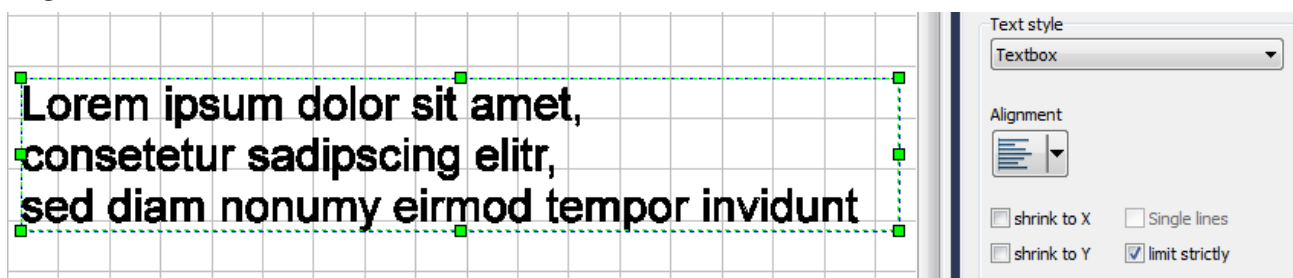
TEXTBOX SCALING OPTIONS

The textbox provides a simple way to restrict dynamic data to a predefined size. Depending on the selected scaling options exceeding text is handled differently.

The following options are available:

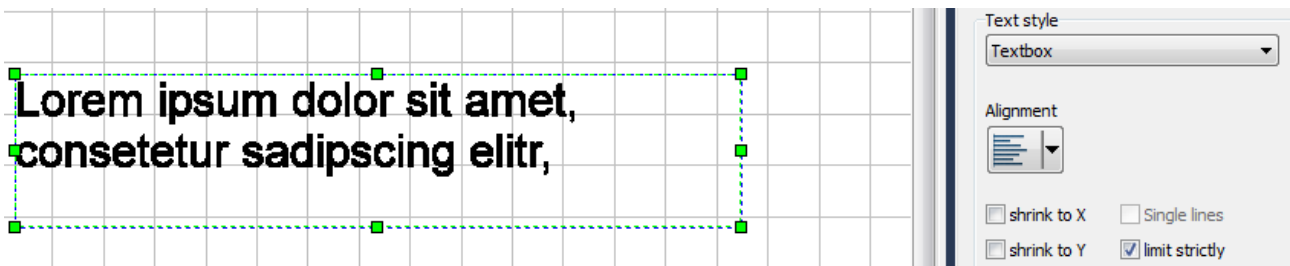
- Scale X → scales text lines so, that they fit into the width of the text field.
- Scale Y → scales all text lines so, that they fit into the height of the text field.
- Single lines (affects only X scaling): → calculates a X scaling factor for each line independently, so only the font of exceeding lines is shrunk. Otherwise the scaling factor of the longest line is applied to all lines.
- Limit strictly → if scaling is only active in one direction, it can happen that the text will exceed the other direction. Limit strictly will remove such lines completely from the text. Otherwise these will be marked regardless of exceeding the textbox.

Originale Textbox



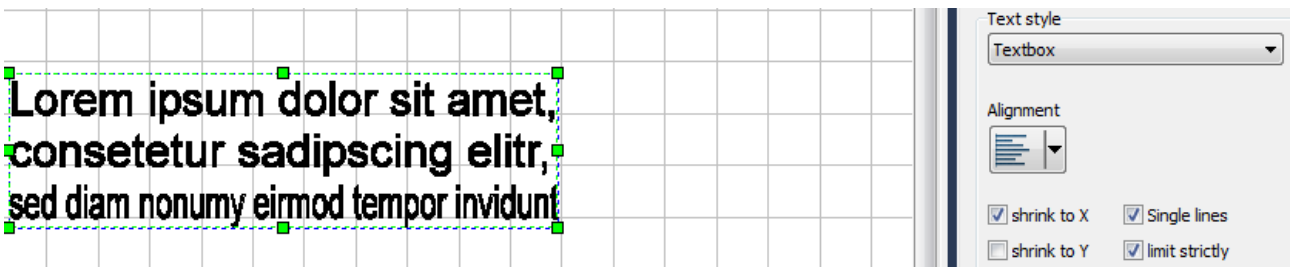
Limit strictly

Will remove all exceeding lines, independently of any scaling options. This option will be disabled if X & Y scaling is active (proportional).



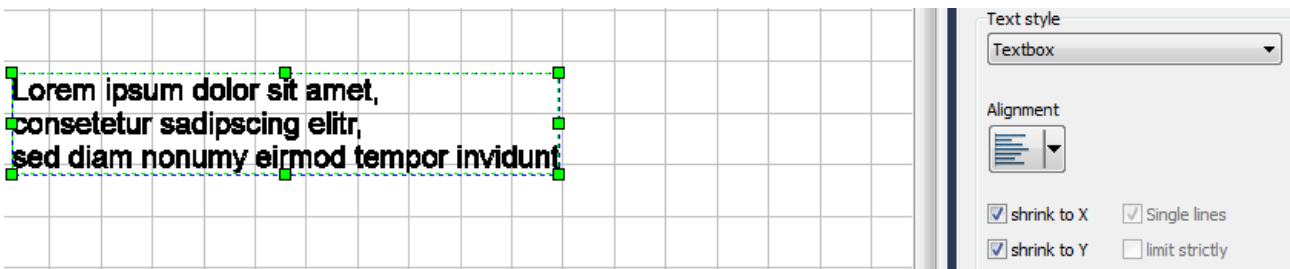
Scale X

Will shrink the font size of all lines, so that they fit into the textbox width.



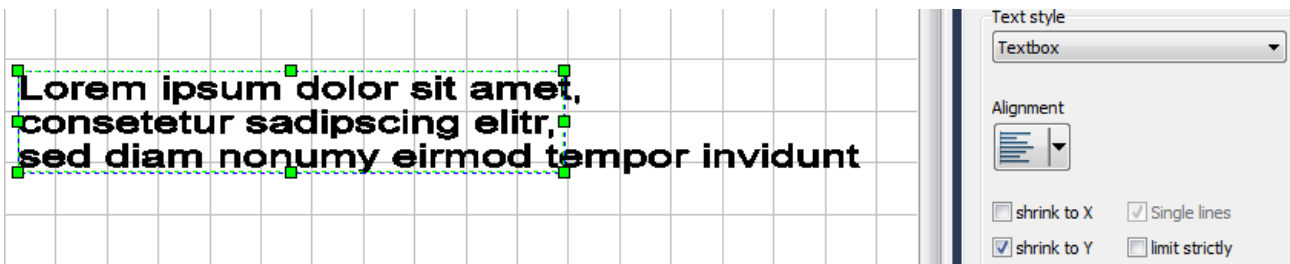
Single Lines (only active, when Scale X is active)

Will act like Scale X, but calculates the scaling factor for each line independently



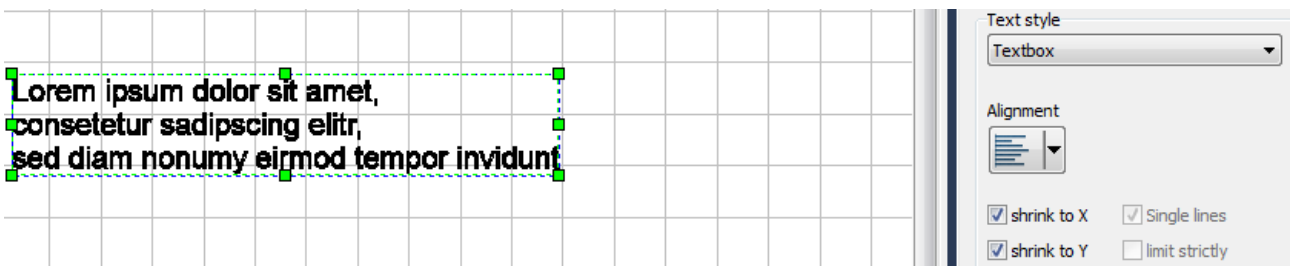
Scale Y


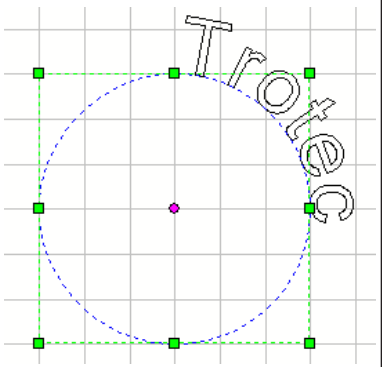

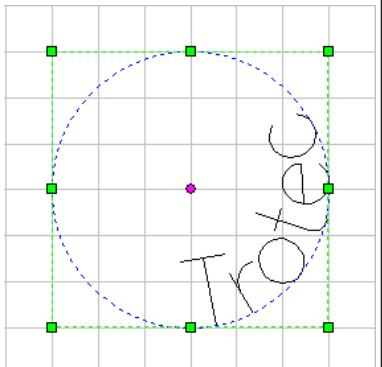

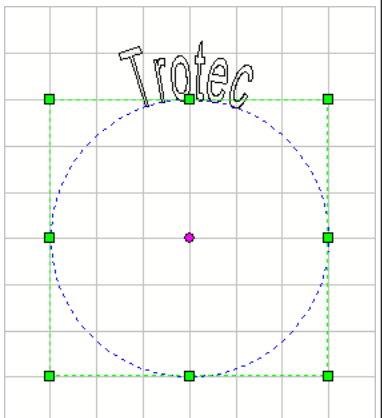
Will shrink the font size of all lines, so that they fit into the textbox height.



Scale X & Y

Will shrink the text proportionally. This means that the text will always fit into the textbox, because of this, all other options are disabled.



Radial text		
<p>The radial text style is used to display the text in the form of a virtual ring marking defined by the Radius parameter. Only the first line of multiple lines of text is displayed.</p>		
<p>Circle text style Outer The text is aligned on the outer side of the virtual ring.</p>	<p>Text style Radial text</p> <p>Radius [mm] 25,00 Angle [°] 90,00</p> <p>Circle text style Outer Orientation Clockwise</p> <p>Delta angle [°] 0,00</p> 	
<p>Circle text style Inner The text is aligned on the inner side of the virtual ring. Additionally, the orientation is set here to counterclockwise.</p>	<p>Text style Radial text</p> <p>Radius [mm] 25,00 Angle [°] 270,00</p> <p>Circle text style Inner Orientation Counterclockw</p> <p>Delta angle [°] 0,00</p> 	
<p>Option Deltawinkel The option delta angle allows the reduction of the text length to a specified angle. Becomes the text length greater, the text will be compressed. With an angle value of 0° this option is deactivated. Additionally, with the button alignment it is possible to define if the text should be aligned centred, left or right to the angle.</p>	<p>Text style Radial text</p> <p>Radius [mm] 15,00 Angle [°] 90,00</p> <p>Circle text style Outer Orientation Clockwise</p> <p>Delta angle [°] 45,00</p> 	

5.2.7 Barcode 1D

The 'New graphic' dialog box is shown with the following settings:

- Barcode type: Data Matrix
- Barcode: ABCabc
- max. barcode length: none
- Size: Auto
- Invert
- Quiet zone (times the module width):
 - Top: 1
 - Left: 1
 - Right: 1
 - Bottom: 1
- Advanced settings: (dropdown menu)
- Center:
 - X [mm]: 0,00
 - Y [mm]: 0,00
- Buttons: Add, Cancel

The 'Graphic properties' dialog box is shown with the following settings:

- Graphic: (tab selected)
- Barcode type: Data Matrix
- Barcode: ABCabc
- max. barcode length: none
- Size: Auto
- Invert
- Quiet zone (times the module width):
 - Top: 1
 - Left: 1
 - Right: 1
 - Bottom: 1
- Advanced settings: (dropdown menu)

Inserting a barcode opens the “New Graphic” dialog in which it is possible to specify the various barcode parameters.

BARCODE TYPE

Use this to select the type of barcode. A list of available barcodes in SpeedMark can be found in chapter "Barcode 1D list".

BARCODE

Use this to enter the barcode applicable for the barcode type.

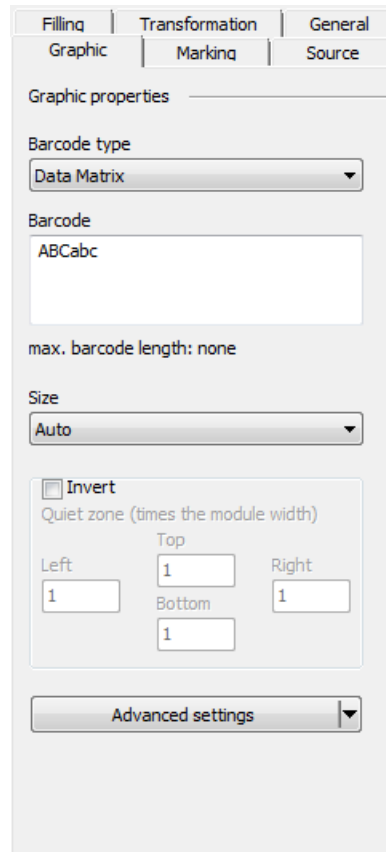
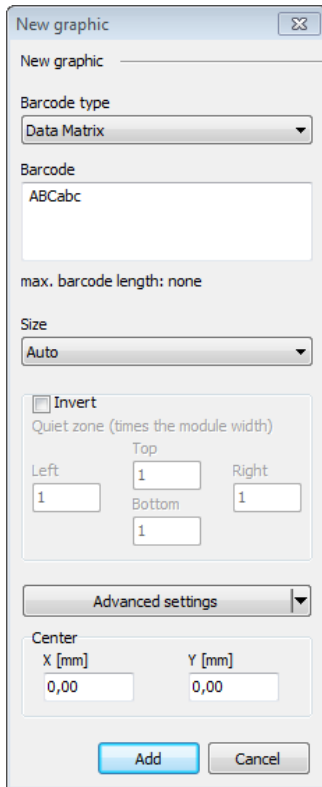
INVERT

The Invert checkbox is used to indicate whether a barcode should be displayed inverted and which quiet zone settings should be used.

ADVANCED SETTINGS

Special settings depending on the chosen barcode type can be setup here.

5.2.8 Barcode 2D



Inserting a data matrix opens the “New Graphic” dialog in which it is possible to specify the various data matrix parameters.

BARCODE TYPE

Use this to select the type of barcode. A list of available barcodes in SpeedMark can be found in chapter "Barcode 2D list".

BARCODE

Use this to enter the barcode applicable for the barcode type.

SIZE

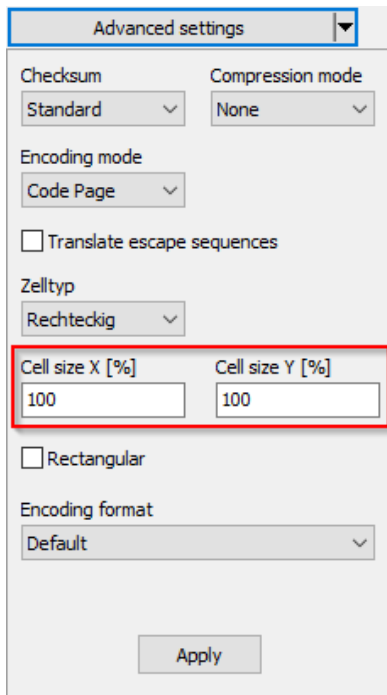
The possible barcode sizes depend on the chosen barcode type and can be setup here.

INVERT

The Invert checkbox is used to indicate whether a barcode should be displayed inverted and which quiet zone settings should be used.

ADVANCED SETTINGS

Special settings depending on the chosen barcode type can be setup here.



Variable cell size

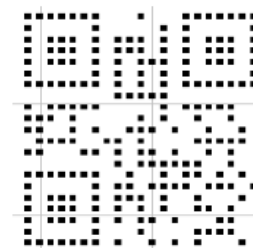
The advanced setting of a Barcode offers the possibility to adjust the size of the barcode cells in X and Y (these are the information dots/lines that form the barcode). Tuning of this setting is useful when engraving plastics to get perfect results. Furthermore, it minimizes bulging effects when deep engraving metal

Additionally, shrinking the cells will speed up the marking process (smaller cells are faster done), while readability of the barcode persists (this has to be tested and tuned for the optimal trade off).

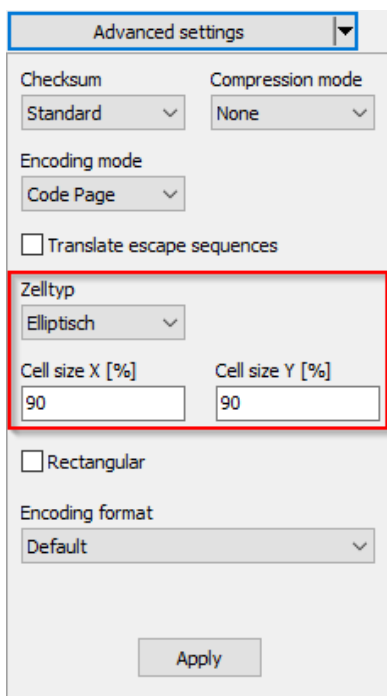
QR-Code with cell size 100%



QR-Code with cell size 50%

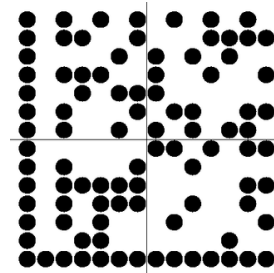


CELL TYPE



The cell type can be changed from rectangular to elliptical. This will display all cells of the 2D barcode as ellipses.

DataMatrix with elliptical cells



CODING OF SPECIAL CHARACTERS

To encode special characters inside the 2D barcode the option "Translate escape sequences" must be enabled. The special character is defined as "\xhh" inside the 2D barcode text string. The sequence "\x" activates the option and "hh" stands for a hexadecimal value.

Example: To add a Group Separator (GS) inside a GS1 barcode "\x1D" must be entered which is ASCII value 29.

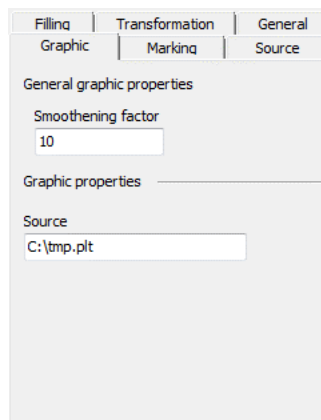
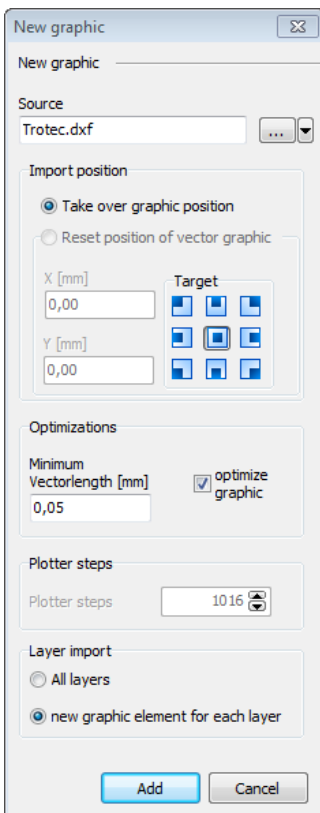
5.2.9 Vector Graphic (DXF, PDF)



The Vector Graphic element is used to import vector graphics from external programs (e.g., Corel Draw , AutoCad, ...) → the import of Corel Draw files is limited to to version X3.



As an additional format PDF4 can be used to import vector graphics → Please refer to Appendix: "PDF-Import" for prerequisites and restrictions.



Inserting a vector graphic opens the “New Graphic” dialog in which it is possible to specify the various import parameters. It is also possible to retrospectively update the file in the Graphic Properties window.



Information

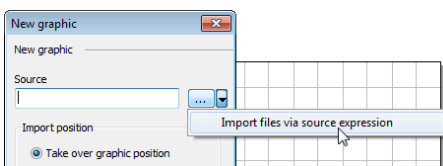
The imported vector file is then actually embedded in the SpeedMark program. This means that any changes made to the original file are not automatically applied to the data in SpeedMark. This is only possible by carrying out a manual adjustment in the Graphic Properties.

SOURCE (NEW GRAPHIC)

A vector graphic is usually imported by entering a file name (including the full file path) or by pressing the button with the three dots to open a file selection dialog.

The following vector graphic import filters are available in SpeedMark:

- AutoCAD DWG
- AutoCAD DXF
- HPGL/2
- SVG
- CGM
- Corel Draw (Corel Draw must be installed on the computer to import Corel Draw files) → If Corel Draw is not installed on the computer, you may export files from Corel Draw as .dxf files and then import them into SpeedMark.
- PDF



In dynamic programs, vector files are sometimes loaded based on various parameters. The arrow buttons may be used to create a vector file directly in the front end. → Using Graphic Properties Source is described in Chapter "Source".

IMPORT POSITION

Use this section to specify whether the original position of the graphic should be accepted or if a new graphic position is required.

When accepting the graphic position, the graphic's position data is extracted from the source file and used for the positioning in SpeedMark. In many cases, this can lead to the graphic being invisible if it is located far outside the operating range of the laser.

When creating a new graphic position, it is possible to specify both the insertion position and the alignment in relation to the insertion position using the position selector target.

OPTIMIZATIONS

Use this to activate various SpeedMark import optimisations.

Minimal Vector length

This optimisation is mainly used to reduce the number of points on a curve with many individual points. The minimal vector length defines the minimum length of a linear vector. The advantage of using this optimisation is the lower amount of memory required and reduced amount of time needed to import the file. In many cases, the import time can be cut from minutes to seconds.

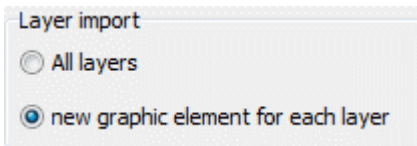
Optimise graphic

If this is selected, SpeedMark optimises the graphic for laser processing:

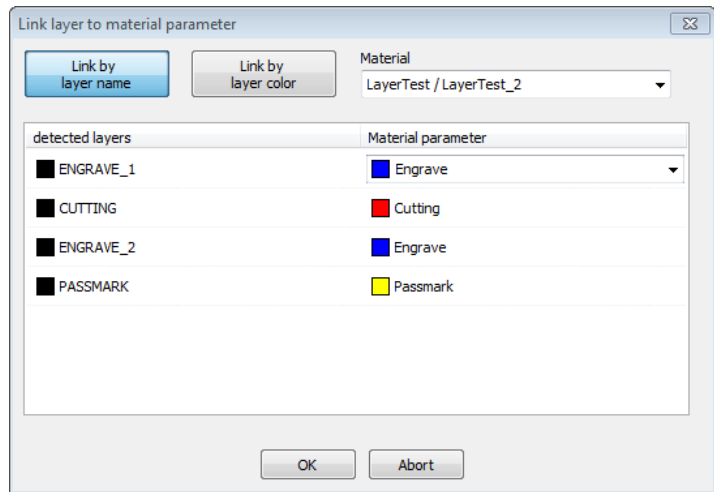
- Deletes zero vectors (unnecessary delay times)
- Links lines to vector strokes if there are no intervals between the existing individual vectors (reduces unnecessary delay times)
- Implements vector sequencing (flow optimisation)

PLOTTER STEPS

This setting is relevant to the import of HPLG files. It is used to specify the plotter steps required for importing (default value is 1016).



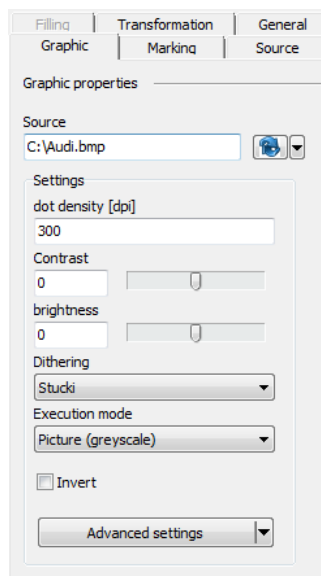
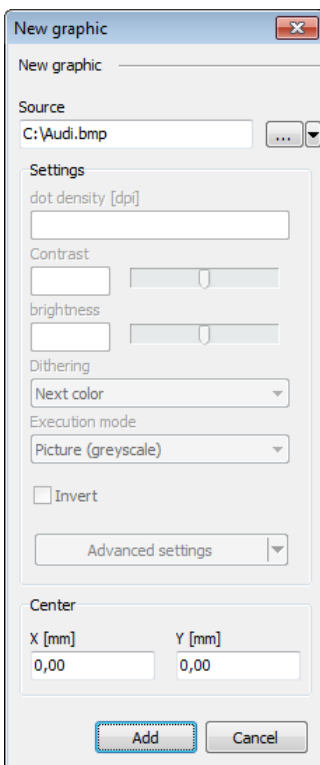
The option "All layers" imports all vector information in one graphic element. By the option "new graphic element for each layer" the layers can be imported in separated graphic elements if the graphic file supports layer information. The layer names or layer colors are used to link the new graphic elements to the material parameters in the material database.



5.2.10 Raster graphic (BMP)



The raster graphic element is used to import raster graphics from external programs (e.g., Paint, Adobe Photoshop, ...). SpeedMark supports a variety of different import filters for transferring data.



Inserting a raster graphic opens the "New Graphic" dialog in which it is possible to specify the file name of the graphic and the import position (centre). Graphic Properties can be used to retrospectively adjust the raster graphic settings in terms of pixel density, contrast, brightness, dithering and execution mode.

SOURCE (NEW GRAPHIC)

A raster graphic is usually imported by entering a file name (including the full file path) or by pressing the button with the three dots to open a file selection dialog.

The following raster graphic import filters are available in SpeedMark:

- Bitmap (bmp)
- JPEG (jpg, jpeg)

SETTINGS (GRAPHIC PROPERTIES)

Use this to adjust the main raster graphic settings to optimise them for laser marking.

Dot Density

Use this to specify the pixel density in “dots per inch”.

Contrast and Brightness

Use this to align the contrast and brightness of the imported raster graphic to those of the laser marking.

Dithering

This is used to describe the process of simulating colours using a reduced colour palette (e.g., converting a colour picture to a black/white graphic).

The following dithering algorithms are available in SpeedMark:

- Next colour
- Floyd Steinberg
- Stucki
- Siera
- Jarvin, Judice & Ninke
- Stevenson & Arche
- Burkes

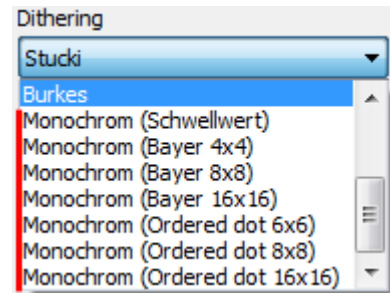
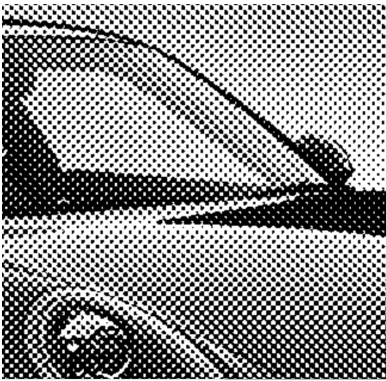
Ordered dithering

To mark images with a laser, it is necessary to convert them to black and white. This conversion uses algorithms to calculate the result, so depending on the used one, the final image looks different. Till now solely error-diffusion algorithms were used in Speedmark, as they produce the best visual output. For some applications (e.g., print media) these fine dots do not provide satisfying result. This also applies to some laser applications.

Because of this SpeedMark also provides the following ordered dithering algorithms:

- Bayer 4x4
- Bayer 8x8
- Bayer 16x16
- Ordered dot 6x6
- Ordered dot 8x8
- Ordered dot 16x16

Clustered dot dithering compared to an error diffusion dithering algorithm (Stucki)



Additionally, exists a Treshold conversion (like "nearest colour"), that can be parametrized by the user.

Execution mode

The execution mode determines if a graphic will be marked row by row or vectorized.

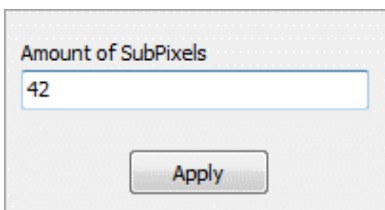
The following options are available:

- Photo (greyscale) Graphic will be marked row by row (recommended for photos) with a constant speed.
- Logo fast (Black/White) Graphic will be vectorized and the found regions will be quickly marked with vectors (recommended for logos). In areas with no marking, the laser quickly jumps to the next vector. The vectors are sorted to reduce jump sizes.
- Logo slow (Black/White) Graphic will be vectorized and the found regions will be quickly marked with vectors (recommended for logos). In areas with no marking, the laser quickly jumps to the next vector. Vectors are not sorted.

Inverted

This specifies whether a raster graphic should be inverted or not.

ADVANCED SETTINGS

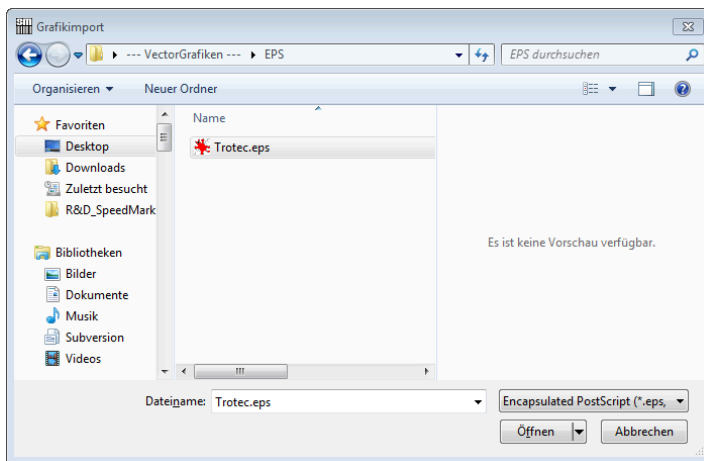


For some applications, especially annealing in focus length or black marking of aluminium, it is necessary to limit the fill distance to a few micrometers. For vector graphics, this value can be easily set in the fill settings. To get the same effect for raster graphics, a pixel density up to 25,000 DPI would be necessary. The subpixel mode automatically increases the pixel density without consuming system resources. For example, to mark a 600 DPI bitmap with 25,000 DPI, a subpixel value of 42 must be entered.

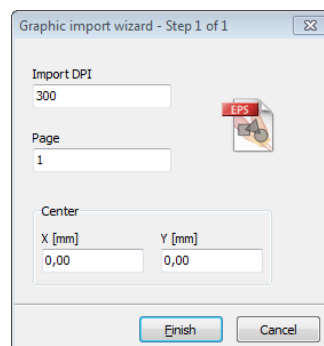
5.2.11 Import



Import Graphic Element supports the import of PDF and EPS files used for raster graphic elements (this means that – contrary to the DXF/PDF-Import - the vector information is treated as a bitmap and bitmap functions will be used for engraving).

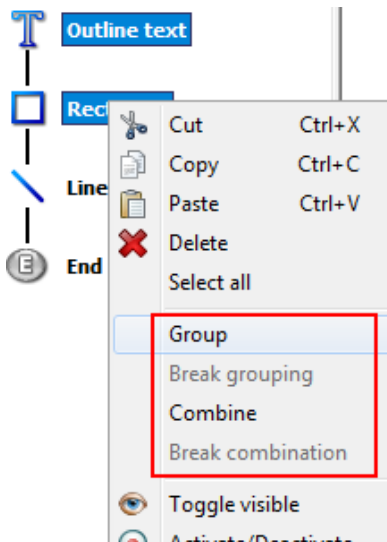


A file selection dialog is used to select the file for importing and the appropriate data filter.



Use the Import Graphic Wizard to set the necessary import settings such as Import DPI, Page and Import Position (Centre). The imported graphic element is then available in SpeedMark as a raster graphic. All raster graphic settings can be found in the Chapter "Raster Graphics".

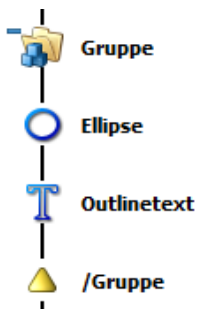
5.3 Grouping elements



SpeedMark provides two ways of grouping elements that have different effects. Both will be described in the following chapters. Creation of the grouping can either be done via the context menu of the drawing area or the one of the flow charts.

GROUP

A group acts like a permanent multiselecting that can be saved, reselected, and altered. It will be represented as an own image in the flowchart. There is no restriction, which elements may be added to a group – they may contain graphic elements along with e.g., control elements.



To create a group, first select the elements that should form the group. This can either be done on the drawing area or in the flowchart. At least two elements must be selected to enable the grouping. Right-clicking on the selection will bring up the context menu like depicted above. By clicking "Group" the group will be created. Changes to properties of a group will be delegated to each single element in the group (if the element support the affected one). Because of that those changes will persist even if the group is dissolved later.

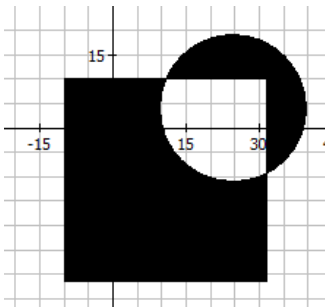


Information

Because a group can contain any type of elements, dynamic transformation cannot be executed on a grouping element.

COMBINATION

The combination is used to combine the filling of the elements. That means that overlapping areas will be left out. Like a group the combination can also be saved and reselected and altered and will be added as an own element in the flowchart. Because of the nature of the combination only fillable elements can be added. Any other element type will produce an error message that will describe the erroneous entry.



Like the group the combination is created by selecting at least two fillable elements and selecting the "Combine" action in the context menu. This can be done on the drawing area or in the flowchart. On creation the filling of all contained elements will be discarded. Because of that all elements will appear unfilled. By assigning a new filling to the combination the desired one will be created.

The combination joins together the contour of all contained elements. The elements themselves are left untouched. Any changes to the combination will not be propagated to the contained elements. Because of the elements will revert to their original settings as soon as they are excluded from the combination. The only exception is the filling that will be discarded.



Information

As the combination is treated as a pure graphic element, also dynamic transformation can be executed on it.

MODIFYING GROUPED ELEMENTS

To modify elements inside a group or combination either select them directly in the flow chart or via dragging a selection in the drawing canvas. Clicking a single element on the canvas is not possible as it will always select the full grouping element. Modifying the element can be done in the usual ways (transformation, properties, or mouse).



Information

Elements in a grouping will keep the changes until they are overwritten by the group settings. The combination will revert the changes immediately (if the properties are relevant for itself (e.g., filling, distance, etc.)).

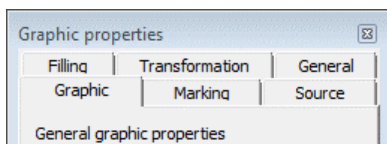
RESTRICTIONS

The mixing of grouping, combination, and special elements (Array, deep engraving) has certain restrictions. The program will give an according error message if an illegal combination is present. The following table will just give a short overview.

Element \ Target	Grouping	Combination	Array	Deep engraving
Graphic element	√	Only fillable	√	√
Scripting/ Control	√	×	×	×

Grouping	√	May only contain graphic elements (Non fillable elements will be accepted and marked in the usual way, but not integrated in the combination.)	May only contain graphic elements	May only contain graphic elements
Combination	√	√	√	√
Array	√	×	√	×
Deep engraving	√	×	×	Results will be difficult to predict! Inner fillings will not be rotated Solution: Move the inner deep engraving to a grouping and add the grouping to the outer deep engraving.

5.4 Editing Basic Graphic Properties



The Graphic Properties window not only offers the possibility of editing special graphic element properties, but it also provides the option of adjusting the basic parameters of all elements. As not all properties are available for each graphic element, these are greyed out or deactivated, as necessary.

Auto data apply

If data is changed in the graphic property sheets, they will be automatically applied on leaving the input field (e.g., Tab) or by pressing “Enter”.

GENERAL

The Graphic Properties General tab contains all the basic setting of each of the individual graphic elements.

Graphic properties

Graphic | Marking | Source
Filling | Transformation | General

Description

Title
Outline text

Note/Comment

ID
{461CA317-C19B-440F-9D6F-EC65C1E5F1C}

Flow control

Breakpoint
 Visible
 Enable

Marking time

Calculated time
112ms

Contour

Point count Length [mm]
607 46,54

Jump count
4

Filling

Point count Length [mm]
0 0,00

Jump count
0

Description section

The standard title is displayed in bold in the flow chart directly next to the element symbol. It is also possible to add a comment. This is likewise displayed on the flow chart below the title.

Behaviour section

It determines the process flow of the graphic element. Breakpoint is used to specify whether the flow should be interrupted during debug mode or not.

Show graphic is used to specify whether an element is displayed on the drawing interface or not (please note, however, that this does not affect the laser marking).

Element active displays the element on the drawing interface although it will not be marked by the laser unless it is actively set.

Position locked indicates whether the element can be selected on the drawing area and thus moved/edited.

Marking time section

Shows the calculated time for a graphic element. This is only an estimation value and will differ, especially for bitmaps, from the marking time.

Contour and Filling sections (is only displayed for graphic elements containing filling)

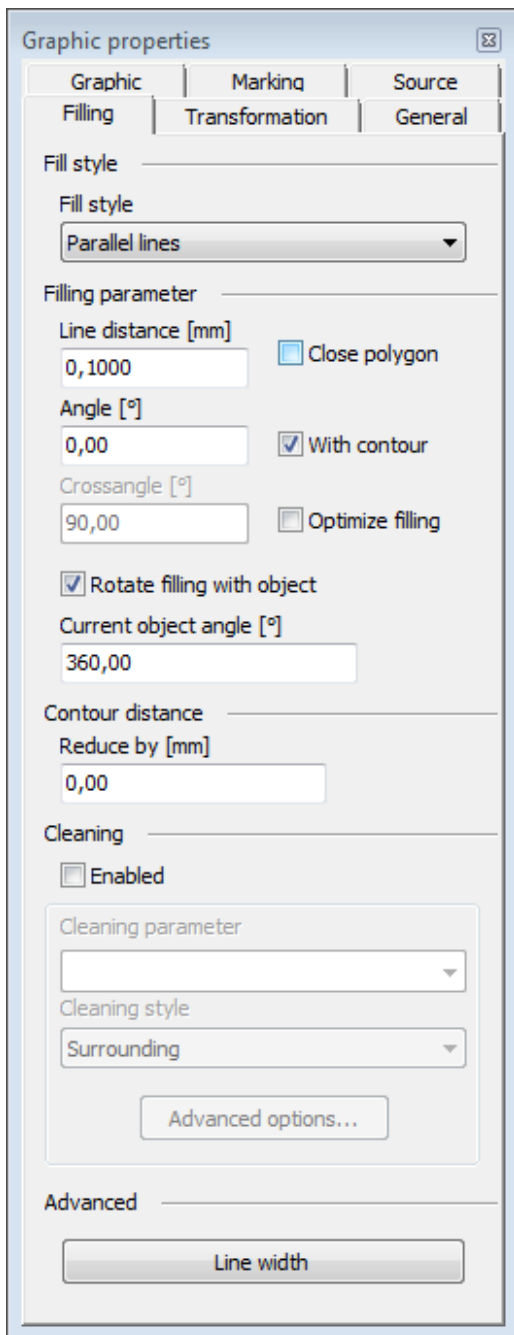
Provide basic information regarding the graphic element in terms of the number of points, number of jumps and overall vector length.

5.4.1 Filling

The Graphic Properties Filling tab contains all the parameters required to define the filling of a graphic element. → This tab is only available for shadable graphic elements.

LIMIT PREVIEW FILL LINES IN CANVAS

Filling Style is used to determine the basic type of filling. There are four filling styles available:

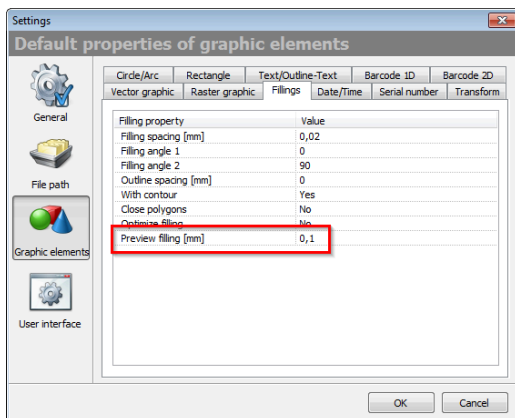


None	Filling is deactivated
Parallel lines	Filling lines are marked from left to right
Bi-directional	Filling lines are marked from left to right and right to left
Crossed lines (parallel or bi-directional)	The filling resembles a definable grid

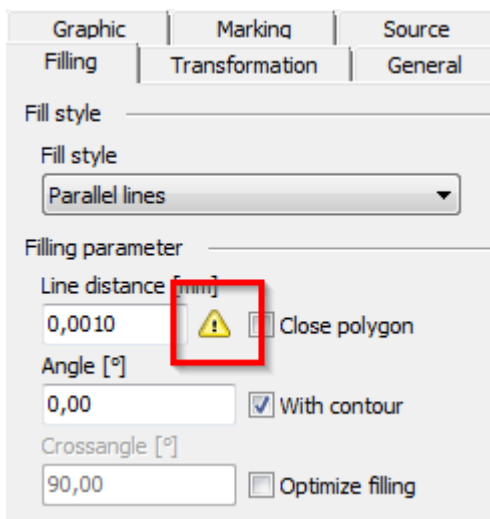
The Filling Parameters section is used to define the actual characteristics of the selected filling style in greater detail.

Line spacing	Intervals between the filling lines
Angle	Angle of the filling lines
Cross Angle	Angle of the crossed lines for the hatched filling style
Closed Polygon	This option refers to the graphics with open polygons e.g., if a “C” in a text should be shaded, this option forms a virtual closure between the start and end points of the “C” so it may be shaded.
With Contour	Draws the contour of the underlying element
Optimize Filling	The filling lines are subjected to vector sequencing and flow optimisation
Filling Angle Relative to Object Rotation	The filling angle is calculated according to the sum of the actual object rotation and the filling angle
Actual Object Rotation	Displays the actual object rotation.

LIMIT PREVIEW FILL LINES IN CANVAS



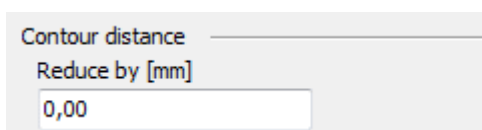
For some applications - especially annealing in focus, creation of colors on stainless steel or black marking of anodized aluminum - it is necessary to use fill distances in the range of a few micrometers (0,001 – 0,005 mm). All these fill lines must then be calculated and displayed. To improve the performance of the SpeedMark application, the drawing of the fill lines can be limited. The maximum value can be defined in the default filling properties (in the settings menu).



A small warning sign in the properties dialog signals the user that only a limited number of fill lines is shown. The marking process is not affected by this setting as it will always be executed with the real value.

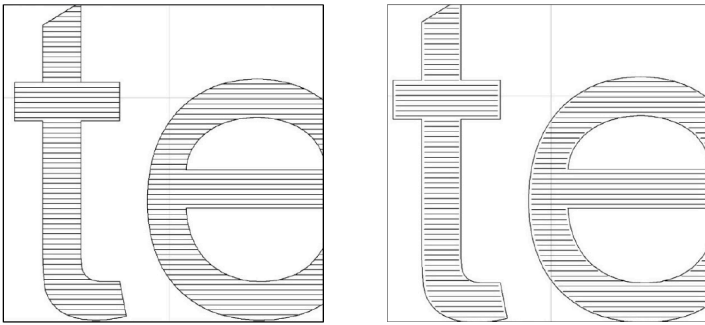
CONTOUR DISTANCE

The filling lines may be shortened by the value entered in the Contour distance section.



Information

However, this function refers to the reduction of individual filling lines and not the outline itself. Because of this, it is not a real 2D-contour (which would be same space at every point between the graphics and the filling lines), instead a 1D in the direction of the filling lines.

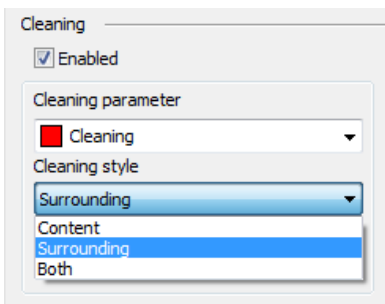


Example that shows contour lines shortened by 0,1mm (from 0mm)

5.4.2 Cleaning

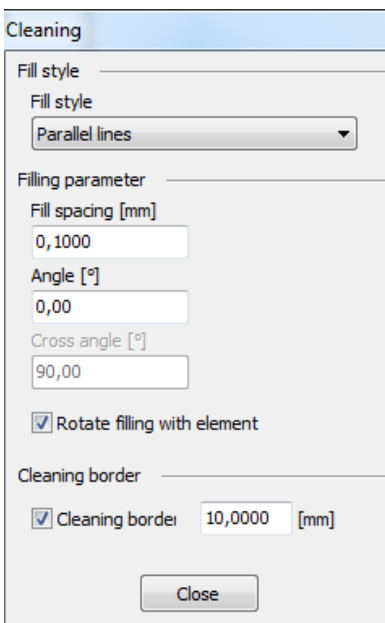
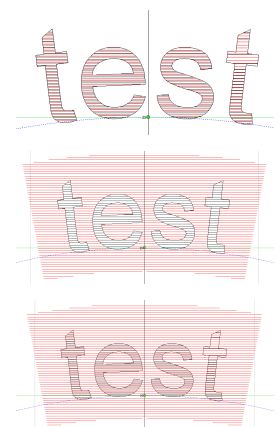
Cleaning offers the possibility to process a graphic's area again with different marking parameters (e.g., to remove dust from the engraving area or to polish the surface).

You can set both the marking parameter set and the special cleaning style.



Cleaning styles

- Content: same area as the marked graphic
- Surrounding: whole area of the graphic (bounding rectangle) minus the marked region
- Both: whole area of the graphic (bounding rectangle)



Usually cleaning uses the same settings as the linked filling, but sometimes this does not yield optimal results. It is possible to use an independent set of parameters that can be defined in the advanced settings (e.g., fill style, line distance, etc.). Additionally, the cleaning area can be extended via the cleaning border size (if necessary).

RADIAL TEXT

Usually, the cleaning area is defined by the bounding rectangle of the graphic (plus the cleaning border size). For the radial text, this area is restricted to the segment surrounding the text (the bound segment), as it can be seen in the screenshots above. This leaves out the circle to which the text is aligned.

5.4.3 Line width

BACKGROUND

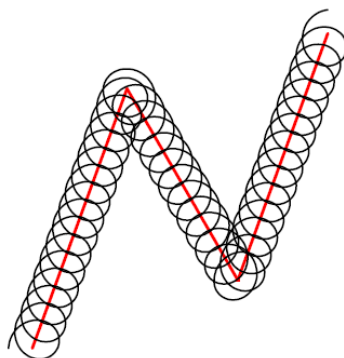
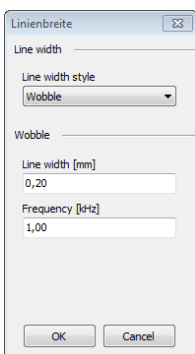
The line width produced by the laser beam for linear movements of the scanner is determined by 2 factors:

- size of the laser spot (this depends mainly on the wavelength of the laser and the focal length of the lens)
- interaction of the laser with the material

Due to these purely physical and optical factors, it has not been possible to take influence on the line width by the software. The line width option allows you to change the width of lines for a laser marking. This option affects all vectors of the vector graphic (contour, filling, cleaning).

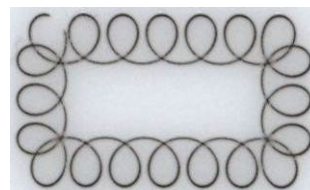
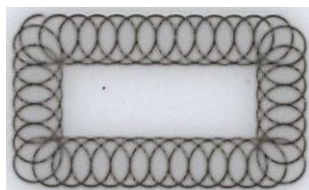
WOBBLE

When wobbling, the linear motion of the scanner is combined with a circular motion. The laser beam is moved spirally. Through the superposition of circular motions, the line width is enlarged. The parameter line width is the requested diameter of the circular movement. The parameter "Frequency" represents the speed of the oscillation.



Information

The wobble process depends on the marking speed, the line width and the wobble frequency. An increasing of the marking speed stretches the spiral movement.

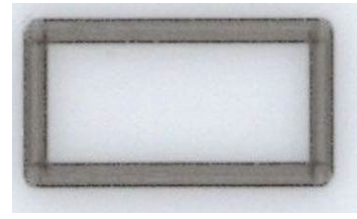
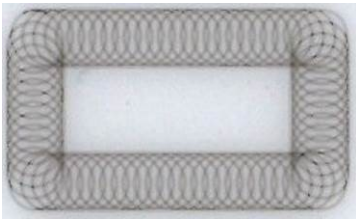


Increasing of the marking speed →

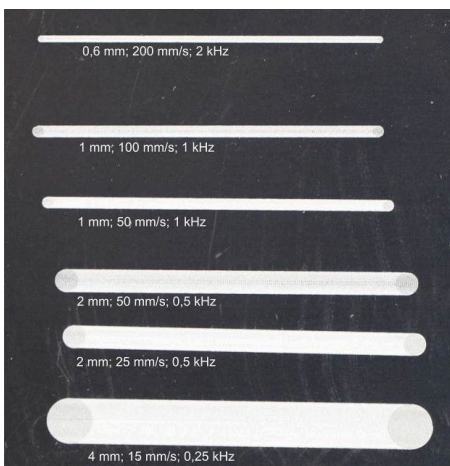


Information

An increasing of the wobble frequency compresses the spiral movement. If the wobble frequency is too high the requested line width cannot be reached. The diameter is reducing. This is due to the high speed of the wobbling. The scanners did not reach the specified positions, due to inertia. This behaviour is independent from the marking speed. A reduction of the marking speed compresses the narrow spiral motion only.

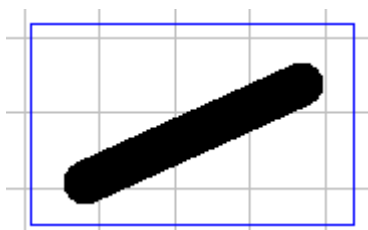


Increasing of the wobble frequency →



Notice

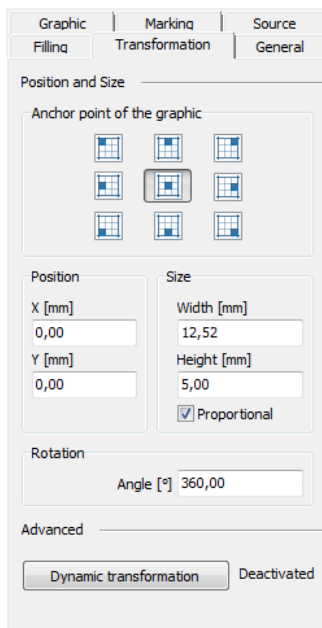
By the superposition of linear vector movement with oscillating circular motion the entire path that the laser must travel increases significantly! To generate clean and consistently filled lines with the Wobble function the marking speed must be reduced significantly regardless of the material. Values in the range 25-300 mm/s are useful here.



If wobble is activated the lines will be shown in the resulting width on the drawing area. This way it is easy to check if the graphics will look as intended.

5.4.4 Transformation

The Graphic Properties Transformation tab contains all the parameters required to transform a graphic element.



Anchor point

Defines the fixed point around which the transformation should occur. This point is marked in purple in the selection marker → see Editing Graphic Elements with the Mous.

Position

May be adjusted by entering the appropriate values in the X and Y input fields.

Adjusting size

By editing the values in the Height and Width input fields. Activating the Proportional option retains the aspect ratio of the graphic element.

Object Rotation

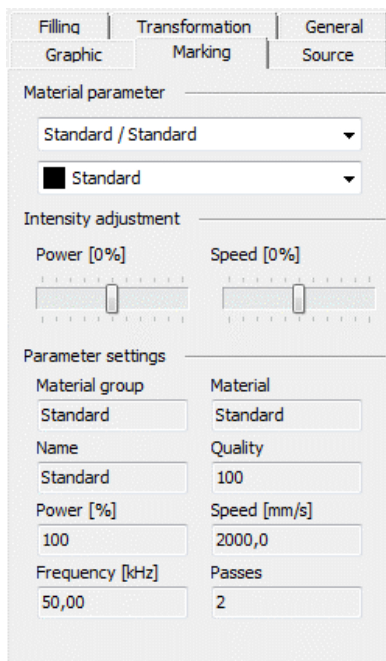
May be adjusted by entering an appropriate angle. Negative angles may also be entered.

Dynamic Transformation

Is used in conjunction with dynamic programs and is explained in greater detail in the following chapters.

5.4.5 Marking

The Graphic Properties Marking tab is used to edit the necessary material parameters.



A detailed explanation of the marking parameters → see "Material Parameter Manager".

section intensity

Is used to adjust laser settings like power and frequency without overwriting the material parameter settings.

Parameter settings

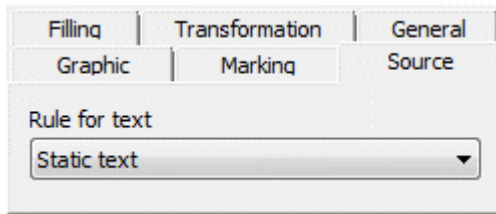
Shows the current parameters used for this graphic element.



Information

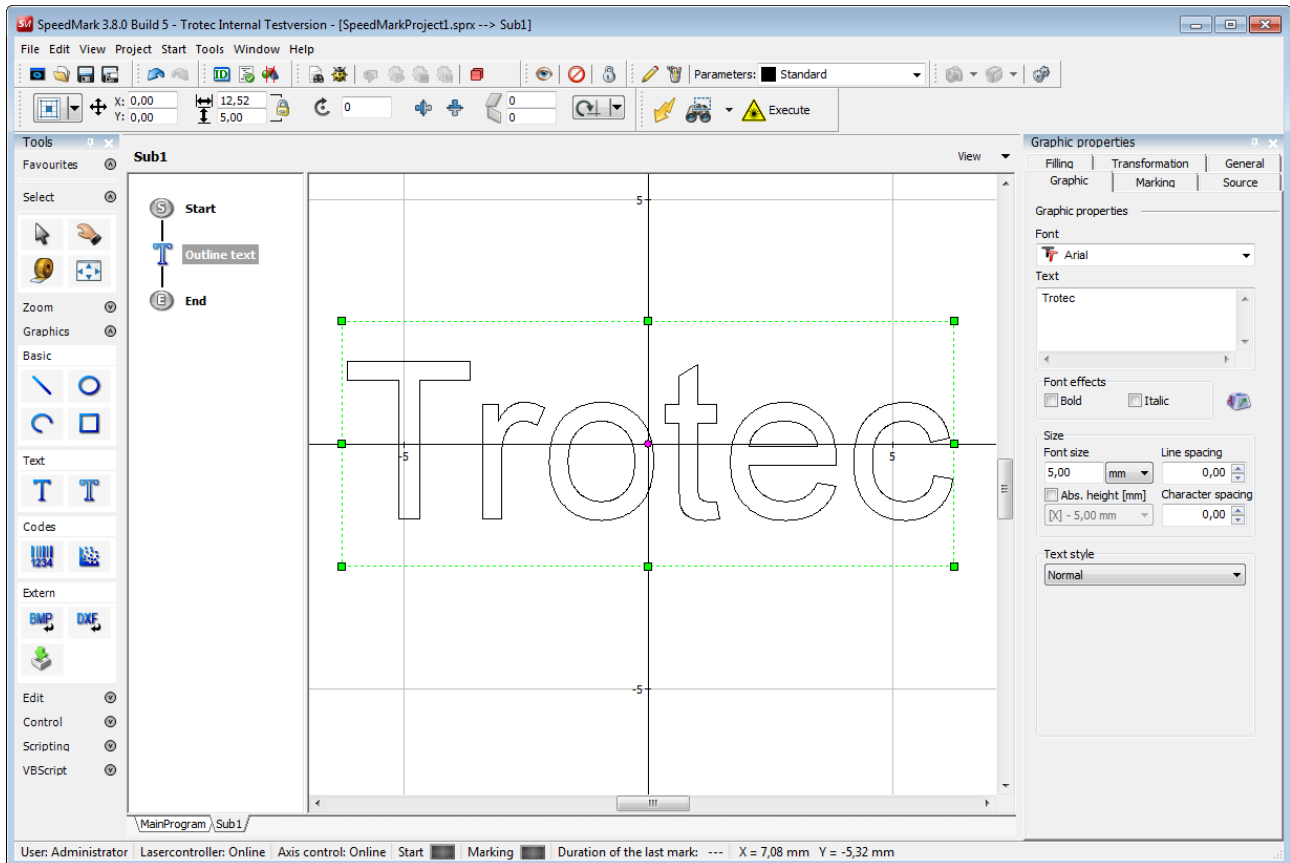
Changing the material parameter itself can be done with the button in section material parameter.

5.4.6 Source



The Source settings are used to link dynamic data to graphic elements. For example, it is possible to set series text functions .
→ see "Serial data and Dynamic Graphic Element Content".

6 Marking with the laser



6.1 Creating a test program

All following procedures are based on the simple program containing the Trotec text pictured above.

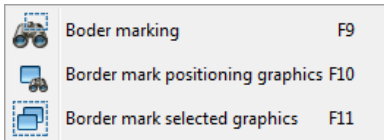
To create the programme:

1. Open a new program using the File → New → New Project menu.
2. Select the Outline Text symbol and insert the text in the machining area.
3. Enter a text and suitable font size.
4. Position the text centrally within the operating range of the laser (represented by the rectangle surrounding the Trotec text).
5. Save the program using the File → "Save As" menu.
 - ✓ The new program is now ready for processing the workpiece.
6. Prepare a suitable workpiece for marking.

6.2 Border marking



Border marking gives the possibility to mark the graphics with the pilot laser to bring the work piece to the correct position.



Border marking

The outer bound of all graphics will be highlighted.

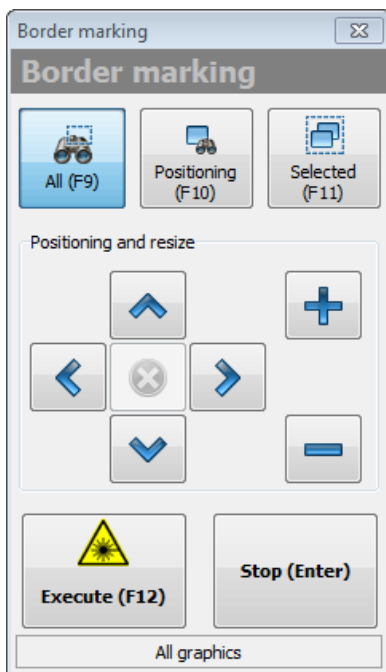
Border mark selected graphics

Only the outer bound of all selected graphics will be highlighted.

Border mark positioning graphics

The contour of all available positioning graphics will be highlighted. If the graphic has a complex outline, the laser may be too slow to produce good results.

→ Activate the dialogue "Border marking".



Border marking

You can change between the above-mentioned options.

Positioning and resize

You can adjust the graphic elements to the work piece.



Information

When option "Selected" is active, changes in position and size are only applied on these graphic elements.

Execute

All graphics will be marked directly.

Stop

The border marking ends.

RADIAL TEXT AND SIMPLE GRAPHICS



To be able to easily position radial text, those elements are handled differently. Not a rectangular outline will be shown, but instead the boundary of the text (bent segment). If a graphic is simple enough (number of vectors, jumps, etc.) also its real outline is drawn (e.g., single characters). If these limits are exceeded, the resulting border mark would be badly visible. So, the system will switch back to using the bounding rectangle.

6.3 Normal program execution

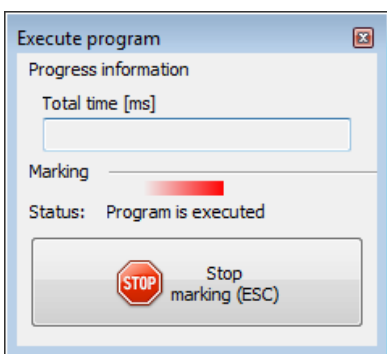


This function is used to execute an entire SpeedMark program including the program and control elements.

START PROGRAM EXECUTION AND MARKING

The actual program execution is started either using the menu (Start → Execute) or the F12 function key.

END PROGRAM

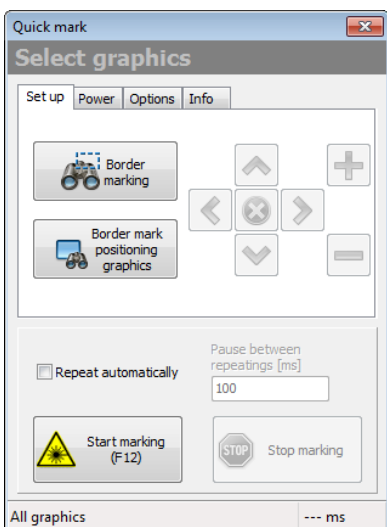


When the program execution starts, the "Execute Program" window opens. The program execution can be stopped at any time by pressing the Stop Marking button. When the program is complete, the execution is automatically interrupted. The window can be closed by clicking on the close button top right.

6.4 Quick mark



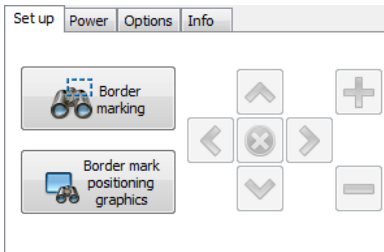
This function is used to execute programs simply and quickly in SpeedMark. Its main purpose is the simple set-up of the work piece and retrieval of the relevant marking parameters. It is initiated using either the menu (Start → Quick mark) or the F8 function key.



Information

The Quick mark function is only used to perform the marking of graphic elements. This mode is not used to mark program and control elements and will ignore any movement actions by a deep engraving element.

6.4.1 Setting up the workpiece



The “Border Marking” and “Border mark positioning graphics” functions are used to set up the work piece in the machining area. The “Border Mark” function enables the XY set-up of the work piece. The pilot laser is used to draw the smallest possible rectangle for all created graphics. With the function “Border mark positioning graphics” only such elements with the material parameter property “Positioning” will be drawn with a rectangle by the pilot laser → see "Material Parameter Manager".

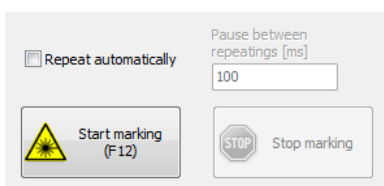


Caution

While the pilot laser is drawing the rectangle, it is in principle safe to reposition and set up the work piece. However, you must continue to observe all laser safety guidelines.

The pilot laser may be deactivated once the work piece has been set up by pressing the button again.

6.4.2 Marking in quickmark mode



Use the Start Marking button to start the laser marking the workpiece.

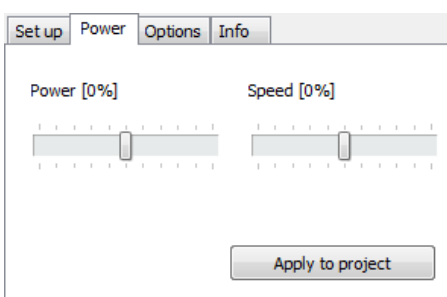


Warning Laser

Use the Stop marking button to interrupt the current marking process at any time.

The “Repeat” option causes SpeedMark to repeat the marking until the Stop Marking button is pressed. You can specify the pauses between the individual repetitions.

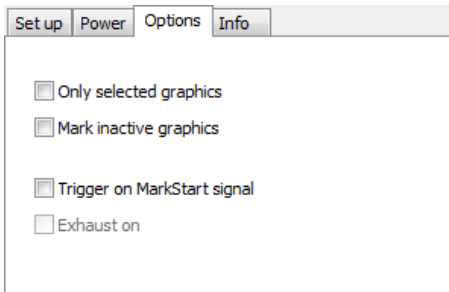
6.4.3 Power



The currently defined material parameter settings can here slightly be adjusted (power and marking speed).

The button “Apply to project” will take over these adjustments to the single graphic elements.

6.4.4 Options



Only selected graphics

Will only mark currently selected graphics in the drawing interface.

Mark inactive graphics

Allows the marking of inactive graphics.

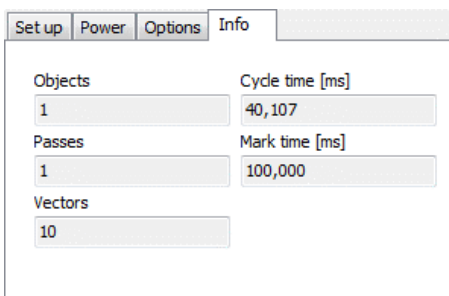
Trigger on MarkStart signal

Causes SpeedMark to begin marking only once the MarkStart signal is issued.

Exhaust on

Will start a connected exhaust before marking.

6.4.5 Marking information

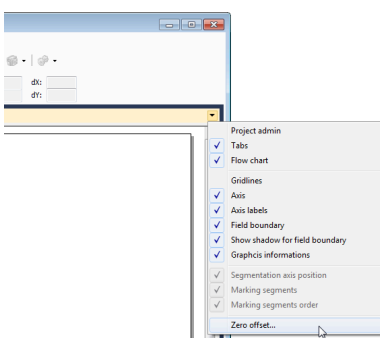


Once the marking is complete, all relevant information such as the number of marked objects, number of cycles, marked vectors, cycle time and marking time are displayed.

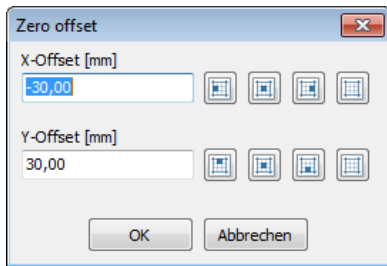
The cycle time indicates the total marking time including the calculation of the vectors and transfer of the data to the laser system.

The marking time indicates the time the laser required to complete the actual marking.

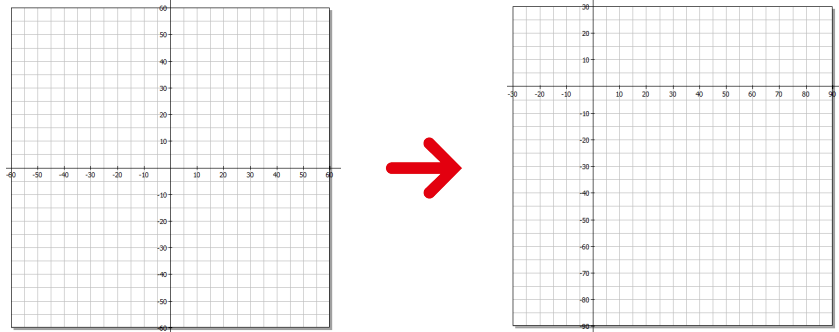
6.5 Individual zero offset



To improve the designing of marking in SpeedMark, the zero point of the marking area can be moved. This makes working with trays much easier, as it allows the drawing area to be adapted to the environment.

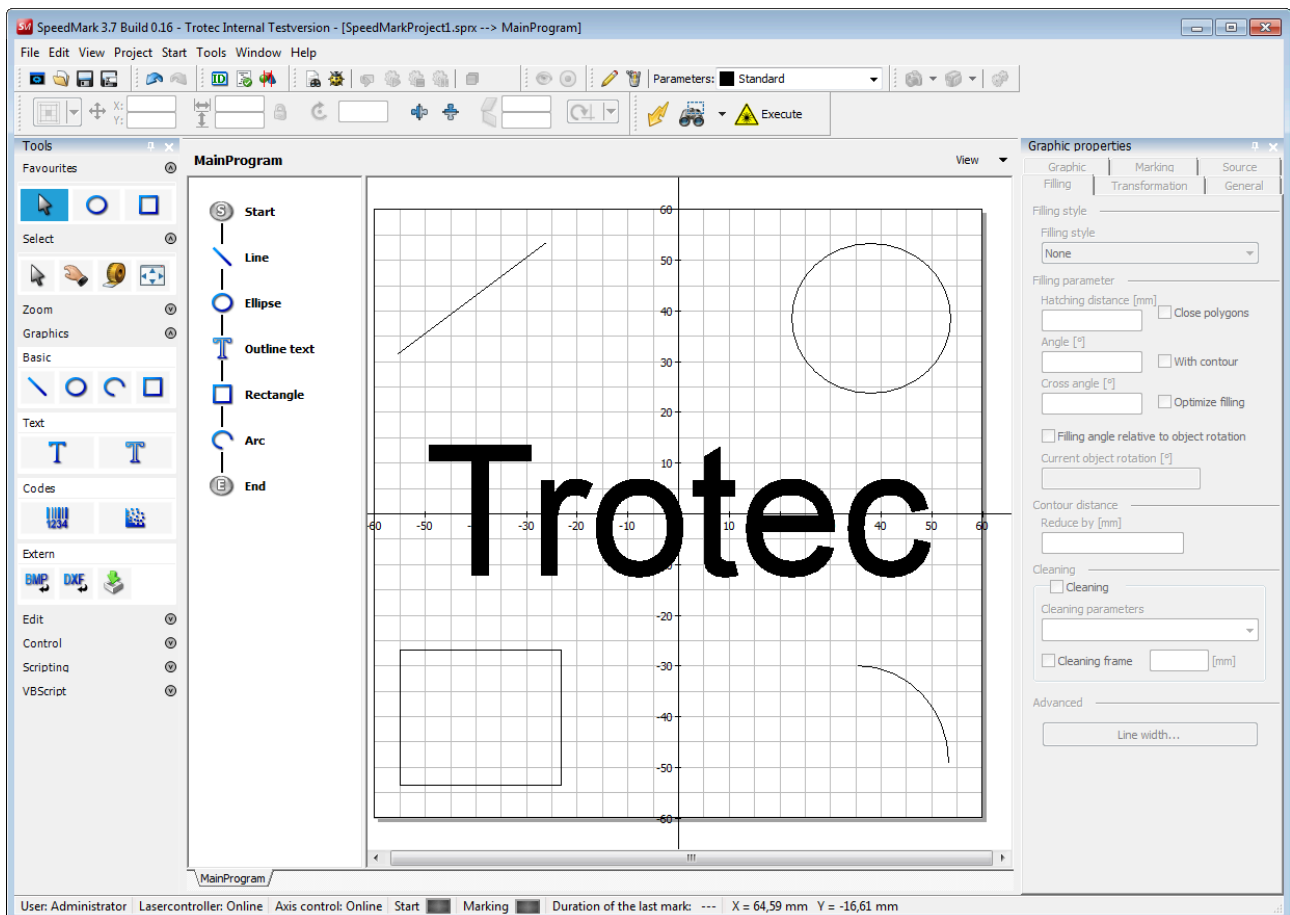


This option is also available for segmentation. It shows the current zero point of the mechanical axes of the SpeedMarker system and can also be freely changed.

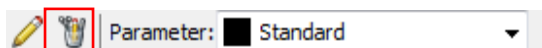


7 Material parameter manager

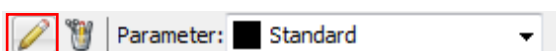
Material parameters can be used to adjust how the laser marks the workpiece. This chapter describes how the material parameters are defined and how they can then be applied to individual graphic elements.



In SpeedMark there is the difference between global material database und local project material parameter:

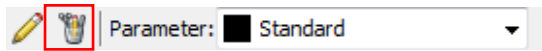


- The global material database is available for all projects. A change will affect all projects.



- The local project material parameter will only be saved with single projects. A change will affect only this project.

7.1 Manage global material database

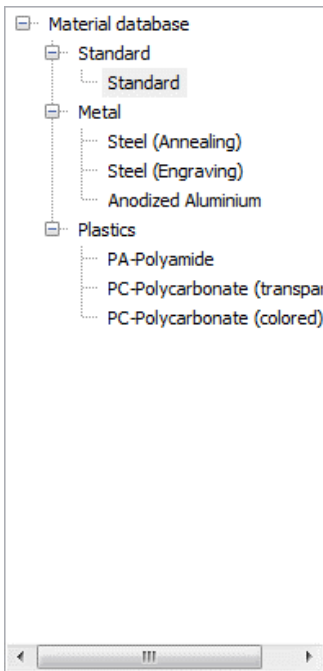


The global material database is available for all SpeedMark projects and allows the controlling of materials and the associated material parameters.

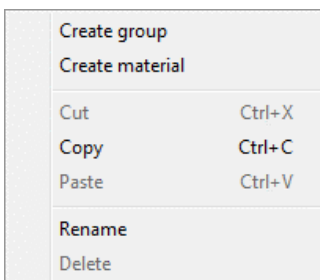
Active	Name	Marking mode	Power [%]	Marking speed [mm/s]	Frequency [kHz]	Quality	Advanced
<input checked="" type="checkbox"/>	Annealing	Marking	100	120,0	25,00	100	P:1; Z: ---;
<input checked="" type="checkbox"/>	Annealing	Marking	100	120,0	25,00	100	P:1; Z: ---;
<input type="checkbox"/>	Param 3	Marking	100	2000,0	50,00	100	P:1; Z: ---;
<input type="checkbox"/>	Param 4	Marking	100	2000,0	50,00	100	P:1; Z: ---;
<input type="checkbox"/>	Param 5	Marking	100	2000,0	50,00	100	P:1; Z: ---;
<input type="checkbox"/>	Param 6	Marking	100	2000,0	50,00	100	P:1; Z: ---;
<input type="checkbox"/>	Param 7	Marking	100	2000,0	50,00	100	P:1; Z: ---;
<input type="checkbox"/>	Param 8	Marking	100	2000,0	50,00	100	P:1; Z: ---;
<input type="checkbox"/>	Param 9	Marking	100	2000,0	50,00	100	P:1; Z: ---;
<input type="checkbox"/>	Param 10	Marking	100	2000,0	50,00	100	P:1; Z: ---;
<input type="checkbox"/>	Param 11	Marking	100	2000,0	50,00	100	P:1; Z: ---;
<input type="checkbox"/>	Param 12	Marking	100	2000,0	50,00	100	P:1; Z: ---;
<input type="checkbox"/>	Param 13	Marking	100	2000,0	50,00	100	P:1; Z: ---;
<input type="checkbox"/>	Param 14	Marking	100	2000,0	50,00	100	P:1; Z: ---;
<input type="checkbox"/>	Param 15	Marking	100	2000,0	50,00	100	P:1; Z: ---;
<input checked="" type="checkbox"/>	Positioning	Positioning					

At the bottom of the dialog are 'Options', 'OK', and 'Cancel' buttons.

Material parameter manager



All used material parameters can be managed by the material parameter manager. If not already visible, this dialog can be opened using the View → "Global material database menu" or the marked buttons in the picture above. All materials and the groups are presented in a tree structure for a better overview.



Materials and the according groups can be added, edited, or deleted with a context menu (right mouse button).



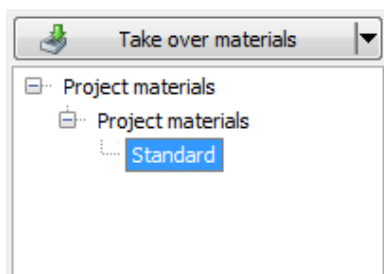
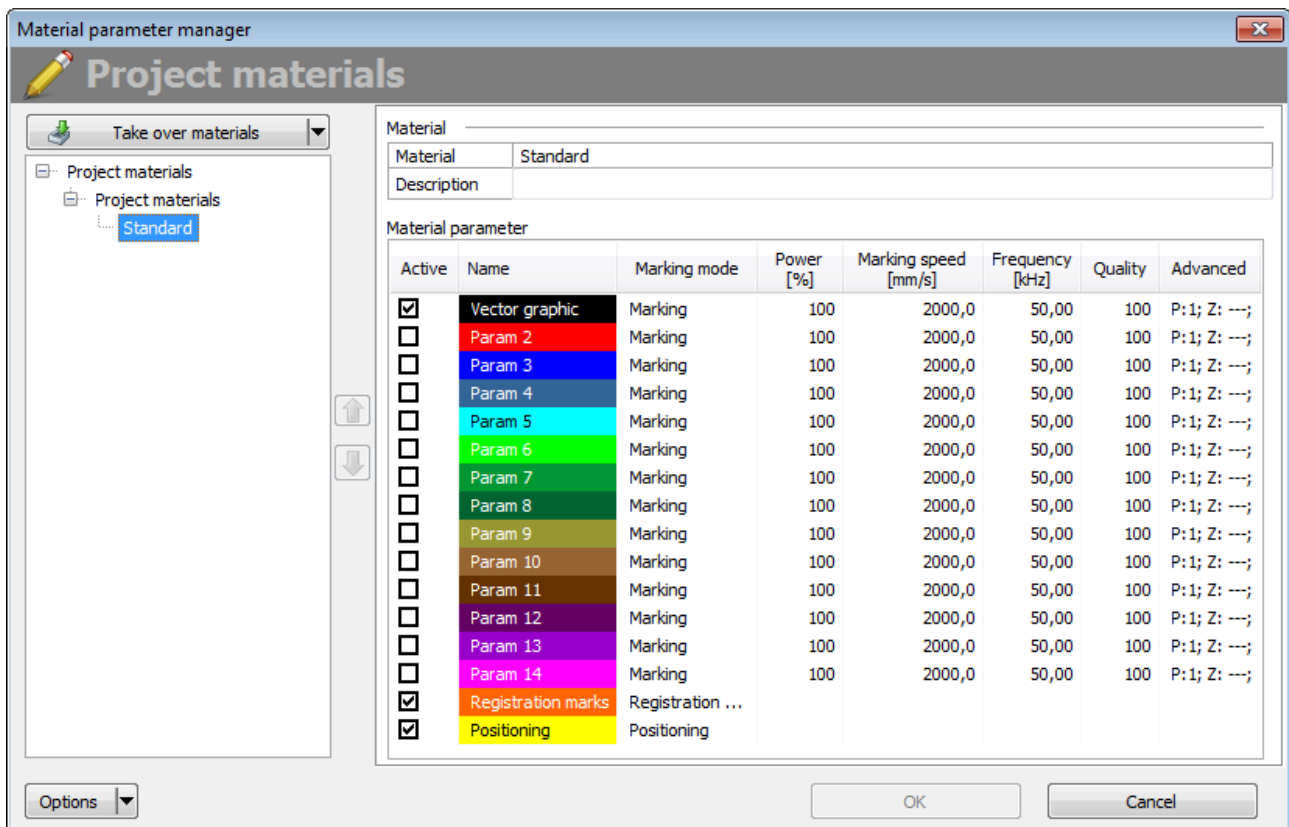
Notice

The material "Standard" cannot be deleted.

7.2 Manage local project material parameter

The local project material parameters are only available for one specific project.

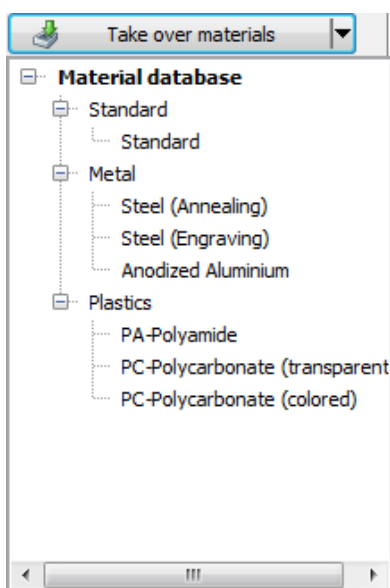




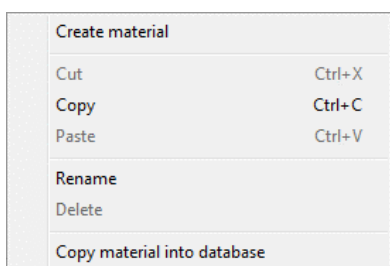
All used material parameters can be managed by the material parameter manager. If not already visible, this dialog can be opened using the View → Project material parameter menu or the marked buttons in the picture before.

All materials and the groups are presented in a tree structure for a better overview.

Material parameter manager



With the button “Take over materials” it is possible to copy materials from the global material database to the project material parameters.



Materials and the according groups can be added, edited, or deleted with a context menu (right mouse button).



Information

The material “Standard” cannot be deleted.

Additionally, it is possible to copy project materials to the global database.

7.3 Define material parameters

Material							
Material		Standard					
Description							
Material parameter							
Active	Name	Marking mode	Power [%]	Marking speed [mm/s]	Frequency [kHz]	Quality	Advanced
<input checked="" type="checkbox"/>	Standard	Marking	100	2000,0	50,00	100	P: 1; Z: ---;
<input checked="" type="checkbox"/>	Vector	Marking	100	2000,0	50,00	100	P: 1; Z: ---;
<input type="checkbox"/>	Param 3	Marking	100	2000,0	50,00	100	P: 1; Z: ---;
<input type="checkbox"/>	Param 4	Marking	100	2000,0	50,00	100	P: 1; Z: ---;
<input type="checkbox"/>	Param 5	Marking	100	2000,0	50,00	100	P: 1; Z: ---;
<input type="checkbox"/>	Param 6	Marking	100	2000,0	50,00	100	P: 1; Z: ---;
<input type="checkbox"/>	Param 7	Marking	100	2000,0	50,00	100	P: 1; Z: ---;
<input type="checkbox"/>	Param 8	Marking	100	2000,0	50,00	100	P: 1; Z: ---;
<input type="checkbox"/>	Param 9	Marking	100	2000,0	50,00	100	P: 1; Z: ---;
<input type="checkbox"/>	Param 10	Marking	100	2000,0	50,00	100	P: 1; Z: ---;
<input type="checkbox"/>	Param 11	Marking	100	2000,0	50,00	100	P: 1; Z: ---;
<input type="checkbox"/>	Param 12	Marking	100	2000,0	50,00	100	P: 1; Z: ---;
<input type="checkbox"/>	Param 13	Marking	100	2000,0	50,00	100	P: 1; Z: ---;
<input type="checkbox"/>	Param 14	Marking	100	2000,0	50,00	100	P: 1; Z: ---;
<input type="checkbox"/>	Param 15	Marking	100	2000,0	50,00	100	P: 1; Z: ---;
<input checked="" type="checkbox"/>	Positioning	Positioning					

A material parameter set always consists of 16 parameters with a name and an allocated colour. This colour is also the colour used to represent the graphic elements in the drawing interface.

The material parameters may be defined according to the following settings:

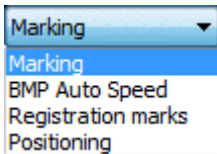
- Aktiv, Name - specifies name and state
- Marking mode - defines special executions modes
- Laser system parameters - specifies the laser output, marking speed and frequency
- Quality - this is used to specify any laser marking delay values
- Advanced - specifies advanced settings e.g., repetitions

7.3.1 Active, Name

Defines if a material parameter is active or not. Inactive material parameters cannot be chosen for graphic elements. The name of a material parameter can be chosen individually.

7.3.2 Marking mode

The marking mode defines special execution settings for this material parameter.



Marking

The graphic element will be marked with the specified laser system parameters.

BMP Auto Speed

Die Vorschubgeschwindigkeit der Scanner wird automatisch aus der DPI der Rastergrafik und der eingestellten Laserfrequenz errechnet. Somit ist in diesem Modus eine Anpassung der Geschwindigkeit nicht möglich.

Registration marks

The graphic element will NOT be marked with the laser but serves only to set up via a camera system (For details regarding the camera please consult the additional manual "SpeedMark Vision").

Positioning

The graphic element will NOT be marked with the laser. It will only be used for positioning of the work piece → see "Setting up the Workpiece".

7.3.3 Laser system parameters

Laser output can be defined in per cent for the purposes of laser processing. The minimum value is 0 per cent and the maximum value 100 per cent.



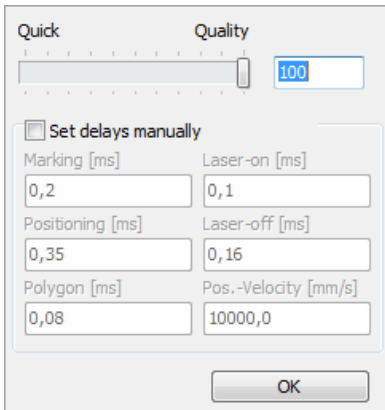
Information

Depending on the laser system used, it may be that certain types of laser only produce an actual laser output above a certain threshold value (e.g., 20%). Please refer to the relevant values in the user manual specific to your laser system.

The Marking Speed parameter affect the behaviour of the scanner head used by your laser system. The Marking Speed specifies how fast the scanner head moves during a laser marking process.

In addition to the output, it is also possible to specify the frequency of the laser pulses. The minimum and maximum values are therefore limited by the type of laser system used. → Values normally range between 20 kHz and 80 kHz; new lasers offer ranges between 2-200kHz.

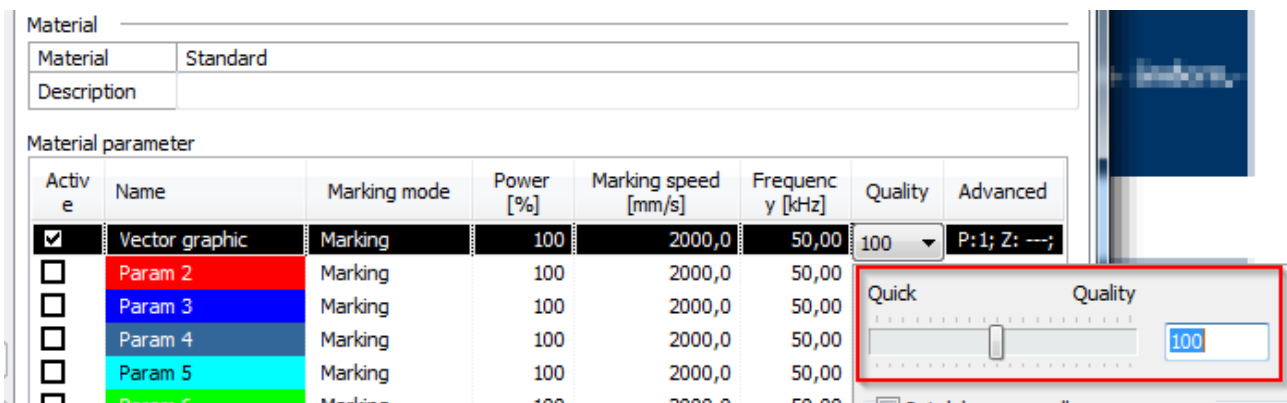
7.3.4 Quality - Delay parameters



With the parameter quality it is easily possible to configure the delay parameters of the laser system. →

(Some of these descriptions have been extracted from the documentation regarding your TLC2 card. Additional information regarding the delay parameters can be found in the documentation belonging to your TLC2 card or the control card you are using.)

A value of 100 means a high quality with moderate delay values. A value to 0 increases the execution speed of a graphic element but can cause quality reduction on certain materials. Because only certain delays influence the marking speed (Marking & positioning), only these are affected by the slider.



Additionally, to the quality parameter it is possible to setup the delay values manually by activating the checkbox “Setup delays manually”. As a laser system essentially consists of two components - the laser and the scanner head - the dynamic behaviour of the scanner head must be synchronised appropriately → A time delay results from the initial acceleration of the mirrors at the beginning of a movement.

The following laser and scanner delays are available:

- Positioning speed
- Marking delay
- Positioning delay
- Polygon delay
- Laser On delay
- Laser Off delay

Positioning speed	The Positioning Speed specifies how fast the scanner head moves between two markings.
Scanner delays	
Scanner delays determine the behaviour of the scanner head in relation to the movement of the mirrors.	

Marking Delay	Although the marking speed is normally lower than the jump speed, a drag delay will occur during marking. To ensure that the mirrors have arrived at their target position before the marking process begins, a suitable value may be selected for the marking delay.
Positioning Delay	At the beginning of a jump between two vectors, the mirrors must first be sped up to reach the preset positioning speed creating a time delay (also known as a drag delay) which must be compensated for. In addition to the drag delay, another delay occurs at the end of the jump as the mirrors must be brought to a complete halt. Their slow reaction time causes a certain amount of oscillation around the target point (settling time). A suitably high positioning delay must be selected to account for the drag delay and settling time.
Polygon Delay	It is not always necessary to completely stop the movement of the mirrors between two consecutive vectors (e.g., the corners of a rectangle). At this point, instead of a marking delay, a polygon delay is automatically inserted as the drag delay and settling time are less.
Laser Delays The laser delays determine when the laser is switched on or off before or after a marking (e.g., vector stroke). The laser delays do not affect the overall marking time unless negative values are selected.	
Laser on Delay	The laser on delay specifies how long the laser must wait before being switched on, although the scanner head has already started the marking process. The laser on delay may be used for the following purposes: <ul style="list-style-type: none"> To prevent a burning effect at the start of a marking process as the scanner head must bring the mirrors up to the preset marking speed. A suitably high positive value should be selected → However, if too high a value is selected, the first part of the vector will not be marked. Some materials take a certain amount of time to react to the laser beam. It may therefore be worthwhile pre-heating the start point of the vector before marking begins. This can be achieved by selecting a negative value → Using negative values for the laser on delay extends the overall marking time.
Laser Off Delay	The acceleration phase at the beginning of a scanner head movement creates a difference between the respective target and actual positions of the mirrors. As the laser should not then be switched off again when the target position is reached, but when the actual position is reached, it is possible to enter a laser off delay.

PROJECT DELAY VALUE GUIDELINES



Information

These guidelines apply primarily to the use of a TLC2 control card. Please refer to the relevant guidelines in the documentation of any other control card you may be using.

When setting the delay values, ensure that the following guidelines are observed to avoid problems:

- The laser off delay must be longer than the laser on delay. Otherwise, laser control errors may occur. → $L_{OffD} > L_{OnD}$
- The marking delay must be greater than the difference between the laser off delay and the laser on delay. → $MarkD > L_{OffD} - L_{OnD}$

7.3.5 Advanced

Passes	<input type="text" value="1"/>
Z-Offset [mm]	<input type="text" value="0,00"/>
Z-Offset factor	<input type="text" value="1"/>
Pulse duration [ns]	<input type="text" value="100"/>
Prepump	<input type="text" value="8500"/>
Color name	<input type="text" value="Black"/>
Color value R	<input type="text" value="0"/>
Color value G	<input type="text" value="0"/>
Color value B	<input type="text" value="0"/>
<input type="button" value="OK"/>	

In the advanced pop-up properties iteration can be configured.

By defining a Z-Offset the Z-axis is moved automatically by this value during marking (of an element that uses that material parameter) . After marking the Z-axis is moved back to the starting position (the value before the Z offset was added). This Offset defines a relative movement (not an absolute position) for the axis.

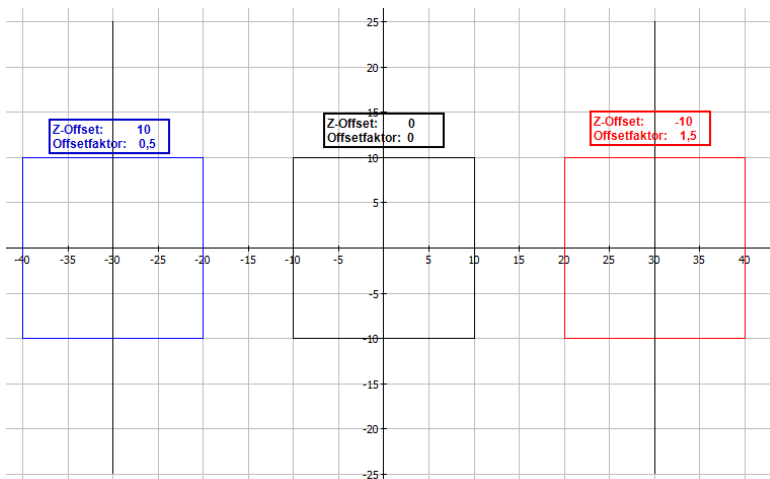


Notice

To be able to use this feature an automatically controlled Z-axis must be installed. Otherwise, the software cannot make the necessary adjustments.

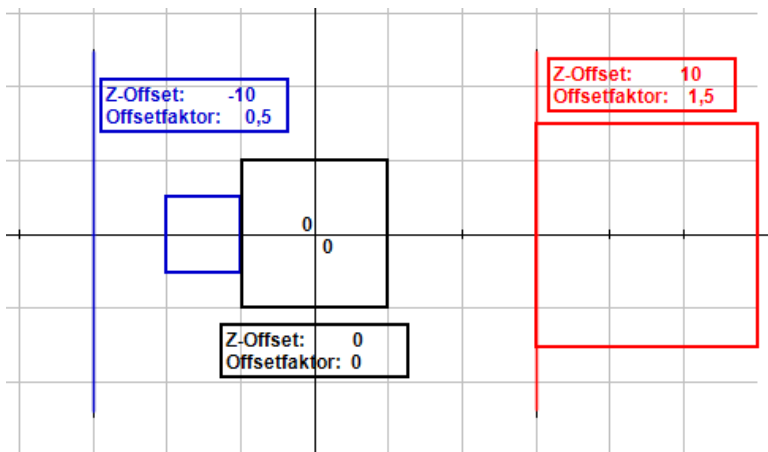
Z-OFFSET FACTOR

The Z-Offset factor is used to compensate any deviations from the intended size that are a result of the movement of the Z-axis. E.g., moving the Z-axis down, shrinks the working area and the contained elements. The factor is only used if the Z-Offset is other than 0. This offset factor cannot be calculated automatically because there are many parameters that must be regarded (original size, layout in the marking area, system configuration, etc.). So, the ideal value must be determined via tests. Be aware: values > 1 increase the final size, values < 1 decrease the final size.



The following examples should visualize the influence of the parameters.

Material parameter manager



A **negative Z-Offset** moves the axis down, which shrinks the working area (and the contained elements). To compensate this, a positive offset factor must be defined.

A **positive Z-Offset** moves the axis up, which enlarges the working area (and the contained elements). To compensate this, a negative offset factor must be defined.

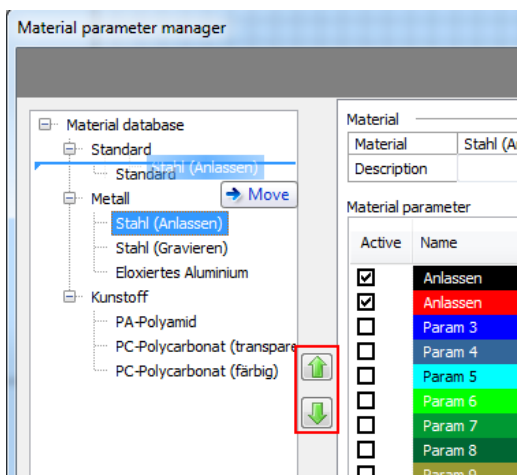


Notice

Any scaling is done based on the centre of the working area! Because of that the Z-offset factor also "scales" the centre point of the graphics element (which subsequently influences the final position of the element).

If the system has a MOPA laser source the pulse duration and prepump can be configured. The pulse duration specifies the timing length of a laser pulse. The prepump value increases/reduces the laser energy on start of a vector.

7.4 Ordering entries of the material database



The material database offers the possibility to rearrange the groups and material entries. This can be done in the global as well as in the project database. The easiest way is reordering the entries via drag and drop (mouse), alternatively the reorder buttons on the right side of the tree can be used. Those buttons will be active if a valid move of the selected element can be done.



Notice

Sometimes the mouse cursor has to be moved to the side of the desired drop target, otherwise the drop would try to create a sub element that is not possible. By trying out the different drop positions you will get used to the drag and drop behaviour quite fast.

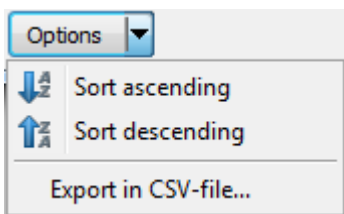
7.4.1 Restrictions

Not all drop targets are valid for certain elements. This will be shown either by an according "not allowed" cursor during drag and drop or the move buttons will get disabled (will turn grey).

The following actions are not possible:

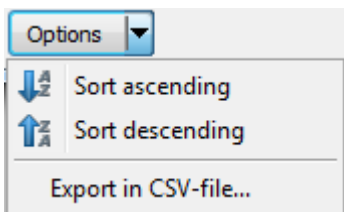
- Entries that originally belong to the default group (standard) can't be moved outside of this group. Materials that have later been placed into the standard group can of course be moved out again.
- Group in another group (no nesting)
- Placing a material outside of a group

7.4.2 Alphabetic sorting



Additionally, it is possible to sort the material groups and materials ascending and descending by name. This feature is available through the options menu.

7.5 Exporting material parameters

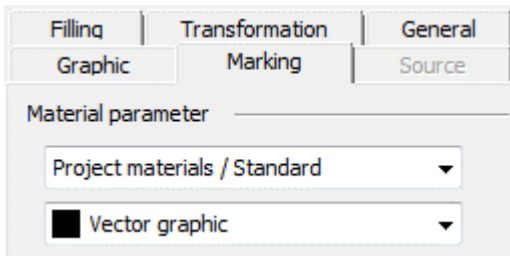


With the export option it is possible to write the whole material database into a CSV file. → These files can be opened with a text editor or Microsoft Excel and similar programs.

7.6 Applying material parameters to graphic elements

Graphic element material parameters can be set in Graphic Properties and via the "Material Parameters" toolbar.

7.6.1 Setting material parameters using graphic properties



The Marking tab in Graphic Properties can be used to directly apply the material parameters to the graphic element using the material parameter combo boxes.

7.6.2 Setting material parameters using the toolbar



By using the “Parameter” combo box it is possible to directly set the material parameters of all selected graphic elements.

The selected parameter is also automatically allocated to any newly inserted graphic elements. The material parameter manager is easily opened using the marker symbol on the right-hand side.

7.7 Determine ideal material parameters

SpeedMark offers various possibilities to tweak parameters to influence the engraving result. Because of that it is difficult and time consuming to test all combinations.

The following settings are the most important to control the engraving quality:

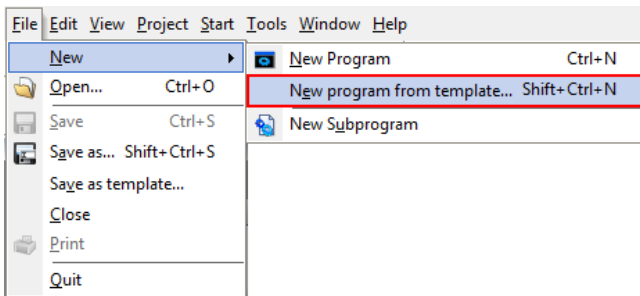
- Frequency (frequency of the pulses the laser fires)
- Marking speed
- Power (% of the maximum power the laser offers)



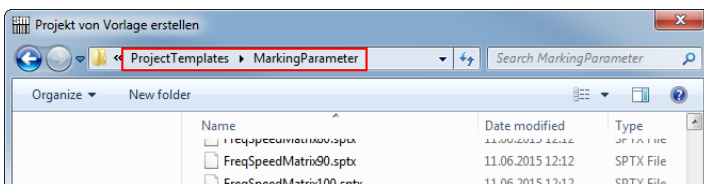
Information

Techniques like moving the focus plane or tuning of the quality parameters are not regarded in this chapter!

To aid in the finding of the perfect material parameters, SpeedMarks offers Templates that will test the various combinations. These resulting test matrices can be engraved in any size (depending on the working piece). The best material parameters can be easily determined by comparing the results.



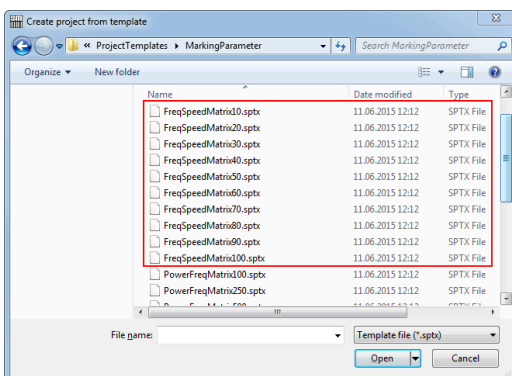
These templates can be found in "File" → "New" → "New program from template".



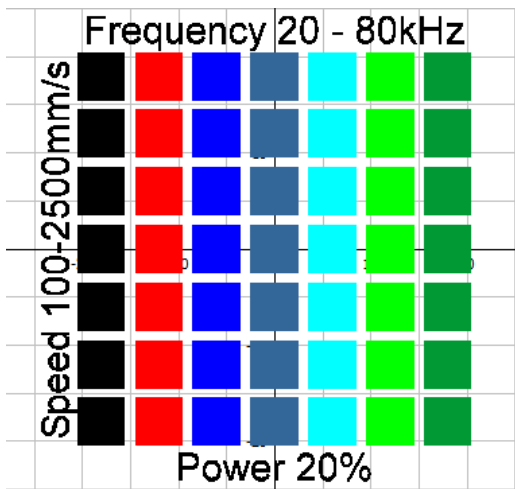
The files for the material parameters are located in the folder "MarkingParameter". There are two sorts of templates: one with fixed values and the others with dynamic value ranges. The first type can be found in the subdirectory "constant values", the dynamic ones in the directory depicted below. Constant matrices offer a better execution time and can be resized quite simple. Therefore they are very useful for a first and quick impression. Finetuning the parameters can then be done with the dynamic ones.

To do a dynamic parameter finding, simply open the according template and execute the program. It will guide you through the necessary steps (values, bordermarking, etc.). There are three types of constant templates that will be described in the following chapters.

7.7.1 Fixed power

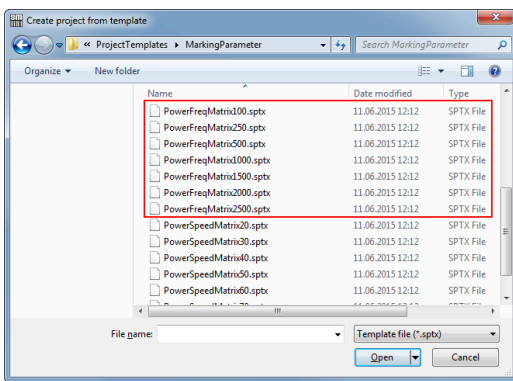


The values for frequency and marking speed are varied in a predefined range.

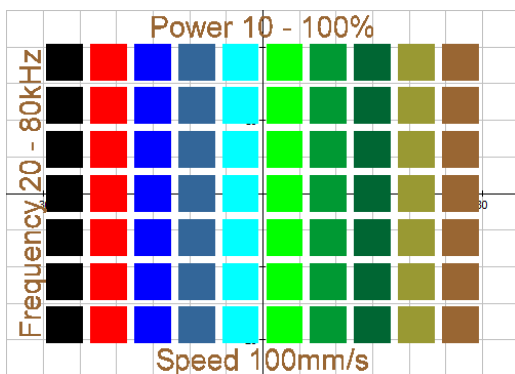


The value in this template type filename depicts the fixed power value (in %).

7.7.2 Fixed marking speed

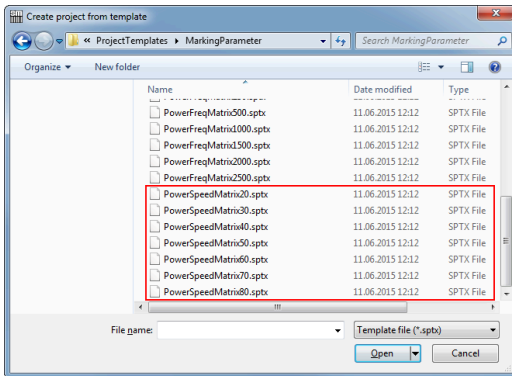


The values for frequency and power are varied in a predefined range..

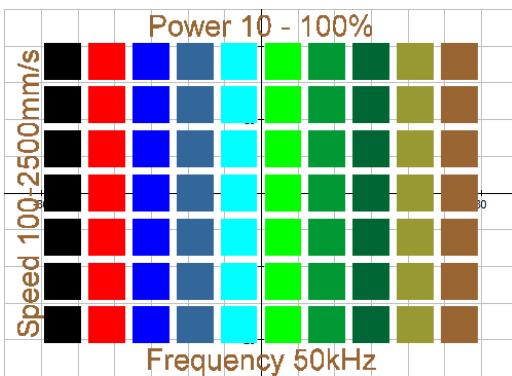


The value in this template type filename depicts the fixed marking speed value (in mm/s).

7.7.3 Fixed frequency

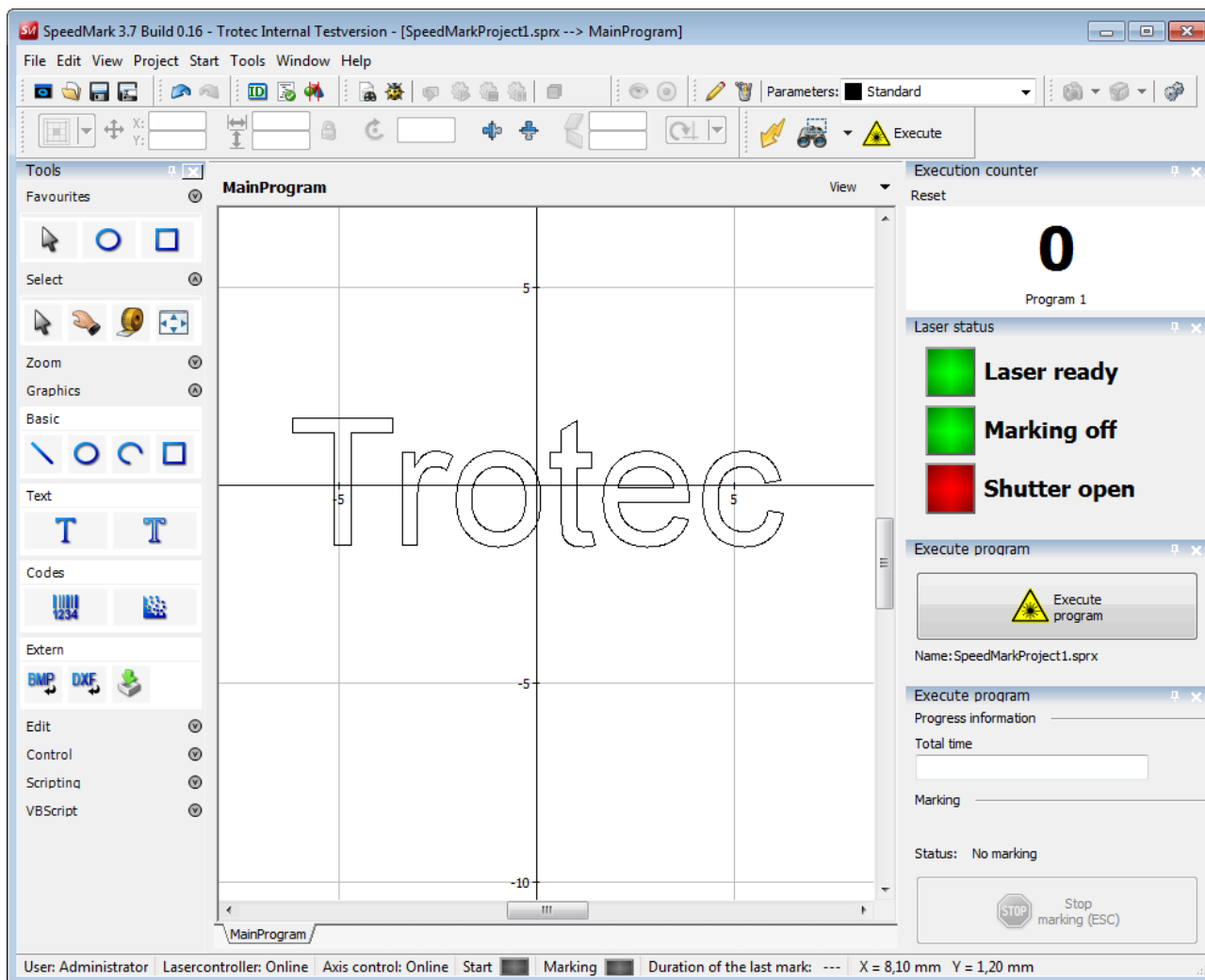


The values for marking speed and power are varied in a predefined range.



The value in this template type filename depicts the fixed frequency value (in kHz).

8 Desktops and user rights control



In SpeedMark it is possible to adjust the user interface to your personal requirements by moving, opening, and closing individual windows (docking). Using the SpeedMark desktop it is possible to save the thus configured user interfaces and open them later for use in other applications.

8.1 Initial user rights

By default, SpeedMark is shipped with limited user rights to avoid accidental changes of the configuration .



Information

When upgrading from a previous SpeedMark version this presetting may be differ. In this case contact your system administrator.



Caution

SpeedMark is configured with an initial administrator password. Please change this password to protect your system from unauthorized access.

To change the user rights and the existing passwords a change to the administrator user is necessary:

- Menu → Tools → Switch user
- User: Administrator
- Password: admin

After this user switch all actions described in the following chapters can be performed.

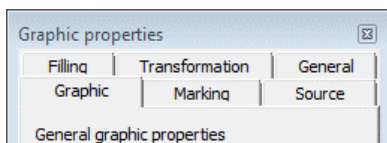
All predefined users:

User	Password	Kommentar
Administrator	admin	has all system rights
User	user	is permitted to use all laser functions
Operator	operator	can execute laser jobs

8.2 Adjusting the SpeedMark user interface layout

OPEN AND CLOSE WINDOWS

SpeedMark windows can be opened and closed using the View menu. Open windows are indicated by the tick on the left-hand side of the menu item.



It is also possible to close a window directly on the user interface by clicking on the X next to the window title.

DOCKING AND MOVING WINDOWS

All open windows can be moved by clicking with the mouse directly on the window title in the user interface. These windows can be moved freely around the user interface and docked on the sidebars.



Information

The “Flow Diagram” window is the only window which cannot be moved as it is linked directly to the drawing interface. However, it is still possible to open and close this window.

8.3 Managing customised user interfaces using the desktops

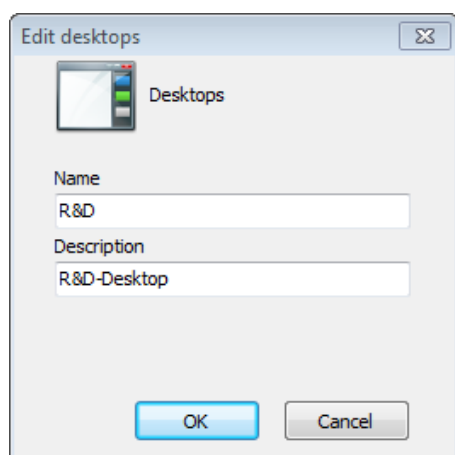
The Desktop Manager can be used to save user interface layouts for use in other applications (as described in the previous chapter).

8.3.1 Creating and selecting desktops using the toolbar

The menu item Tools->Switch desktop can be used to select the standard desktop and previously saved desktops (e.g., operator), and to save current desktops.

This menu consists of three parts:

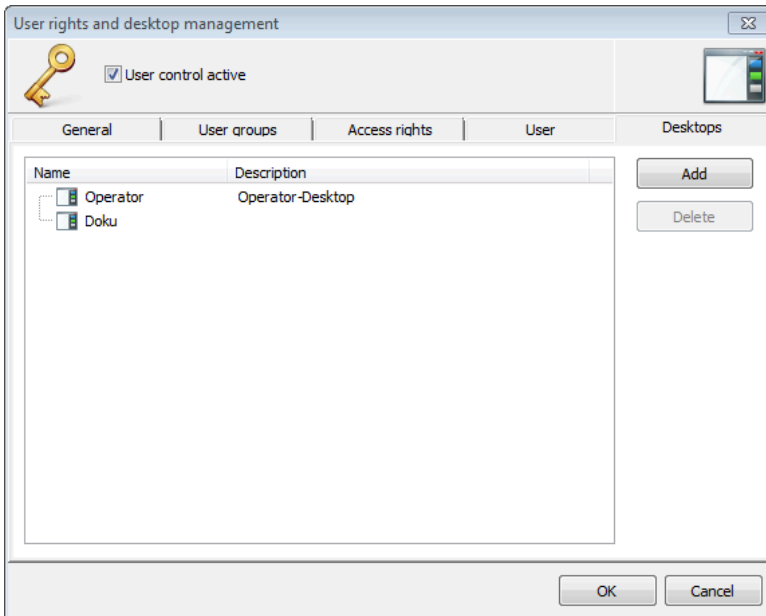
- Standard desktop
- List of previously created desktops
- Save desktop



“Save Desktop” can be used to save the current user interface as a desktop. The adjacent dialog may be used to assign a name and description to the created desktop. The desktop is created by pressing the OK button.

Every newly created desktop is then added to the desktop list and is available for selection.

8.3.2 Creating and managing desktops using the desktop manager



Via the menu: Tools → User managements and desktops... it is possible to open the Desktop Management dialog. This dialog displays all the desktops currently available. The Add button is used to add the current user interface as a new desktop.



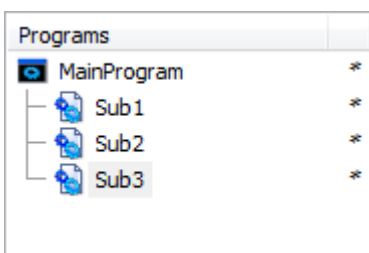
Information

If you want to create a user interface without the Desktop toolbar, you can do this using the Add button. It is not possible to do this using the Desktop toolbar.

The Delete button can be used to delete existing desktops.

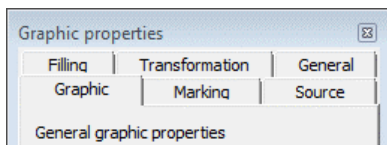
8.4 SpeedMark windows

All SpeedMark windows can be opened and closed using the menu items on the View main menu.



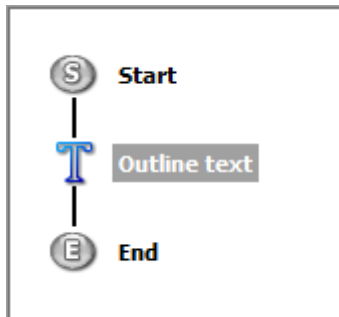
Project management

The Project Management window lists the master program and assigned sub-programs. The second column displays the file paths.



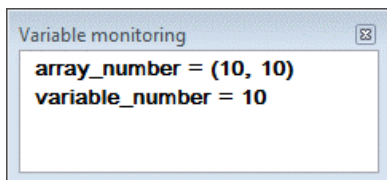
Graphic properties

The Graphic Properties window displays all the data relating to a selected graphic element. It may also be used to adjust all the relevant properties.



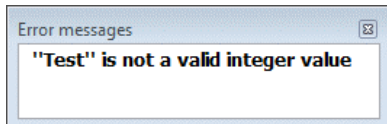
Flow chart

The Flow Diagram window displays the entire program flow. It is also possible to adjust the structure of the flow by inserting elements.



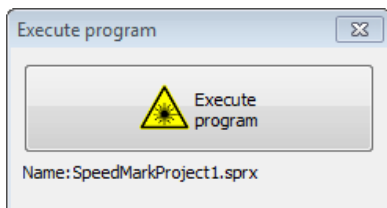
Controlling variables

The Variable Monitoring window displays the values of all the defined variables during the debugging process (only when pause or breakpoint).



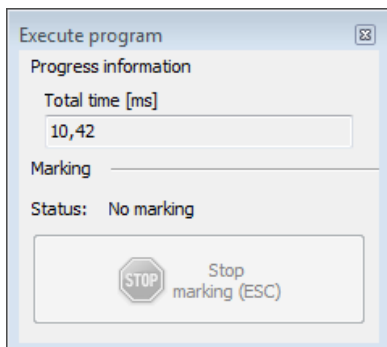
Error messages

Error messages caused by the program are displayed in this window.



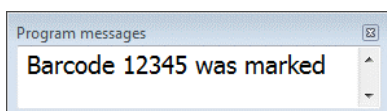
Execute program

The Execute Program window executes the current SpeedMark program.



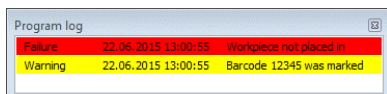
Internal runscreen

Is used to interrupt the current program. It displays the overall flow time when the program is complete.



Program messages

Über den Programmbefehl „AddProgramMessage“ können Meldungen an dieses Fenster ausgegeben werden.



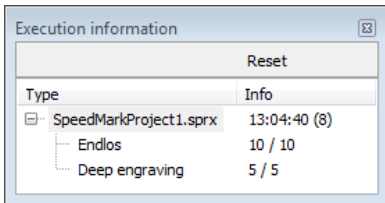
Programm log

The “AddProgramMessage” program command can be used to issue program messages in this window.



Execution counter

The execution counter shows the current program execution or the value of the current execution counter element.

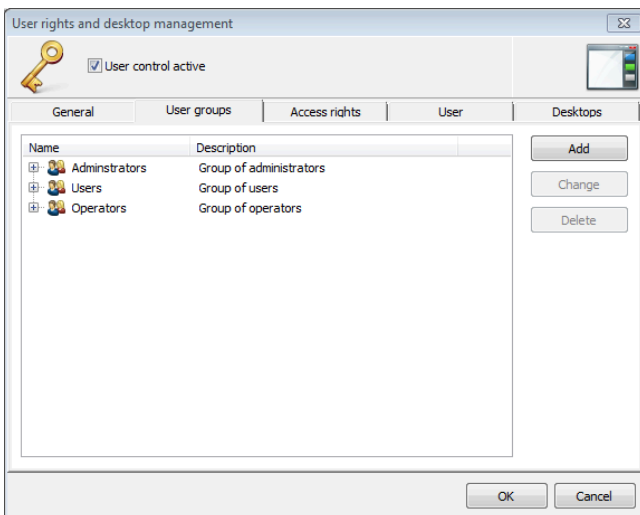


Execution info

The execution info shows various information of the current running marking program.

8.5 User groups

Via the menu: Tools → User Rights and Desktops it is possible to open the User Rights Management dialog.



The user rights control is based on the user groups. The user groups Administrator, Developer, User and Operator are provided as standard.

Add Button

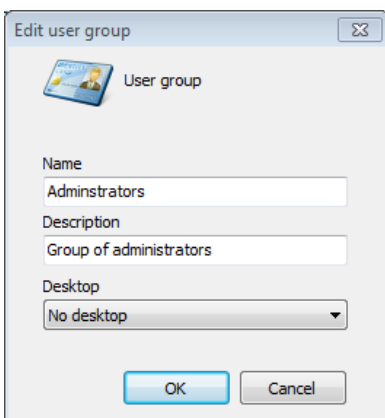
Can be used to add new user groups.

Edit Button

Can be used edit existing user groups.

Delete Button

Can be used to delete existing user groups. However, this is only possible if the user group does not have any users allocated to it. It is also not possible to delete the Administrator user group.



It is possible to specify the following user group properties:

- User group name
- User group description
- Desktop

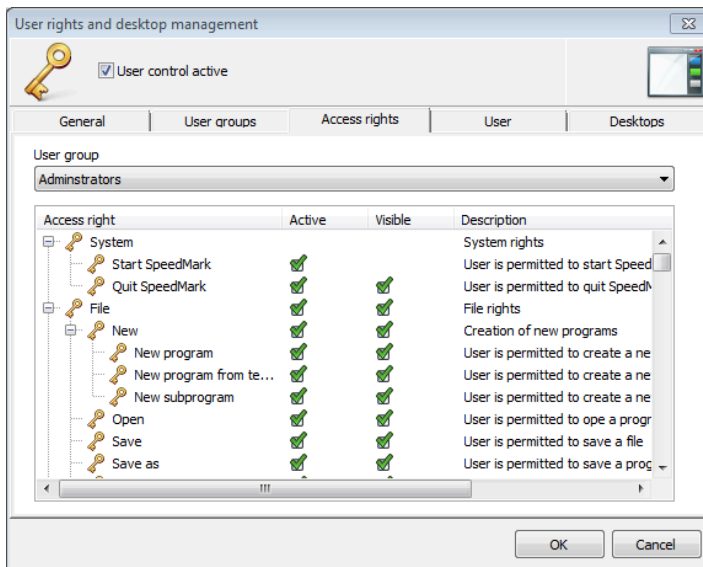
The Desktop option is used to assign existing desktops to the user group.



Information

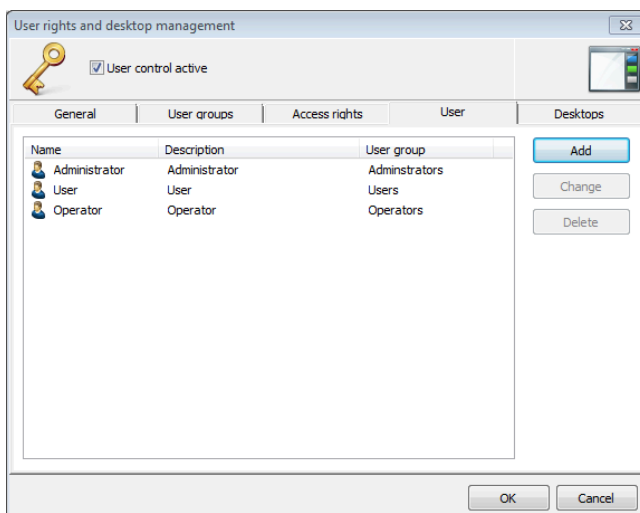
If one of the users of this user group now registers with SpeedMark, it automatically switches to this set desktop.

8.6 Access rights



The Access rights tab is used to define the rights of individual user groups in detail. It can be used to specify whether menu items should be activated or deactivated and whether menu items should be visible or invisible.

8.7 Users



Users tab

SpeedMark users may be created and edited.

Add button

Adding new users.

Edit button

Existing users can be edited.

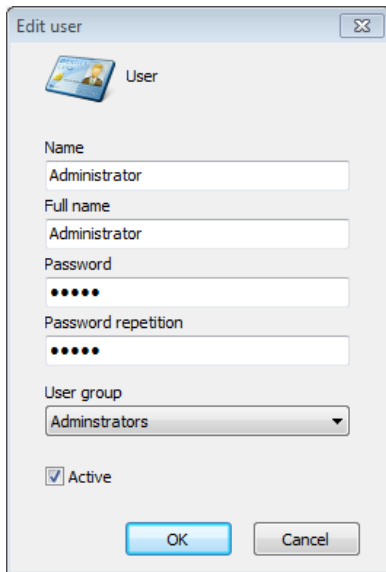
Delete button

Existing users can be deleted.



Information

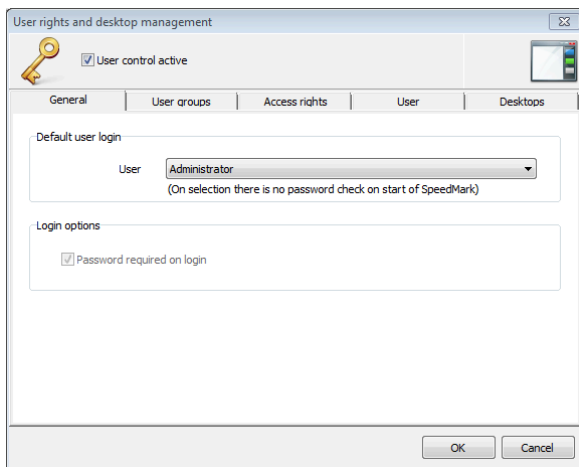
However, this is not possible for the final user of the Administrator user group.



The following properties may be specified for a user:

- Username
- Full name of user
- Password
- Assigned user groups
- User status (active/inactive)

8.8 Basic user rights settings



The basic user rights settings are used to define user control behaviour in more detail.

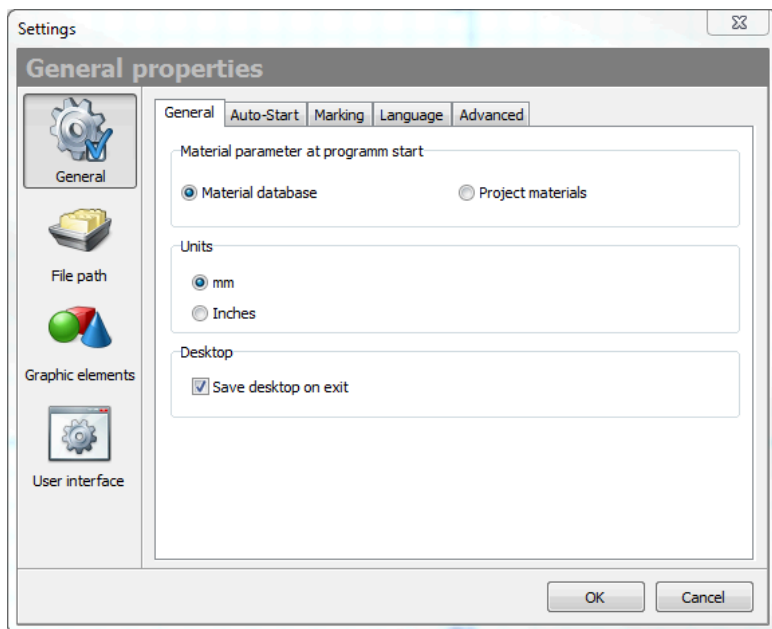
Standard user login

Option is used to specify a user registered automatically when SpeedMark starts.

Password required on login

Option specifies whether a user must enter a password when registering or not.

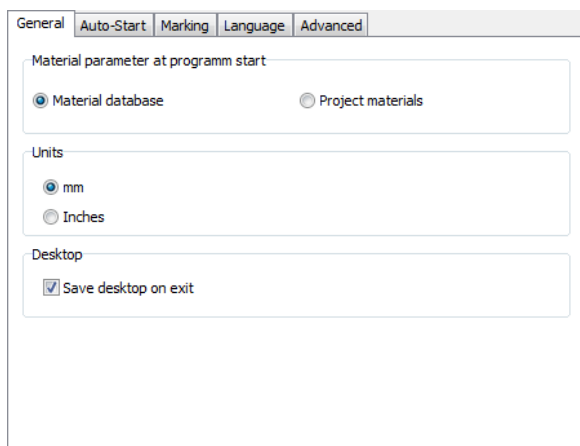
9 Configuring SpeedMark



The basic SpeedMark settings can be opened via the Tools → Settings menu. This dialog can be used to set and adjust all basic SpeedMark settings.

9.1 General properties

9.1.1 General

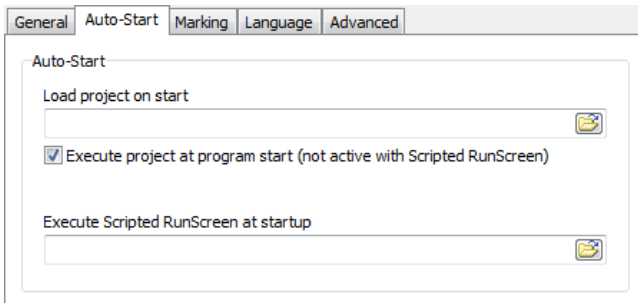


The selection of the initial marking parameter can be done in section material parameter at program start.

Units

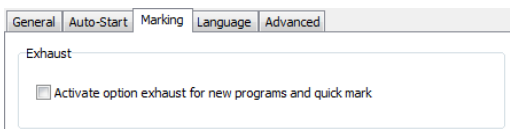
Are used to specify whether the SpeedMark interface should display millimetres or inches. As SpeedMark always saves and processes all measurements in millimetres it is easy to perform a conversion during operation.

9.1.2 Auto-Start



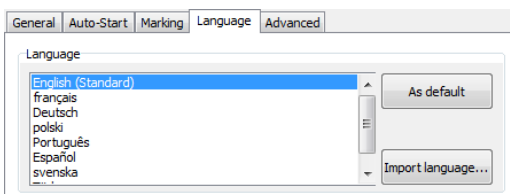
The Auto-Start section is used to specify whether a SpeedMark program should be loaded and executed automatically when SpeedMark starts up. The program name and path may be entered directly into the editing field or inserted from a file selection dialog using the “Open file” button (on the right-hand side of the editing field).

9.1.3 Marking



In the section exhaust the default setting for the exhaust is defined.

9.1.4 Language



SpeedMark supports two languages as standard: English and German. To switch languages, the relevant language should be selected and then the “Standard” button pressed to set it as the new default language.

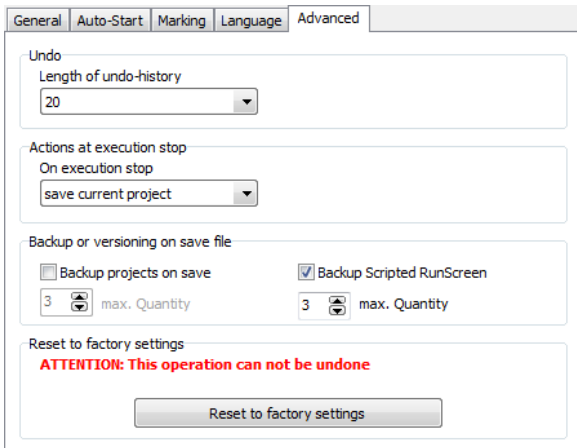


Information

As SpeedMark does not allow the language to be switched during operation, SpeedMark must be rebooted for the change to take effect. Additional languages can be added by pressing the button “Import language”.

Configuring SpeedMark

9.1.5 Advanced



The Undo option is used to specify how many undo steps should be saved in SpeedMark when editing graphic elements.

However, this history is deleted entirely when SpeedMark is closed and is not available after a reboot.

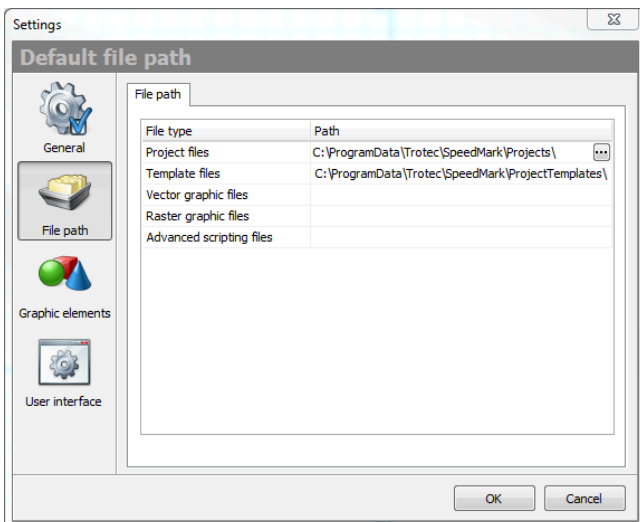
With the button “Reset to factory settings” it is possible to reset all made changes.



Notice

Please check if all laser specific configuration files are backed up because it is not possible to undo this operation.

9.2 Default file path



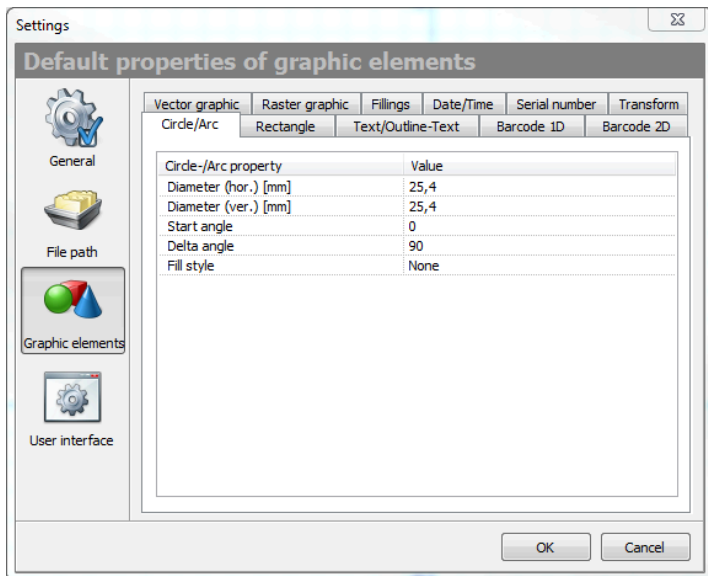
The default file path option allows the definition of paths which will be used in file open and file save operations.

This is possible for the following file types:

- Project files
- Template files
- Vector graphic files
- Raster graphic files

If no file path is defined, the last known path will be used for this file type.

9.3 Default properties of graphic elements

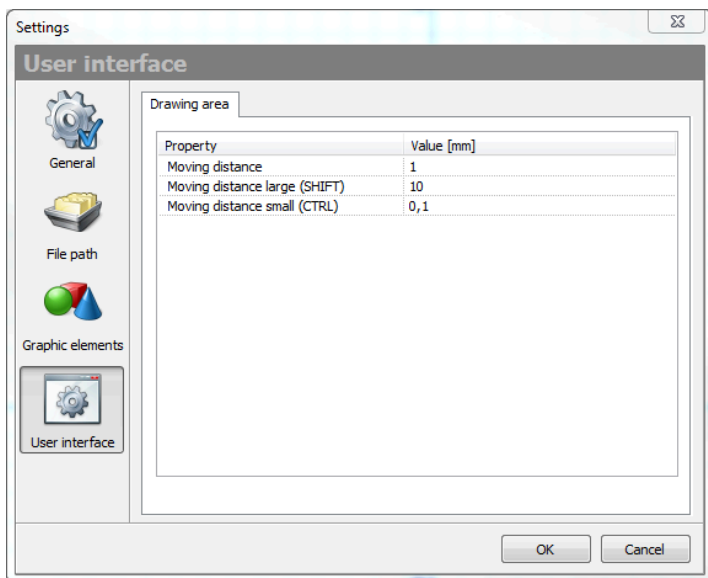


The default properties of graphic elements allow the specification of default values which will be used when creating new graphic elements.

This is possible for the following elements and graphic properties:

- Circle/Arc
- Rectangle
- Text/Outline-Text
- Barcode
- Datamatrix
- Vector graphic
- Raster graphic
- Filling
- Date/Time
- Serial text

9.4 User interface

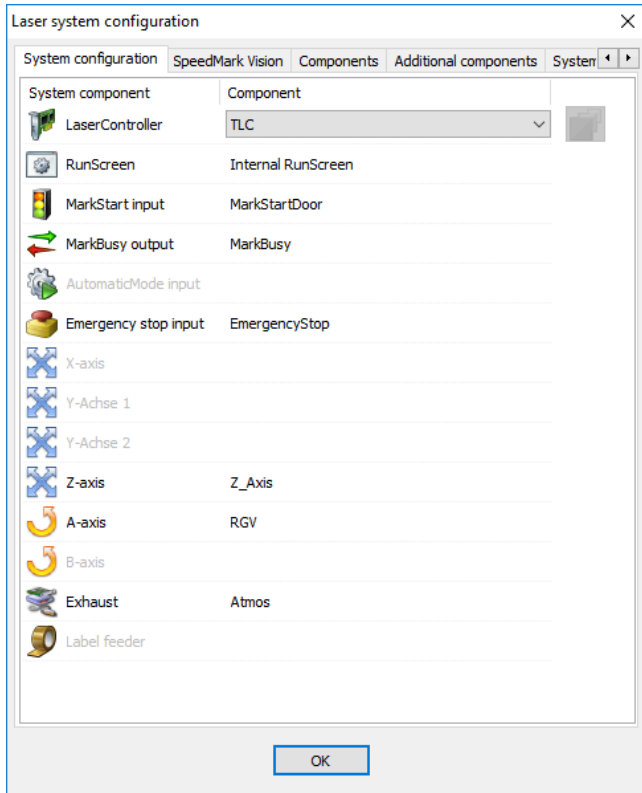


In the section user interface defaults for the user interaction with SpeedMark can be defined.

Tab Drawing area

Moving distance defines the amount by which selected graphic elements should be moved on the drawing area when cursor keys are used.

9.5 Laser system configuration



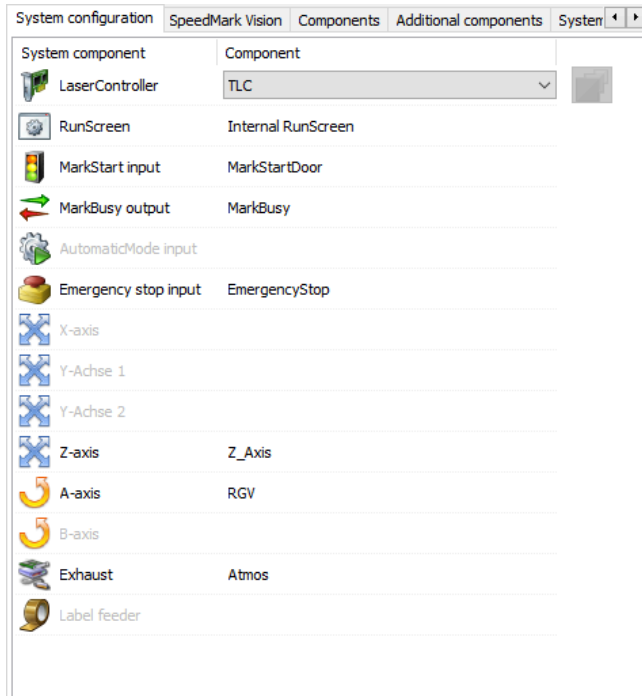
The dialog for configuring the laser system can be opened with short cut F3 or via the menu Tools → Laser system configuration.



Information

If this operation is locked by user rights, change to the administrator level (see "Initial user rights").

9.6 System configuration



On the tab system configuration all available components (like TLC2 Laser controller) can be registered

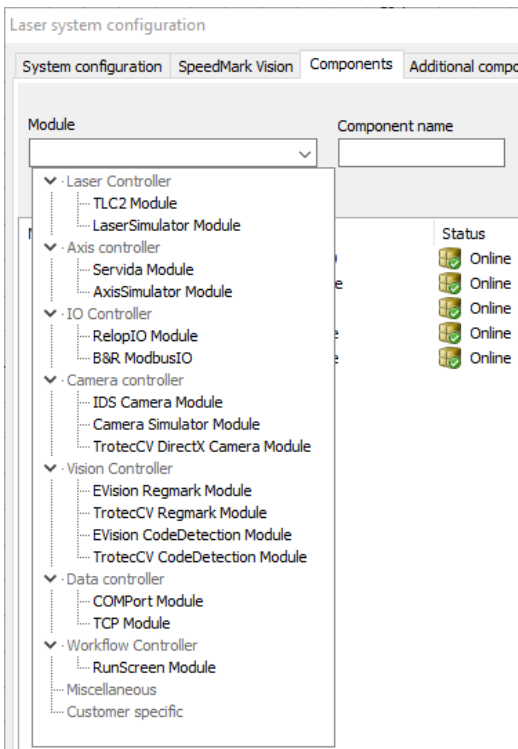
These registered components can be used for special tasks like MarkStart monitoring, controlling the exhaust and so on.

The following component types are available:

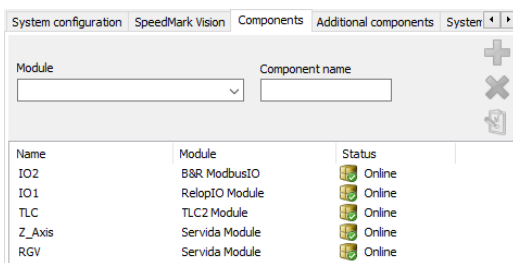
- LaserController - Controls the laser
- RunScreen - Dialog control during program execution
- MarkStart-Eingang - External signal to start marking
- MarkBusy-Ausgang - Sets the marking busy signal
- AutomaticMode-Eingang - Controls the automatic program execution
- X-Axis - Axis for planar segmentation
- Y-Axis 1 - Axis for planar segmentation
- Y-Axis 2 - Axis for planar segmentation
- Z-Axis - Axis for distance to work piece
- A-Axis - Axis for rotary
- B-Axis - Axis for rotary
- Exhaust - Controlling the exhaust from SpeedMark

To register component, they must be defined. This will be described in the following sections of this document.

9.7 Components



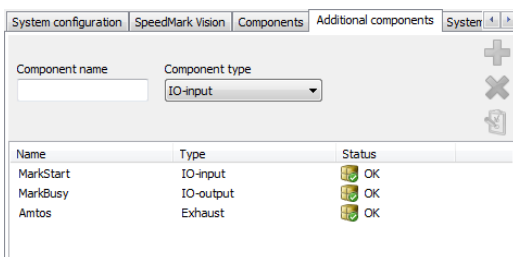
This dialog is used to add new components, modify existing ones and delete those no longer required. In order to add a new component, a component name must be entered, and the appropriate module selected. As SpeedMark features a lot of components that can be used and configured, the components are divided into logical groups. This way it is easy to identify the according group and pick the wanted component from there. Add a new component by clicking on the plus symbol.



Once the components have been added, they can be fully configured by double-clicking on them see "Modules and Components".

Components can be deleted by selecting the components then clicking on the Delete symbol.

9.8 Additional components

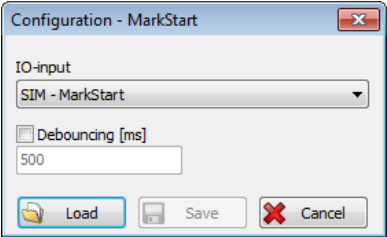


This kind of components can be defined additionally to normal components within SpeedMark.

They are special in that way that they use functional parts of normal hardware components.

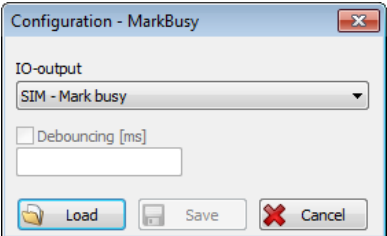
With this structure it is possible to connect a single IO-Input like MarkStart with a physical IO-Input of a hardware component. In most cases that will be the TLC2-card, but it also could be the IO-Input of a Relop-IO-card. Due to this abstraction within SpeedMark a MarkStart is available and the real origin of the signal can be configured.

9.8.1 Component type IO-Input



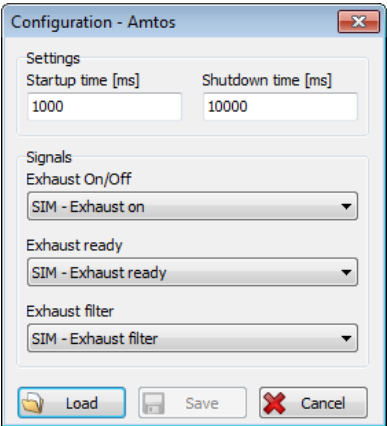
For an IO-Input additional component it is possible to choose an IO-Input from the combo box IO-Input. The combo box provides all available inputs from all hardware components.

9.8.2 Component type IO-Output



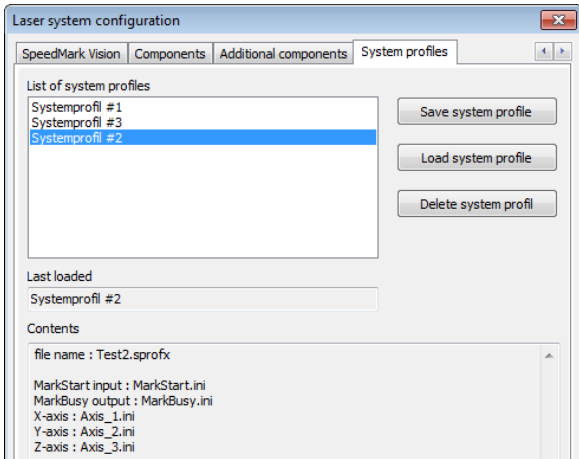
For an IO-Output additional component it is possible to choose an IO-Output from the combo box IO-Output. The combo box provides all available outputs from all hardware components.

9.8.3 Component type exhaust



The configuration of an exhaust allows the definition of the necessary signals as well as the behaviour during program execution.

9.9 System profiles



The system profiles offer the possibility to save the whole configuration of the laser system. This includes all config-files and components with their individual settings. Use this feature to quickly change between different system setups or hardware components (e.g., other lenses). Mark a saved profile to see the details of the saved system.



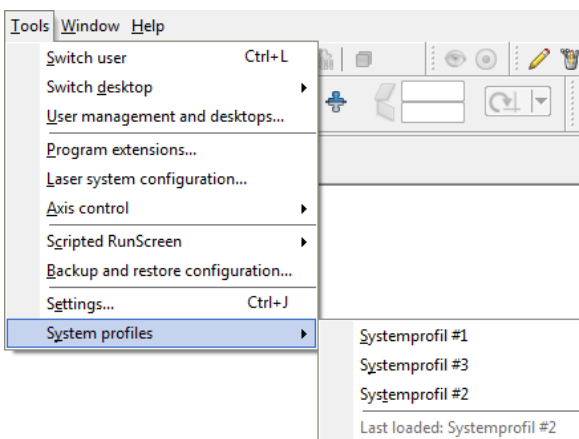
Notice

Profiles save the system state now they are created. So, to be of use, the whole system must be configured to make up a valid and useful profile (laser system, axis, distortion correction, etc.). Otherwise, each step that was not configured must be done again after the load of a profile.



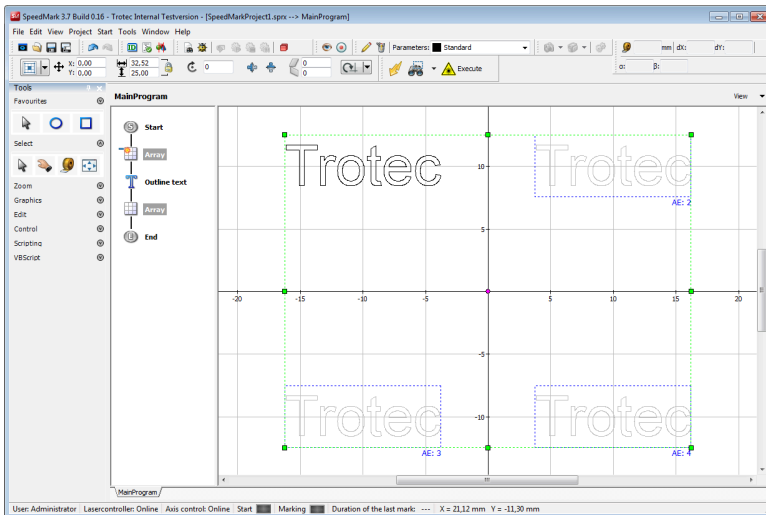
Notice

If a new profile is loaded the zero point of any axis (especially Z) might be set to the saved zero point, but the axis will not be moved that location! This must be done manually at some point before starting to engrave with the new configuration!



Saved profiles can easily be switched by selecting it in the menu entry "Tools" → "system profiles". The last loaded system profile is shown at the end of the menu. Please note that the current configuration may differ from this system profile.

10 Graphic operations



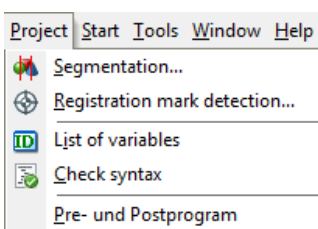
With graphic operations it is possible to change the execution of graphic elements:

- Segmentation
- Deep engraving
- Array

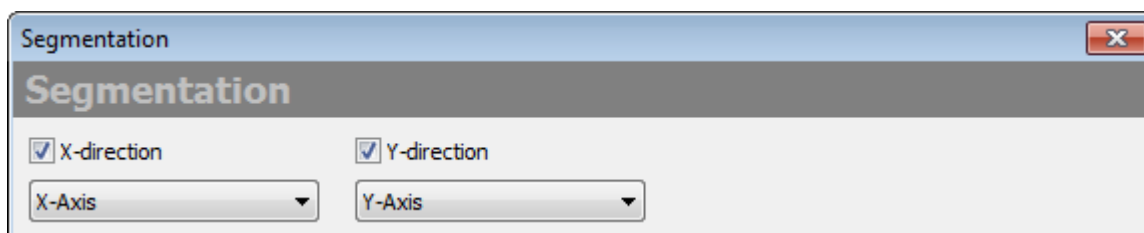
10.1 Segmentation

There are two types of segmentation: The Linear segmentation and the Rotary engraving. In case of a linear segmentation, the galvo head or the workpiece is moved by a mechanical feed axis. This increases the possible marking area. In case of a rotary engraving, the marking surface is located on a circumference. The circumference can be marked by rotating the workpiece.

10.1.1 Setup segmentation



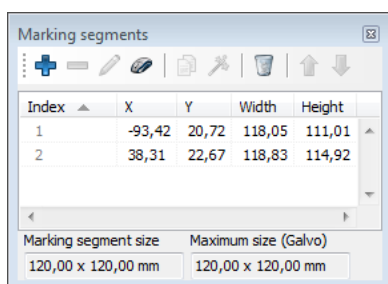
The segmentation can be configured via menu point Project → Segmentation. First the checkboxes for the X and/or Y direction must be activated, depending on whether a 1D or 2D segmentation is required.



The desired axis is selected in the list. The X, A or B axes are available for the X direction. For the Y direction, the Y, A, or B axis. E.g., the X and Y axes must be selected for a 2D linear segmentation. A combination of two rotary axes is not possible. In the general settings will be defined which axis will be used for the motion. The available axis must be configured before usage .

SpeedMark automatically detects if the used axis is a rotation or planar axis .

10.1.2 Managing marking segments



The marking segment list window can be shown via menu point View → Operator Windows → Marking Segments.

Menu item	Symbol	Description
Add		Adds a new marking segment to list by entering position and size.
Delete		Deletes selected marking segment
Edit		Edits the properties of the selected marking segment
Add by mouse drawing		Adds a new marking segment by drawing a rectangle on the canvas. This mode is stopped by clicking the icon again.
Copy		Adds a copy of the selected marking segment
Start wizard		Starts the marking segment creation wizard
Delete all		Deletes all marking segments in list
Move up		Changes the order of the marking segments
Move down		Changes the order of the marking segments

10.1.3 Adding marking segments

Marking segment properties

Index (0 appends at end)
1

Centre
X [mm]
-180,00

Y [mm]
-180,00

Size
Width [mm]
120,00


Height [mm]
120,00

Offset
Offset X [mm]
0,00

Offset Y [mm]
0,00

OK Cancel

All graphics are divided manually into marking segments. The marking segments can be created in the following ways:

- Manually by adding it with  and entering the values
- Manually by using the mouse mode
- Via the wizard

WIZARD

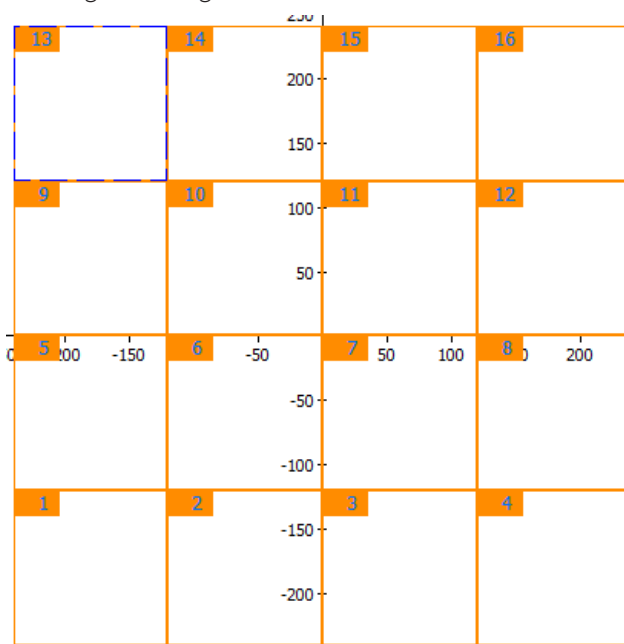
Marking segmente offset

Offset X [mm] Offset Y [mm]
0,00 0,00

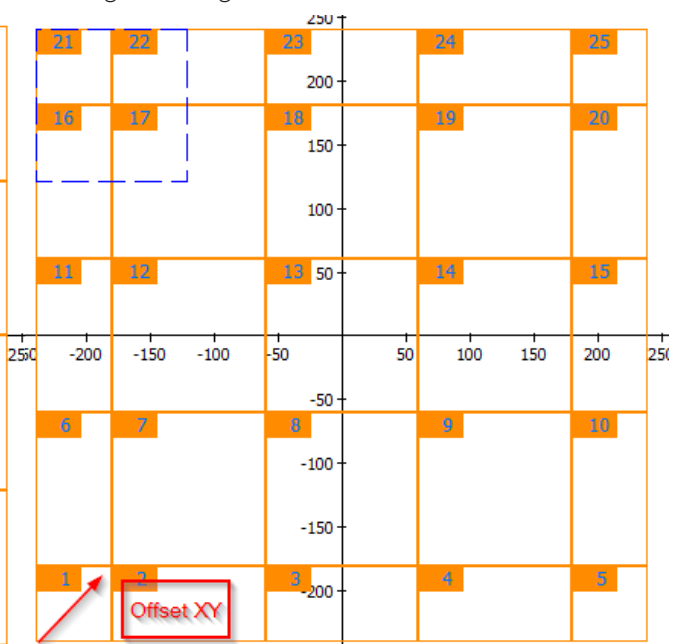
OK Cancel

With the help of the creation wizard, an equidistant grid can be generated over the entire working area. The start point for the generation of the grid can be shifted by adding an offset.

Wizard generated grid without an offset



Wizard generated grid with an offset in X and Y





Information


The wizard can only be used with an empty marking segment list.

MARKING SEGMENTS

Each marking segment is shown in the canvas and the order is symbolised by a small number.

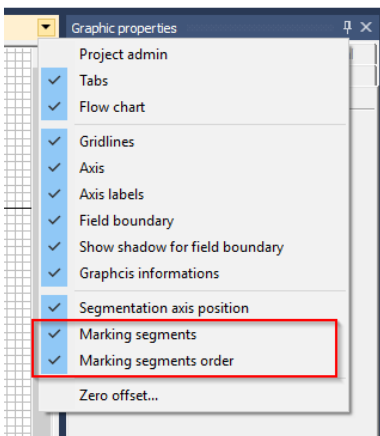


Selected marking segments (displayed in green) can also be moved by pressing CTRL+arrow keys on the keyboard.

Each marking segment can be edited afterwards by clicking . Additionally, this way an offset for each segment can be defined. The offset setting of each marking segment shifts the moved axis position during execution. The marking content is not affected. Smaller (absolute) positioning errors of the axis system can be corrected that way.

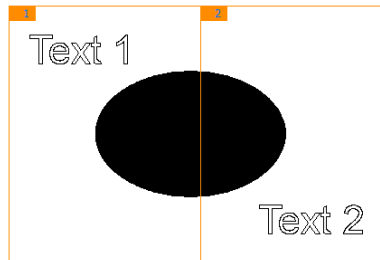
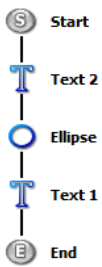
The drawing surface menu can be used to switch both the numbering and the display of the marking segments themselves on and off.

10.1.4 Execution of the marking segments

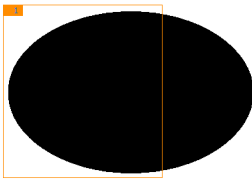


For a segmentation, each marking segment is executed in the order specified. The axes are moved to the centre of the marking segments. Then the marking content is executed in the order of the flowchart.

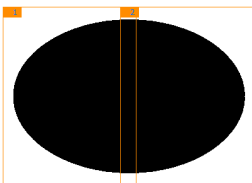
In the example below the axes will move to the first marking segment (number 1). Then the first part of the ellipse and afterwards the Text 1 is executed, because Text 1 comes after the ellipse in flowchart. Next the axes move to second marking segment (number 2). Here Text 2 and then the rest of ellipse will be executed, because Text 2 comes before the ellipse in flowchart.



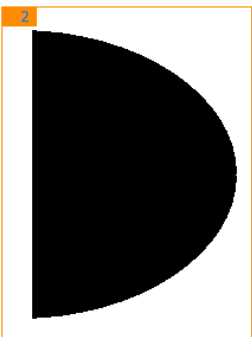
SPECIAL TREATMENTS



All graphic parts that are not contained in a marking segment are ignored. The marking segments acting like a die cutter. Not cutted parts are ignored without any error message. A special case are here raster graphics. If a raster graphic completely fits into the marking segment the graphic is not divided and executed altogether. If not, the raster graphic is executed line by line. The line feed is performed by the mechanical axes instead of the galvo.

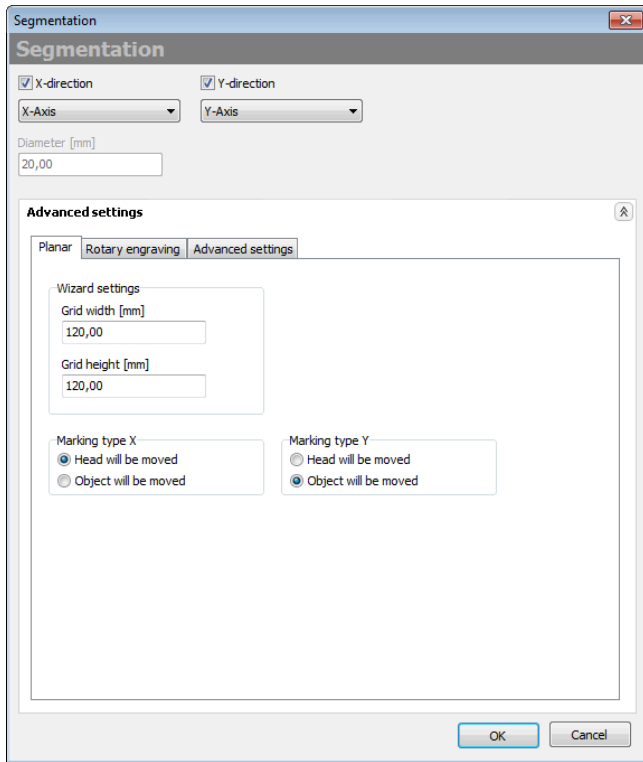


Overlapping parts are only marked in the first segment where they are encountered (list order) and are removed from the other segments.

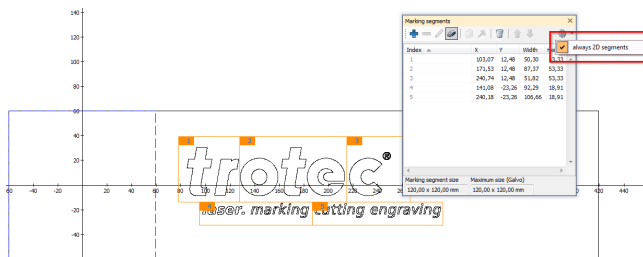


If marking segments overlap, the overlap is executed from the first segment in order. The example shows the resulting segment (number 2).

10.1.5 Linear segmentation

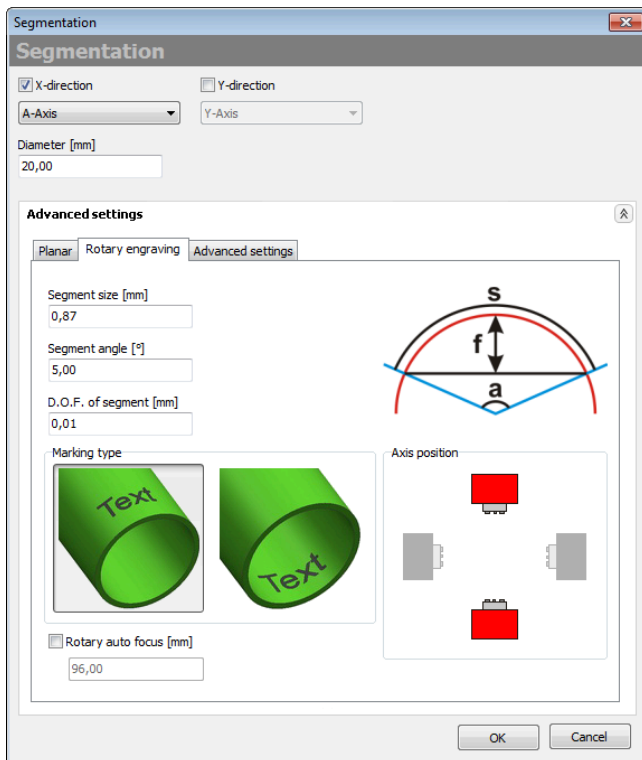


The size of the marking field results from the travel distance of the axes (limits) and the size of the galvo marking field. The grid size values are used for the marking segment creation wizard. In a 1D segmentation one dimension of a marking segment is the galvo size. This behaviour can be disabled by checking the „always 2D segments” option in the marking segment manager window. With this option enabled 2D marking segments can also be created in a 1D segmentation. By splitting the graphics in free regions (without overlapping content) the final segmentation result can be greatly improved.

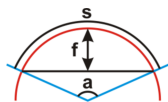


The marking type specifies if the laser head or the object is being moved by the defined axis.

10.1.6 Rotary engraving



The size of the marking field results from the diameter input. The size of the marking segments is limited. This is done by segment size, segment angle or depth of field. These three values describe a circular arc and are interdependent. Changing one value will change the two other values.

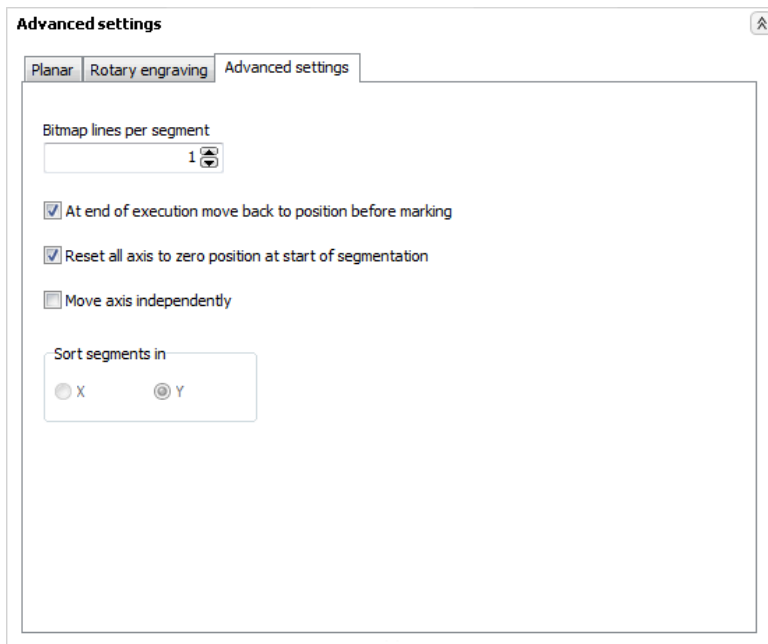


The following graphic illustrates this:

- "s" - segment size in mm
- "a" - segment angle in °
- "f" - depth of field of the segment in mm

Furthermore, the position of the rotary axis with respect to the marking field must also be defined. The direction of rotation is changed via the marking type (internal or external marking). The "Autofocus" option moves an existing Z axis to the focus point depending on the diameter. The entered value matches the Z height of the axis of rotation to which the workpiece rotates.

10.1.7 Advanced settings

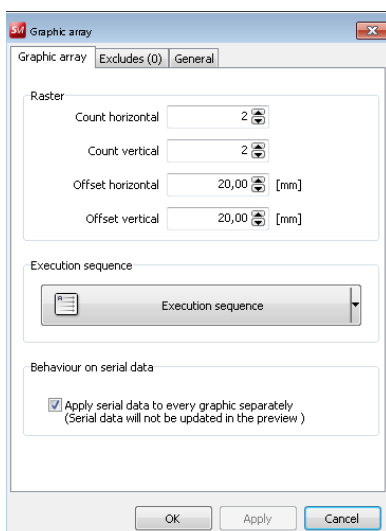


The advanced settings allow to configure the segmentation better.

The Bitmap Lines per Segment parameter is used to improve the throughput speed. If this value is increased, several bitmap lines per axes move are marked. The number of axis movements is thereby reduced.

In addition, you can specify how the system should behave at the beginning and at the end of the segmentation. A movement to the zero point of the axes can improve the result because the segmentation always takes place from the same origin. With the determination of the sorting, a possible fast axis can be preferred.

10.2 Graphic array



The graphic operation array can be selected from the toolbar graphic operations .

The graphic operation array can be selected from the toolbar graphic operations .

Use the array element to mark the same graphic element multiple times in a rectangular grid. The raster defines the count and the offset of the array elements.

The execution flow specifies how the elements should be marked. In the section “Behaviour on serial data” will be defined if the serial function should be called for every single element of the array or should be called only once for the whole array.



On the tab sheet Excludes it is possible to exclude single cells of the array from being marked.

All cells with a hook will be marked. Cells without a hook won't be marked.

In the drawing area all excluded cells will not be shown as well. An exception is the cell which contains the original graphics. This cell will be marked with "Excluded" if this is the case.

10.3 Deep engraving



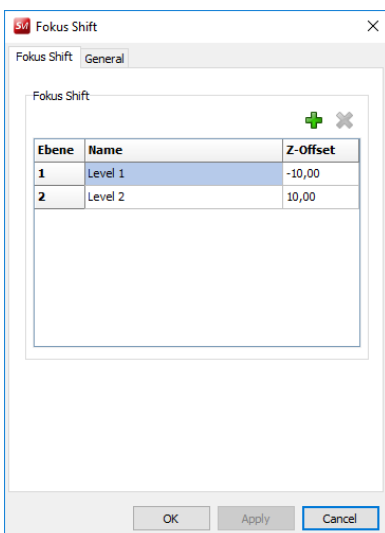
The graphic operation deep engraving is as well selected by the toolbar graphic operations.

The iteration count defines the deepness of the engraving.

In the section filling it is possible to define the rotation angle and when it should be applied. This is important to optimize the surface quality of the deep engraving (smooth, not rippled).

The option mark contour of the filling settings can be overwritten. Additionally, with the axis control it is possible to move the z-axis.

10.4 Focus shift

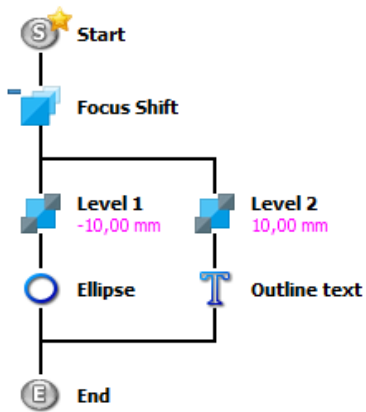


The graphic operation focus shift is selected by the toolbar graphic operations.

Each level is defined by a Z-offset. Levels can be easily added and deleted. The levels are processed in the order in which they were defined.

On execution, the optical axis is moved to the new Z-offset value and then the elements contained in the level are processed. Execution then continues with the next level.

This element controls only the optical axis - not the mechanical Z axis.



In the flowchart, the individual levels are symbolized by paths. Each path contains the name of the layer as well as the Z-offset. The graphics can then be added to each path according to the Z-level.

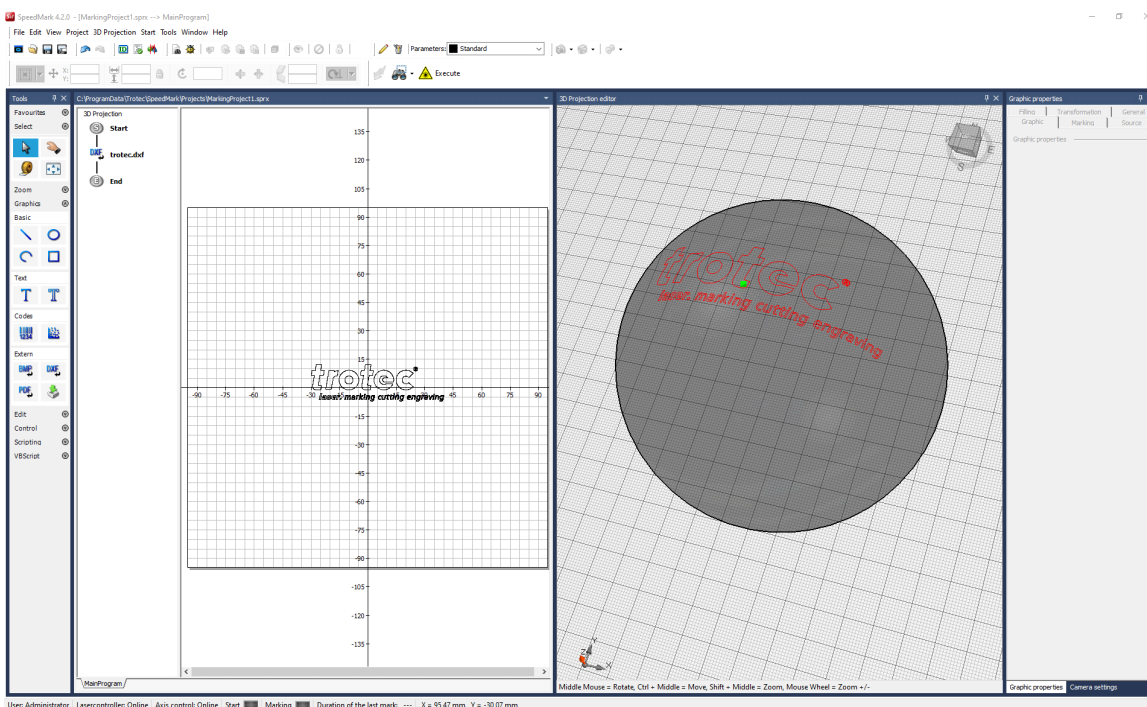
11 3D Projection

When marking on a 3D object with a 2D laser marker, the following problems occur:

- The marking is not the same everywhere because the laser can only work in focus in a small area (depth of field).
- If the difference in Z-height becomes too great, marking cannot be done (marking disappears).
- The graphics appear geometrically distorted on the object.

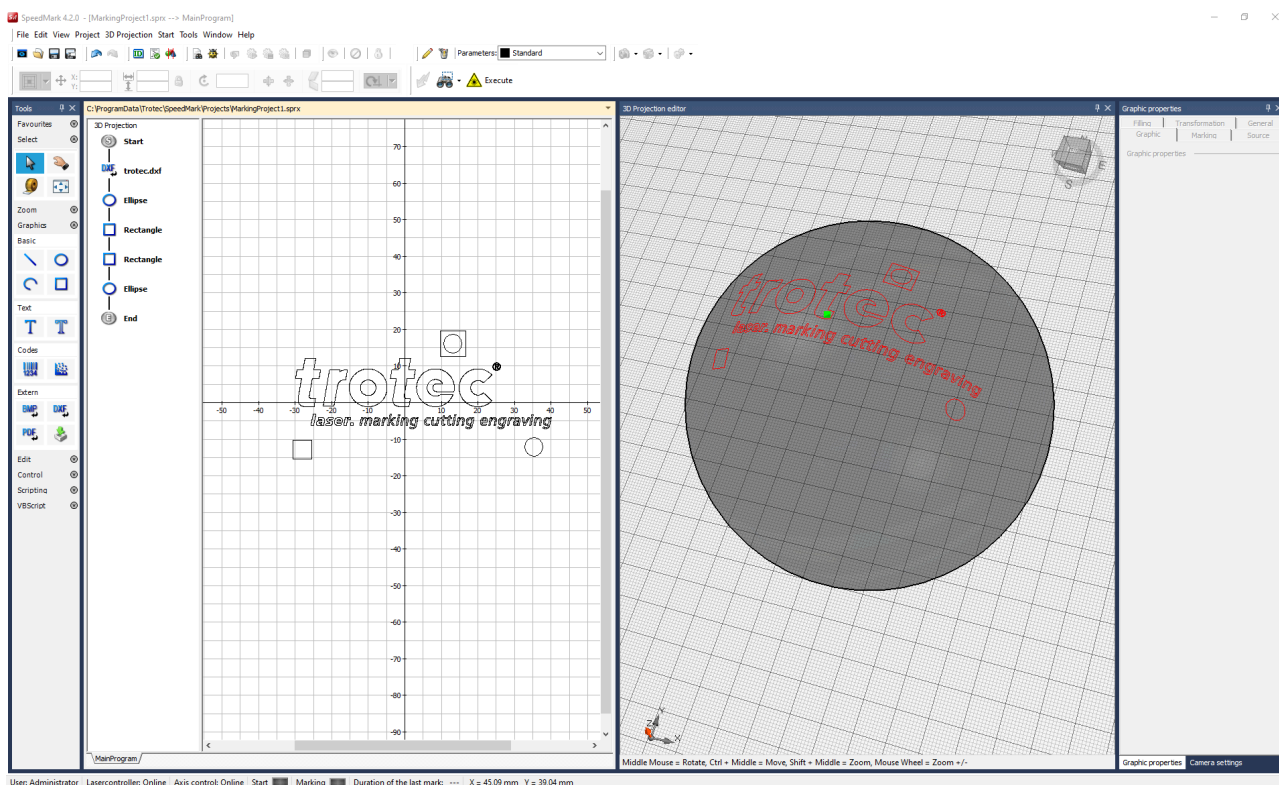
With 3D projection, the graphics of the 2D drawing surface are projected onto a 3D object:

- The 2D graphic data is converted into 3D graphic data so that the resulting 3D marking appears on the workpiece without distortion.
- The Z-focus position is always readjusted so that work is carried out in focus at every location on the 3D object.



3D Projection

11.1.1 Operating principle



The 2D drawing surface is unrolled onto the 3D object like a sheet of paper. The 2D origin (0,0) corresponds to the green tag point on the 3D object.

The size, position, content etc. of the 2D graphics on the drawing surface thus have a direct influence on the 3D result.

Changing the 3D tag point (location on the object) only affects the 3D result, not the 2D drawing area.

The graphics always appear in the 3D preview without filling, as these are only calculated for marking.

11.1.2 Requirements

The following requirements must be met:

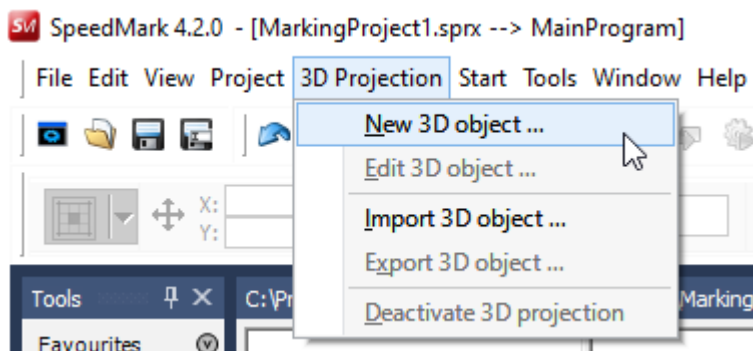
- A SpeedMarker LWS with XYZ axis system
- A SpeedMarker DS must be installed in the LWS.
- 3D licence key for the SpeedMark software

11.1.3 Restrictions

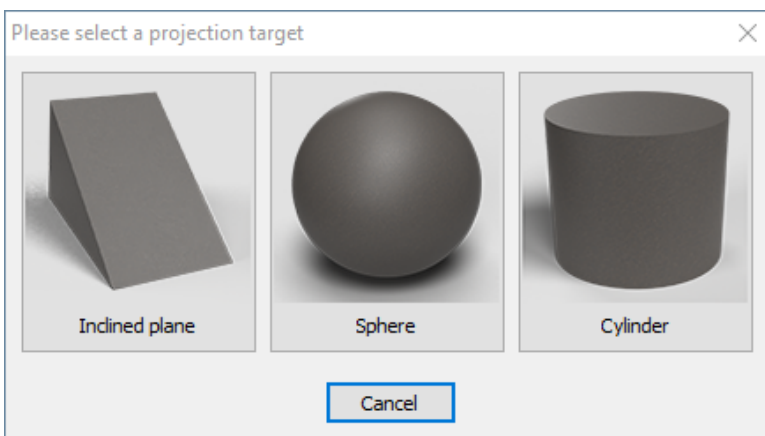
The 3D projection cannot be used together with the following SpeedMark features:

- Segmentation
- Registration mark recognition
- Deep engraving element
- Raster graphic element
- FocusShifter element

11.1.4 Activate 3D projection

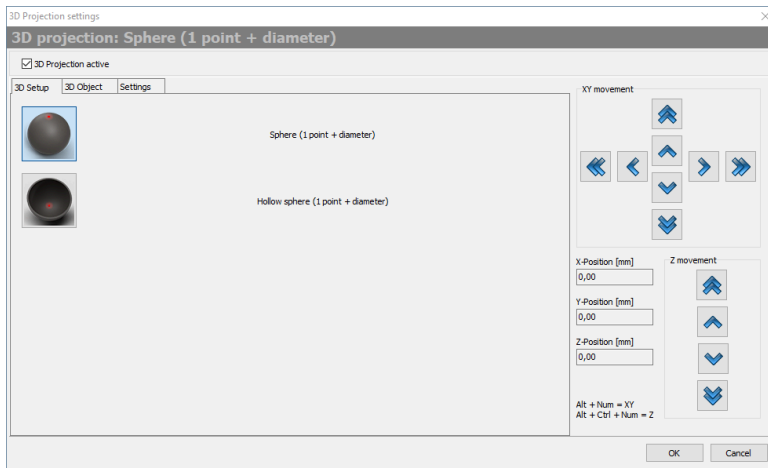


1. Create your 2D graphics in SpeedMark as usual.
2. Then click on the menu item "3D Projection" -> "New 3D Object...".

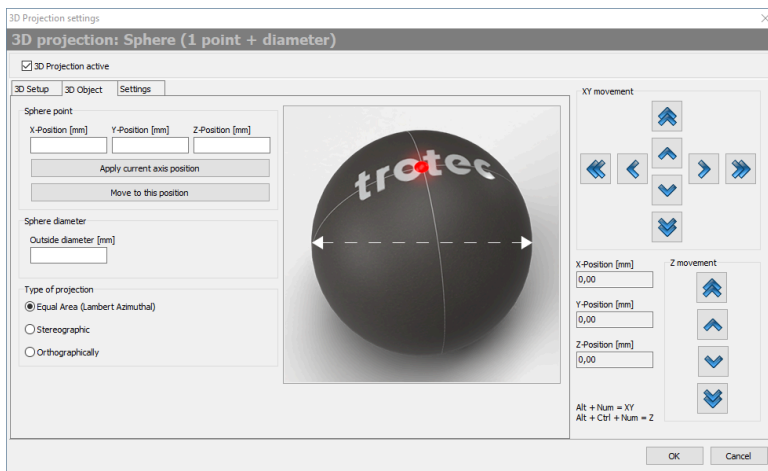


3. Now select a 3D basic shape.

3D Projection



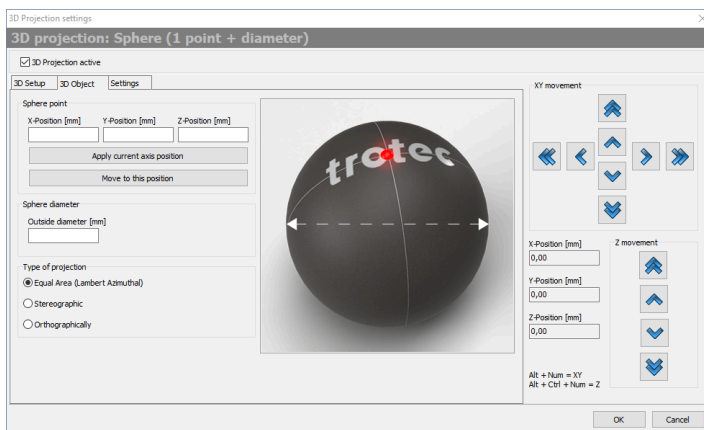
4. In the next step, select the type of 3D object (sphere or hollow sphere in the example).



5. Now configure the 3D object and close the dialogue with "OK".

You can see the result in the 3D preview. The 3D projection thus affects all the graphics in the current programme, not the other programmes in the project. This allows you to combine different 3D projections in one SpeedMark project. Create a sub-programme for each projection and activate the 3D projection mode in it.

11.1.5 Configure 3D projection



Depending on the 3D object type, different data is required for the creation:

1. To define a point on the 3D object, move the xyz-axes of the LS to that position.
2. Make sure that the pilot laser and the focus laser overlap (the laser is then in focus at this position).
3. To move the xyz-axes, use the menu on the right.

You can move the axes individually here (arrow buttons). The current xyz-position is displayed on the right-hand side.

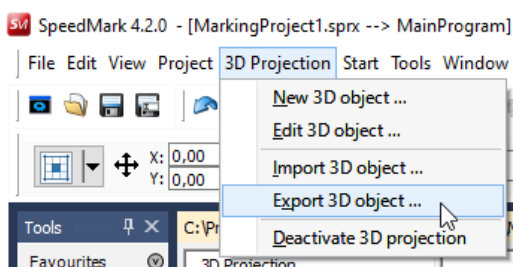


Another possibility is the procedure via keyboard:

1. To do this, press the "Alt" key and the desired arrow key on the numeric keypad.
2. By pressing the "Alt", "Ctrl" key and arrow keys on the numeric keypad, the z-axis can be moved.
3. Then take over the current position by pressing the button "Take over current axis position" on the left side.

You can return to this position at any time by pressing the "Move to this position" button.

11.1.6 Import, export 3D object



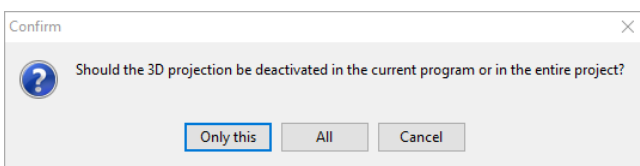
You can also export your configured 3D object to a file.

This allows it to be reused in other sub-programmes or SpeedMark projects.

The information of the 3D object is exported into a *.sp3D file.

Only the current 3D configuration is saved in the file - not the 3D graphic data.

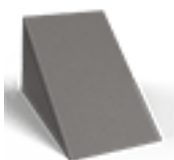
11.1.7 Deactivate 3D projection



By pressing the menu item "Deactivate 3D projection" you can deactivate the 3D mode in the current programme or in the entire project (all programmes).

11.1 Projection types

The following projection types are currently supported.



Inclined plane



Cylinder

3D Projection



Ball

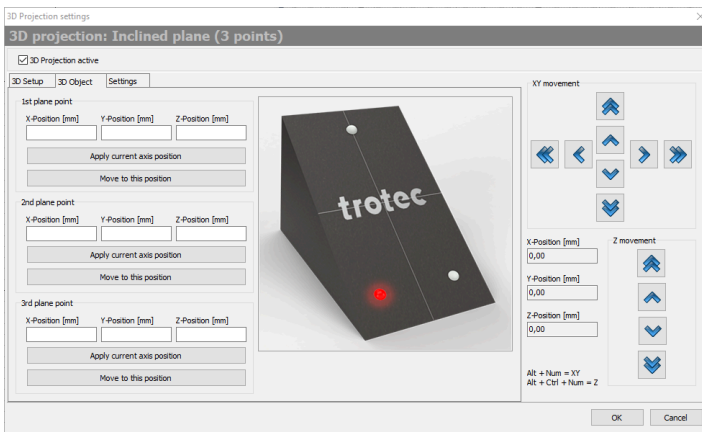


Hollow cylinder



Hollow sphere

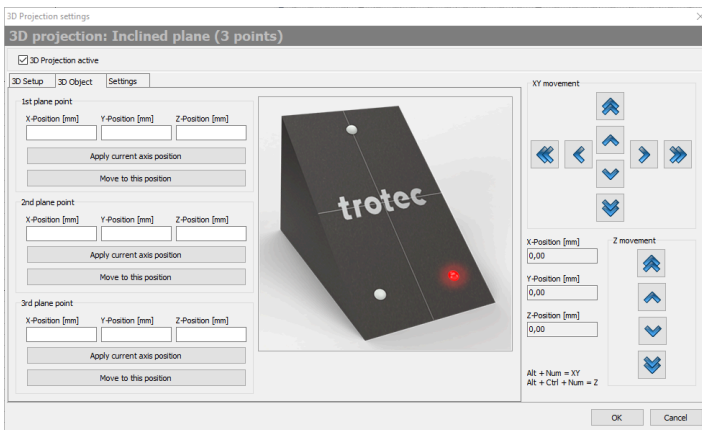
11.1.1 Inclined plane



3 points are needed to configure a plane in space.

The location of the points also determines the position of the graphic on the 3D object.

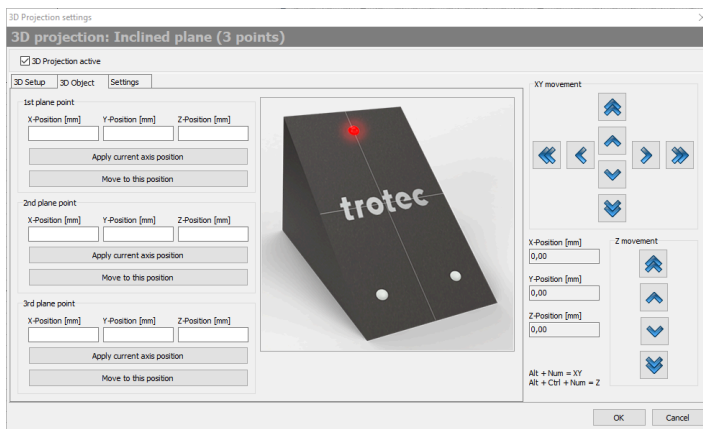
The 2nd and 3rd plane points determine how the 2D x-direction is mapped onto the 3D object.



These two points must point in the same direction as the bottom edge of your 3D marking result.

If these two points are swapped, the graphic is mirrored on the 3D object.

If the points are not exactly on the lower edge, there will be a rotation.



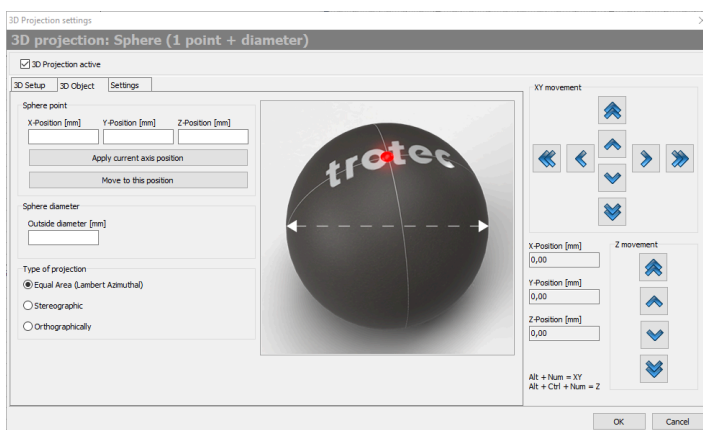
For the first point, select any point on the upper edge of the marking result.

The y- and z-direction results automatically.

The 3D tag point then lies in the centre of the rectangle spanned by the 3 points.

11.1.2 Ball

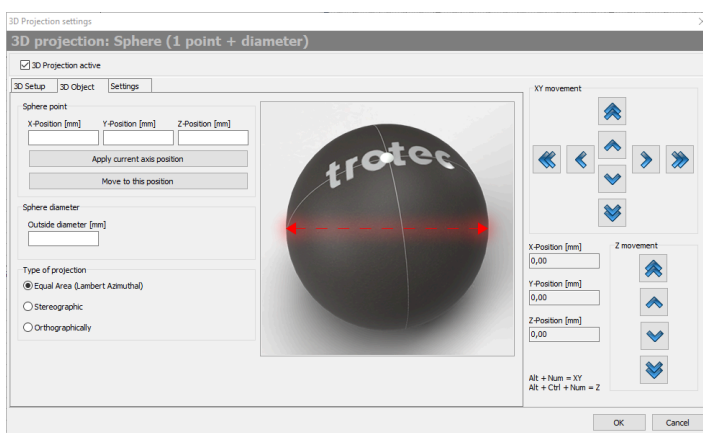
11.1.2.1 Ball 1 point and diameter



For the configuration of a sphere in space, 1 point and an outer diameter are required.

For this point, select the uppermost point of your spherical shape.

This is then also automatically the 3D tag point.



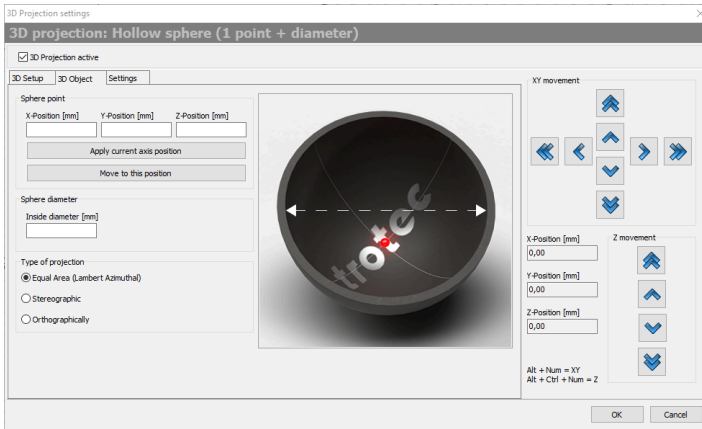
Specify the outer diameter of the sphere and the desired projection type.

Type of projection

- Equal area (Lambert Azimuthal) - All areas of the graphic are correctly displayed.
- Stereographic - Graphic is displayed true to angle.
- Orthographically - Projection is normal to the sphere on a tangential plane → Graphic is projected vertically.

3D Projection

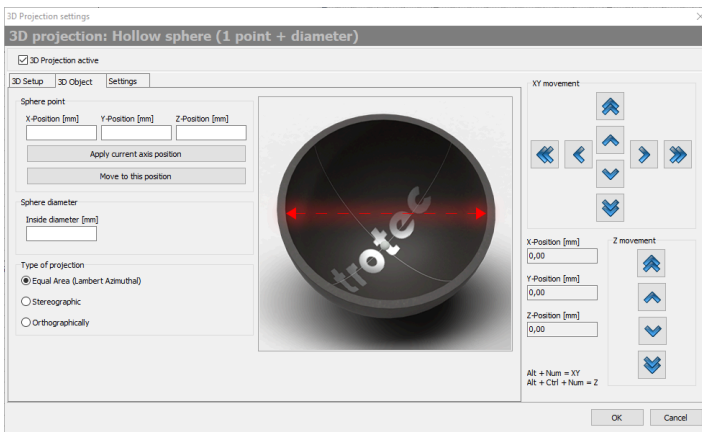
11.1.2.2 Hollow ball (1 point and diameter)



For the configuration of a hollow sphere in space, 1 point and an inner diameter are required.

For this point, select the lowest point within your hollow sphere shape.

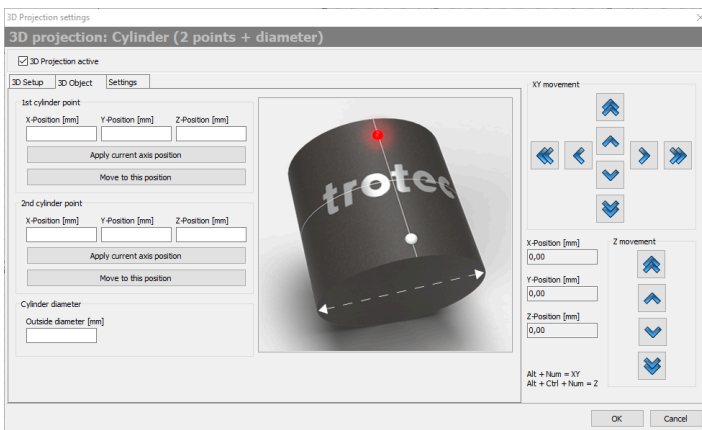
This is then also automatically the 3D tag point.



Further specify the inner diameter of the hollow sphere and the desired projection type.

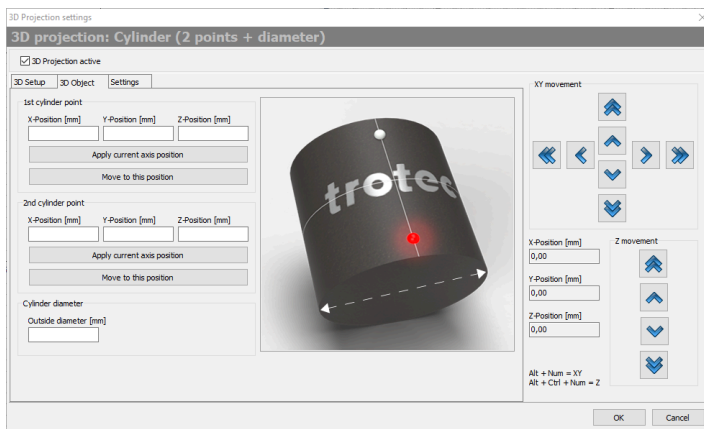
11.1.3 Cylinder

11.1.3.1 Cylinder (2 points + diameter)

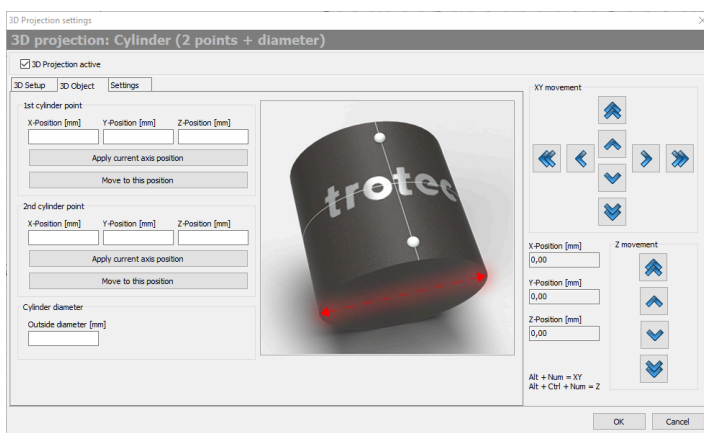


For the configuration of a cylinder in space, 2 points and an outer diameter are required.

Specify two points on the cylinder workpiece that are highest and aligned with the cylinder axis.

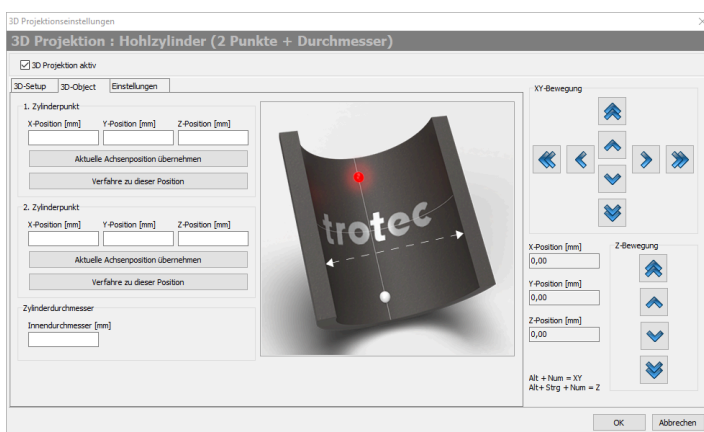


The 3D Tag point is obtained from the center of the line passing through these two points.



Continue to specify the outside diameter of the cylinder.

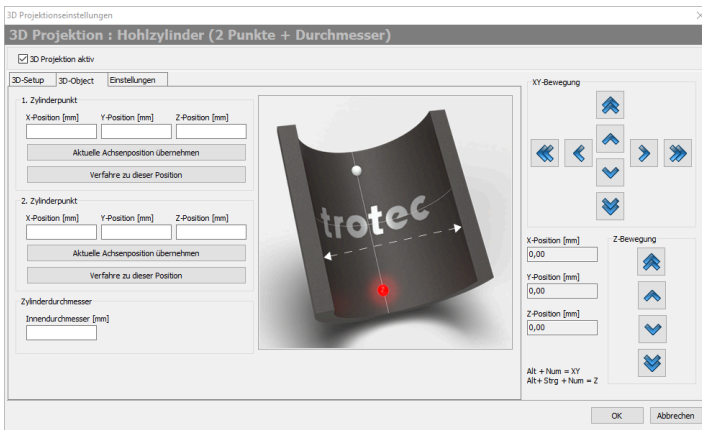
11.1.3.2 Hollow cylinder (2 points + diameter)



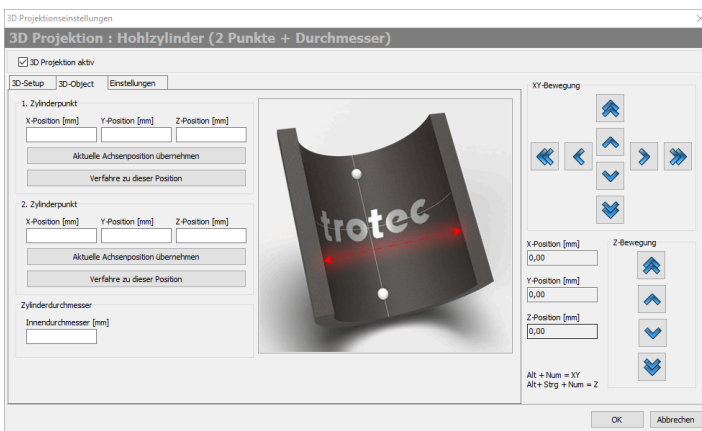
For the configuration of a hollow cylinder in space, 2 points and an inner diameter are required.

For this purpose, specify two points within the hollow cylinder workpiece that are lowest and in alignment with the hollow cylinder axis.

3D Projection



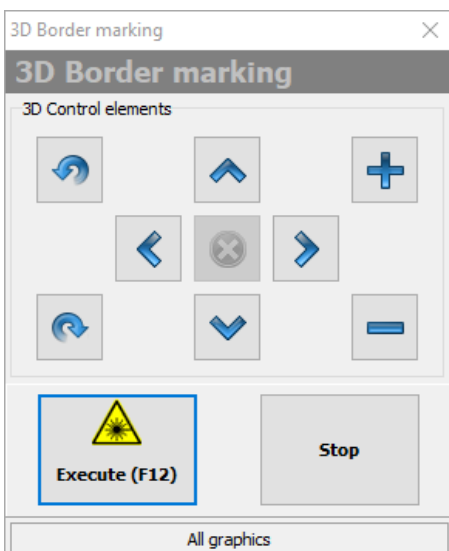
The 3D Tag point is obtained from the center of the line passing through these two points.



Furthermore, specify the inner diameter of the hollow cylinder.



11.2 Mark 3D boundary

With the function Mark 3D Boundary you can generate a preview rectangle on your 3D object. The laser system is moved to the tag point position and the outer boundaries of the graphics are displayed with the pilot laser.



With the help of the direction buttons you can change the position of the tag point. The next possible position on the 3D object is used for each step.

This means that the direction buttons cannot be used to move (maneuver) freely in space. The system always follows the surface shape.

With  and  the graphics are enlarged or reduced. In addition, they can also be rotated to the left or right.

With and the graphics are enlarged or reduced. In addition, they can also be rotated to the left or right.

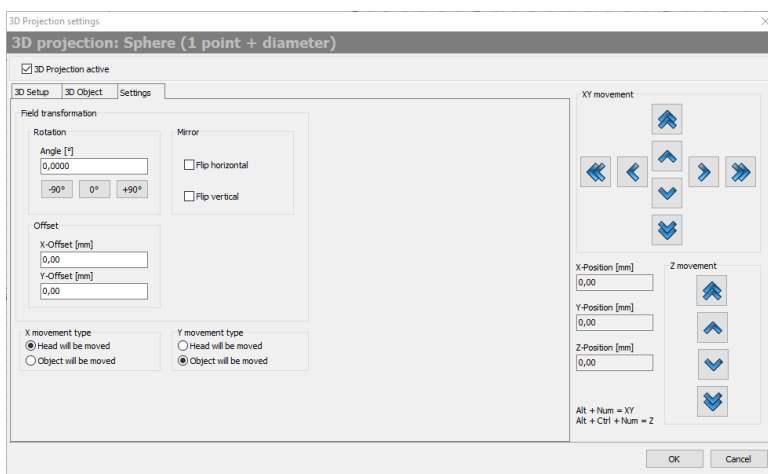
11.3 Advanced settings

Here you can transform the 2D drawing area with all graphics - rotation, xy-mirroring and displacement.



Information

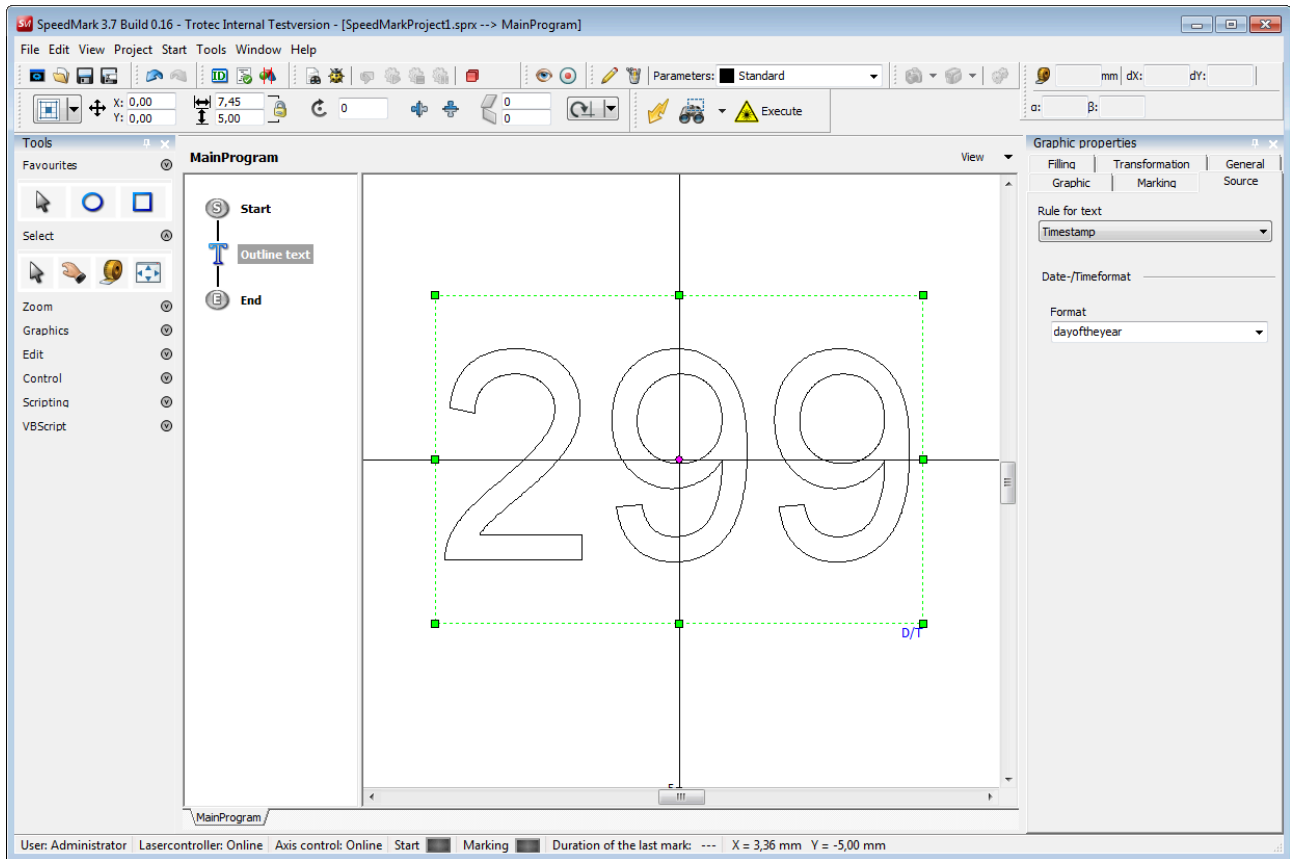
Set transformations are not displayed in the 2D drawing area. They only take effect shortly before the 2D graphic data is converted into 3D graphic data, i.e. before projection.



Settings made here only affect the current program:

- Each program can have a projection with different "Advanced Settings".
- You can define the type of your xy-axes if your system is not a standard LWS.
- The settings "Head is moved" or "Object is moved" have an effect on the direction of movement of the axes.

12 Serial data and dynamic graphic element content



The Serial text and dynamic element content functions may be used to extend the content of a specific graphic element using a variable component. This allows the creation of SpeedMark programs capable of reacting to external circumstances during operation.



Information

By means of the variable editor, these contents can also be loaded in advance and then used by several elements see "Variable editor".

A graphic element must be selected to select dynamic graphic element content. Then the Source tab can be used to select the relevant content type.



Information

The types of content available for selection depend on the graphic element selected. e.g. graphic elements such as rectangles or lines do not possess any content types.

The following types of content are available for selection depending on the graphic element selected:

- Serial number
- Expressions
- File expressions

- Serial file
- Time stamp

12.1 Serial number

Serial number may be selected for the content source of text elements. The current text is then replaced by the current serial number.



Information

SpeedMark currently only supports whole decimal numbers as serial text.

The screenshot shows the 'Graphic properties' dialog box with the 'Source' tab selected. The 'Rule for text' dropdown is set to 'Serial number'. The 'Serial number' section contains a 'Serial number parameter' group with the following fields: 'Current value' (1), 'Start value' (1), 'End value' (100), and 'Increment' (1). There is an 'End value infinite' checkbox which is unchecked. Below this is a 'Format' section with a dropdown set to '%d' and a 'Result' field showing '1'. At the bottom is an 'Optional actions' section with two dropdowns: 'On End value' set to 'Reset to start value' and 'On program start' set to 'Keep current value'.

Before applying the Serial Text function, it is necessary to specify the parameters such as start value, increments and end value.

It is also possible to specify that the end value is infinite.

The presentation format a serial number can be selected in the Format section of the Serial Text settings. Via the dropdown a list of predefined format strings can be accessed. Further it is possible to adapt a format mask, by simply change it in the edit field.

The appearance of the formatting is displayed in the “Results” field for preview purposes. It is also possible to request help with formatting using the button containing a question mark.

Optional Actions allow actions to be carried out on specific events:

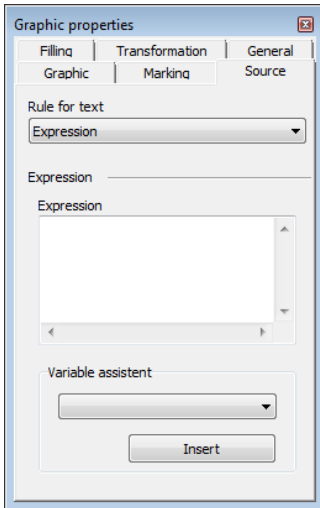
On End Value

- Reset to start value.
- Ask User
- End program

On Program Start

- Reset current value to start value.
- Keep current value.
- Ask for start value.

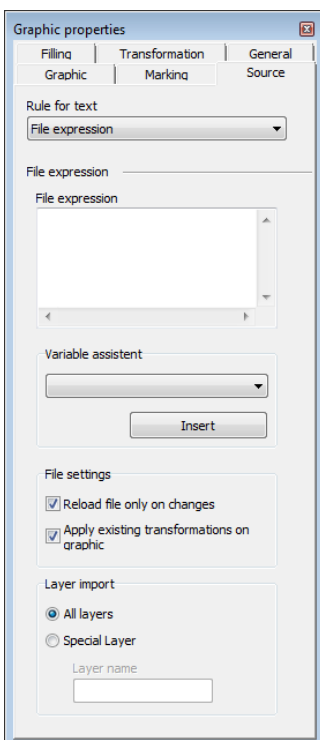
12.2 Expressions



The Expressions source content makes it possible to replace the content of a graphic element with the content of a variable or a calculated value - see "Simple scripting".

To aid operation, a Variable Wizard is available to quickly request a list of all available variables - For more information on variable types see "Variables".

12.3 Dynamic loading of vector graphics



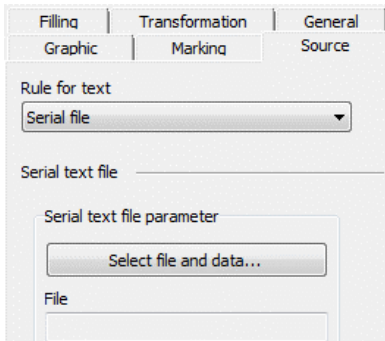
The File Print Out source content is available for vector graphic type graphic elements and allows the dynamic import of various vector graphics while a SpeedMark program is running.

A valid file name must be added to the File Print Out field in the form of a variable or a calculated string. As with Print Out, a Variable Wizard is also available.

It is also possible to specify whether an import should only be carried out if changes are made to the file. That means that SpeedMark checks whether the current imported graphic has changed its format in any way before a new import is carried out.

Under certain circumstances, this can significantly affect the execution speed of the created program.

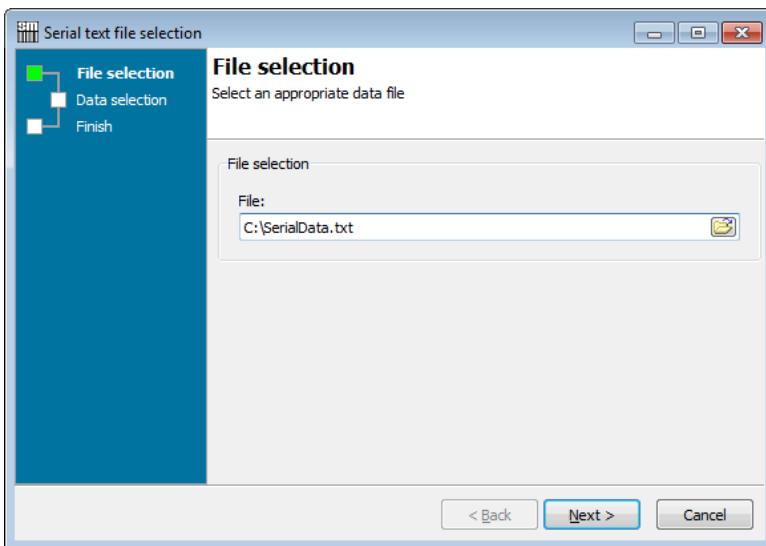
12.4 Seriendatei



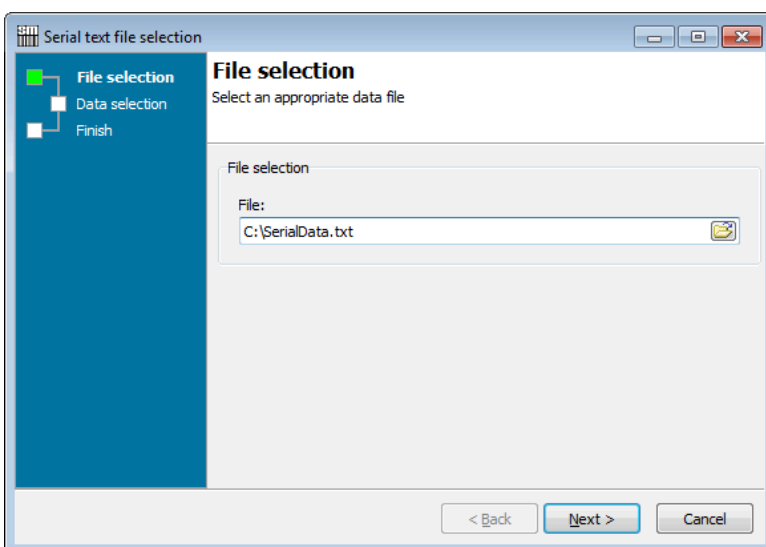
The Expressions source content makes it possible to replace the content of a graphic element with the content of a CSV file (that means, the data columns must be separated by a special character.

This character must be selected during the import dialog. The files should be saved as .TXT or .CSV.

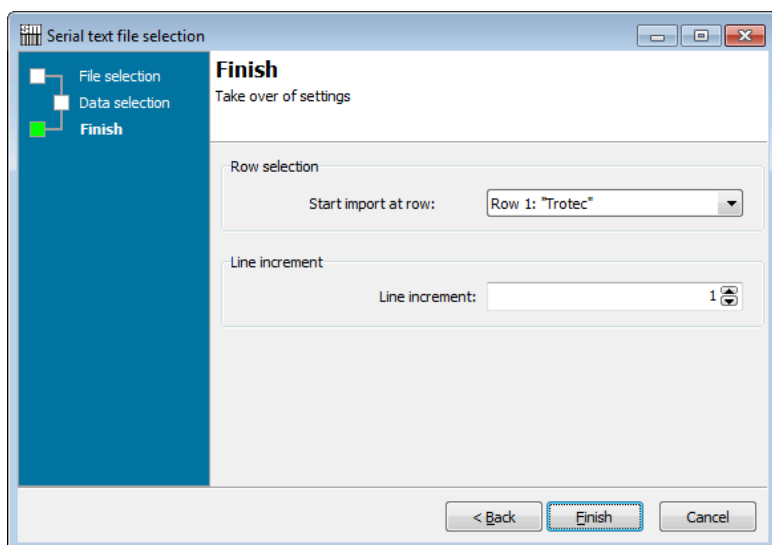
With the button "Select file and data" the wizard for selection of file and data will be started.



On this page the file selection is performed.

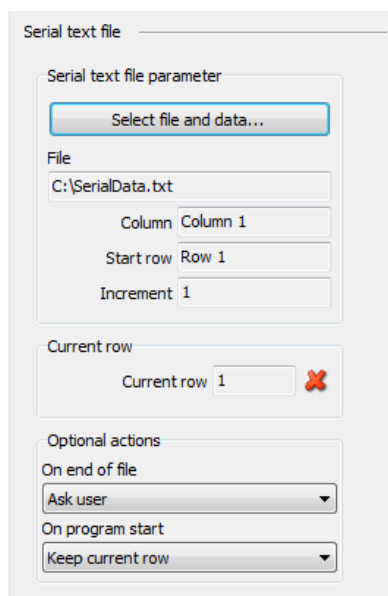


With the data selection the delimiter and the column can be selected.



On the last page the start row and the line increment are defined.

After finishing the wizard all settings are visible in the graphic properties.



Optional actions allow actions to be carried out on specific events:

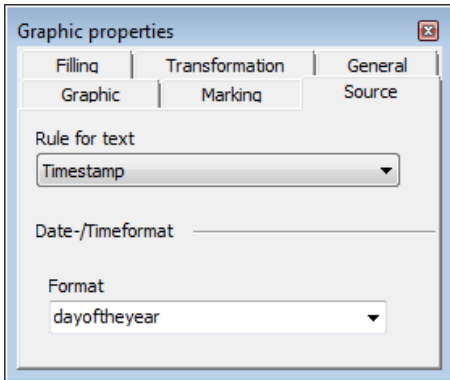
On File Value

- Reset to start row.
- Ask User
- End program

On Program Start

- Reset current row to start row
- Keep current row
- Ask for start value

12.5 Time stamp



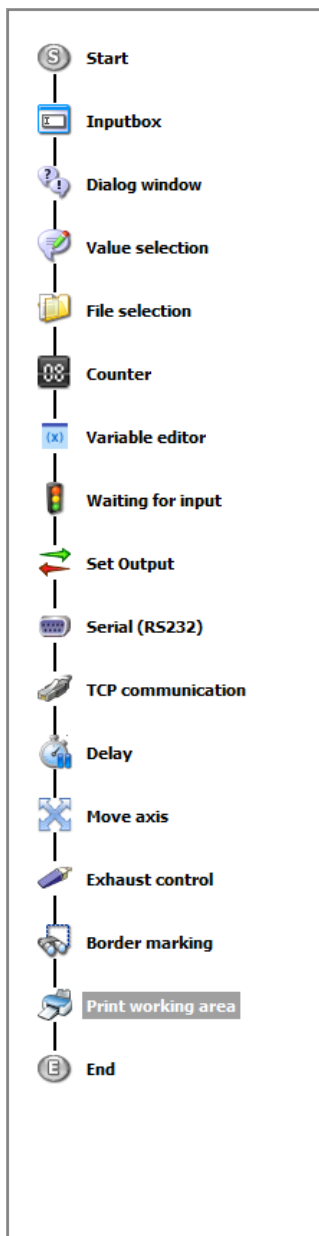
Time stamp may be selected for the content source of text elements.

The current text is then replaced by today's date.

It is also possible to specify the presentation format by using the Format combo box.

13 Control elements

Control elements may be used by SpeedMark programs while in progress to communicate with either the user or a connected system to exchange data and react to events.

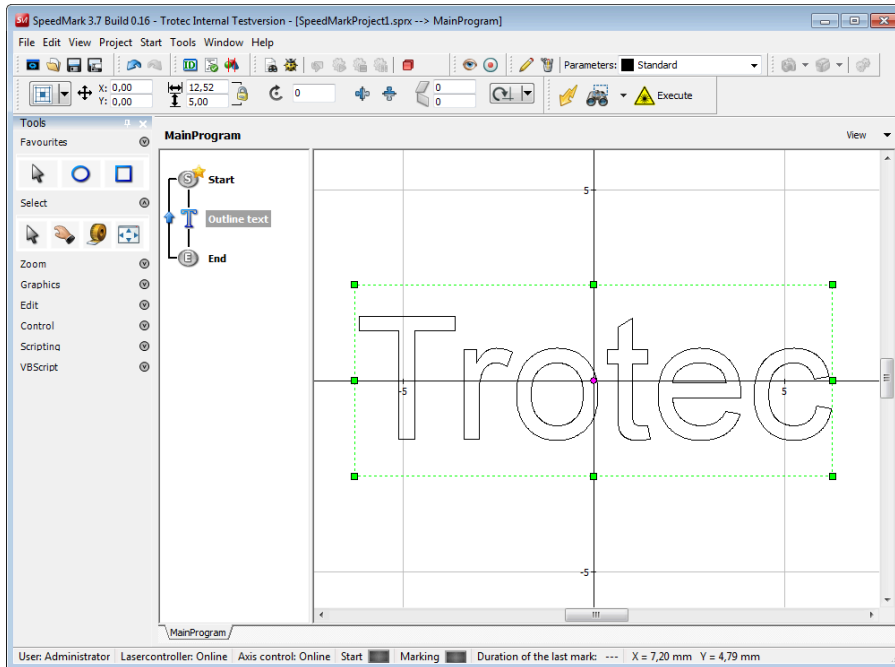


Each of the property's dialogs can be opened by double-clicking the mouse.

The following control elements are available:

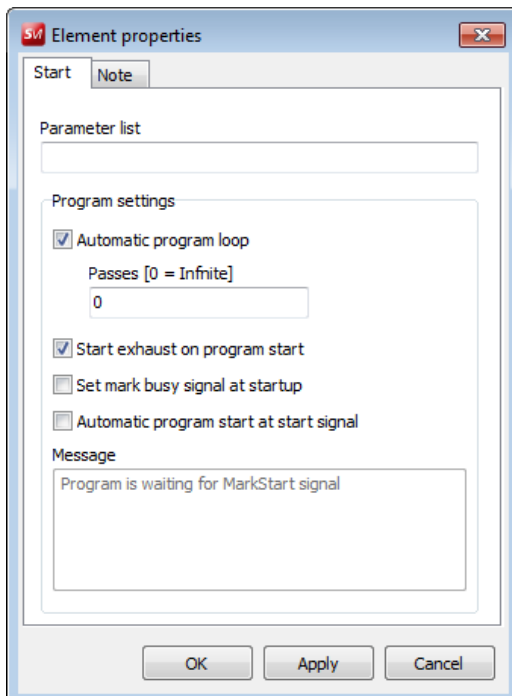
- Inputbox
- Dialog windows
- Value selection
- File selection
- Counter
- Variable editor
- Waiting for signal
- Set IO-Output
- Serial (RS232)
- TCP communication
- Delay
- Move axis
- Exhaust control
- Border marking
- Print working area

13.1 Start element



With the start element it is possible to set up the behaviour of programs at the start and end phase.

OPTIONS OF THE START ELEMENT



The automatic program loop repeats the program if it is not cancelled or till the pre-set number of passes was reached.



Information

The start element will be marked with a "star" symbol and a loop arrow from the end element to the start element will be added to signal that the program loop is active.

The option "Start exhaust at program start" sends according to commands to the exhaust. Correct exhaust configuration is necessary.

The MarkBusy signal can be automatically set with the subsequent option.

The option automatic program starts at start signal waits with program execution until a MarkStart signal comes. In combination with automatic program loop it is very easy to work off a staple of work pieces.

13.2 Input window

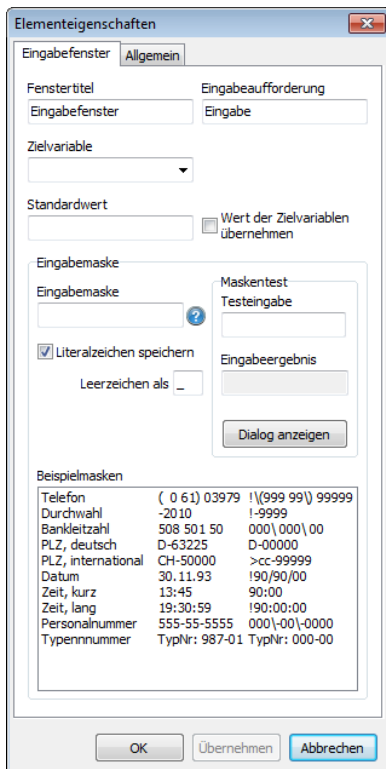


The input window control element allows the user to enter configurable input values via the keyboard or barcode scanner, for example.



Notice

A target input variable must be defined before the input window can be used.



It is also possible to specify the window title and a description of the input field.

To be able to check the entries in the front end, it is possible to create an input mask.

The button containing a question mark may be used to request detailed information about input masks.

It is also possible to perform test inputs to validate the input mask.

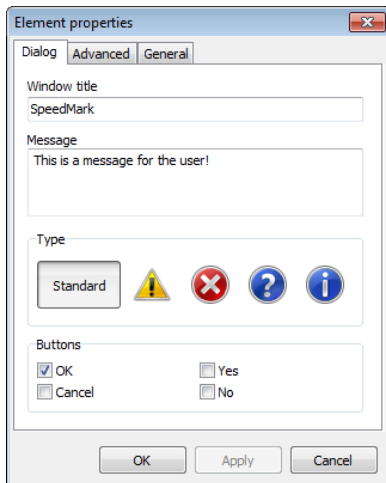
The program execution is then interrupted during the program execution and an input dialog opens in which it is possible to perform the user input.

The result of the input is then saved in the target variables for future use.

13.3 Dialog window



The dialog window control element allows displaying configurable messages to the user.



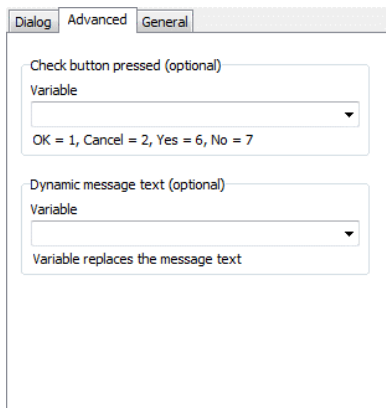
It is possible to define the message type like:

- Standard
- Confirmation
- Warning
- Information
- Error

As well as the shown buttons:

- OK
- Cancel
- Yes
- No

The program execution is then interrupted during the program execution and a message box is shown.

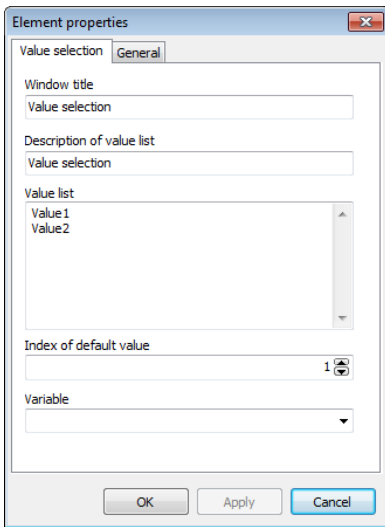


In tab advanced a variable can be defined which gets the value of the pressed button. Also it is possible to display a dynamic message by defining an appropriate variable

13.4 Value selection



The value selection control element creates a window with a value list the user can choose on single value.



All values of the list must be defined in its own row. With “Index of default value” it is possible to define the default selected value of the list.



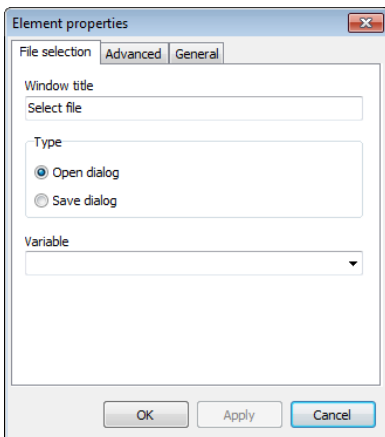
Information

A target variable must be defined before the value selection window can be used.

13.5 File selection



The file selection control element creates a window where the user can choose a filename.



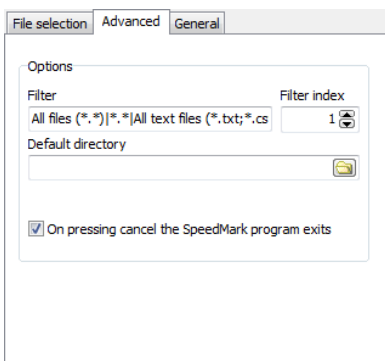
The following file selection types are possible:

- Open dialog
- Save dialog



Information

A target variable must be defined before the file selection window can be used.



In tab advanced it is possible to define a filter for file extensions in the following form:

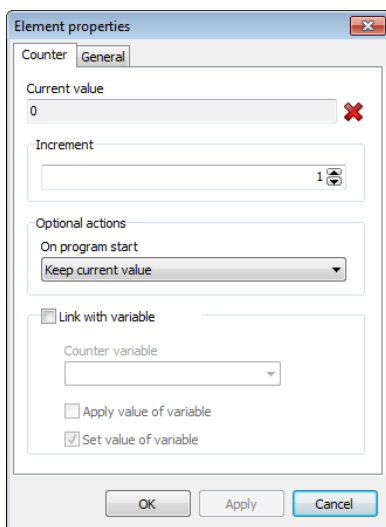
<Description1>|<Filter1>|<Description2>|<Filter2>|...

Additionally, it is possible to define a default directory.

13.6 Counter



The control element counter enables the simple creation of a counting possibility within SpeedMark programs. The internal counter will be incremented by the increment value at every call within the flow chart.



With the optional action “On program start” can be determined if the internal counter should be saved or resetted.

Additionally, it is possible to link the internal counter to a variable.

13.7 Variable editor

Dynamic content (e.g., serial numbers, time stamps, etc.) as described in chapter "Serial data and Dynamic Graphic Element Content" is only available to the specific element (e.g. text, barcode, etc.).



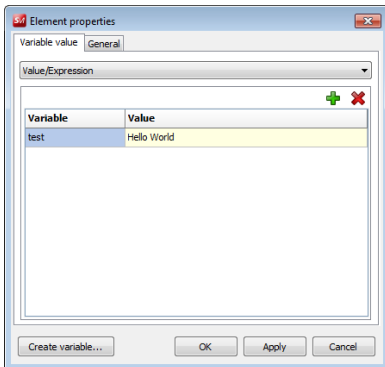
The control element variable editor allows for simple creation and editing of variable values. These variables are not bound to a specific element in the program flow. Because of that it is possible to use them multiple times at any position in the program.

The following edit options are available:

- Set value
- Timestamp
- Serial number
- Serial file

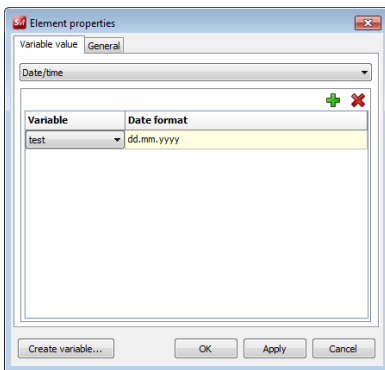
With the button "Create variable" it is possible to create new variables for the current marking program (The usage is limited to text variables).

VALUE/EXPRESSION



With set value it is possible to assign a constant value to selected variables. Calculated expressions are not possible as all values are interpreted as text.

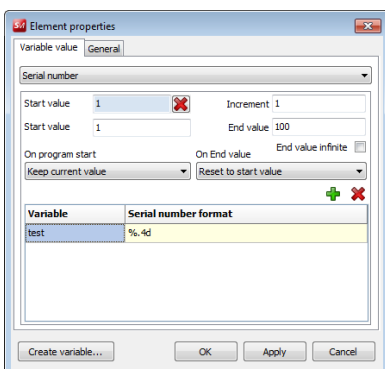
TIMESTAMP



With timestamp it is possible to assign the current timestamp to selected variables with a defined format.

Timestamp formats can be chosen either via list or manual user input.

SERIAL NUMBER

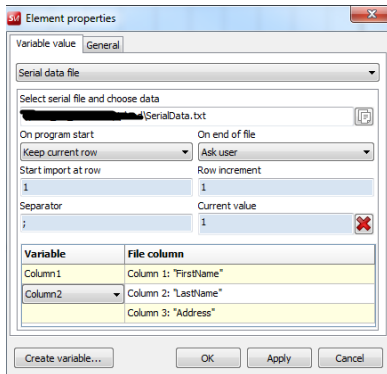


With serial number it is possible to assign a serial number to selected variables with a defined format.

Serial number formats can be chosen either via list or manual user input.

The serial number will be updated according to the settings on every execution.

SERIAL FILE

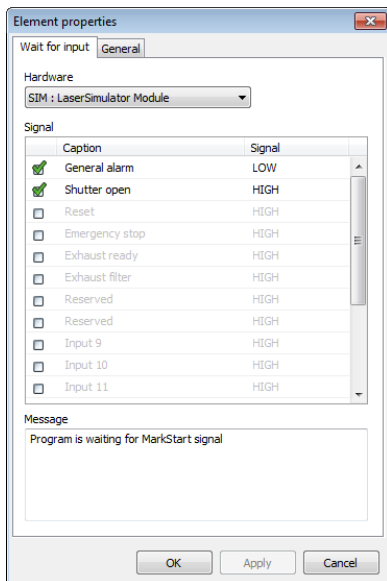


With serial number it is possible to assign the content of a text file. Every column of the file can be associated to a variable. On every execution the content of the next row will be assigned to the variables.

13.8 Wait for signal



Waits for a configured signal from an I/O input or the user presses a button. If it is only necessary to wait for the user to press a button, the Keyboard option must be selected in the Hardware combo box.



It is also possible to configure a suitable output message in the Message field. Otherwise, all cards with system-configured I/O inputs can be selected in the Hardware combo box.

When selecting multiple inputs, both signal settings must be met before SpeedMark executes the program.

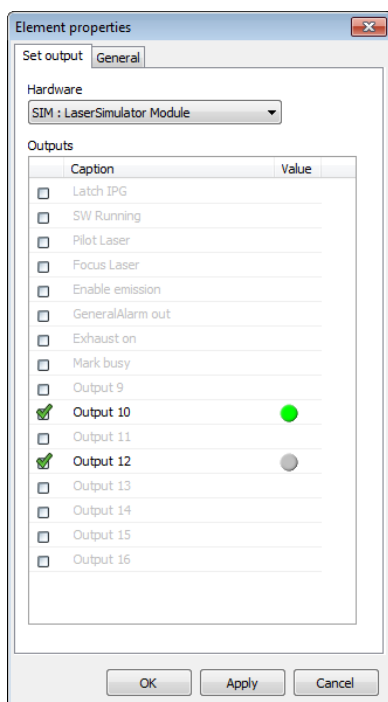
The signal inputs may be checked for:

- HIGH
- LOW
- Side HIGH/LOW
- Side LOW/HIGH

13.9 Set I/O output



This control element sets an I/O output of a system-configured I/O card. It is possible to set one or more outputs

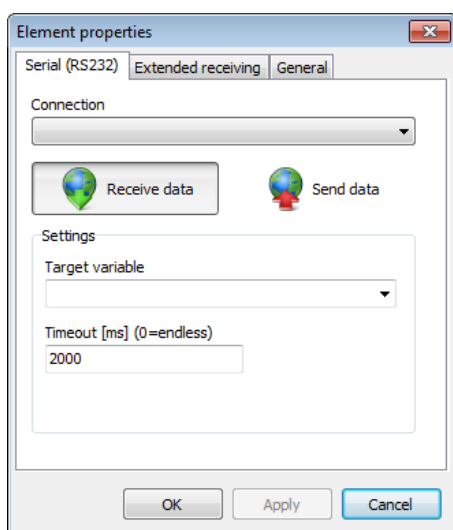


If the dot under Value is set to green, the output is set to HIGH.
If the dot under Value is set to grey, the output is set to LOW.
The output values are set by simply clicking on the dot.

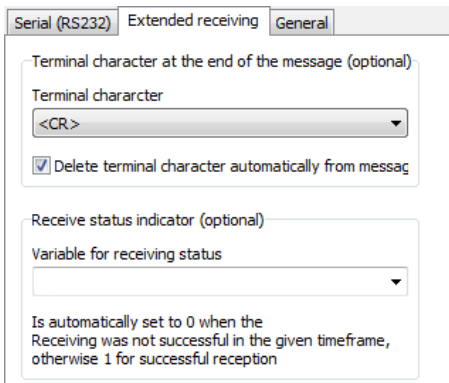
13.10 Serial (RS232)



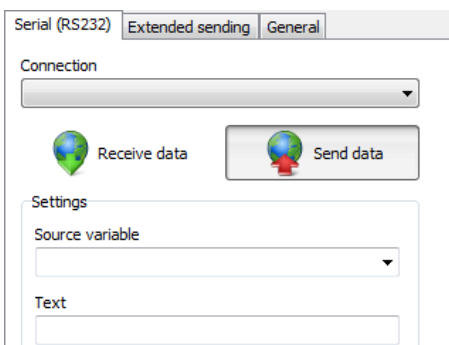
The control element Serial (RS232) allows the sending and receiving of data via a serial port. (This port must be defined as described in chapter "Modules and Components" and in chapter "COM Port")



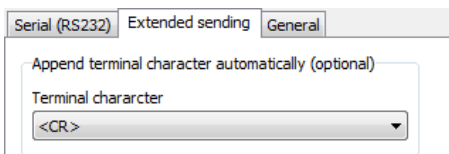
All received data will be written in the target variable.



In tab extended receiving a terminal character and variable for receiving status can be defined.



When sending the data can be written manually into the input field text or be defined in a source variable - When using a source variable, the value in input field text is ignored.

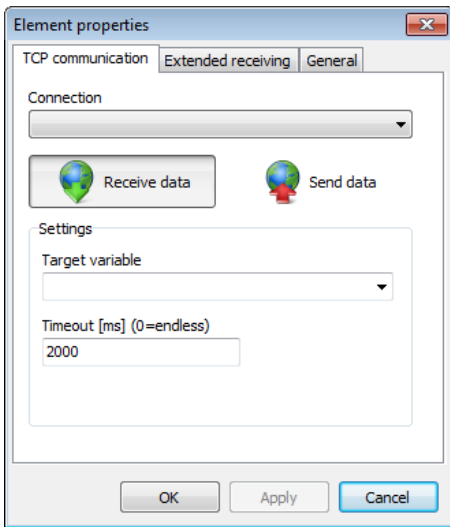


In tab "extended sending" a terminal character can be defined.

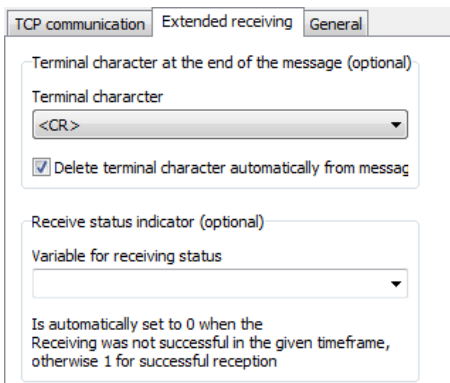
13.11 TCP communication



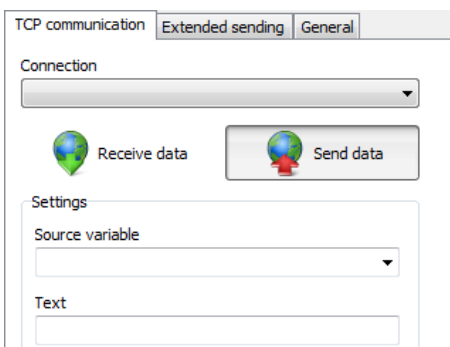
The control element TCP communication allows the sending and receiving of data via network. (This TCP port must be defined as described in chapter "Modules and Components" and in chapter "TCP Module")



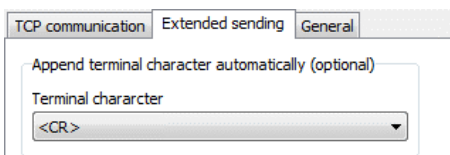
All received data will be written in the target variable.



In tab extended receiving a terminal character and variable for receiving status can be defined.



When sending the data can be written manually into the input field text or be defined in a source variable (When using a source variable, the value in input field text is ignored).

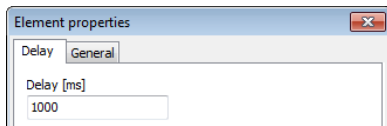


In tab "extended sending" a terminal character can be defined.

13.12 Delay



The Delay control element delays program execution for a set period.



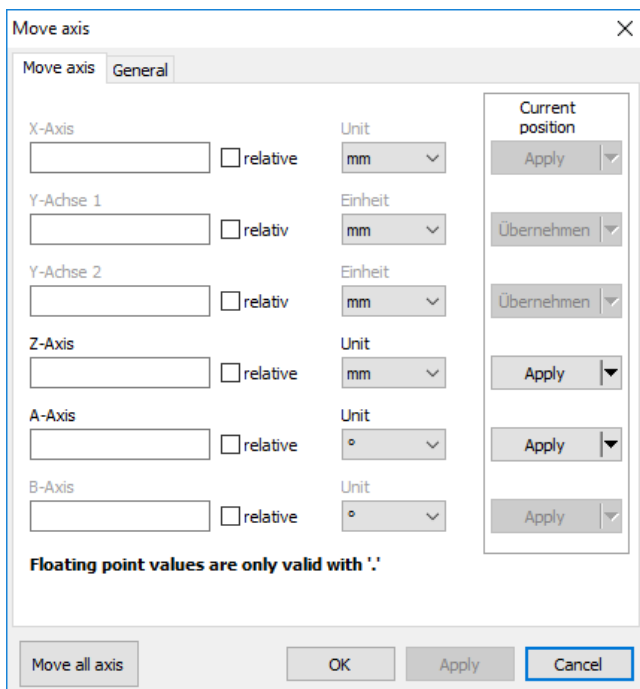
This value may be specified in the Time field.

This control element is usually used when external systems (e.g., axes) require specific time spans before proceeding with the actual marking.

13.13 Move axis

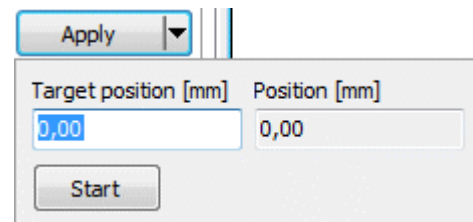


The move axis control element allows a simple control of connected axis.

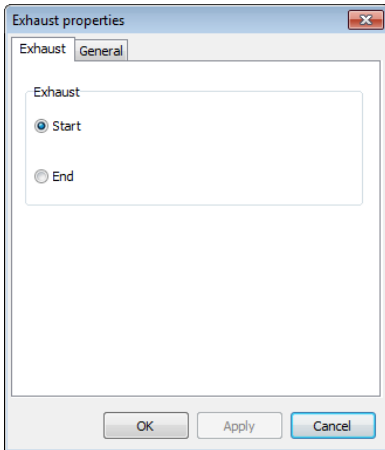


With "current position - apply" it is possible to take over the current value of the axis position into the input field.

Additionally, it is possible by clicking the arrow on the Apply-Button to get the current position of the axis. If a value is written into the target position field, clicking Start moves the axis to the given position.

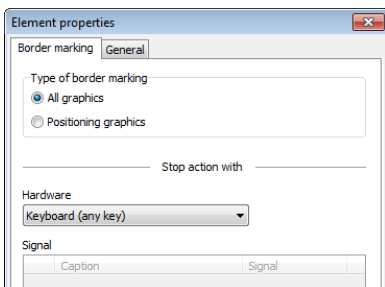


13.14 Absaugung steuern



The exhaust control element allows a simple control of a connected exhaust.

13.15 Border marking

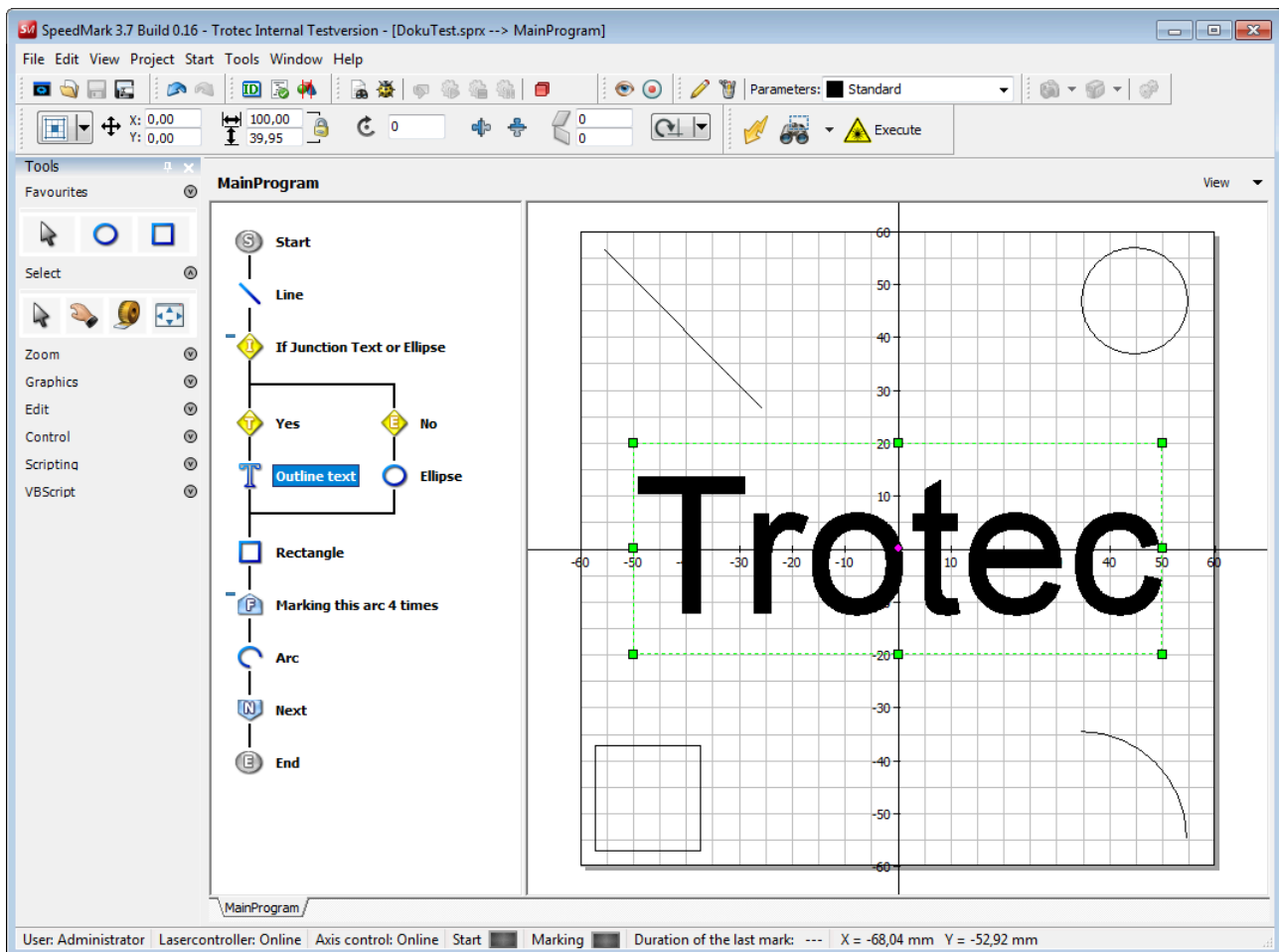


The control element Border marking allows the break the execution of the program to adjust a work piece.

It can be determined on which signal the execution resumes.

14 Basic flow chart programming

SpeedMark not only allows the basic marking of graphics using a laser, it also affects the flow of a program. Basic programming methods can extend SpeedMark programs using a dynamic component with very little effort.



Information

Rudimentary programming knowledge offers a distinct advantage with this type of laser marking. However, programming knowledge is not a requirement for the basic operation of the SpeedMark flow control.

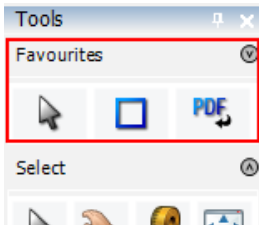
14.1 General

The Tools toolbar can be used to create new control and programming elements in the flow chart.



Information

In the SpeedMark default settings, the Tools toolbar is positioned vertically. However, it is presented horizontally in this document for ease of illustration.



Such elements can be created simply by clicking on the respective symbol.

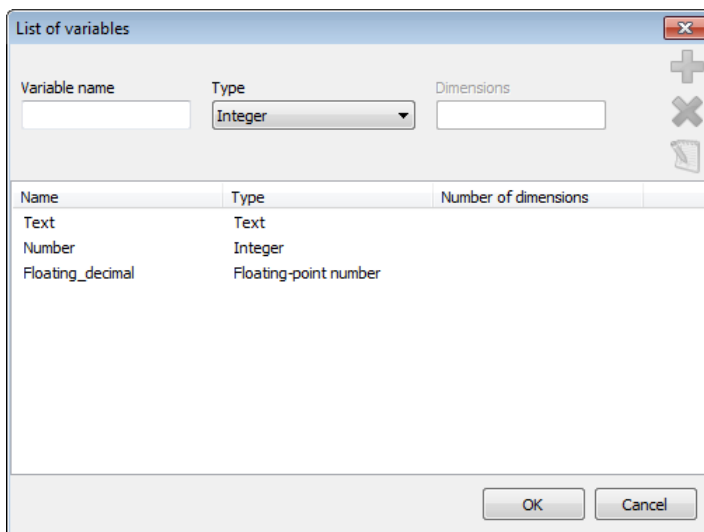
Such elements can be created simply by clicking on the respective symbol. Then move the mouse to the flow diagram and insert the element by clicking the mouse on the desired position.

The arrows positioned next to each element in the toolbar are used to access additional elements.

All available control and programming elements are located on the toolbar beginning with the traffic light symbol (Wait for Signal). An arrow is located next to each symbol and clicking once on an arrow opens a list containing all the graphic elements available for this group.

14.2 Variables

Variables are used in SpeedMark to transfer information from one control or programming element to the next.



All defined variables are available throughout the program.

That means that you may, for example, calculate an X position, save it in a variable and then transfer it to a graphic element for dynamic positioning.

The “List of Variables” dialog pictured above may be opened directly using the (Project → of Variables) menu. This dialog contains options for creating, editing, and deleting variables.

CREATING VARIABLES

To create variables, enter a unique name for the variable in the Variable Name field. Then select a suitable variable type from the adjacent list.



Information

A variable name may only be allocated once within a SpeedMark program.

SpeedMark supports the following types of variable:

Type	Description
Integer	4-byte integer (-231 ... 231-1)
Text	String consisting of ASCII/ANSI symbols
Floating-point number	8-byte real number ($5.0 \cdot 10^{-324}$... $1.7 \cdot 10^{308}$)
Integermatrix	Matrix consisting of integer values
Text matrix	Matrix consisting of text
Floating-point matrix	Matrix consisting of floating decimal values

Clicking on the green plus symbol adds a new variable to the list which is then available for other applications.

EDITING VARIABLES

To edit variables, select the variable in the list by double-clicking with the mouse. All property values for the variables are then transferred to the Variable Name, Variable type, and Dimension fields.

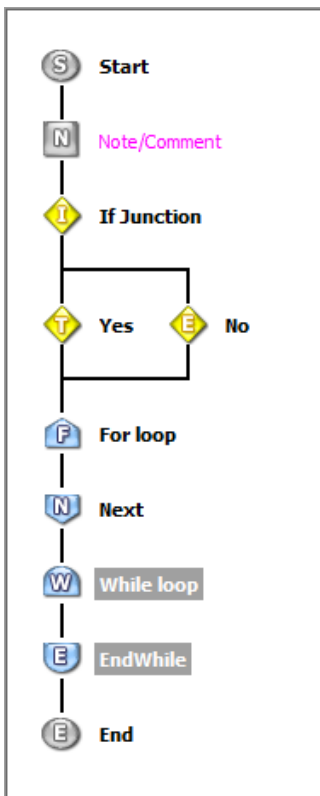
The type and dimension of the selected variable may now be edited (it is not possible to edit the variable name). The changes are then accepted by clicking on the “Apply” button.

To change the variable name, select the variable you want to edit. Then click with the right mouse button on the selection and select “Edit Variable Name” from the context menu.

DELETING VARIABLES

Variables can be deleted simply by selecting the variable to be deleted from the list, then clicking on the red X symbol.

14.3 Basic programming elements



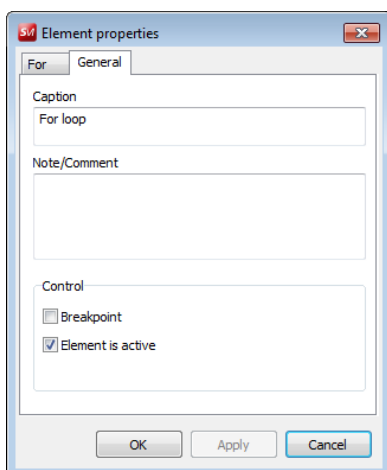
The programming elements give SpeedMark programs a dynamic component. You can open the properties dialog for each of the elements with a double click.



Information

This chapter describes only the basic programming elements. All advanced programming elements are described in detail in Chapter "Simple Scripting".

14.3.1 Basic element properties



The Basic Element Properties tab is used to specify whether the element should have a breakpoint (see chapter "Debug programs"), whether the element is active and which title and comment should be displayed.

14.3.2 Creating conditions

Conditions are used in branches and certain loops to specify the exact program. The design of such conditions is described in this chapter and applied in the subsequent chapters.

Conditions can be used to check variables against fixed values or other variables using relational operators. A condition must always be entered using the following format:

[Variable/Value] [Relational Operator] [Variable/Value] e.g., Variable > 3

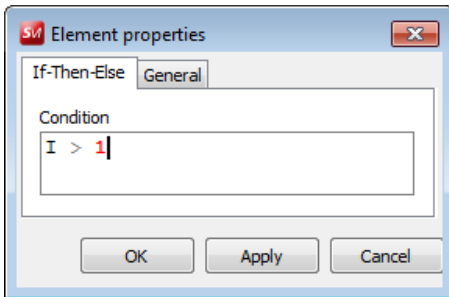
Relational Operator	Function
=	The condition is true if the values to the left and the right of the operator are equal.
>	The condition is true if the value on the left is greater than that on the right.
<	The condition is true if the value on the left is less than that on the right.
>=	The condition is true if the value on the left is greater than or equal to that on the right.
<=	The condition is true if the value on the left is less than or equal to that on the right.

It is also possible to combine individual conditions using Boolean operators and parentheses.

[Condition1] [Boolean-Operator] [Condition2] e.g. (Variable > 3) And (Variable < 4)

Boolean Operator	Function
Not	Negates the result of the condition to which Not is applied. e.g. Not (2 > 3) → gives a true result
And	Combines the results of two conditions, whereby both conditions must be true for the total result to be true. e.g. (2 > 1) And (5 > 2) → gives a true result
Or	Combines the results of two conditions, whereby one condition must be true for the total result to be true. e.g. (2 > 1) Or (2 > 5) → gives a true result
Xor	Combines the results of two conditions, whereby one condition must be unequal to the other for the total result to be true. e.g. (2 > 1) xor (2 > 5)

14.3.3 Branch



The Branch elements may be used to easily implement alternative program flows. The If-Then-Else field can be used to specify the path the program should take.

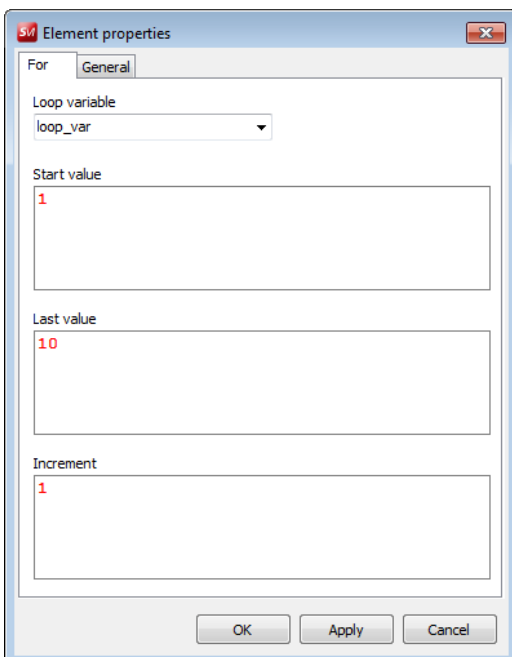


If the condition is fulfilled, SpeedMark carries out the Then branch.



If the condition is not fulfilled, SpeedMark carries out the Else branch.

14.3.4 Incremental loop



The Incremental Loop enables a repetition of the part of the program within the loop with definable parameters.

To set the incremental loop, a loop variable must be specified (by selecting in the Loop Variable combo box)

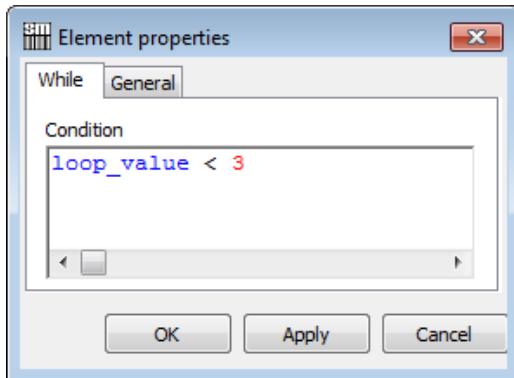
A start value, an end value and the increments of the loop must then be entered.



Information

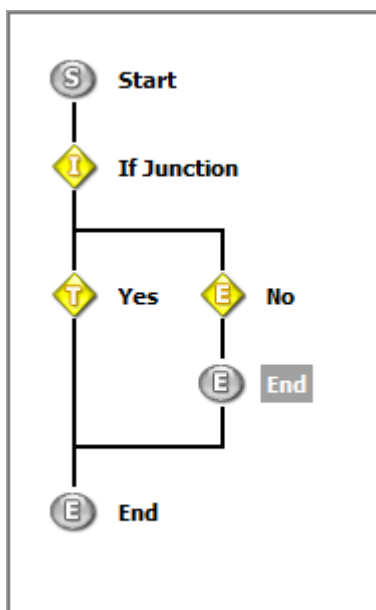
The start value, end value and increments may also be variables.

14.3.5 Conditional loop



The Conditional loop enables a repetition of the part of the program within the loop providing the given condition is true. If the given condition is no longer valid, the program will continue after the loop.

14.3.6 Programm end



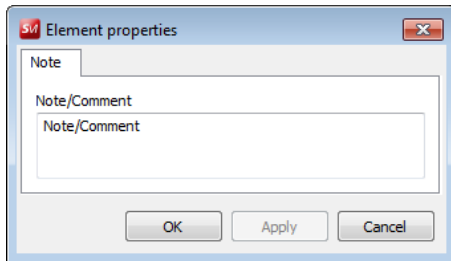
The Program end element ends the program immediately at that position and does not execute any following program elements. It is therefore possible, for example, to use branches and loops to trigger a premature abortion of the program in certain instances.

14.3.7 Program abort



In comparison to the program end element the program abort cancels the execution in every case, where the program end element is only jumping the program end.

14.3.8 Comment/Note



This programming element creates a comment in a SpeedMark program. This is used to provide information on the flow of such a program for any other SpeedMark users working with it. A suitable text can be entered in the Element Properties window.

14.4 Debug programs

To support the development of SpeedMark programs, SpeedMark provides several program debugging functions:

- Incremental program execution
- Breakpoints
- Window for displaying current variable values
- Window for displaying any error messages

Symbols before Debug Mode is activated

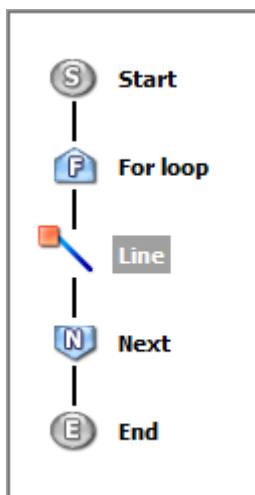


Symbols while Debug Mode is activated



14.4.1 Breakpoints

SpeedMark stops the current program execution when it reaches breakpoints and the program developer can evaluate the current progress, view variable values and investigate any errors.



Before you can add a breakpoint to a program, you must select an element in the flow diagram.

Then select the Switch Breakpoint function from the main menu (Start), the context menu or the toolbar. → Re-executing the function deletes the breakpoint again.



Sets or removes a breakpoint in a program instruction.



Removes all breakpoints.

All elements containing a breakpoint are displayed in the flow diagram with a simple red breakpoint symbol.

14.4.2 Incremental program execution



The Debugging function is used to activate the SpeedMark Debug Mode. The program execution runs to the first breakpoint or until any Program End is found. SpeedMark stops the program execution at the first breakpoint it finds as per the instructions of the breakpoint.



The Single Program Instruction function executes the current element in the flow diagram, jumps to the next element without executing it and waits for the next user input.



Continue Program causes SpeedMark to continue with the program without interruption until the next breakpoint.

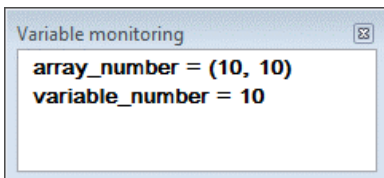


Stops the program and ends the execution.



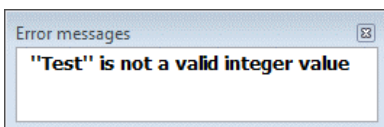
Pauses the program. The program can be continued using "Continue Program".

14.4.3 Actual variable values



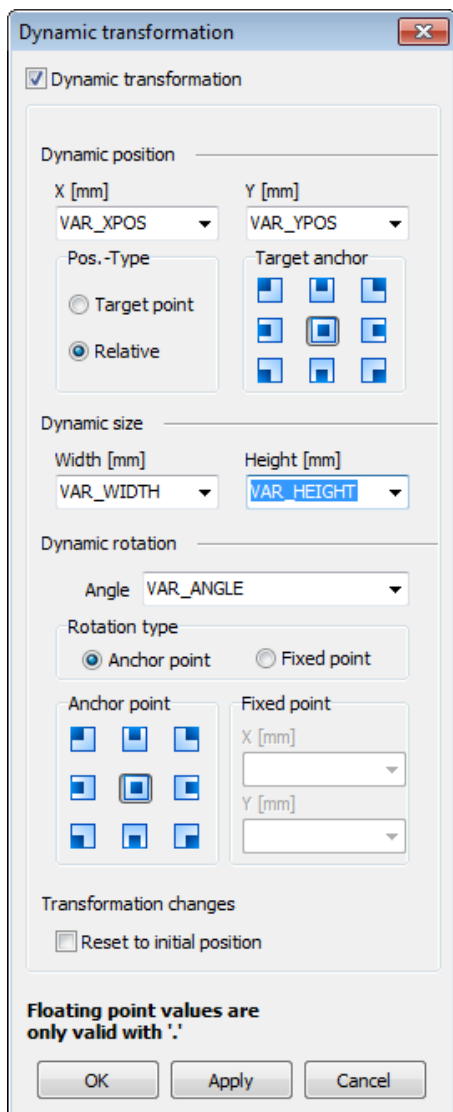
While SpeedMark is in Debug Mode, it is possible to request all current variable values. The associated window can be opened using Menu → View → Debug windows → Variable Monitoring.

14.4.4 Displaying Error Messages



It is possible to display error messages in SpeedMark during and after the execution of a program. The associated window can be opened using Menu → View → Debug windows → Error Messages.

14.5 Dynamic positioning

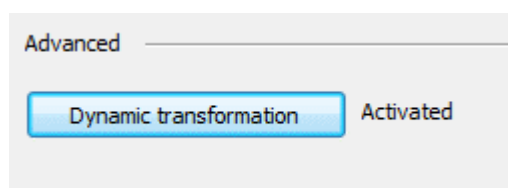


Dynamic positioning uses variables to dynamically adjust the:

- Position
- Size
- Rotation

of graphic elements while a SpeedMark program is running.

The dynamic transformation of each graphic element is specified in the Transformation tab in Graphic Properties



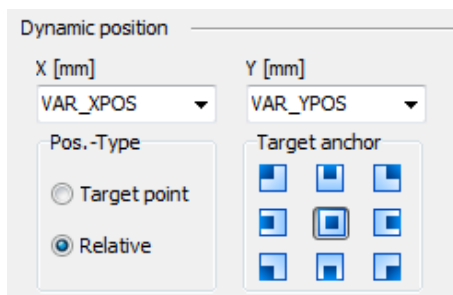
If no variables have been entered in the respective combo boxes, these values will not be changed.



Information

The last section, Transformation Changes, is used to specify whether SpeedMark should retain the applied changes or reset them once the program has finished.

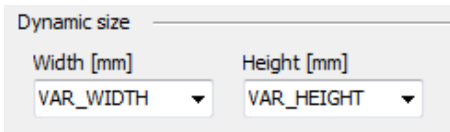
POSITION



A combo box in Dynamic Positioning (the upper section of the dialog) is used to set the X and Y variables.

It is possible to specify whether these variable values should be given a specific target as their position or whether they refer to a relative shift in the current position.

The Target Anchor Point is used to specify which of the graphic element's anchor points should be used as the reference for the positioning.

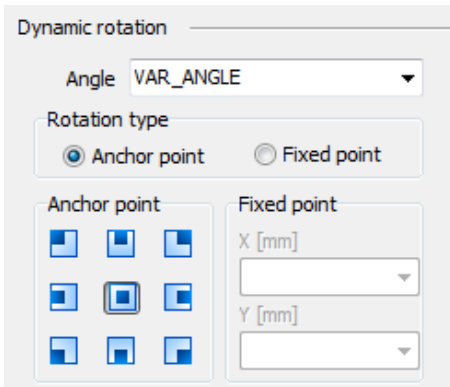
SIZE


Dynamic size

Width [mm] Height [mm]

VAR_WIDTH VAR_HEIGHT

The size of the graphic element may also be dynamically adjusted by selecting variables from the combo boxes.

ROTATION


Dynamic rotation

Angle VAR_ANGLE

Rotation type

Anchor point Fixed point

Anchor point

Fixed point

X [mm]

Y [mm]

To execute a dynamic rotation, it is possible to select a variable from the “Angle” combo box.

It is also possible to specify whether a graphic element should be rotated around an anchor point or a fixed point (also variable).

14.6 Pre- and post program

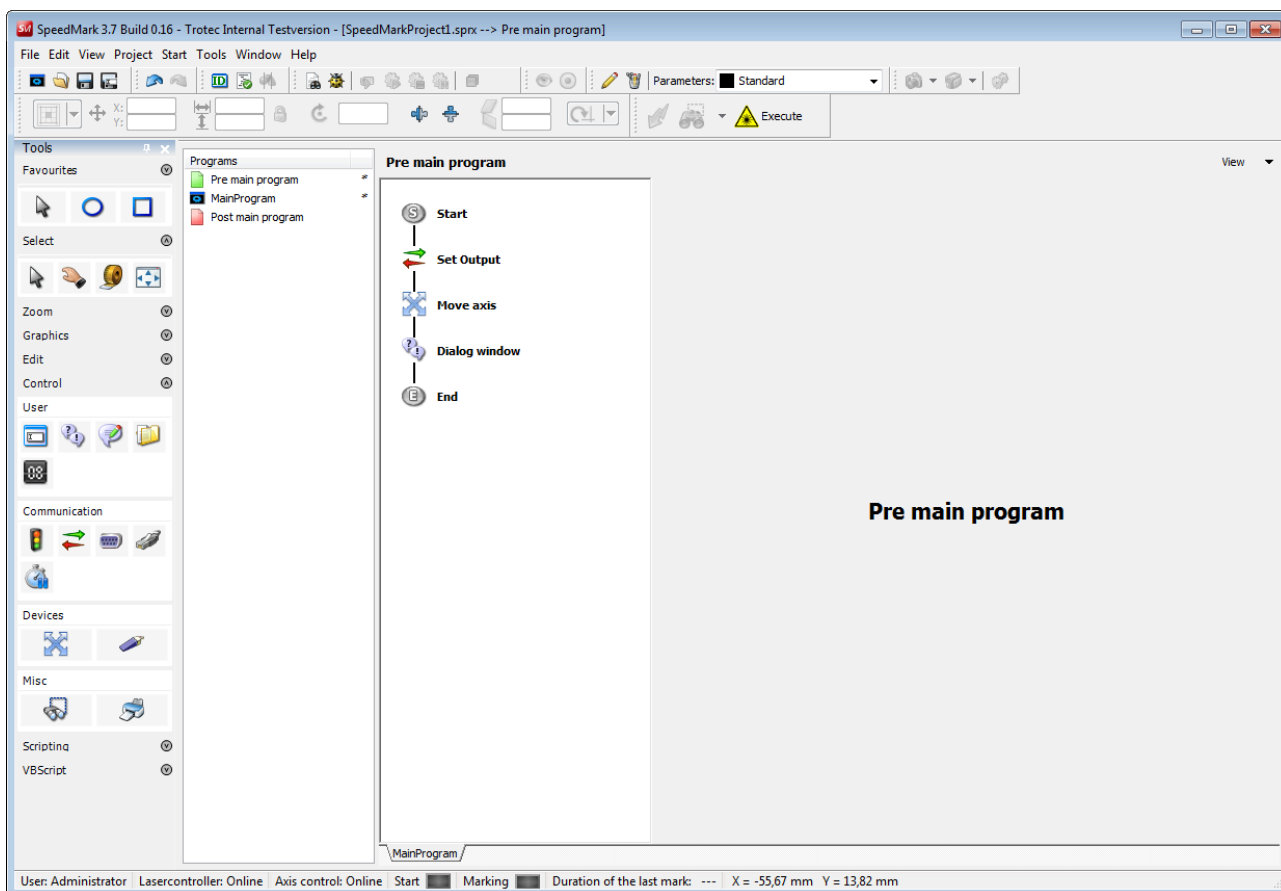
With the option pre- and post program, it is possible to insert a control flow before and after the actual program execution.

The option will be activated through Menu → Project → Pre- and post program.

PRE-PROGRAM

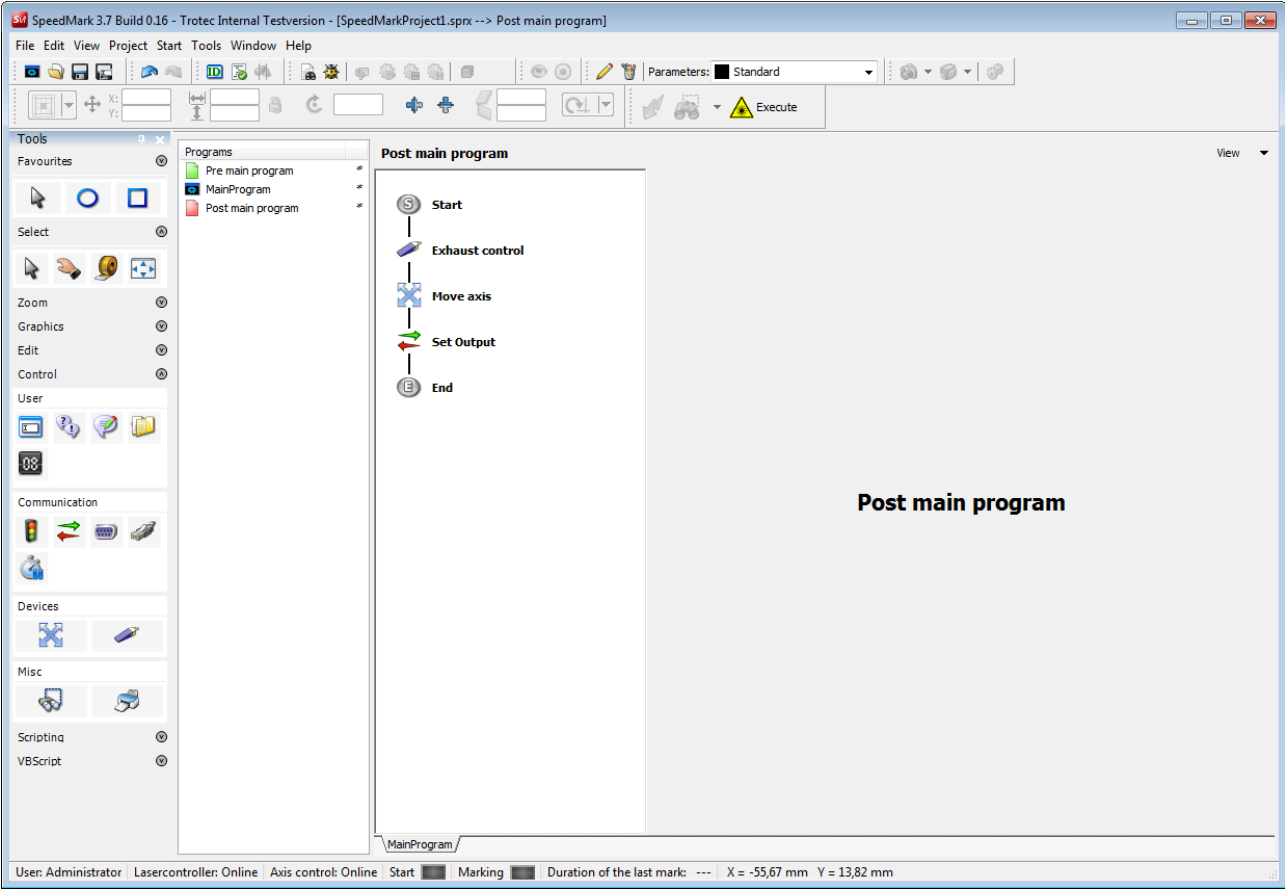
It is not possible to insert graphics into the pre program. This section serves only for initializing the system before the actual program execution.

Basic flow chart programming



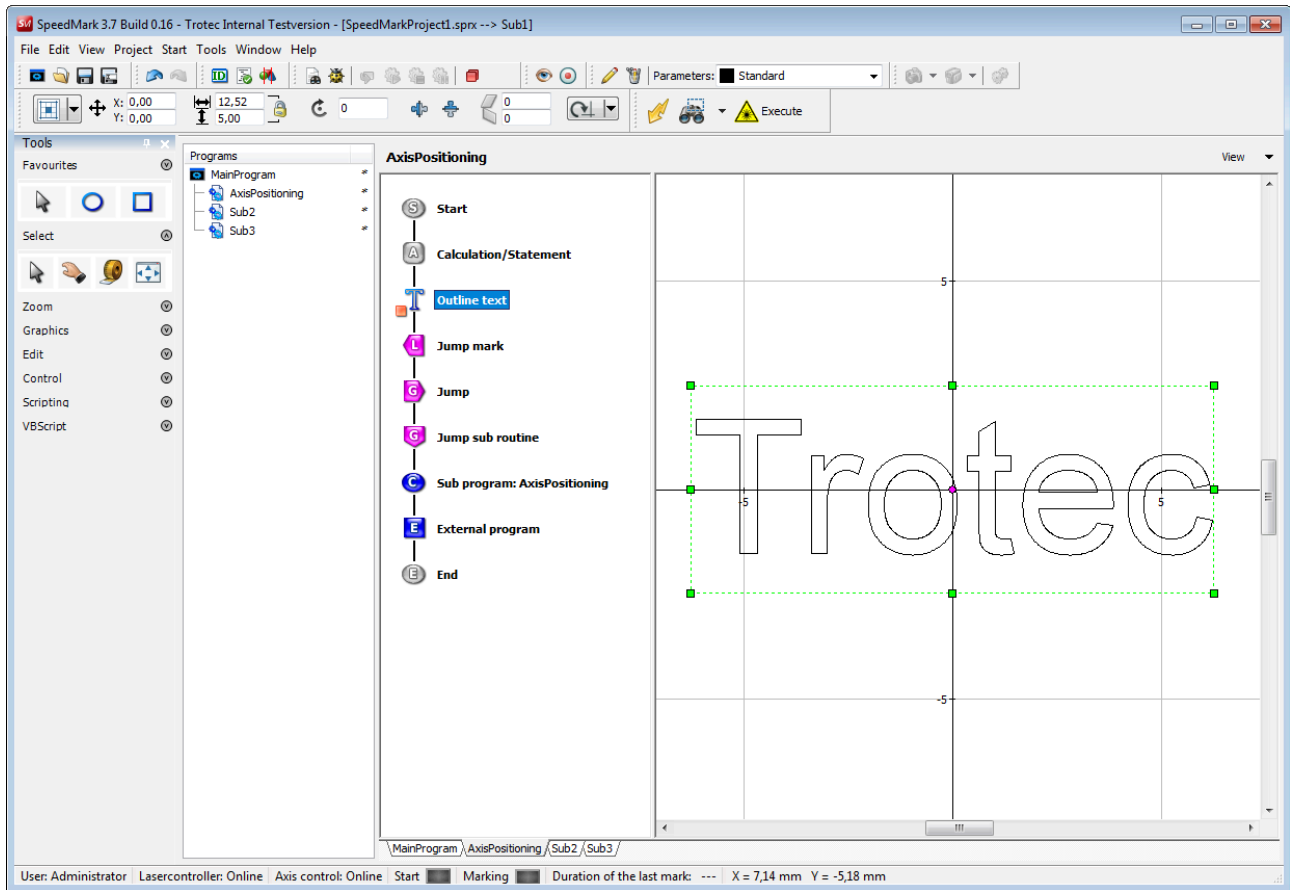
POST-PROZESSING

It is not possible to insert graphics into the post program. This section serves only for shutting down the system after the actual program execution.



15 Simple scripting

It is possible to fully automate SpeedMark programs using the advanced programming elements.



Information

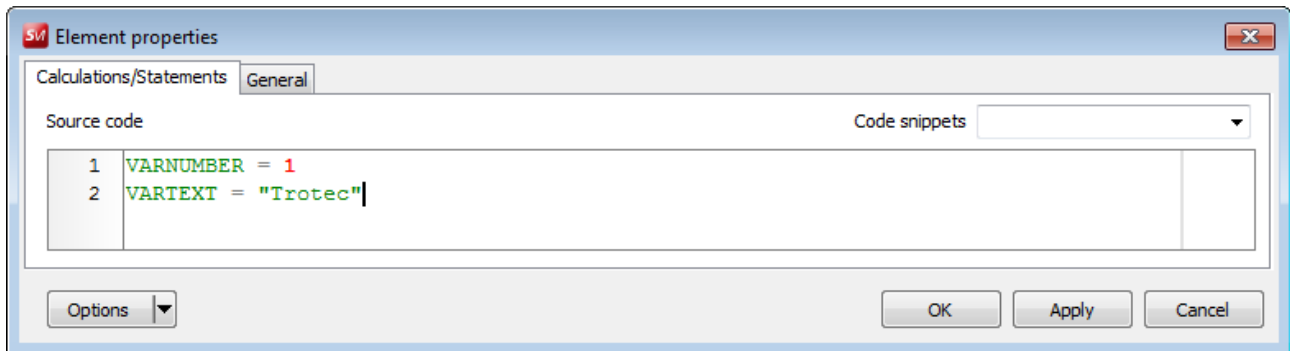
Advanced programming knowledge offers an advantage with this type of laser marking. This type of programming is mainly used in industrial environments employing repetitive tasks of long duration.

15.1 Advanced programming elements

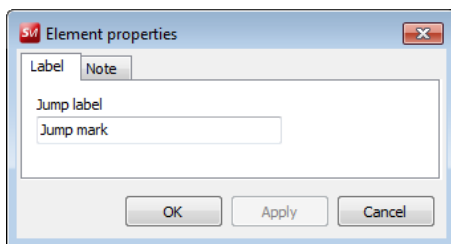
CALCULATION/ ALLOCATION



The Calculation/Allocation element is used to create flow scripts in the SpeedMark script language. This makes it possible to modify variables and access external files and components such as the laser or I/O cards. A detailed specification of the SpeedMark script language and further explanations regarding the application of this element can be found in Chapter "Scripting".

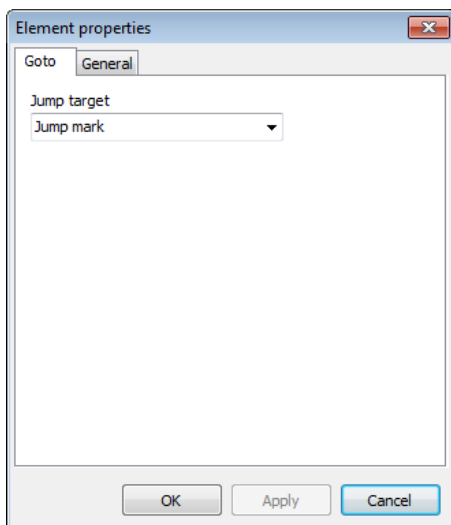


JUMP LABEL



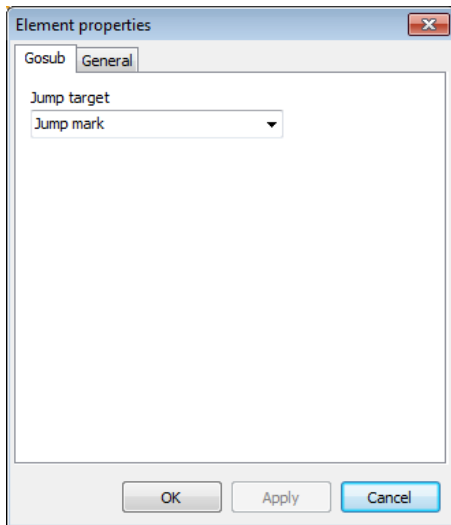
A jump label may be used to specify a position within a SpeedMark program to which it is possible to make a direct jump. These are sometimes required when it is necessary to jump back to the beginning from various positions within large scripts.

JUMP TO JUMP LABEL



It is possible to use the Jump-to-Jump Label element in conjunction with the Jump Label programming element introduced in the previous chapter to jump directly to the jump label. This element may be inserted at any point in the flow diagram. The Jump Target combo box is used to select the target Jump Label.

JUMP TO SUB-ROUTINE



This is used to jump to a sub-routine in the flow diagram. This is marked with a jump label.

In contrast to Jump to Jump Label, this saves the current position.

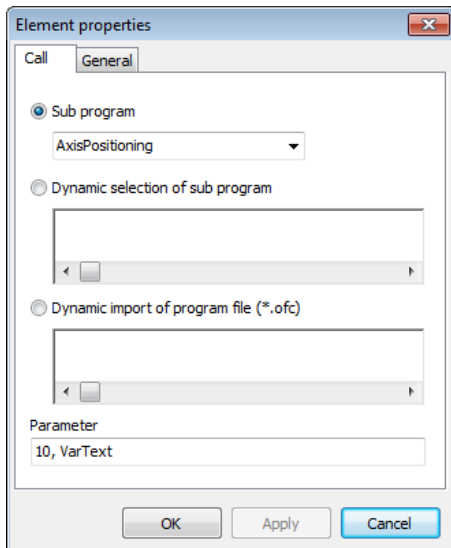
It is therefore possible to return to this initial position using the following element (Jump Back out of Sub-Routine) on completion and continue with processing.

JUMP BACK OUT OF SUB-ROUTINE



Is used to jump back out of the sub-routine.

SUB-PROGRAM



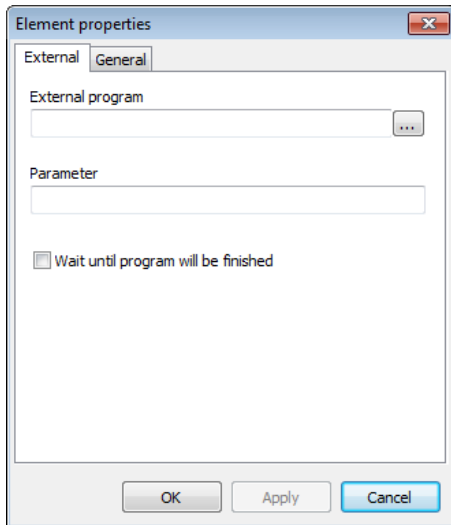
The Sub-Program programming element is used to request a sub-program.

Once the sub-program is complete, the next instruction in the program is carried out.

The Parameter field can then be used to transmit information to the sub-program.

It is also possible to dynamically request sub-programs. This is either possible through the sub program name or the filename. To do this, enter in the field a variable containing the name/path to the appropriate sub-program.

EXTERNAL PROGRAM

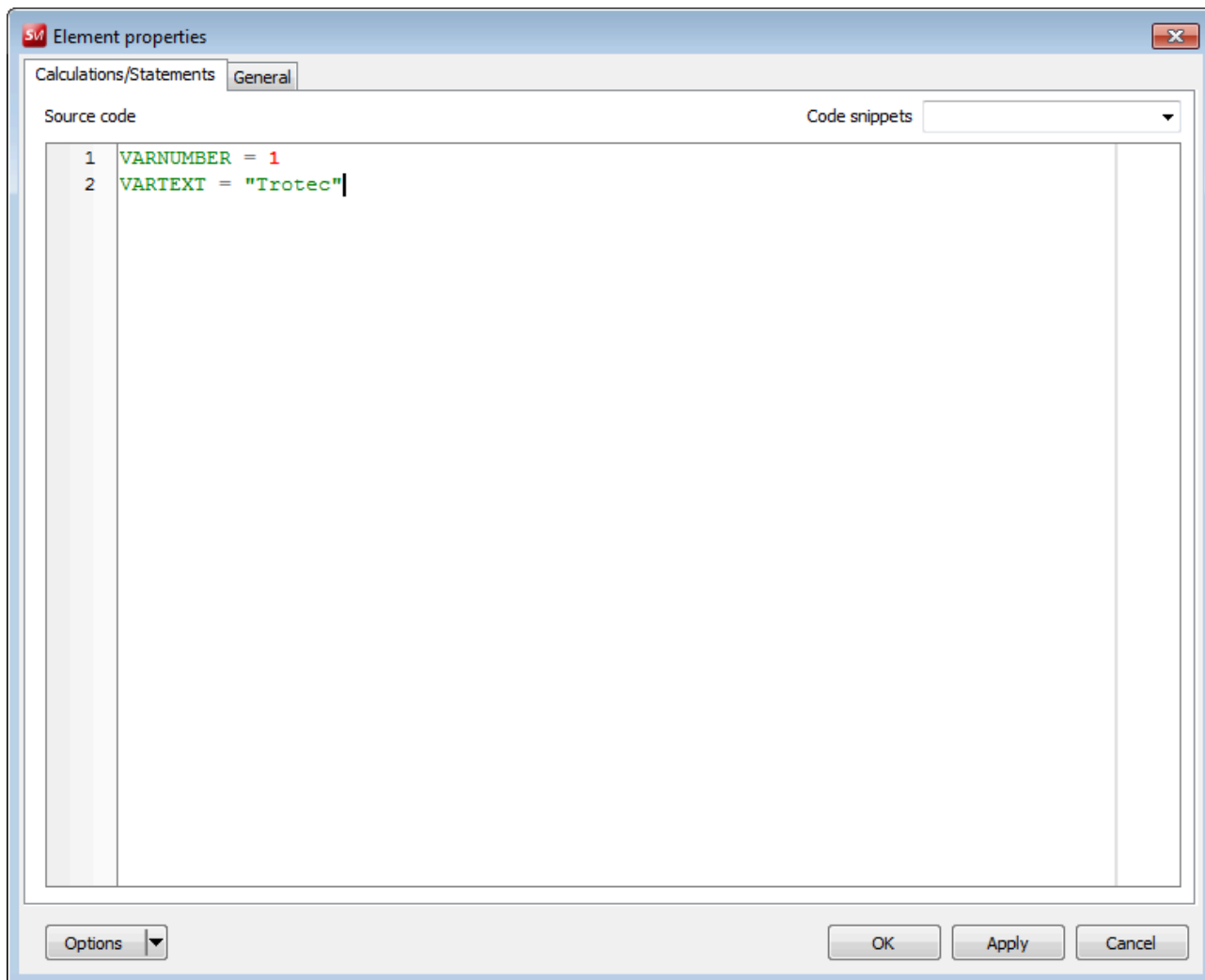


The External Program programming element is used by SpeedMark to request an external program.

It is also used to give the application command line parameters.

The option exists to specify whether the SpeedMark program should wait until the external program has stopped or not.

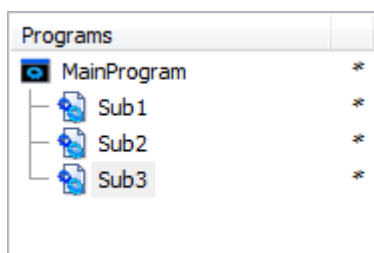
15.2 Scripting



SpeedMark scripts may be used to fully automate program execution.

A full description of the syntax and all functions is contained in the document entitled "SpeedMark Scripting Reference".

15.3 Master programs and sub-programs



Sub-programs are used to improve the structure of SpeedMark programs and re-use individual program sections in other SpeedMark programs.

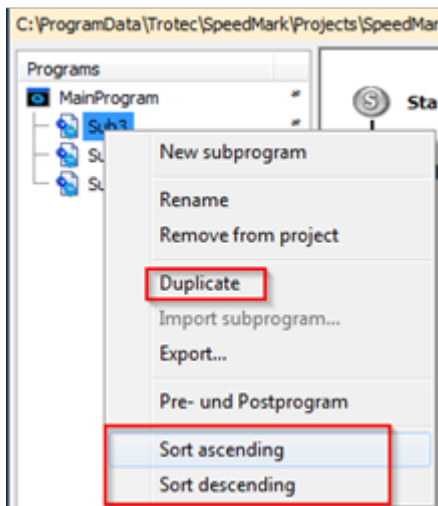
15.3.1 Adding or inserting sub-programs

A new sub-program can be added using Menu → File → New → New Sub-Program. This always assigns a sub-program to a master program.

As sub-programs are saved as independent files, it is possible to assign them to other master programs as well.

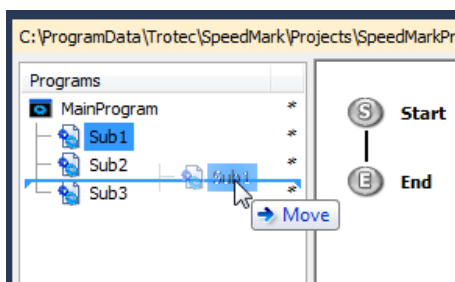
By right-clicking on the master program in the Project Management window it is possible to link existing sub-programs to the master program via the menu item “Add Existing Sub-Program”.

15.3.2 Managing sub-programs



Duplicating

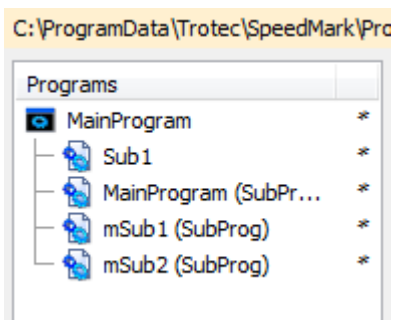
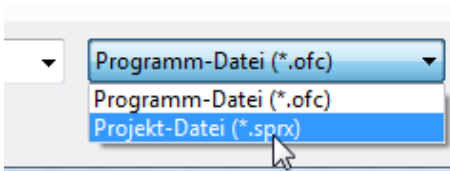
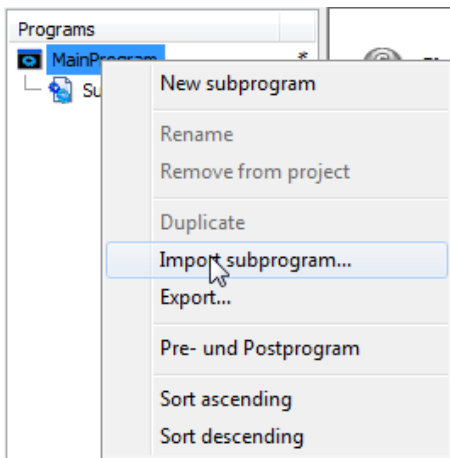
If subprograms have similar structures and/or content it is easy to create a new, similar subprogram. Using the "duplicate" function contained in the context menu will create an exact copy of the subprogram. So only the needed changes must be done afterwards.



Sorting

Sub-programs can be rearranged manually, so that they follow the logical order (or reflect changes in the program logic). This can be done by using drag and drop (mouse). Returning to a normal sort order is also possible via the context menu that provides ascending and descending sorting by name.

IMPORT AND EXPORT



Export

Sub-programs can be exported via the context menu. Export is available if a subprogram is selected and will save the program as an OFC-file.

Import

The import can only be done when the main program is selected. It is possible to import OFC files (single subprograms) or whole SPRX files.

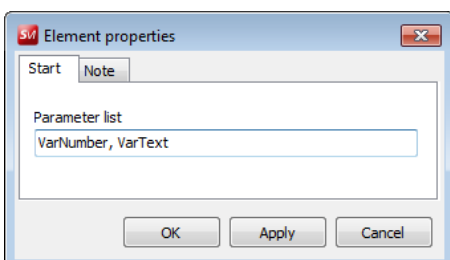
If the SPRX contains subprograms itself, those will be imported alongside the main program. Each of the imported parts will be suffixed with SPRX-Filename to prevent any confusion because of duplicate names.



Notice

The material database of the imported SPRX will not be integrated into the actual project! Speedmark will try to match the parameter via name, if this is not possible the default parameter will be used!

15.3.3 Specifying transfer parameters



To dynamize sub-program requests it is possible to transfer parameters from the master program.

A list of parameters consisting of local sub-program variables is therefore defined in the sub-program start element. When the sub-program starts, the variables are populated with the values from the master program.

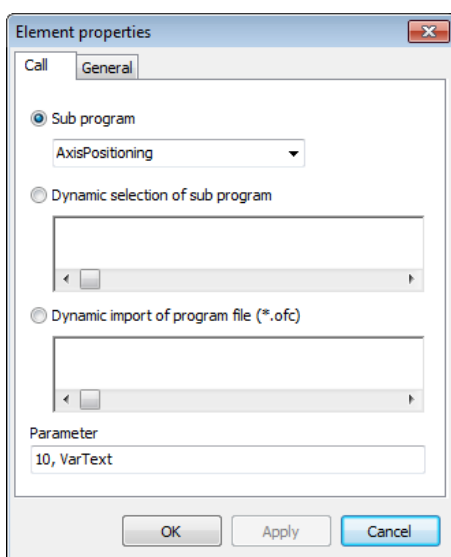
It is also possible to transmit values from the sub-program back to the master program. The identifier “Ref” is then prefixed to the name of the variable in the parameter list.

Example of a parameter list:

- VarZahl, Ref VarText

In the example above, the VarText value is transmitted back to the master program on completion of the sub-program.

15.3.4 Opening a sub-program



Sub-programs can be opened by the master program and other sub-programs using the Sub-Program programming element.

All parameters to be transferred are specified in the parameter list, separated by a comma.

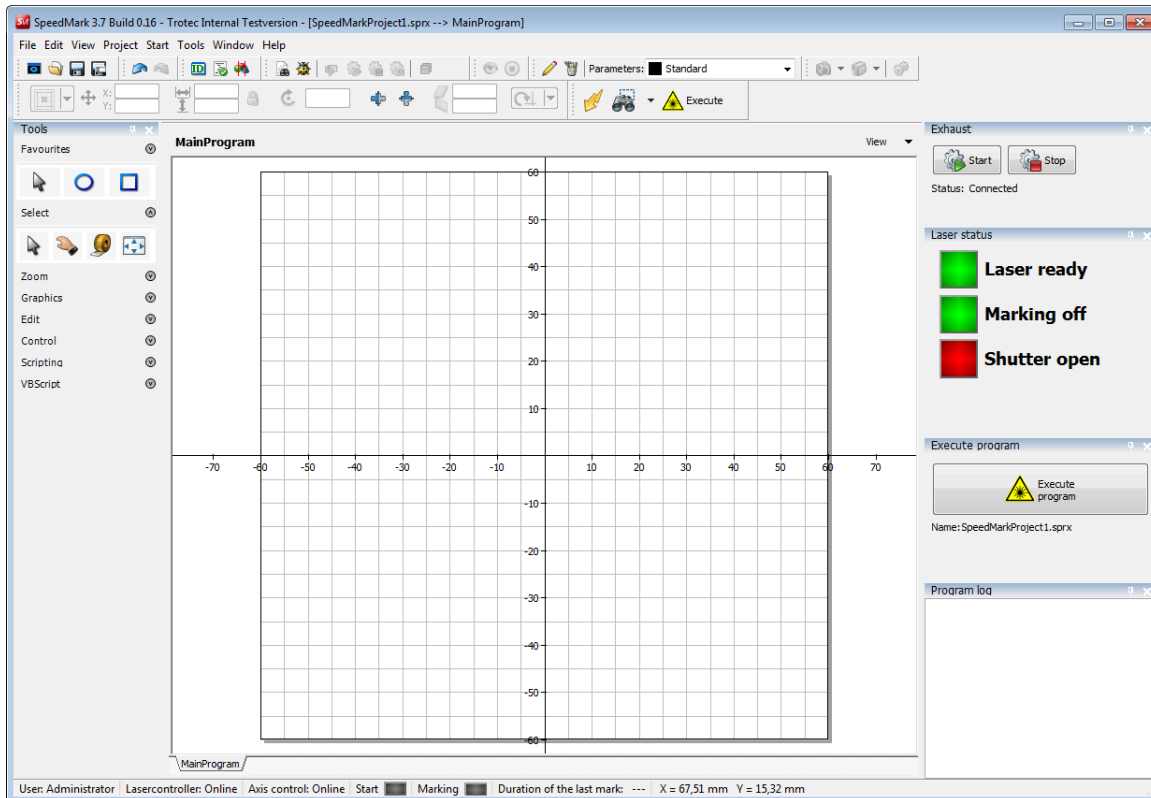
This makes it possible to enter both variable and fixed values.

**Information**

In the case of reference parameters, a variable must be entered when the sub-program is requested.

16 Modules and components

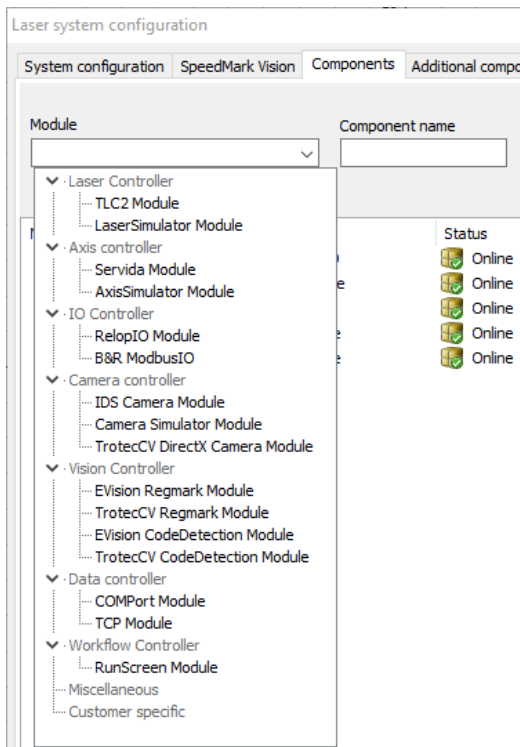
In SpeedMark, modules are used in combination with components to form an extension basically representing additional hardware components.



Information

The function - e.g., connection of a TLC2 card or Servida motor - is implemented by the module. Such modules are configured by the system when it boots. In contrast, components are used to connect SpeedMark and the installed modules. These components may then be configured accordingly in subsequent steps.

16.1 Component list



The configuration of modules and components is carried out using the Tools → Laser system configuration.

This dialog is used to add new components, modify existing ones, and delete those no longer required.

To add a new component, a component name must be entered, and the appropriate module selected. Add a new component by clicking on the plus symbol.

Once the components have been added, they can be fully configured by double-clicking on them.



Information

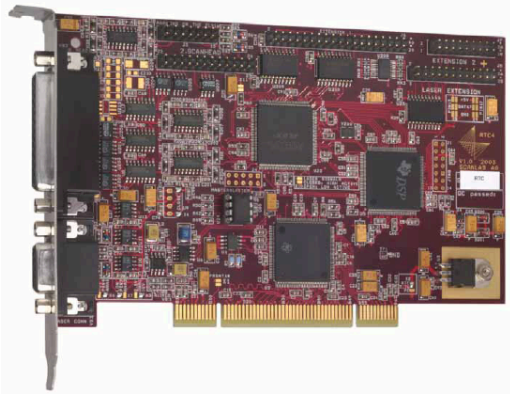
Modules such as the laser controller only allow the definition of an individual component. For other modules such as I/O cards or motor controllers, the number of components depends on the number of in-built hardware components.

Components can be deleted by selecting the components then clicking on the Delete symbol.

16.2 Components Window

Various modules and components use additional windows in SpeedMark. These can be opened and closed using Menu → View → [ComponentName] → [Windowlist].

16.3 TLC2 laser controller



The TLC2 module and associated components control the Trotec laser system laser and scanner.

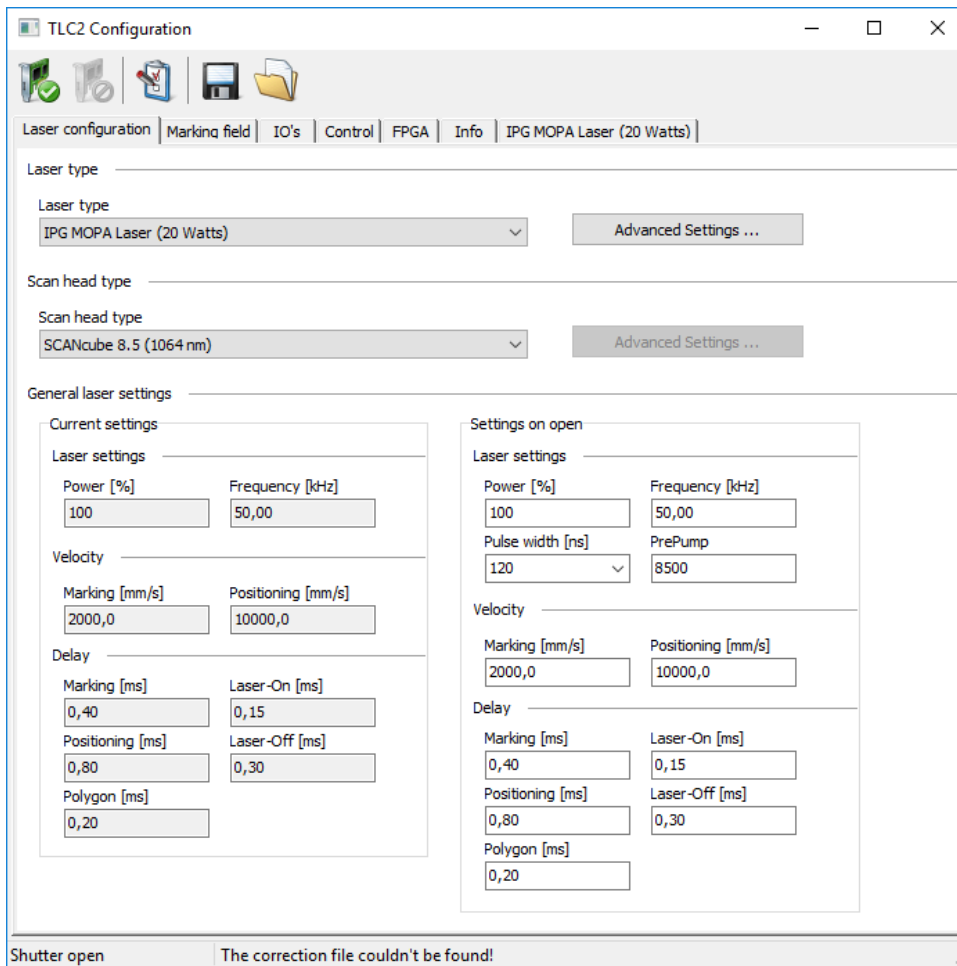
The module is integrated in SpeedMark and connects SpeedMark to the laser and scanner system, thus enabling the laser marking or engraving of the graphics created in SpeedMark on a wide range of work pieces.

16.3.1 Functional range of module






The TLC2 module therefore fulfils the following functions:

- Laser control
- Scanner head control
- Configuration of the field correction file
- Configuration of the operating range
- Transformation of the operating range
- Control of the card I/Os
- Output of the laser system's status
- Manual control of the scanner head mirrors

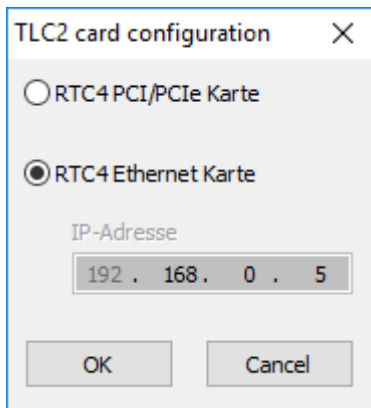
16.3.2 Configuration



CONFIGURATION CONTROL

Tool	Name	Description
	Open	Tries to create a connection to the laser
	Close	Closes the open laser connection
	Configuration	Configuration of the card type
	Save	Saves the configuration contained in a .ini file.
	Load	Load the configuration in the specified .ini file.

CARD TYPE



Determining the card type for the laser system used. For an Ethernet system, the following IP address are already in use:

192.168.0.5	Ethernet laser rack
192.168.0.7	Ethernet laser rack (serial interfaces)
192.168.0.10	LWS SPS
192.168.0.50	optional IO's

LASER TYPE (LASER CONFIGURATION)



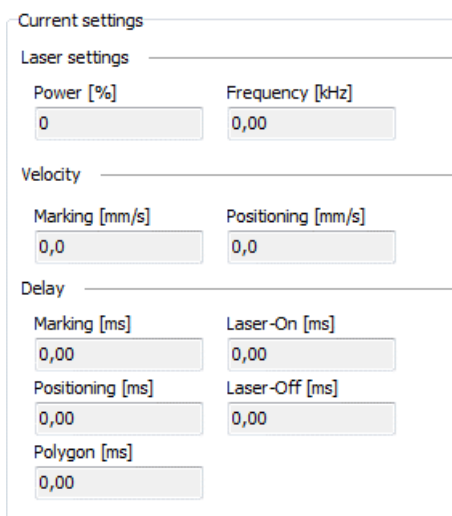
This specifies the type of laser used in the laser system. Different types of lasers also allow the specification of additional settings. In this case, the Advanced Settings button is activated automatically.

SCAN HEAD TYPE (LASER CONFIGURATION)



Defines the used scan head type. Depending on the selected head advanced settings may be available.

CURRENT LASER SETTINGS (LASER CONFIGURATION)



The current laser settings display the actual values used in relation to the marking parameter settings.

SETTINGS ON OPENING (LASER CONFIGURATION)

Settings on open

Laser settings

Power [%]	Frequency [kHz]
100	50,00
Pulse width [ns]	PrePump
120	8500

Velocity

Marking [mm/s]	Positioning [mm/s]
2000,0	10000,0

Delay

Marking [ms]	Laser-On [ms]
0,40	0,15
Positioning [ms]	Laser-Off [ms]
0,80	0,30
Polygon [ms]	
0,20	

The Settings on opening define the marking parameter values to be used when the card is initialised.

Further information about marking parameter settings can be found in Chapter "Material Parameter Manager".

SCANNING LENS TYPE (MARKING FIELD)

Scanning lens type

160mm F-Theta-Linse (1064 nm)

Defines the used scanning lens type

FIELD DISTORSION (MARKING FIELD)

Field distortion

Correction file

C:\ProgramData\Trotec\Speedmark\Config\TLC2Module\SM_FL_160.ctb

Program file

C:\ProgramData\Trotec\Speedmark\Config\TLC2Module\RTC4D2.hex

In the case of the TLC2 card, field distortion is defined using a correction file specified using the Correction File input field.

The program file is used to specify TLC2 card properties. This file is delivered with SpeedMark and the TLC2 card.

FIELD BORDERS (MARKING FIELD)

Field borders

<p>Maximum field border size</p> <p>Width [mm]</p> <p>128,50</p> <p>Height [mm]</p> <p>128,50</p>	<p>Working area</p> <p>Width [mm]</p> <p>120,00</p> <p>Height [mm]</p> <p>120,00</p>	<p>Field border wizard</p> <p>Field borderwizard</p> <p>Field grid for distortion</p> <p>Pilot laserwizard</p>
---	--	--

The laser system field borders are essentially defined by the optics used. The Field Borders Wizard is used to calculate these borders incrementally.



Caution

In order not to damage the scanner head with the mirrors, the operating range should always be slightly smaller than the maximum field borders.

The Pilot Laser Wizard is used to adjust the pilot laser so that the offset of the laser pointer position is compensated for by the actual laser beam used. This offset is determined by the difference in wave lengths of the pilot laser and the processing laser.

The button “Field grid for distortion” marks a grid to create a distortion file.

FIELD TRANSFORMATION (MARKING FIELD)

Field transformation

Activate field transformation

Rotation

Angle [°]

0,0000

Shifting

X-Offset [mm]

0,00

Y-Offset [mm]

0,00

Mirroring

Horizontal mirroring

Vertical mirroring

The field transformation of the marking field enables the transformation of the actual marking field compared to the marking field shown in SpeedMark.

I/O INPUTS

Index	Description	Value
1	Laser Status 1	<input type="radio"/>
2	Laser Status 2	<input type="radio"/>
3	Laser Status 3	<input type="radio"/>
4	Laser Status 4	<input type="radio"/>
5	GeneralAlarm	<input type="radio"/>
6	Shutter open	<input type="radio"/>
7	Reset	<input type="radio"/>
8	Emergency Stop	<input type="radio"/>
9	Input 9	<input type="radio"/>
10	Input 10	<input type="radio"/>
11	Input 11	<input type="radio"/>
12	Input 12	<input type="radio"/>
13	Input 13	<input type="radio"/>
14	Input 14	<input type="radio"/>
15	Input 15	<input type="radio"/>
16	Input 16	<input type="radio"/>

The I/O inputs display the status of all 16 of the card's available I/O inputs.

It is possible to change the name of the inputs by double-clicking on the name.

The new names are then also available in elements such as the Wait for Signal element.

I/O OUTPUTS

Index	Description	Value
1	Latch IPG	<input type="radio"/>
2	SW Running	<input checked="" type="radio"/>
3	Pilot Laser	<input checked="" type="radio"/>
4	Focus Laser	<input checked="" type="radio"/>
5	Emission enabled	<input type="radio"/>
6	GeneralAlarm out	<input type="radio"/>
7	Reserved	<input type="radio"/>
8	Output 8	<input type="radio"/>
9	Output 9	<input type="radio"/>
10	Output 10	<input type="radio"/>
11	Output 11	<input type="radio"/>
12	Output 12	<input type="radio"/>
13	Output 13	<input type="radio"/>
14	Output 14	<input type="radio"/>
15	Output 15	<input type="radio"/>
16	Output 16	<input type="radio"/>

The I/O outputs of all 16 of the card's I/O outputs can be set using this dialog.

An I/O output is set by clicking on the dot in the Value column (green = HIGH, grey = LOW).

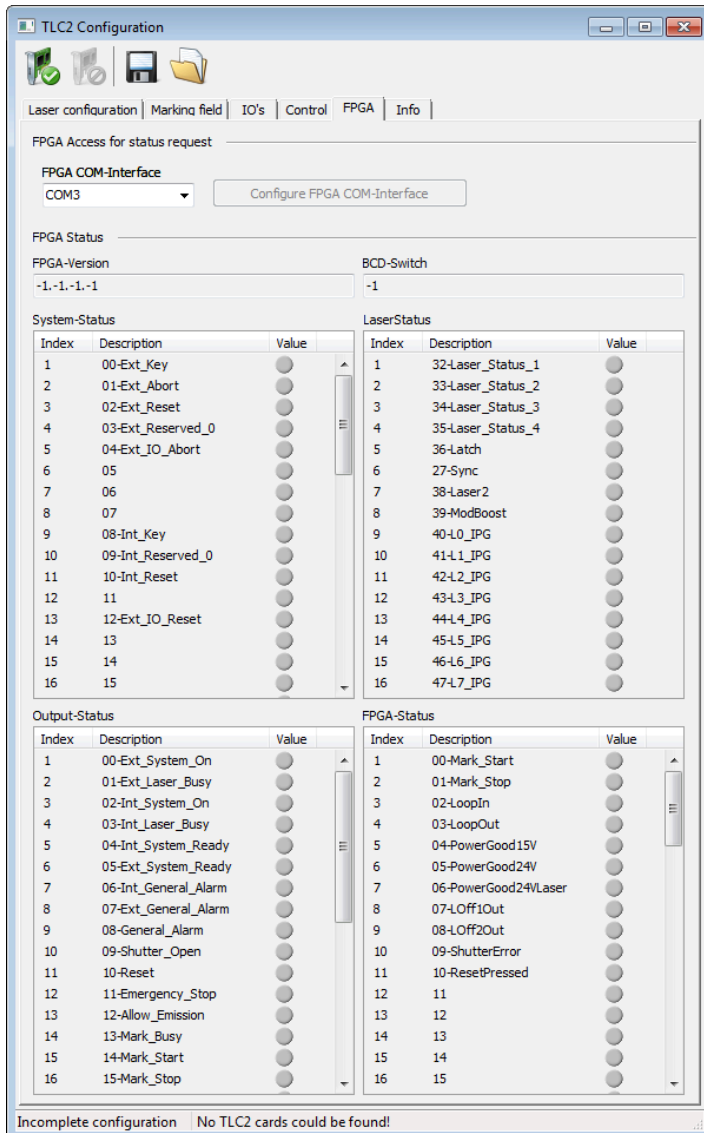
It is possible to change the name of the outputs by double-clicking on the name.

The new names are then also available in elements such as the Set Signal element.

SCANNER HEAD MANUAL CONTROL (CONTROL)

This dialog is used to manually move the mirrors for test and maintenance purposes.

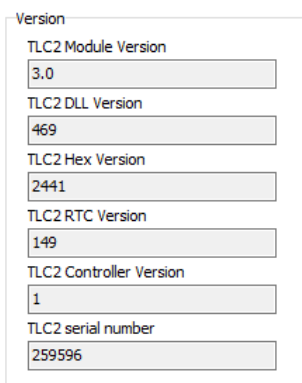
FPGA



The tab-sheet FPGA shows a detailed overview of the current state of the laser system.

All signals which are processed by the TLC2-FPGA are presented in a signal overview.

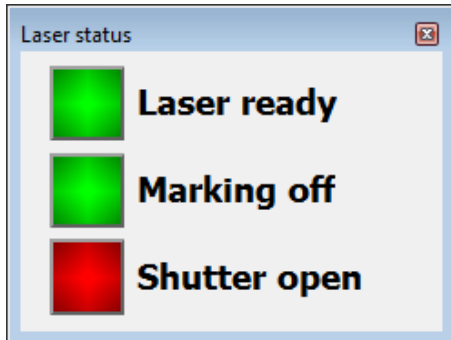
VERSION (INFO)



The Version information mask supplies all the information relating to the version of the card used.

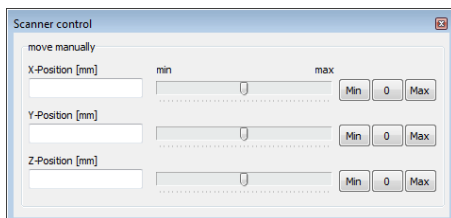
16.3.3 SpeedMark windows

LASER STATUS



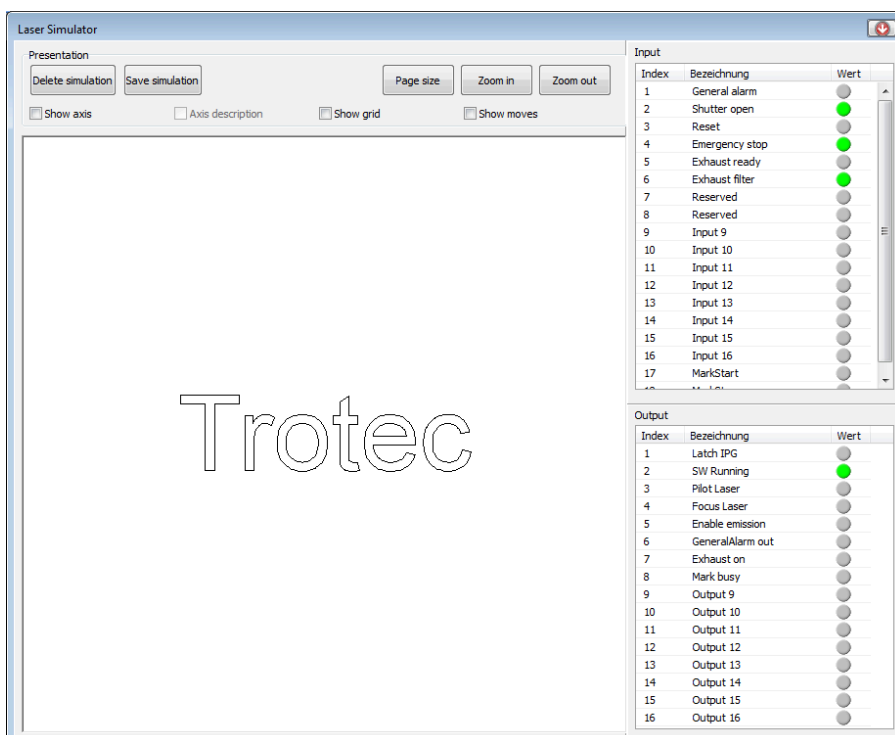
The status of the laser is displayed in SpeedMark using the Laser Status window.

SCANNER CONTROL



This window is used to manually move the mirrors for test and maintenance purposes.

16.4 Laser Simulator



Modules and components

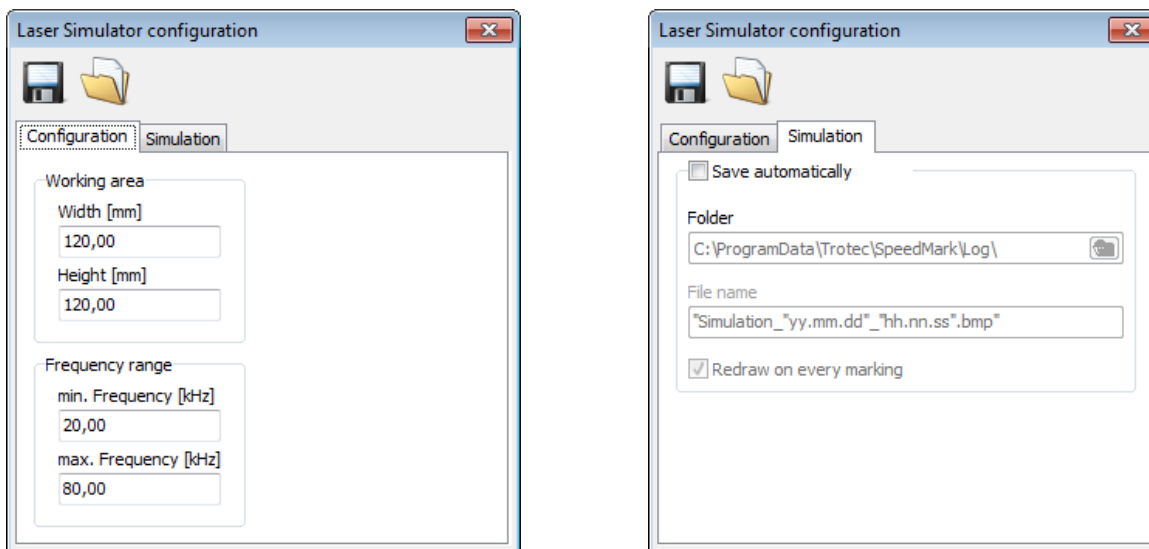
The LaserSimulator module and associated components allows the usage of SpeedMark without laser system for testing purposes or work preparation.

16.4.1 Functional range of module



The LaserSimulator module therefore fulfils the following functions:

- Simulation of a laser via the same interface TLC2 is using
- Graphical representation of the marking process
- Configuration of the operating range
- Control of the I/Os
- Output of the laser system's status

16.4.2 Laser simulator configuration



CONFIGURATION CONTROL

Tool	Name	Description
	Save	Saves the configuration contained in a .ini file.
	Load	Load the configuration in the specified .ini file.

WORKING AREA

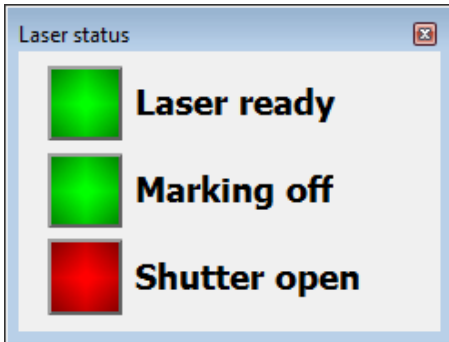
In this section it is possible to define the size of the working area. These values will be used by SpeedMark to calculate the size of the drawing interface.

AUTOMATIC SIMULATION SAVES

It is possible to automatically save simulations as bitmap files.

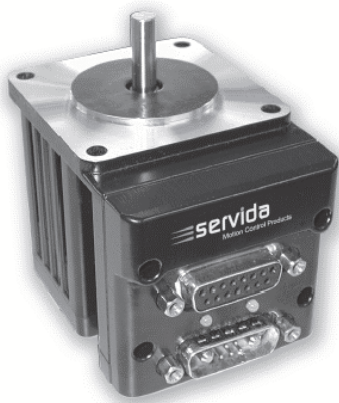
16.4.3 SpeedMark windows

LASER STATUS



The status of the laser is displayed in SpeedMark using the Laser Status window.

16.5 Servida axis control



The Servida module and associated components support the control of Servida motors used to control axial and curved engravings.



Information

All rights to the name Servida and the associated drive systems are retained by the Servida Corporation. Further information about Servida drives can be found in the relevant documentation.

The motors can be controlled manually and by using the scripting functions.

16.5.1 Functional range of module



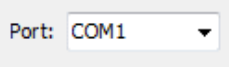



The Servida module fulfils the following functions:

- Initialisation of the motors
- Control of the motors using scripting functions
- Manual control of the motors

16.5.2 Configuration

CONFIGURATION CONTROL



Tool	Name	Description
	Open	Tries to establish a connection to a Servida motor
	Close	Closes an open connection
	COM-Port	COM port used to communicate with the Servida motor
	Save	Saves all configurations
	Load	Loads all configuration settings
	Load Parameters	Load template parameters

GENERAL SETTINGS

General settings
Control

Axis type

planar rotation

Max position error

Deactivate hardware limits

Positive

Negative

Encoder resolution [Inc/R]

PWM limit [%]

Hand button

Active

Swap

Inverted

Slope [mm/R]

Engine brake active

Temperature

Temperature [°C]

Gear factor

Commutation mode

Info

CPU:

Version:

Max temperature [°C]

Setting	Description
Axis Type	Specification of axis type. The available options are planar axis or rotation axis.
Encoder Resolution	Number of motor steps per revolution or per mm (planar)
Slope	Slope of the thread in mm per rotation
Gear Factor	Transfer factor of gears
Max. Position Error	Maximum position error (drag error) in motor steps
PWM Limit	Power limit
Engine break active	For motors with engine break
Max. Temperature	Maximum motor temperature for cut off
Deactivate Hardware Limits	Activates/deactivates limit switch signals
Hand button	Activate or swap hand buttons or invert signals
Info	Additional motor information

CONTROL

The screenshot displays the 'CONTROL' interface with the following sections:

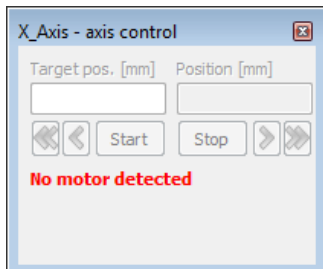
- General settings:** Includes tabs for 'General settings' and 'Control'.
- Motion:**
 - Move speed [mm/s]: 20,0
 - Hand speed [mm/s]: 10,0
 - Acceleration: 400
 - PID parameters: P=100, I=30, D=200
 - IL: 500, A: 0
 - InPos-Window [mm]: 0,10
 - InPos-Timer [ms]: 1000
- Software limits:**
 - Limits active
 - Min position [mm]: 0,00
 - Max position [mm]: 300,00
 - Offset [mm]: 0,00
 - Invert positions
 - Zero position button
- Reference:**
 - Speed [mm/s]: 5,0
 - Acceleration: 100
 - Direction: positive
 - Referencing button
 - Index distance:
- Status:**
 - In motion
 - In Position
 - InPos-TimeOut
 - Historical positive limit
 - Historical negative limit
 - Index report available
 - Position wrap around
 - Position error
 - Temperature error
 - Motor off
 - Index active
 - Positive limit active
 - Negative limit active
 - Math overflow
 - Array index error
 - Syntax error
 - PWM limit
 - EEPROM checksum
 - Reset button
- Positioning controls:**
 - Target pos. [mm] and Position [mm] input fields
 - Target position [inc] and Position [Inc] input fields
 - Start and Stop buttons
 - Directional arrow buttons
 - Position scale from 0,00 to 300,00
- Inputs/Outputs:**
 - Interlock
 - Endswitch POSITIVE
 - Automatic mode
 - Hand button POSITIVE
 - Ready
 - Endswitch NEGATIVE
 - Hand button NEGATIVE

Setting	Description
Move speed (Motion)	Motor move speed in mm per second or rotations per second
Hand speed (Motion)	Motor move speed in mm per second or rotations per second
Acceleration (Movement)	Acceleration of the motor
P	Proportionality factor
I	Integral factor
D	Differential factor

IL	Integral limit
A	Acceleration feed forward
InPos-Fenster	Tolerance range for positioning
InPos-Timer	Delay time for positioning
Software limits activated	Activates the software limits (position borders) of the motor.
Min. Position	The smallest position which can be reached in ° or mm (planar)
Max. Position	The greatest position which can be reached in ° or mm (planar)
Offset	The zero-point offset of the positions in ° or mm (planar)
Invert Positions	Inverts the motor positions
Zero Point	Sets the current motor position to the zero point (modifies the offset value)
Speed (Referencing)	Maximum motor speed in mm per second or rotations per second during referencing
Acceleration (Referencing)	Acceleration of the motor during referencing
Direction	Direction of the reference movement (positive or negative limit switch)
Referencing	Starts referencing
Index Interval	Interval in motor steps after a successful referencing between the limit switch and the first index marker found
Status	Motor status signals
Reset	Resets the motor status signals
Target position	The target of the next movement in ° or mm (planar)
Position	Current motor position in ° or mm (planar)
Start	Starts the movement to target position
Stop	Stops the current movement
<<	Fast movement in a negative direction
<	Slow movement in a negative direction
>	Fast movement in a positive direction
>>	Slow movement in a positive direction
Inputs/Outputs	Current input and output status

16.5.3 SpeedMark windows

MANUAL AXIS CONTROL



This window is used to manually adjust the motor position in SpeedMark.

16.6 Relop I/O

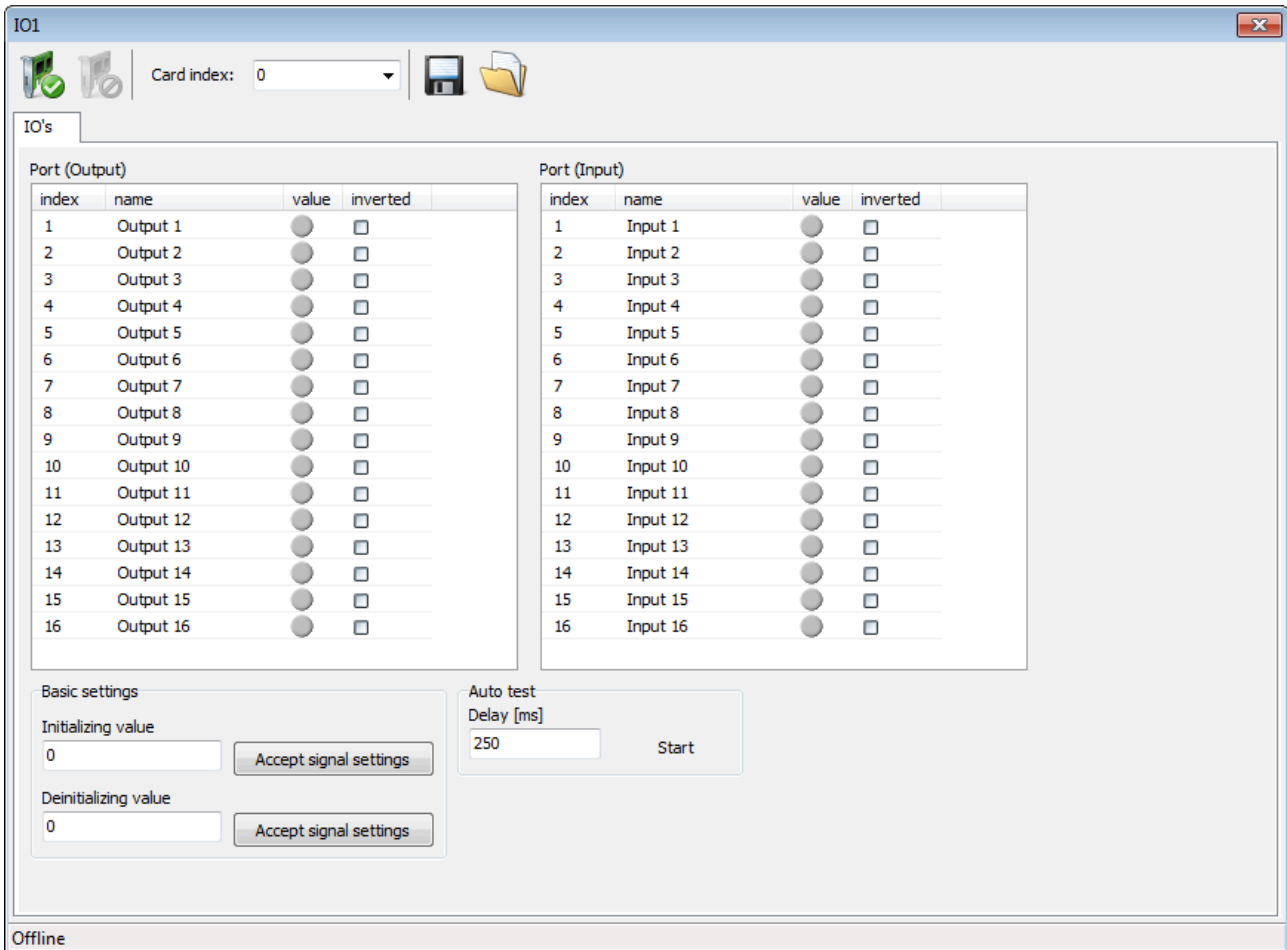
The Relop I/O module and associated components support the control of a Relop I/O card by SpeedMark.

16.6.1 Functional range of module

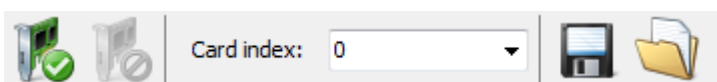
The Relop I/O module fulfils the following functions:





- Initialisation of a Relop I/O card
- Provision of functions for accessing the I/O ports


16.6.2 Configuration



CONFIGURATION CONTROL



Tool	Name	Description
	Open	Tries to establish a connection to the I/O card.
	Close	Closes an open connection.
	Card	Card Index is used to specify which card to communicate with.
	Save	Saves all configurations.

	Load	Loads all configuration settings
---	------	----------------------------------

SETTINGS

Setting	Description
Output Port Index	Displays the switching status of all 16 outputs. The individual outputs can be switched manually by clicking on the grey or green dots.
Output Port Index	Displays the index number of each output.
Output Port Name	Displays the name of each output. This name can be modified. Select an output, move the mouse over the name field, then click once with the left mouse button. The name is now highlighted in blue and can be edited.
Invert Output Port	Negates individual or all outputs.
Input Port	Displays the switching status of all 16 inputs.
Input Port Index	Displays the index number of each input.
Input Port Name	Displays the name of each input. This name can be modified. Select an input, move the mouse over the name field, then click once with the left mouse button. The name is now highlighted in blue and can be edited.
Invert Input Port	Negates individual or all outputs.
Initialisation Value	Defines the switching status of the outputs when the card is opened.
Deinitialisation Value	Defines the switching status of the outputs when the card is closed.
Auto Test Delay	Carries out a test on the card in which all outputs and inputs are switched in turn. The delay is used to set the time between the switching operations.

16.6.3 SpeedMark windows

The Relop I/O module use two windows in SpeedMark. One window for the Output-Port and another for the Input-Port.

16.7 B&R Modbus TCP IO

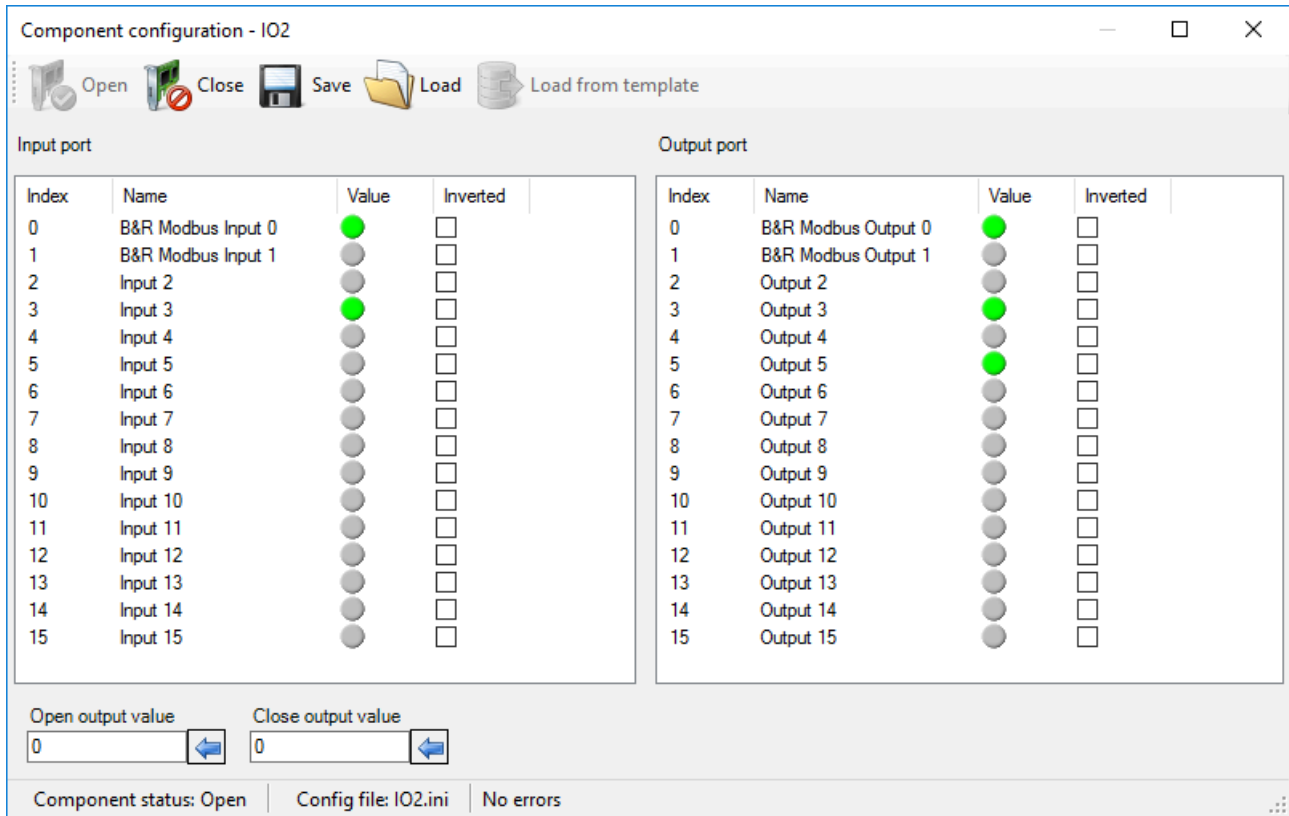
The B&R-Modbus module and associated components support the control of a B&R Modbus TCP IO controller by SpeedMark.

16.7.1 Functional range of module

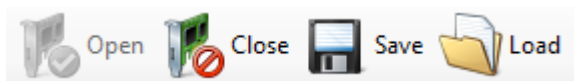
The B&R-Modbus module fulfils the following functions:

- Initialisation of a B&R-Modbus controller
- Provision of functions for accessing the I/O ports

16.7.2 Configuration



CONFIGURATION CONTROL



Tool	Name	Description
	Open	Tries to establish a connection to the B&R Modbus controller
	Close	Closes an open connection
	Save	Saves all configurations
	Load	Loads all configuration settings

SETTINGS

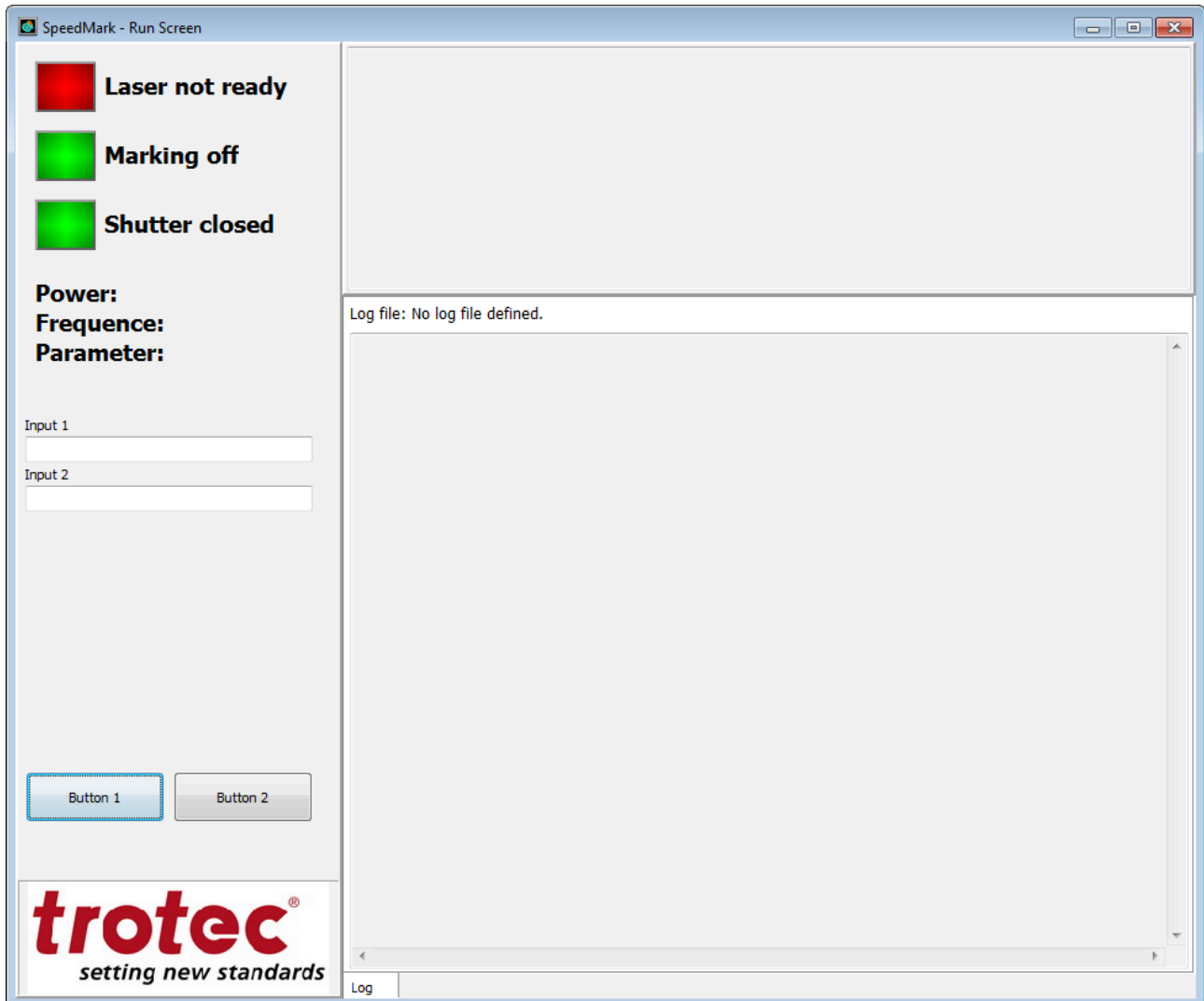
Setting	Description
---------	-------------

Output Port	Displays the switching status of all 16 outputs. The individual outputs can be switched manually by clicking on the grey or green dots.
Output Port Index	Displays the index number of each output.
Output Port Name	Displays the name of each output. This name can be modified. Select an output, move the mouse over the name field, then click once with the left mouse button. The name is now highlighted in blue and can be edited.
Invert Output Port	Negates individual or all outputs.
Input Port	Displays the switching status of all 16 inputs.
Input Port Index	Displays the index number of each input.
Input Port Name	Displays the name of each input. This name can be modified. Select an input, move the mouse over the name field, then click once with the left mouse button. The name is now highlighted in blue and can be edited.
Invert Input Port	Negates individual or all outputs.
Initialisation Value	Defines the switching status of the outputs when the controller is opened.
Deinitialisation Value	Defines the switching status of the outputs when the controller is closed.

16.7.3 SpeedMark windows

The B&R-Modbus module use two windows in SpeedMark. One window for the Output-Port and another for the Input-Port.

16.8 RunScreen



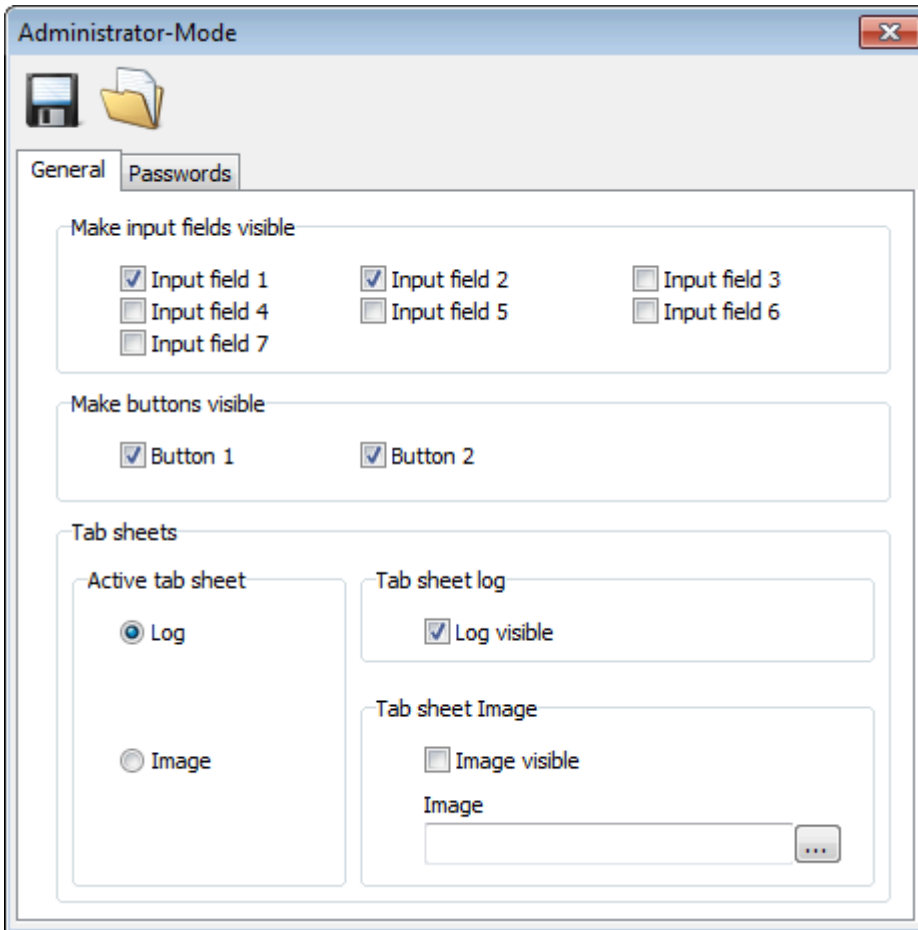
The RunScreen module and associated components generate a configurable dialog while a SpeedMark program is being processed.

16.8.1 Functional range of module



The RunScreen module therefore fulfils the following functions:

- Displays a dialog while a SpeedMark program is being processed.
- Configures the dialog.
- Provision of functions for adjusting the dialog while the program is being processed.

16.8.2 Configuration RunScreen



CONFIGURATION CONTROL

Tool	Name	Description
	Save	Saves all configurations
	Load	Loads all configuration settings

GENERAL

Setting	Description
Input Field Visible	Sets which input field should be visible
Button Visible	Sets which button should be visible
Aktive Registerkarte	Auswahl der aktiven Registerkarte
Registerkarte Log sichtbar	Einstellung, ob Registerkarte Log sichtbar sein soll
Registerkarte Bild sichtbar	Einstellung, ob Registerkarte Bild sichtbar sein soll

Bild	Auswahl des Bildes das bei Registerkarte Bild angezeigt werden soll.
------	--

PASSWORDS

Password safety is active

The Passwords tab is used to specify whether a password is required for the RunScreen service menu.

When a program is interrupted, the service menu opens, and active password protection ensures that the program may only be closed by entering the valid password.

The adjacent illustration shows the RunScreen service menu. It can be used to select from various options to continue processing when a program is interrupted (ESC key).

16.8.3 SpeedMark windows

The RunScreen module does not support any windows in SpeedMark.

16.9 COM Port

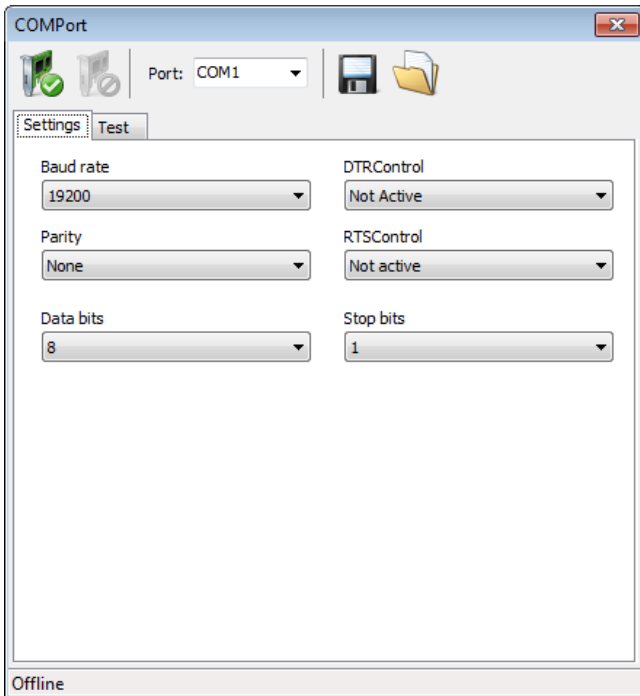
The COM port module and associated components support the control of the COM ports available on the PC system.

16.9.1 Functional range of module

The COM port module fulfils the following functions:

- Initialisation of the selected COM ports
- Provision of functions for accessing the COM ports.

16.9.2 Configuration



CONFIGURATION CONTROL



Tool	Name	Description
	Open	Tries to establish a connection to the COM interface
	Close	Closes an open connection
	Port	The COM port determines which COM interface to use in the PC
	Save	Saves all configurations
	Load	Loads all configuration settings

SETTINGS

Setting	Description
---------	-------------

Baud rate	Sets the transmission rate
Parity	Determines whether an even or uneven number of bits should be transmitted
Data Bits	Determines the number of bits transmitted
Stop Bits	Determines the number of stop bits transmitted
RTS Control	Interface handshake
DTR Control	Interface handshake

16.9.3 SpeedMark windows

The COM port module does not use any windows in SpeedMark.

16.10 TCP module

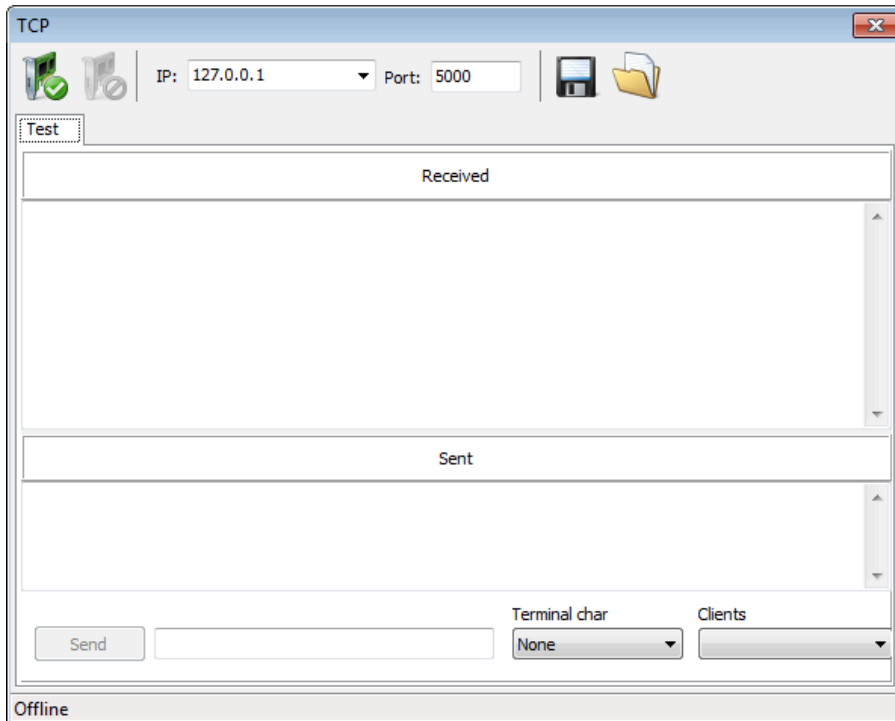
The TCP module and associated components support the data exchange through built in network capabilities.

16.10.1 Functional range of module

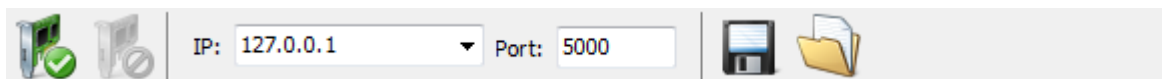
The TCP module fulfils the following functions:

- Initialisation of the selected IP address
- Testing the connection by sending and receiving data within the configuration dialog
- Test client shipped with SpeedMark setup

16.10.2 Configuration TCP



CONFIGURATION CONTROL



Tool	Name	Description
	Open	Opens a channel on the PC to receive and send data
	Close	Closes an open connection
	IP adresse	IP address of this computer
	Port	Communication port
	Save	Saves all configurations
	Load	Loads all configuration settings

16.10.3 SpeedMark windows TCP

The TCP module does not use any windows in SpeedMark.

16.11 Axis simulator

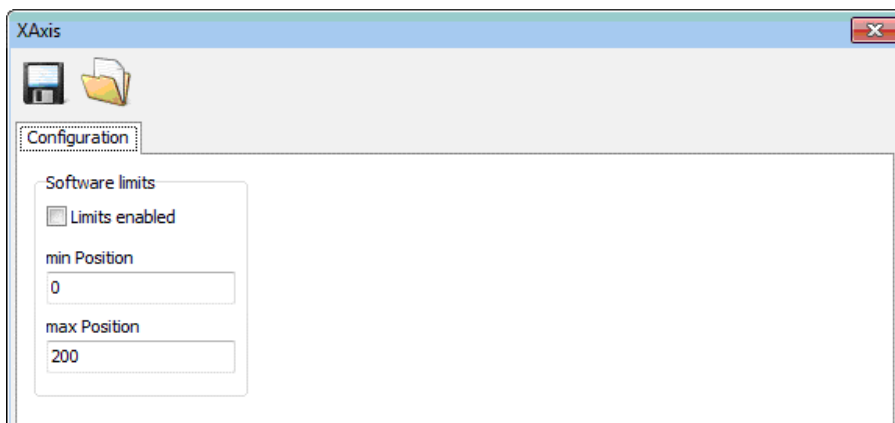
The axis simulator module and associated components allows the usage of SpeedMark without axis for testing purposes or work preparation.

16.11.1 Functional range of module



The axis simulator module fulfils the following functions:

- Simulation of an axis
- Definition of work area (limits)

16.11.2 Configuration



CONFIGURATION CONTROL

Tool	Name	Description
	Save	Saves all configurations
	Load	Loads all configuration settings

SETTINGS

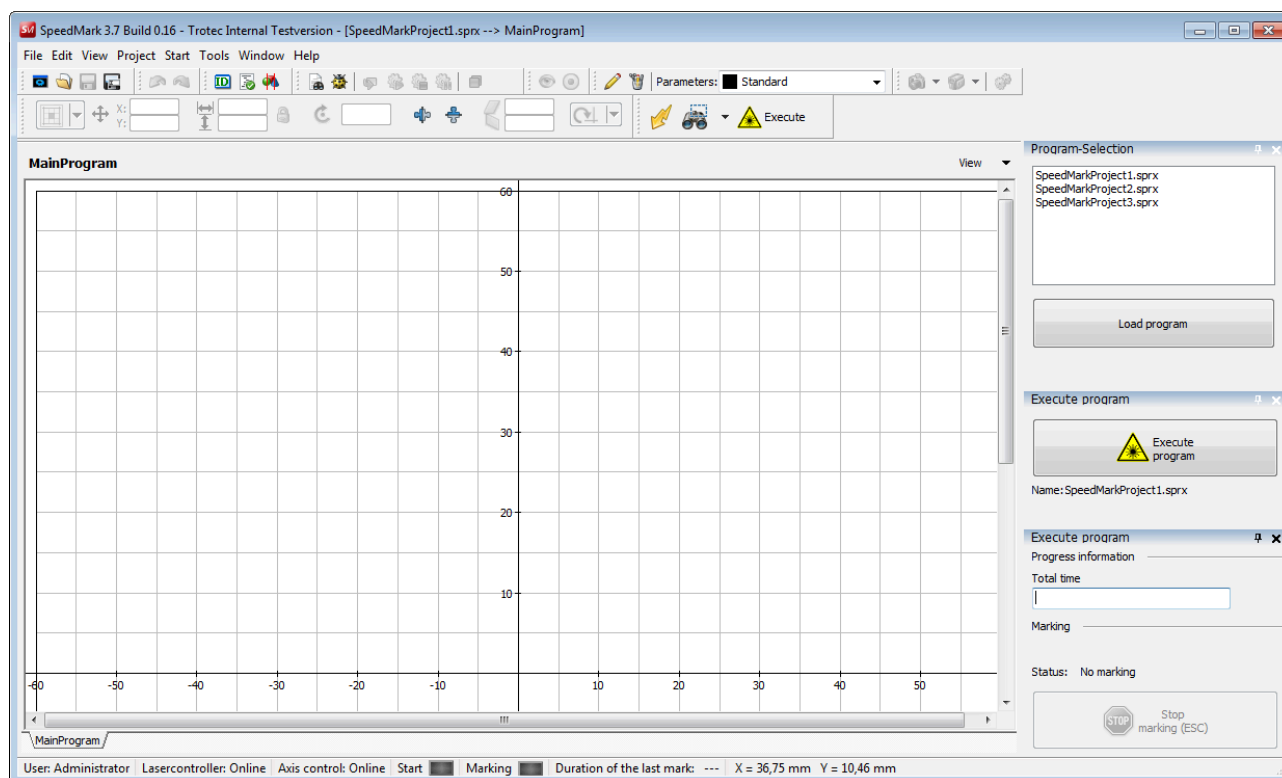
setting	Description
Limits enabled	Determines if this axis has limits or not
Min Position	Minimum position of this axis
Max Position	Maximum position of this axis

16.11.3 SpeedMark windows

The axis simulator module does not use any windows in SpeedMark.

17 Extensions

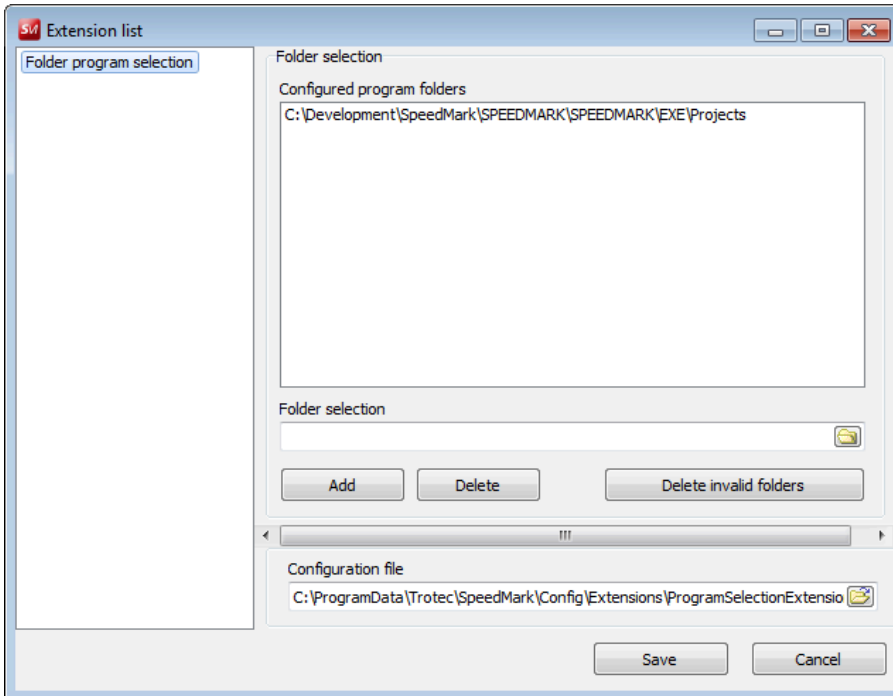
Extensions are used to provide additional functions within SpeedMark.



Information

In contrast to modules, extensions directly increase the functional range of SpeedMark. It is therefore also possible to use the extension function of modules.

17.1 Configuration of extensions



The configuration of extensions is carried out using the Tools → Program Extensions menu.

17.2 Extensions window

Various extensions use additional windows in SpeedMark. These can be opened and closed using Menu → View → Program Extensions → [Extension] → [Windowlist].

17.3 Program selection extension

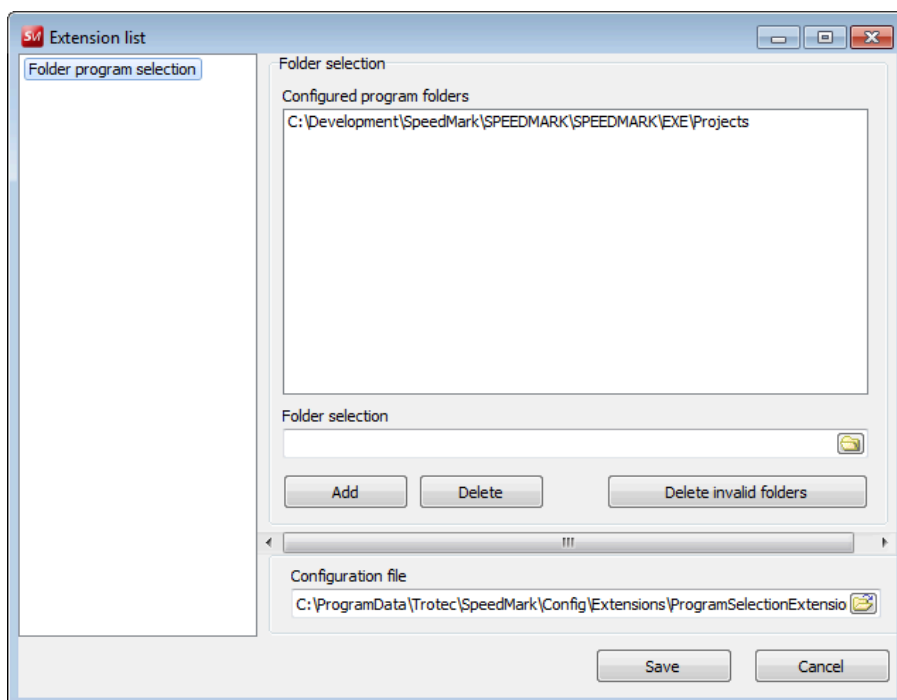
The program selection extension is used to make a simple selection of SpeedMark programs from a configurable directory list.

17.3.1 Functional range of extension

The Program Selection extension fulfils the following functions:

- Selects and loads programs from a list.
- Configures the directories used to generate the program lists.

17.3.2 Configuration extensions



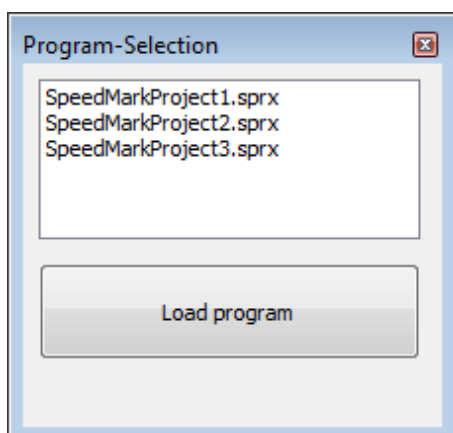
DIRECTORY SELECTION

Directory Selection displays a list of all configured directories which can be used to search for SpeedMark programs. The Directory Selection input field is used to specify directories which are added to the list using the “Add” button.

CONFIGURATION FILE

The Configuration File input field is used to enter the directory and name of the configuration file used.

17.3.3 SpeedMark windows

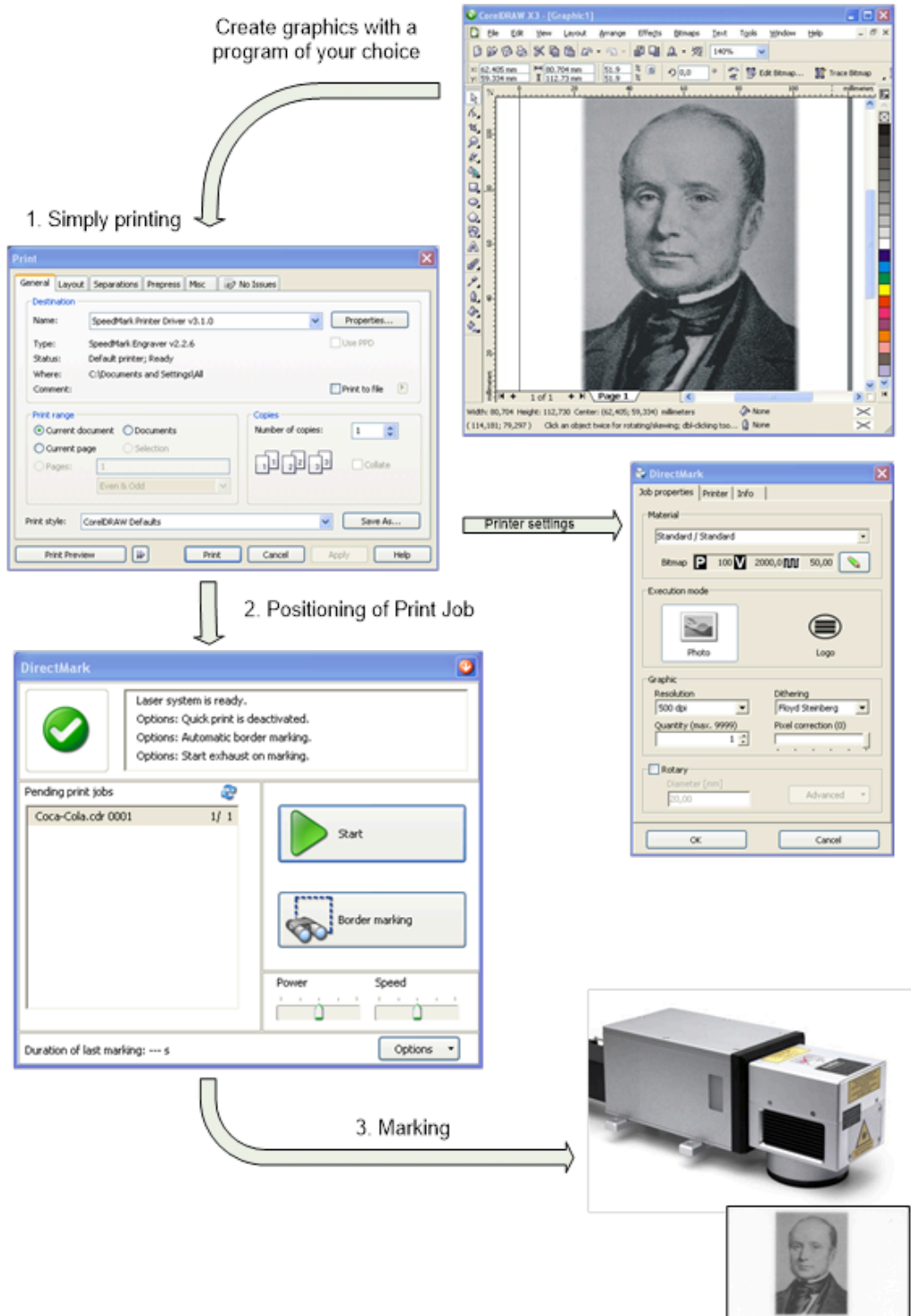


The Program Selection window displays a list of all the SpeedMark programs found which may then be loaded into SpeedMark using the Load Program button.

18 DirectMark

18.1 What is DirectMark

Simply control your Trotec Laser from your favorite graphic program.



18.2 Starting the DirectMark Software



Information

To start the DirectMark software an external program (e.g., CorelDraw) must be used, which starts the DirectMark program directly after printing.

LICENSING

At every start, the software checks if a valid license key is available. If not provide a valid license key according to the instructions - see also "Advanced options".

SCOPE OF APPLICATION OF SOFTWARE

With the DirectMark software, you can print both vector and bitmap graphics from third-party programs to DirectMark and mark them with the laser.

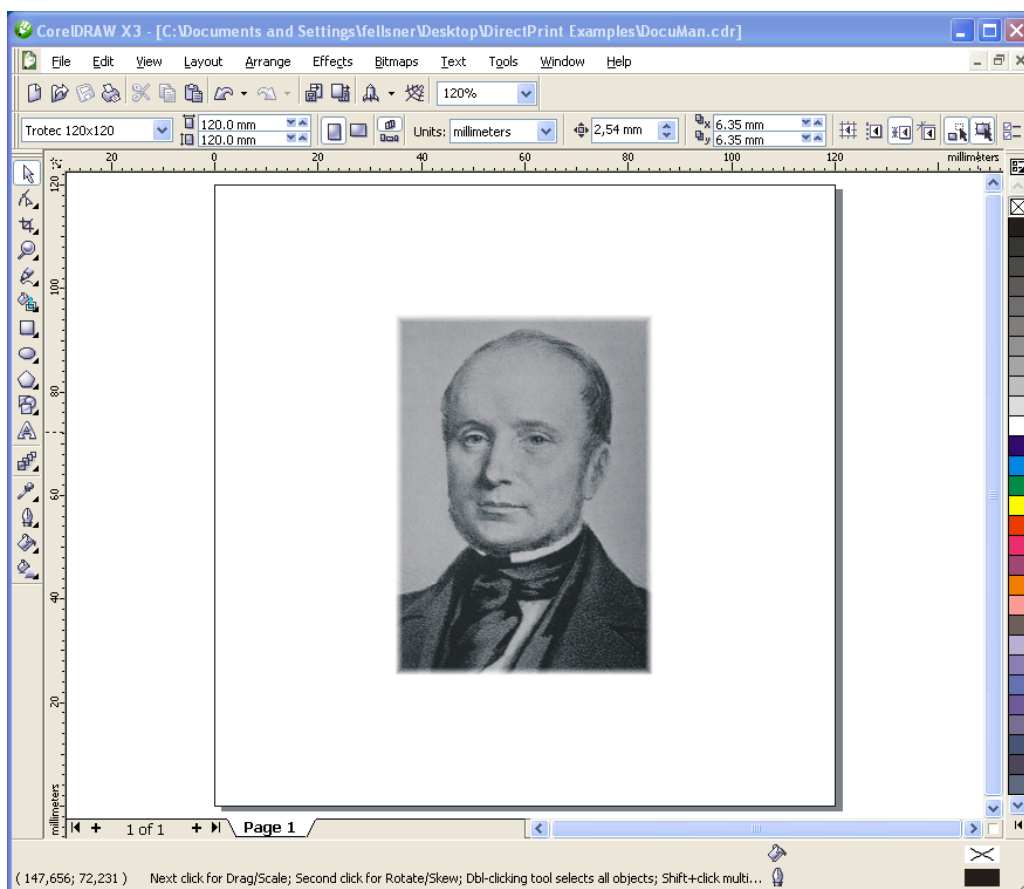
18.3 Creation of content to mark



Information

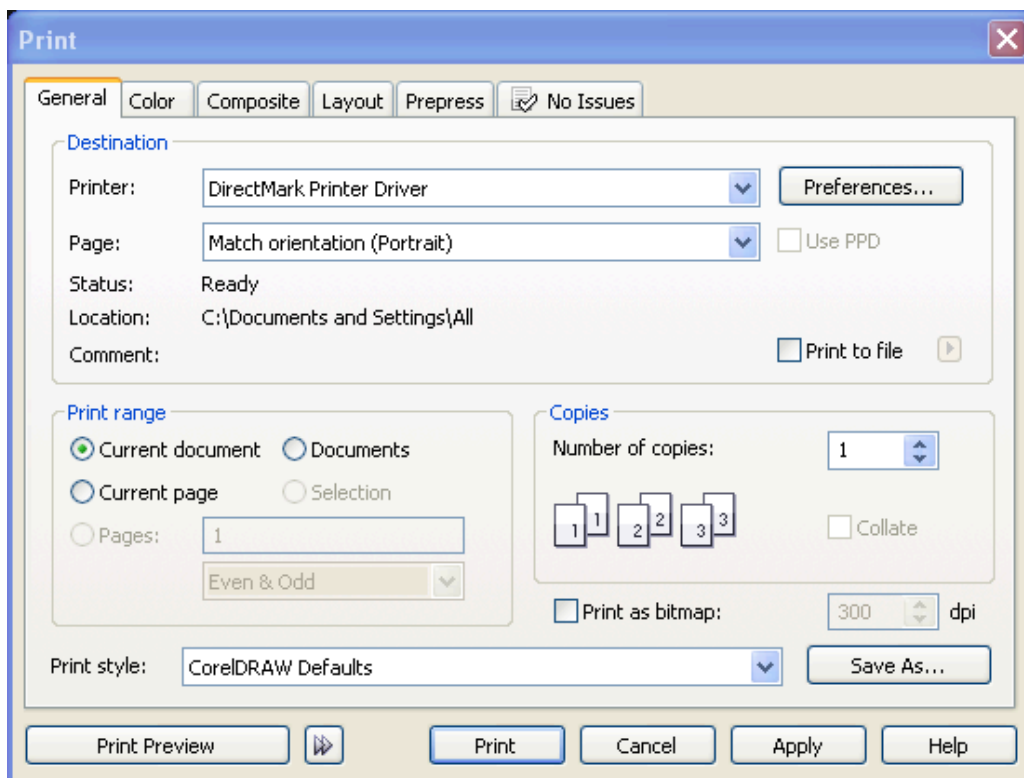
The following examples and explanations use the graphic program CorelDraw®. But the instructions can be performed with other graphic programs as well.

18.3.1 Preparations in graphic program



1. To avoid distortions and cut of graphics, the page size within the graphics program be equal to the size of the marking field. A smaller page size is no problem.
2. Insert the graphic to mark as usual.
3. Print your graphic with the normal printing function.

Some programs (e.g., Word) have a quick print function. But with the first use of DirectMark you should use the normal print function to setup necessary printer properties.



Notice

On systems with more than one printer attached, please choose the correct one – DirectMark Printer Driver.

Within the printing dialog of your graphic program, you can setup the printer properties for the printing process.



Information

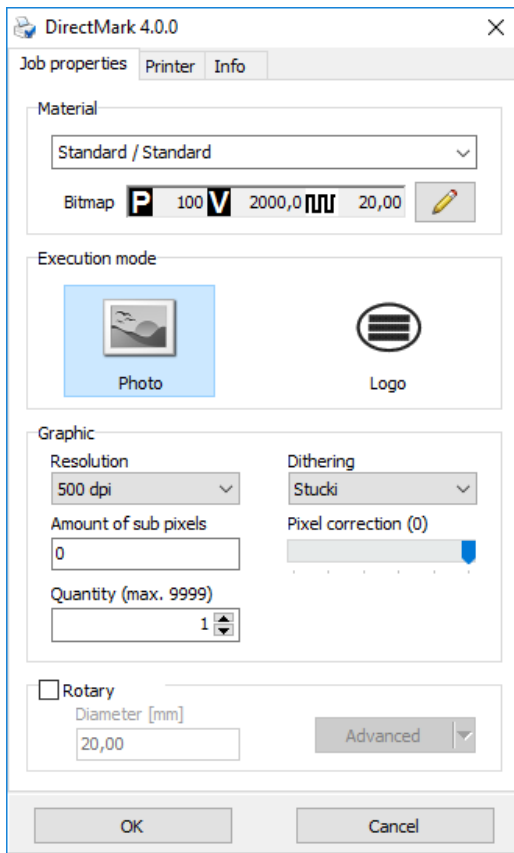
The option “copies” is not supported by DirectMark. This setting must be configured within DirectMark printer properties.

18.3.2 DirectMark Print Properties



The DirectMark printer properties – as shown above – can be started via the button properties within the printing dialog of your graphic program.

JOB PROPERTIES



In the section material you can setup the used material for the work piece. The button with the pen allows editing of the material parameters .

With the execution mode you can choose between photo and logo.

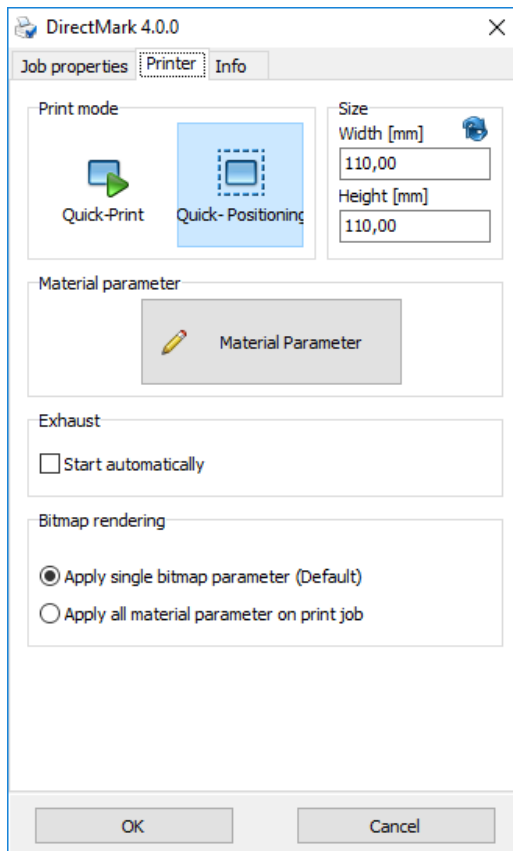
In photo mode the marking will be performed row by row. In this case the execution is slower.

Black and white graphics can be marked in logo mode. The graphic will be vectorized which speeds up the marking significantly.

The section graphic is used to change the resolution (in DPI), the dithering (only photo mode), the amount of sub pixels, the pixel correction and the quantity.

With the option Rotary it is possible to process rotary jobs. Only the diameter of the work piece must be specified.

PRINTER-PROPERTIES



In the section print mode you can choose if Quick-Print mode or Quick-Positioning mode should be used. In Quick-Print mode DirectMark instantly starts the marking process when the graphic program has finished the creation of the print job - The marking process will only be started automatically when there are no pending failures of the system.

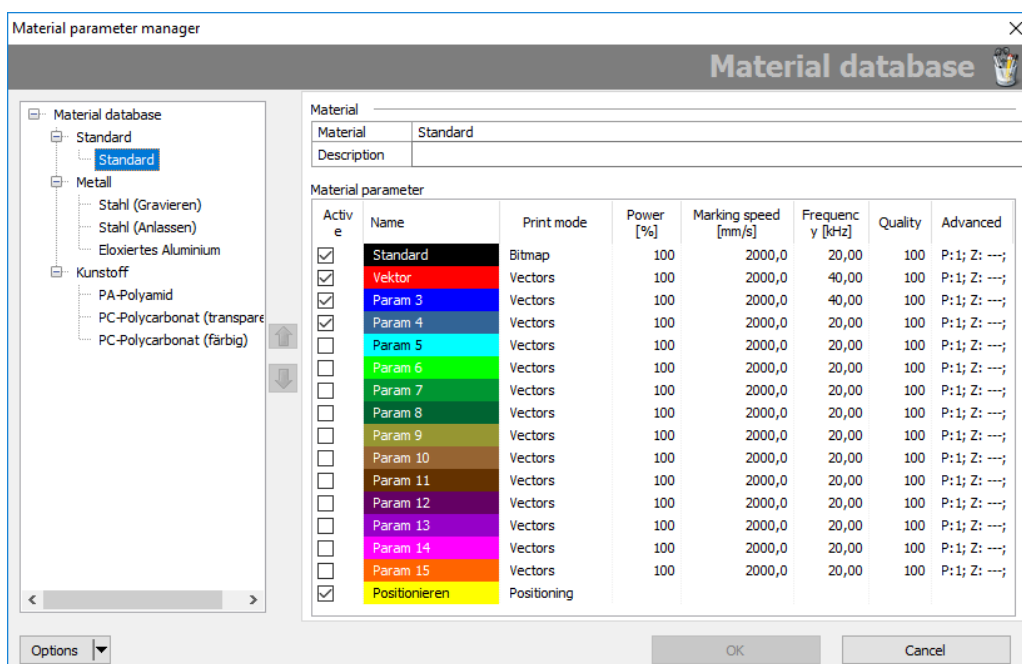
In Quick-Positioning mode the DirectMark print job list will be opened after the creation of the print job. In this case a positioning of the work piece can be done. The marking process will then be started manually. The size values height and width are used to define the size of the printing area. These size values must be equal or smaller to size of the real marking field. With the update button the current size of the marking field can be requested.

The material parameter can be edited by pressing the Material Parameter button. The option “Exhaust – Start automatically” will start a connected exhaust before the beginning of the marking process.

In the section bitmap rendering you can determine how the detection of bitmaps in relation to the material parameter shall be done.

MATERIAL PARAMETER MANAGER

The material parameter manager allows the creation and editing of materials for the marking process.

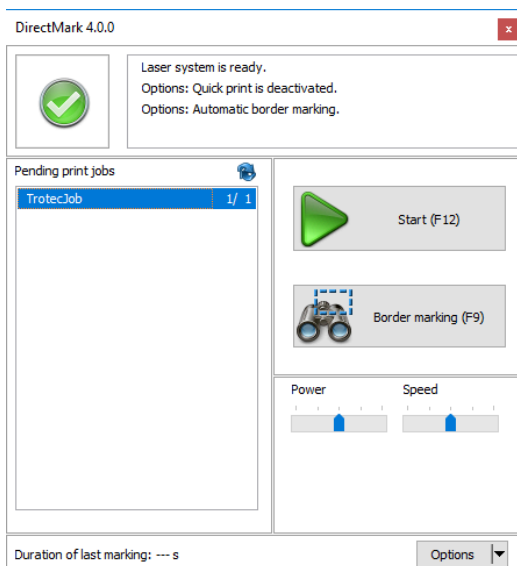


In the parameter table are 16 marking colors per material defined. Every color defines its own parameter settings. Single colors can be activated or deactivated.

The print mode defines the kind of executions for the color.

- **Bitmap:** This parameter will be used for bitmaps.
- **Vectors:** If a vector line (width of the line must be hairline) is found in the graphic, the corresponding color will be applied to it.
- **Positioning:** When vectors are found which have this color, then these vectors will not be marked. Instead, they can be used for positioning.

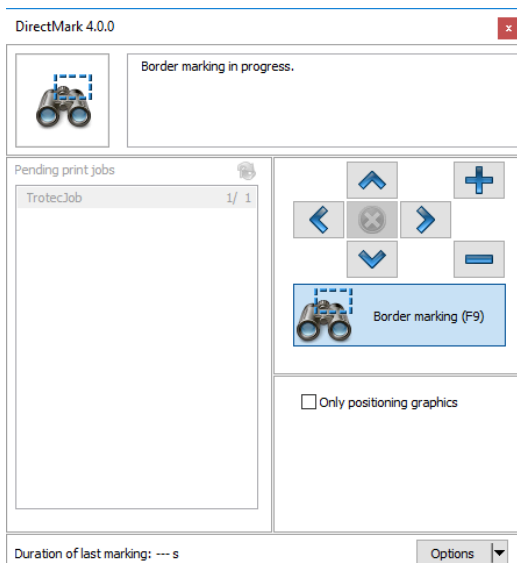
18.4 Marking with DirectMark



After creation of the print job by the graphic program, the data will be sent to DirectMark and is ready for marking with the laser system.

DirectMark automatically detects if a new print job is available and opens the DirectMark window.

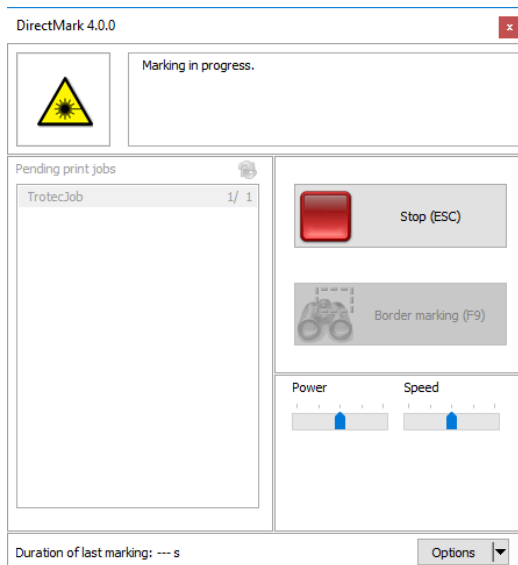
POSITIONING OF PRINT JOBS



With the button Border marking it is possible to perform positioning of the print job or the work piece. It is also possible to determine if the whole bitmap should be border marked or only the positioning graphics.

With the arrow buttons it is possible to move the print job. The button in the middle resets changes already made. Move changes are applied by ending Border marking.

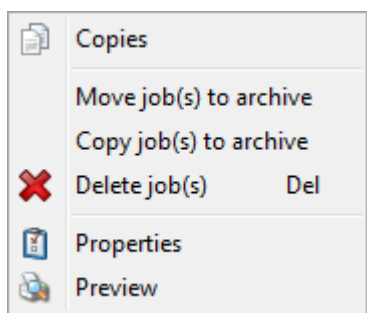
MARKING ON WORK PIECE EDIT PRINT JOB LIST



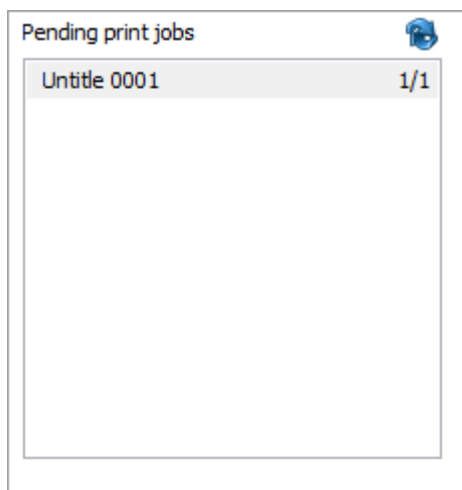
With the Start button the marking of the print job with the laser system will be started. The button Stop cancels an already running marking process. In this case the print job will not be deleted.

On marking end the print job will be deleted and is not available anymore. At the end of the marking the marking time will be shown in the bottom left of the window.

EDIT PRINT JOB LIST



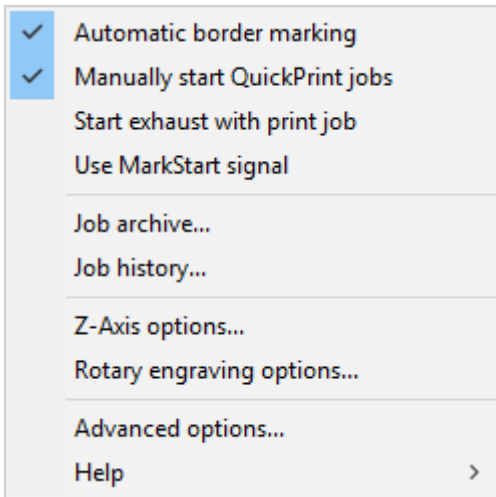
Moreover, it is possible to edit the list of pending print jobs with a right mouse button click.



Print jobs can be deleted, or the number of copies can be changed. Single jobs can also be copied or moved to the archive.

18.5 DirectMark Options

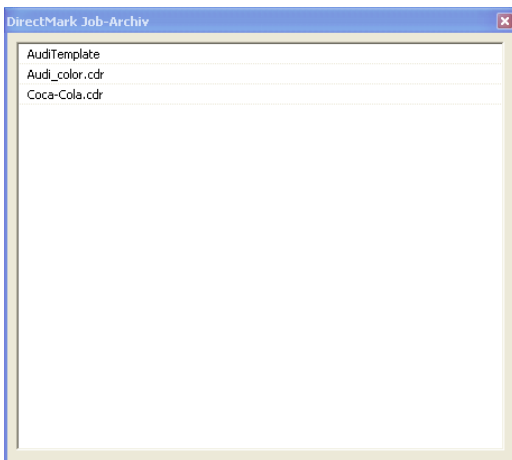
18.5.1 Single Options



The option “Automatic border marking” starts the border marking automatically when a print job is available. The option “Manually start QuickPrint jobs” deactivates the print mode setting of the printer properties.

The option “Start exhaust with print job” starts a connected exhaust before the beginning of the marking process. The option “Use MarkStart signal” waits with the marking process until a MarkStart signal is detected.

JOB ARCHIVE



From the job archive it is possible to take over archived jobs back to the print job list. Archived jobs can be simple moved or copied.

All available actions can be accessed by right clicking an archive file in the list.

JOB HISTORY

DirectMark job history

Print job	Duration [s]	Time stamp	Status
▶ TrotecJob.tsf	0,000	2019.09.25 15:28:12	Cancel
TrotecJob.tsf	0,000	2019.09.25 15:25:51	Cancel
Untitled-1.tsf	0,582	2019.05.20 17:06:41	OK
new 1.tsf	0,311	2019.05.20 17:04:59	OK
Unbenannt.tsf	0,015	2019.05.20 17:02:33	OK
TrotecJob.tsf	0,000	2019.05.20 16:58:09	Abbruch
Untitled-1.tsf	0,484	2017.11.19 11:59:16	OK
Untitled-1.tsf	0,484	2017.11.19 11:17:09	OK
Untitled-1.tsf	0,484	2017.11.19 11:14:30	OK

The job history shows all jobs that have been executed. This data includes duration, time stamp and execution status.

Z-ACHSEN OPTIONEN

Z-Axis options

Move axis

Move axis

10 Start

10,00 Stop

Reference axis

Reference axis

Provides the options to move and if necessary, reference the z-axis.



Information

This entry is only active if an electrical z-axis is installed.

ROTARY ENGRAVING OPTIONS

Rotary engraving options

Move axis

Reference axis

Reference axis

Axis position

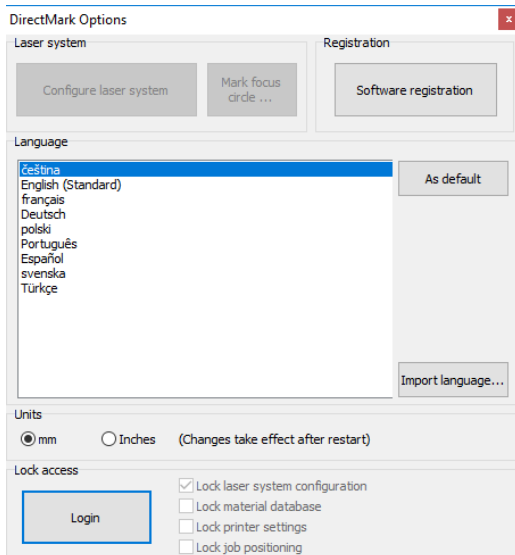
Provides the option to set up the position of the rotary engraving unit, to move and if necessary, reference the axis of the rotary unit.



Information

This entry is only active if a rotary engraving unit is installed.

18.5.2 Advanced options



With the advanced options it is possible to configure the laser system, change the language or perform the software registration. - After a laser system configuration DirectMark should be restarted.

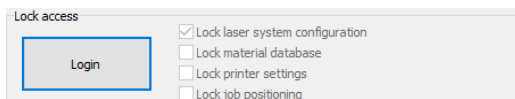
LOCK ACCESS

By default, DirectMark is shipped with limited access to avoid accidental changes of the configuration.

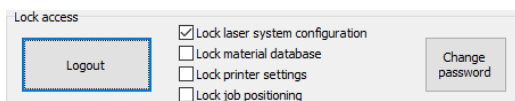


Notice

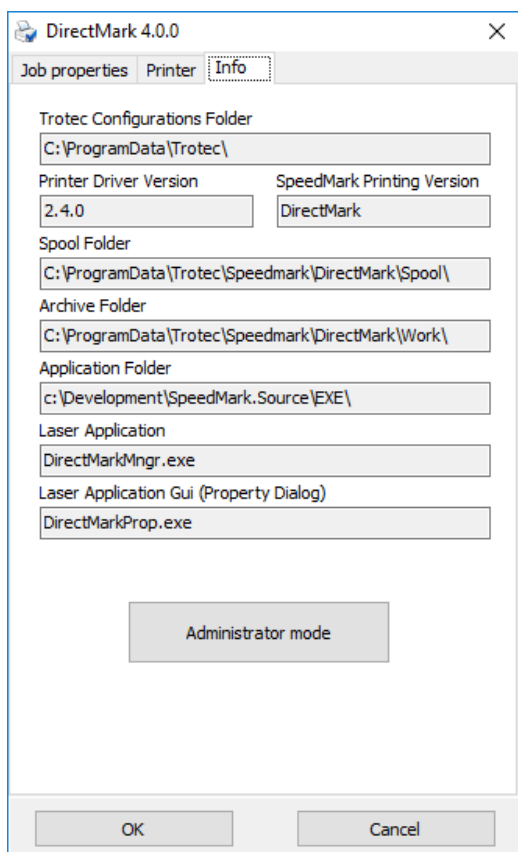
DirectMark is configured with an initial password. Please change this password to protect your system from unauthorized access. The initial password is “admin”.



Admin-mode can be enabled with the button “Login” to change or reset the locks.



Now the function groups can be locked, or the password can be changed.



Within the printer properties on tab sheet “Info” it is possible to change into administrator mode – after entering the password – to change locked settings.

18.6 Rotary engraving

HOW TO ACTIVATE ROTARY ENGRAVING



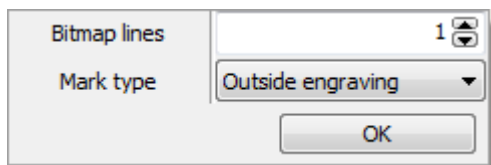
The printing dialog offers the option to activate the rotary engraving. It is essential to define the exact diameter of the working piece to prevent gaps or overlapping sections.



Information

Be aware that there is no test at this point if a rotary engraving unit is installed . Check the configuration to make sure, the job can be executed correctly!

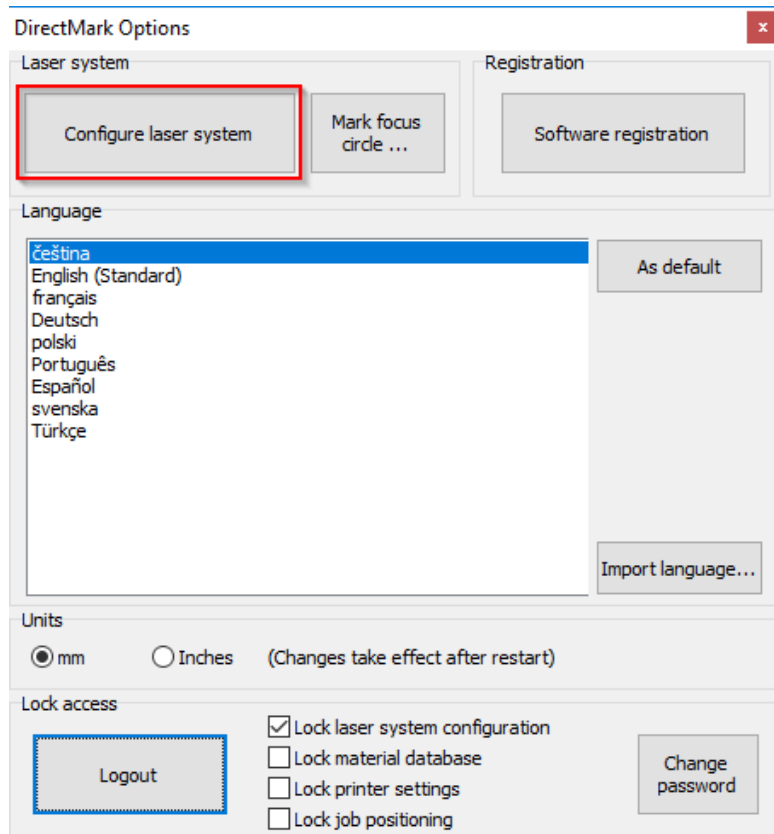
ADVANCED OPTIONS



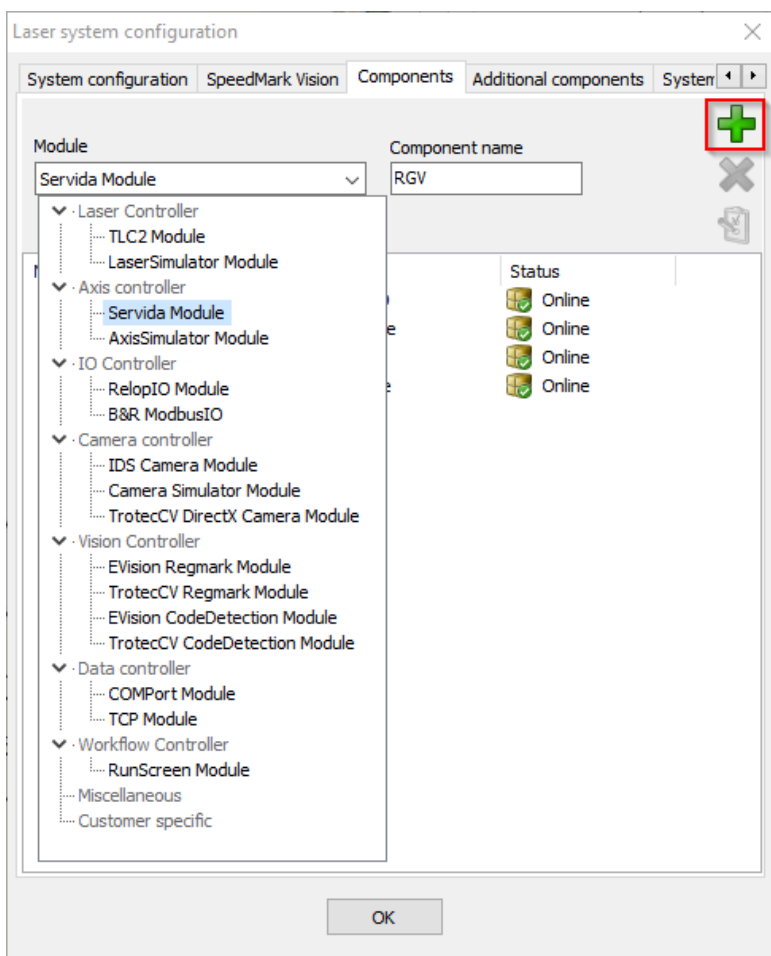
The advanced options let you define the marking type. This can either be an outside engraving (e.g., pipes) or inside engraving (e.g., rings).

Bitmap lines will define the count of pixel rows that will be marked before the rotary unit moves to the next segment (by rotating the axis). Many lines speeds up the marking process but entails the risk, that focus is lost at the edges (which will be visible as a not uniform marking result). So, it is necessary for each working piece to find an acceptable tradeoff between speed and quality.

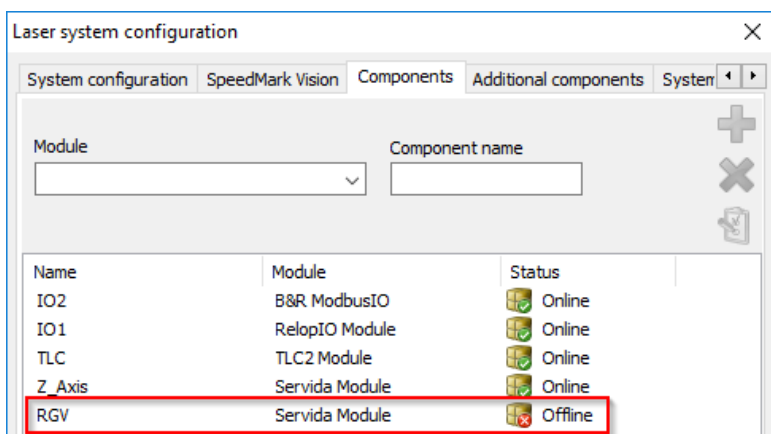
CONFIGURING A ROTARY ENGRAVING UNIT



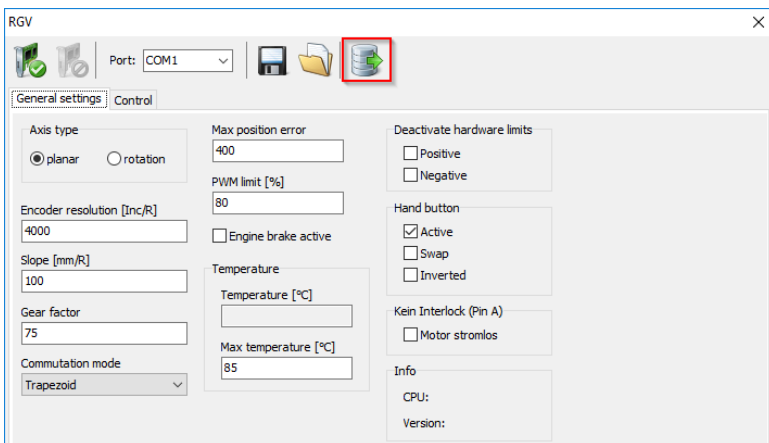
1. Please switch to DirectMark Advanced Options and login to access laser configuration (Default-Password: admin). Select „Configure laser system“.



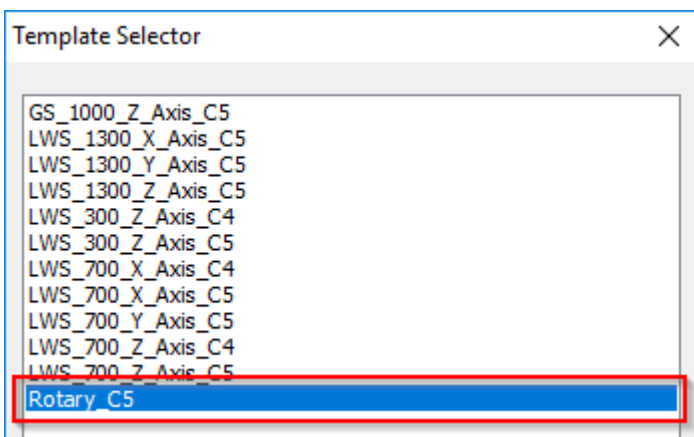
2. In the Tab "Components" create a new rotary unit by adding a Servida-module.



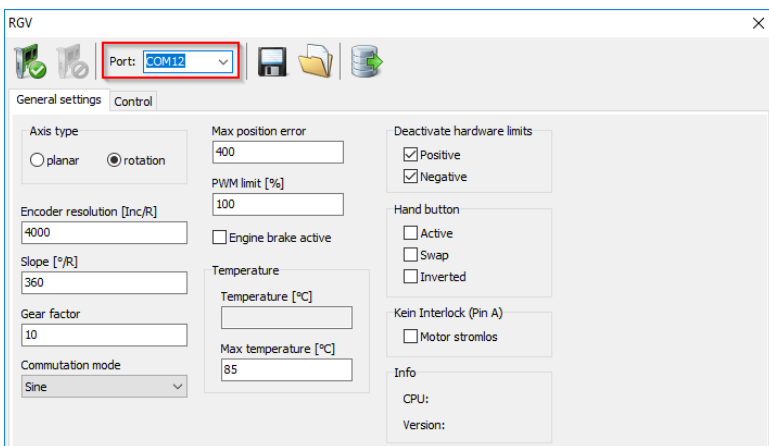
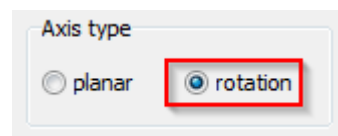
3. Open the configuration of the new component by double clicking it.



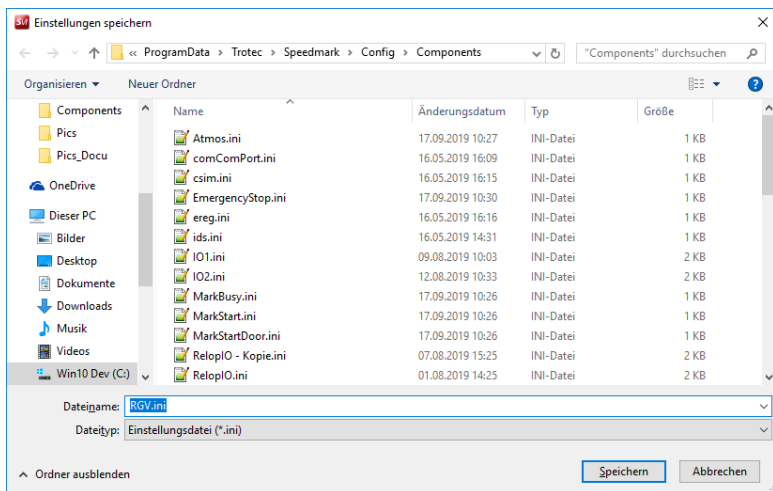
4. Load the rotary parameters from the according template.



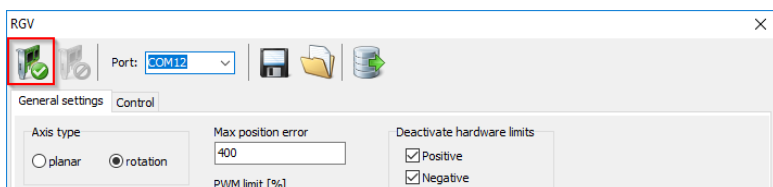
Verify that the axis type is set to "rotation" afterwards.



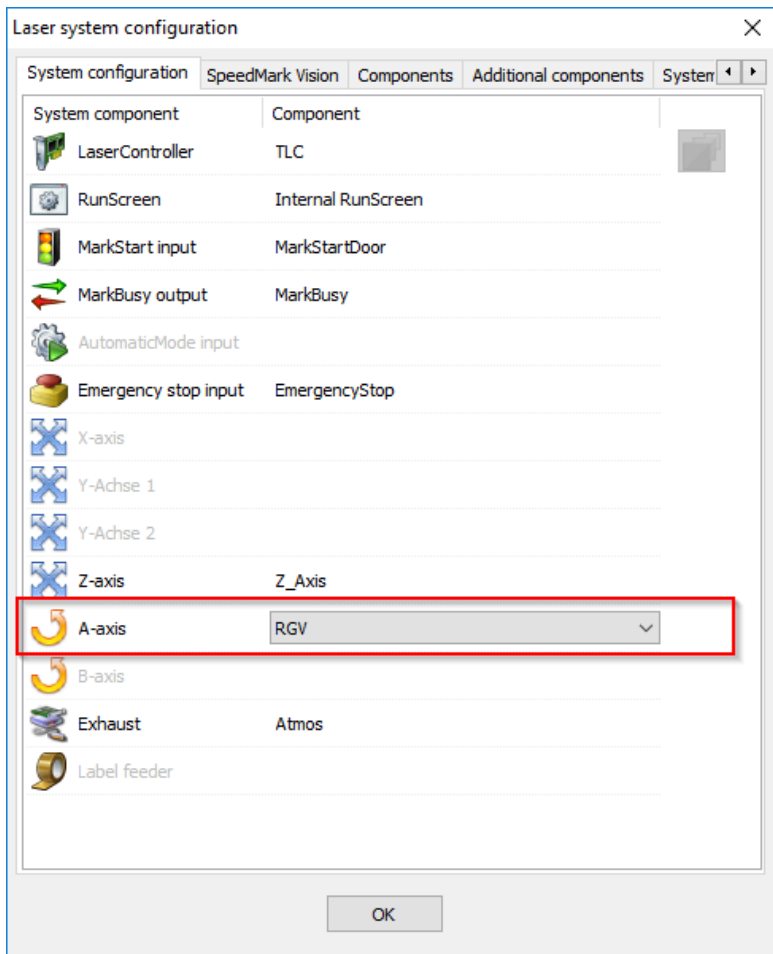
5. Select the COM port that connects the RGV to the PC.



6. Now save the configuration of the rotary engraving unit.



7. Connect the rotary engraving unit by clicking on "Open".



8. As the final step you have to assign the newly added RGV as the A-Axis in the System configuration tab.

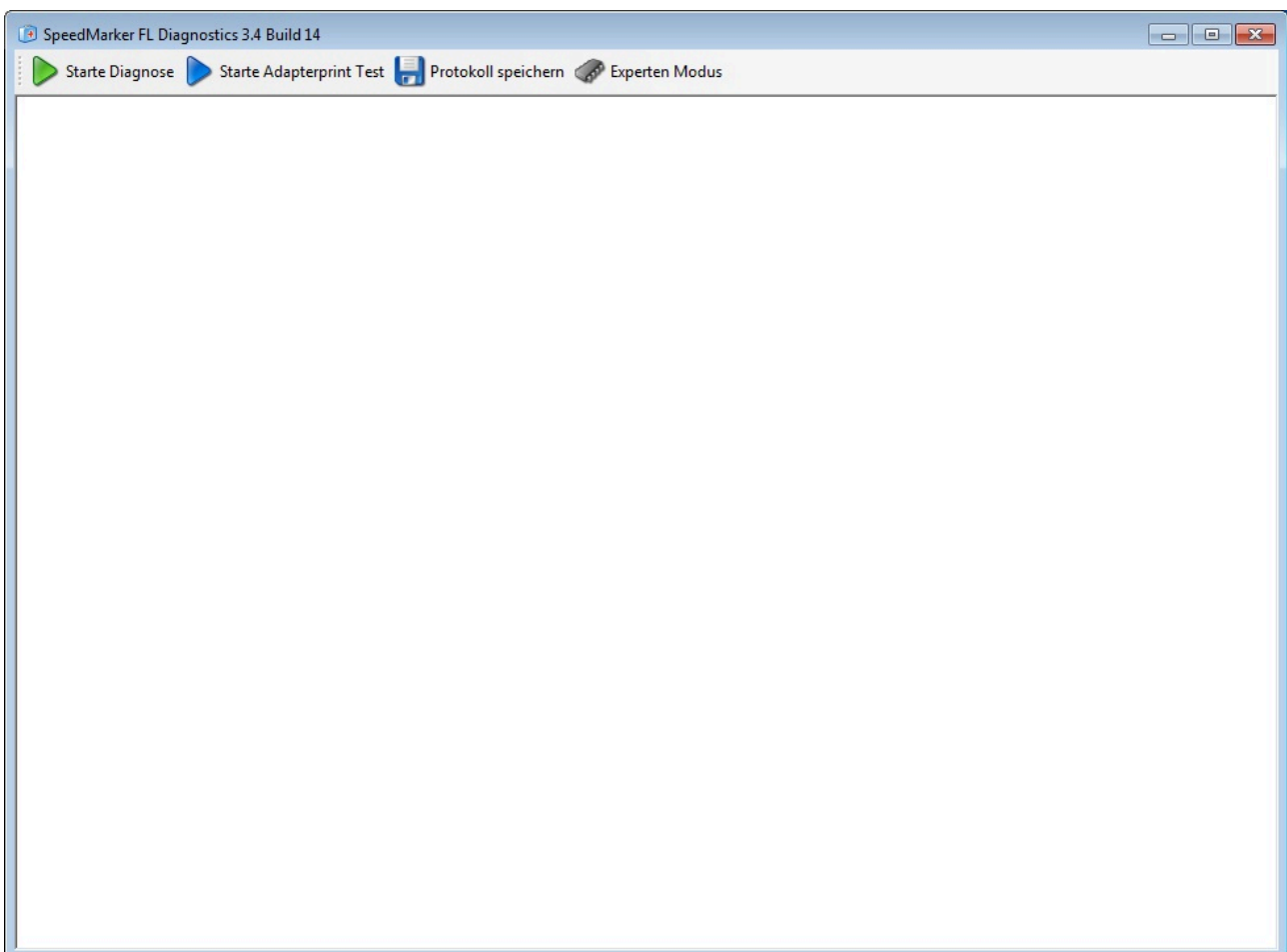
19 Appendix

19.1 Utilities

SpeedMark Utilities are a collection of utility programs which support the user outside of the actual SpeedMark software in the work with the Trotec laser system. These programs can be found under the SpeedMark installation directory in the folder Utilities.

19.1.1 Speedmarker Diagnostics

With SpeedMarkerDiagnostics a diagnosis of the laser system can be done step by step. The diagnosis will be started with the button “Start Diagnosis”. Follow the instructions on the screen to get a correct result.



Notice

During the usage or start of SpeedMarkerDiagnostics it is not allowed to run SpeedMark, because there would be no access to the relevant hardware components.

19.2 Barcodes

19.2.1 Barcode 1D list

Code 11
Code 2 of 5 Standard
Code 2 of 5 Interleaved
Code 2 of 5 IATA
Code 2 of 5 Matrix
Code 2 of 5 Data Logic
Code 2 of 5 Industrial
Code 39
Code 39 Extended
EAN-8
EAN-8 + 2 Digits
EAN-8 + 5 Digits
EAN-13
EAN-13 + 2 Digits
EAN-13 + 5 Digits
EAN/UCC 128
UPC 12
Codabar 2 Widths
Service-ID
Code 128
Deutsche Post Leitcode
Deutsche Post Identcode
ISBN 13 + 5 Digits
ISMN
Code 93
ISSN
ISSN + 2 Digits
Flattermarken
GS1 DataBar (RSS-14)
GS1 DataBar Limited (RSS)
GS1 DataBar Expanded (RSS)

Appendix

Telepen Alpha
UCC / EAN-128 (GS1-128)
UPC Version A
UPC Version A + 2 Digits
UPC Version A + 5 Digits
UPC Version E
UPC Version E + 2 Digits
UPC Version E + 5 Digits
USPS PostNet 5
USPS PostNet 6
USPS PostNet 9
USPS PostNet 10
USPS PostNet 11
USPS PostNet 12
Plessey
MSI
SSCC 18
Transaction-ID
LOGMARS
Pharmacode One-Track
PZN (Pharma Zentralnummer)
Pharmacode Two-Track
Code 128 Subset A
Code 128 Subset B
Code 128 Subset C
Code 93 Extended
Australian Post Customer
Australian Post Customer 2
Australian Post Customer 3
Australian Post Reply Paid
Australian Post Routing
Australian Post Redirection
ISBN 13
Royal Mail 4 State (RM4SCC)
EAN 14 (GTIN 14)
NVE 18

Japanese Postal
Korean Postal Authority
GS1 DataBar Truncated (RSS-14 Truncated)
PLANET 12 digit
PLANET 14 digit
USPS Intelligent Mail® Barcode or IM® Barcode
Plessey Bidirectional
Telepen
GS1 128 (EAN/UCC 128)
ITF 14 (GTIN 14)
KIX – Dutch Postal Code
DAFT Code
Italian Postal 2 of 5
DPD
HIBC LIC 128
HIBC LIC 39
HIBC PAS 128
HIBC PAS 39

19.2.2 Barcode 2D list

PDF417
PDF417 Truncated
MaxiCode
QR-Code
Data Matrix
Codablock-F
GS1 DataBar Stacked (RSS-14 Stacked)
GS1 DataBar Stacked Omni directional (RSS-14 Stacked)
GS1 DataBar Expanded Stacked (RSS Expanded Stacked)
Micro PDF417
Aztec Code
Micro QR-Code
HIBC LIC Data Matrix
HIBC PAS Data Matrix

HIBC LIC QR-Code
HIBC PAS QR-Code
HIBC LIC PDF417
HIBC PAS PDF417
HIBC LIC Micro PDF417
HIBC PAS Micro PDF417
HIBC LIC Codablock-F
HIBC PAS Codablock-F
QR-Code 2005

19.3 Command line parameters

COMMAND LINE STRUCTURE:

SpeedMark.exe key1:value1 key2

Parameter	Description	Example
user	Username to log on	SpeedMark.exe user:operator password:operator
password	Password of the user defined with parameter user.	SpeedMark.exe user:operator password:operator
recreatematerialdatabase	Creates a new default material database. Old file is overwritten.	SpeedMark.exe recreatematerialdatabase
disableautostarts	Avoids the start of any project or scripted runscreen defined in settings.	SpeedMark.exe disableautostarts
loadproject	Loads the given marking project	
executerunscreen	Executes the given advanced scripting project	

19.4 PDF-Import

19.4.1 Prerequisites

PDF-Import in SpeedMark supports any File that meet PDF standard 1.5 or higher. Regular PDFs do not save any additional layer information, so the mapping from layer to material parameter must be done by name only. Many

programs offer the possibility to export to PDF, but depending on the settings and the selected PDF standard the resulting file structure looks different. SpeedMark should support all files as long as they meet the PDF standard 1.5+.

Following programs have been tested:

- CorelDraw X3
- CorelDraw X5
- CorelDraw X7
- Illustrator CS5

19.4.2 Restrictions

PDF (like DXF) in SpeedMark is used for the import of vector data (e.g. cutting lines, etc.) and for extraction of registration marks. Because of this content elements like bitmaps, texts and additional graphics information (fillings, line width, line color) are discarded by the import. Additional layer information (like layer colors) – that can be saved by 3rd-party software (e.g. CorelDraw) – do not comply with the PDF standard and are saved in proprietary structures inside the PDF file. Those informations will not be processed and used by SpeedMark.

Please consider the following details:

- Texts must be converted to vector data to get processed.
- Vector data that should represent special information (e.g. cutting lines) have to be placed on a separate layer.
- Layer names should be unique (because the mapping is only done by name), otherwise data from those layers will be merged in one element.
- Only the first page of a PDF will be analysed (other pages are ignored).
- The import does not follow any links to other PDFs.