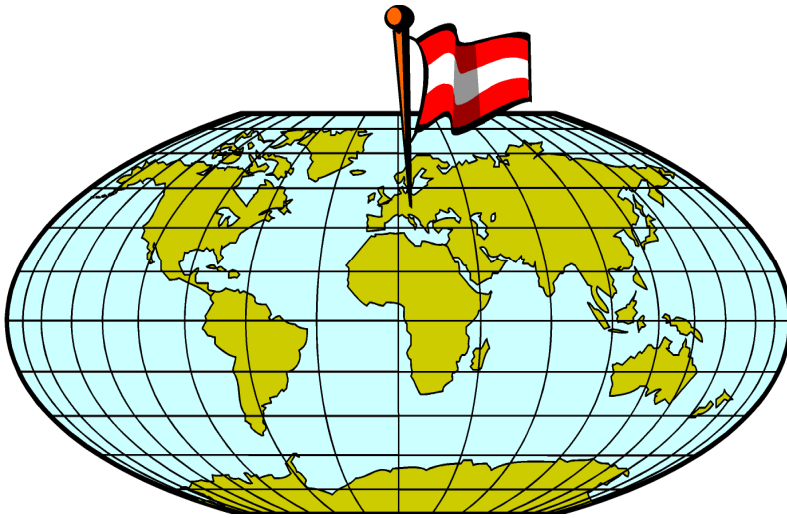




User Manual SpeedMark V3.4





**TROTEC VERTRIEBS UND
PRODUKTIONS GmbH**

Linzer Straße 156
A – 4600 Wels
AUSTRIA

Tel.: ++43/7242/239-0

Fax: ++43/7242/239-7380

E-mail: trotec@troteclaser.com

www.troteclaser.com



TROTEC accepts no liability for any direct or indirect damage arising from the application or use of the products, circuits or software described herein. The operating instructions must be read carefully and observed before the equipment is commissioned.

TROTEC reserves the right to amend any product described herein without prior notice.

© This document and all diagrams remain the intellectual property of Trotec Produktions- u. Vertriebs GmbH.

The entire document has been provided to the user for personal use only. This document may not be reproduced or passed to a third party without our written approval. Any infringement will be prosecuted under criminal law.





1 Contents

- 1 Contents 3**
- 2 General 9**
 - 2.1 Using this Manual 9
 - 2.2 Computer Requirements 10
 - 2.3 Compatibility 10
 - 2.4 Intended Use of the Laser System 10
- 3 First Steps 11**
 - 3.1 Installation of the SpeedMark Software 11
 - 3.2 Starting the SpeedMark Software 11
 - 3.3 Licensing 11
 - 3.4 Initial User Rights 12
 - 3.5 Scope of Application of Software 12
- 4 User Interface 13**
 - 4.1 SpeedMark Programs 14**
 - 4.1.1 Basic SpeedMark Program for Simple Laser Marking 14
 - 4.1.2 Dynamic SpeedMark Program 15
 - 4.1.3 Main-Program and Associated Sub-Programs 16
 - 4.2 User Interface Windows 17**
 - 4.2.1 Flow Diagram with Flow Chart 17
 - 4.2.2 Drawing Interface 17
 - 4.2.3 Graphic Properties 18
 - 4.3 Tools Toolbar Functions 18**
 - 4.3.1 Select and Zoom Tools 19
 - 4.3.2 Graphic Elements 19
 - 4.3.3 Graphic operations 20
 - 4.3.4 Control Elements 21
 - 4.3.5 Programming Elements 22
 - 4.4 Menu and Toolbar Functions 23**
 - 4.4.1 File Menu 23
 - 4.4.2 Edit Menu 23
 - 4.4.3 View Menu 24
 - 4.4.4 Project Menu 26
 - 4.4.5 Start Menu 26
 - 4.4.6 Tools Menu 27
 - 4.4.7 Windows Menu 27
 - 4.4.8 Help Menu 27
 - 4.5 Context Menu Functions 28**
 - 4.6 Shortcuts 28**
 - 4.6.1 General 28
 - 4.6.2 Projects 28
 - 4.6.3 Laser control 28
 - 4.6.4 Edit graphic elements 29
 - 4.6.5 Create graphic elements 29



4.6.6 Zoom graphic elements 29

4.6.7 Marking parameters 29

4.6.8 Function keys overview 29

5 Editing Graphic Elements 30

5.1 General 30

5.1.1 Creating a graphic Element 30

5.1.2 Selecting Elements 32

5.1.3 Changing the View in the Drawing Interface 32

5.1.4 Editing Graphic Elements with the Mouse 32

5.1.5 Graphic Properties 34

5.1.6 Free Transformation 35

5.2 Creating and Editing Graphic Elements 37

5.2.1 Point 38

5.2.2 Line 38

5.2.3 Ellipse/Circle 39

5.2.4 Arc 40

5.2.5 Rectangle 41

5.2.6 Text 42

5.2.7 Outline Text 45

5.2.8 Barcode 1D 49

5.2.9 Barcode 2D 50

5.2.10 Vector Graphic 51

5.2.11 Raster Graphics 54

5.2.12 PDF 56

5.2.13 Import 57

5.3 Editing Basic Graphic Properties 58

5.3.1 Basic Graphic Properties 58

5.3.2 General 59

5.3.3 Filling 60

5.3.4 Transformation 61

5.3.5 Marking 62

5.3.6 Source 62

6 Marking with the Laser 63

6.1 Creating a Test Program 63

6.2 Border marking 64

6.3 Normal Program Execution 65

6.3.1 Start Program Execution and Marking 65

6.3.2 End Program 65

6.4 Quick mark 66

6.4.1 Set-Up Workpiece 67

6.4.2 Quick mark 67

6.4.3 Power 68

6.4.4 Options 68

6.4.5 Marking Information 68

7 Material Parameter Manager 69

7.1 Manage Global Material Database 70

7.2 Manage local project material parameter 71

7.3 Define Material Parameters 73

7.3.1 Active, Name 74

7.3.2 Marking mode 74

7.3.3 Laser system parameters 74





7.3.4 Quality - Delay Parameters 75
7.3.5 Advanced..... 77
7.4 Exporting Material Parameters..... 78
7.5 Applying Material Parameters to Graphic Elements..... 78
7.5.1 Setting Material Parameters using Graphic Properties 78
7.5.2 Setting Material Parameters using the Toolbar 78
8 Desktops and User Rights Control 79
8.1 Initial user rights..... 80
8.2 Adjusting the SpeedMark User Interface Layout 80
8.2.1 Open and Close windows..... 80
8.2.2 Docking and Moving Windows 81
8.3 Managing Customised User Interfaces Using the Desktops 81
8.3.1 Creating and Selecting Desktops Using the Toolbar..... 81
8.3.2 Creating and Managing Desktops Using the Desktop Manager 82
8.4 SpeedMark Windows..... 83
8.4.1 Project Management 83
8.4.2 Graphic Properties..... 83
8.4.3 Flow chart 83
8.4.4 Controlling Variables 83
8.4.5 Error Messages 83
8.4.6 Execute Program 84
8.4.7 Internal RunScreen..... 84
8.4.8 Program Messages 84
8.4.9 Program Log 84
8.4.10 Execution counter..... 84
8.4.11 Execution info 84
8.5 User Groups 85
8.6 Access Rights 86
8.7 Users..... 86
8.8 Basic User Rights Settings..... 87
9 Configuring SpeedMark 88
9.1 General properties..... 89
9.1.1 General 89
9.1.2 Auto-Start..... 89
9.1.3 Marking 90
9.1.4 Language..... 90
9.1.5 Advanced..... 91
9.2 Default file path..... 92
9.3 Default properties of graphic elements..... 93
10 Laser System Configuration..... 94
10.1 System configuration..... 95
10.2 Components..... 96
10.3 Additional components..... 96
10.3.1 Component type: IO-Input 97
10.3.2 Component type: IO-Output 97
10.3.3 Component type: Exhaust 97





- 11 Graphic operations..... 98**
- 11.1 Segmentation 99
 - 11.1.1 Setup segmentation..... 99
 - 11.1.2 Rotary engraving 100
 - 11.1.3 Linear segmentation 101
 - 11.1.4 Advanced settings 101
- 11.2 Graphic Array..... 102
- 11.3 Deep Engraving 102
- 12 Serial data and Dynamic Graphic Element Content 103**
- 12.1 Serial Number 104
- 12.2 Expressions 105
- 12.3 Dynamic Loading of Vector Graphics 105
- 12.4 Serial file..... 106
- 12.5 Time Stamp 108
- 13 Control elements 109**
- 13.1 Start element 110
 - 13.1.1 Options of the start element 110
- 13.2 Input Window 111
- 13.3 Dialog window..... 112
- 13.4 Value selection..... 113
- 13.5 File selection 113
- 13.6 Counter 114
- 13.7 Wait For Signal..... 115
- 13.8 Set I/O Output..... 116
- 13.9 Serial (RS232)..... 117
- 13.10 TCP communication..... 118
- 13.11 Delay 119
- 13.12 Move axis..... 119
- 13.13 Exhaust control..... 120
- 13.14 Border marking..... 120
- 14 Basic flow chart programming 121**
- 14.1 General 122
- 14.2 Variables 122
 - 14.2.1 Creating Variables 123
 - 14.2.2 Editing Variables..... 123
 - 14.2.3 Deleting Variables 123
- 14.3 Basic Programming Elements..... 124
 - 14.3.1 Basic Element Properties 124
 - 14.3.2 Creating Conditions 125
 - 14.3.3 Branch 126
 - 14.3.4 Incremental Loop 126
 - 14.3.5 Conditional Loop..... 127
 - 14.3.6 Program End..... 127





14.3.7 Program Abort 127
14.3.8 Comment/Note..... 127
14.4 Debug Programs..... 128
14.4.1 Breakpoints..... 128
14.4.2 Incremental Program Execution 129
14.4.3 Actual Variable Values 129
14.4.4 Displaying Error Messages..... 129
14.5 Dynamic Positioning 130
14.5.1 Position 131
14.5.2 Size..... 131
14.5.3 Rotation 131
14.6 Pre- and Post program..... 132
14.6.1 Pre-Program 132
14.6.2 Post-Processing 133
15 Simple Scripting 134
15.1 Advanced Programming Elements 135
15.1.1 Calculation/Allocation 135
15.1.2 Jump Label 135
15.1.3 Jump to Jump Label 136
15.1.4 Jump to Sub-Routine 136
15.1.5 Jump Back out of Sub-Routine..... 136
15.1.6 Sub-Program 137
15.1.7 External Program..... 137
15.2 Scripting 138
15.3 Master Programs and Sub-Programs 139
15.3.1 Adding or Inserting Sub-Programs 139
15.3.2 Specifying Transfer Parameters 139
15.3.3 Opening a Sub-program 140
16 Modules and Components 141
16.1 Component list..... 142
16.2 Components Window 142
16.3 TLC2 Laser Controller 143
16.3.1 Functional Range of Module..... 143
16.3.2 Configuration 144
16.3.3 SpeedMark Windows..... 150
16.4 Laser Simulator..... 151
16.4.1 Functional Range of Module..... 151
16.4.2 Configuration 152
16.4.3 SpeedMark Windows..... 152
16.5 Servida Axis Control 153
16.5.1 Functional Range of Module..... 153
16.5.2 Configuration 154
16.5.3 SpeedMark Windows..... 156
16.6 Relop I/O 157
16.6.1 Functional Range of Module..... 157
16.6.2 Configuration 157
16.6.3 SpeedMark Windows..... 158
16.7 RunScreen..... 159
16.7.1 Functional Range of Module..... 159
16.7.2 Configuration 160



16.7.3 SpeedMark Windows..... 161

16.8 Profibus 162

16.8.1 Functional Range of Module..... 162

16.8.2 Configuration 162

16.8.3 SpeedMark Windows..... 163

16.9 COM Port 164

16.9.1 Functional Range of Module..... 164

16.9.2 Configuration 164

16.9.3 SpeedMark Windows..... 165

16.10 TCP Module 166

16.10.1 Functional Range of Module..... 166

16.10.2 Configuration 166

16.10.3 SpeedMark Windows..... 167

16.11 Axis Simulator..... 168

16.11.1 Functional Range of Module..... 168

16.11.2 Configuration 168

16.11.3 SpeedMark Windows..... 168

17 Extensions 169

17.1 Configuration of Extensions 170

17.2 Extensions Window..... 170

17.3 Program Selection Extension..... 171

17.3.1 Functional Range of Extension..... 171

17.3.2 Configuration 171

17.3.3 SpeedMark Windows..... 172

18 Appendix: Utilities 173

18.1 SpeedMarkerDiagnostics..... 173

19 Appendix: Barcodes..... 174

19.1 Barcode 1D list..... 174

19.2 Barcode 2D list..... 176

20 Appendix: Command line parameters 177





2 General

2.1 Using this Manual

Attention:

This user 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 user 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).

The following symbols are used within this user manual to aid understanding:



Failing to observe this part of the user manual could pose a particular risk for operating or maintenance personnel.



Caution: this component is energised. These parts contain electrical safety instructions which must be carefully observed, particularly when undertaking maintenance or service work.



Caution: these parts indicate that extreme care should be taken regarding the potential risks posed by the laser beam.



Instructions or information regarding individual equipment components or the software intended to simplify or aid use.



2.2 Computer Requirements



The following recommendations are the required minimum a more powerful computer will produce and display the graphics much more quickly. This will not affect the overall marking time as the laser system contains an independent computer unit.

- Windows 7 32-bit
Windows® XP 32-bit (with Service Pack 2 or above)
- 512 MB RAM, 200 MB hard disk
- Pentium® 1 GHz processor or AMD Athlon™ XP
- Monitor resolution at least 1024 x 768 pixels
- 24-bit colour graphics card
- CD-drive
- Serial port (Com port) (alternatively a USB-to-COM converter is available)
- Mouse
- Please check the requirements in the relevant documentation of the laser system employed

2.3 Compatibility



Software with the same version number (first two digits) must be used in order for various Trotec software components to work together smoothly. The last digit of the version number is irrelevant (X.X.X).
Example: SpeedMark 3.4.x will only function with TLC2 module 3.4.x.

2.4 Intended Use of the Laser System

SpeedMark software is used in all TROTEC Galvo laser systems.



The marking process may only be conducted using fault-free machines (please also refer to the user manual for the TROTEC laser system you have purchased).



Any other application of the equipment is considered contrary to intended use. The manufacturer accepts no liability for any personal injury and/or material damage arising as a result of this.



The equipment may only be operated, serviced and commissioned by individuals familiar with the intended use and potential risks of the machine!



Failing to observe the operating, service and maintenance regulations provided by the manufacturer in this user manual exempts the manufacture from any liability in the event of a fault.





3 First Steps

3.1 Installation of the SpeedMark Software



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. This program guides you through the menu-based installation process and copies all the necessary files to your hard disk.¹
4. The installation process is complete.

3.2 Starting the SpeedMark Software



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.

3.3 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.

¹ Additional information regarding the installation of the SpeedMark software with respect to upgrades and the deinstallation of the software can be found in the installation manual.





3.4 Initial User Rights

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



SpeedMark is configured with an initial administrator password. Please change this password to protect your system from unauthorized access (see chapter 8.1 Initial user rights on page 80)

3.5 Scope of Application of Software

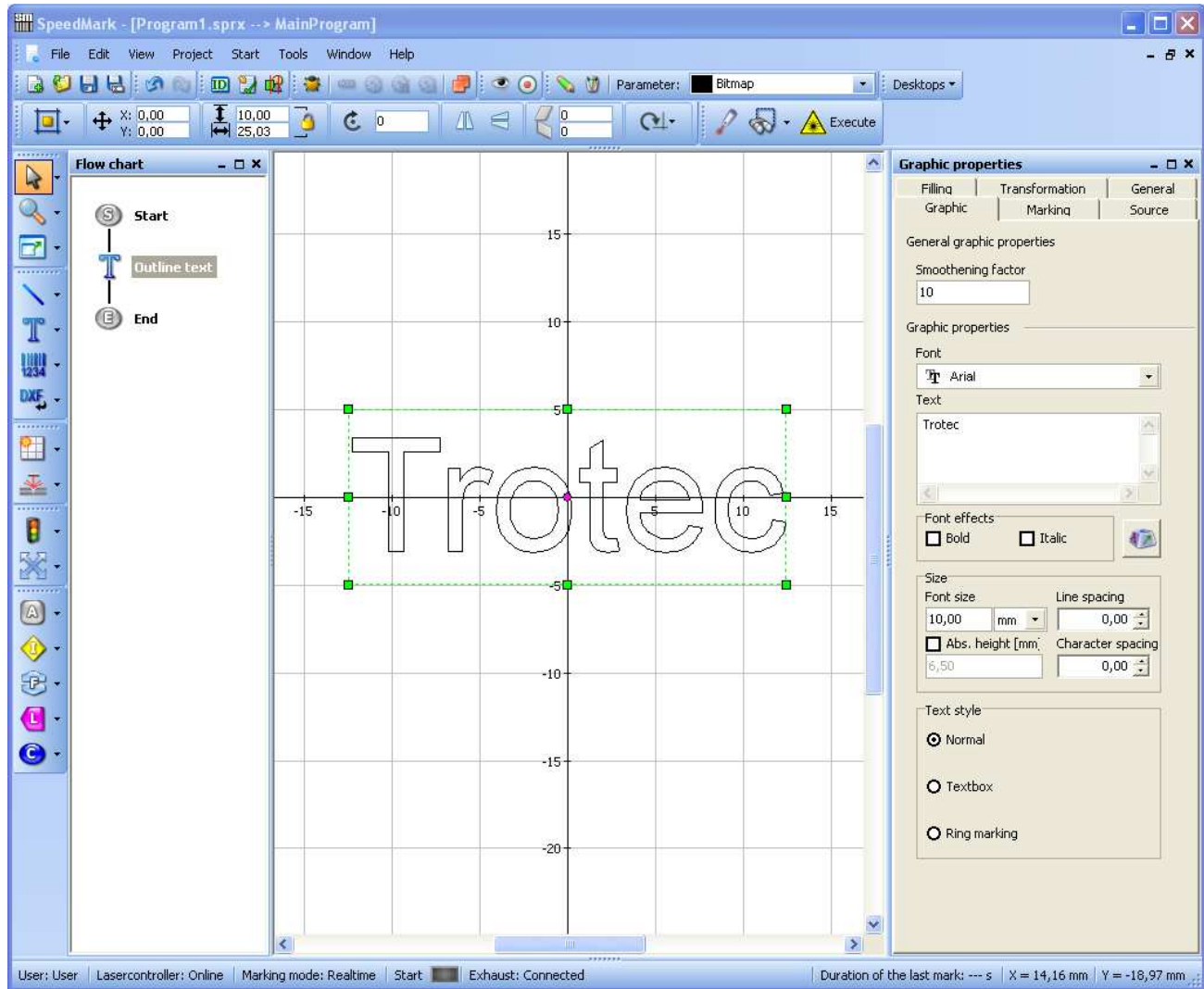
The SpeedMark software may be used to:

- 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 view² of the SpeedMark software. It basically consists of the following areas:

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

² An explanation of the adjustment of various SpeedMark views can be found in Chapter 8 Desktops and User Rights Control on Page 79



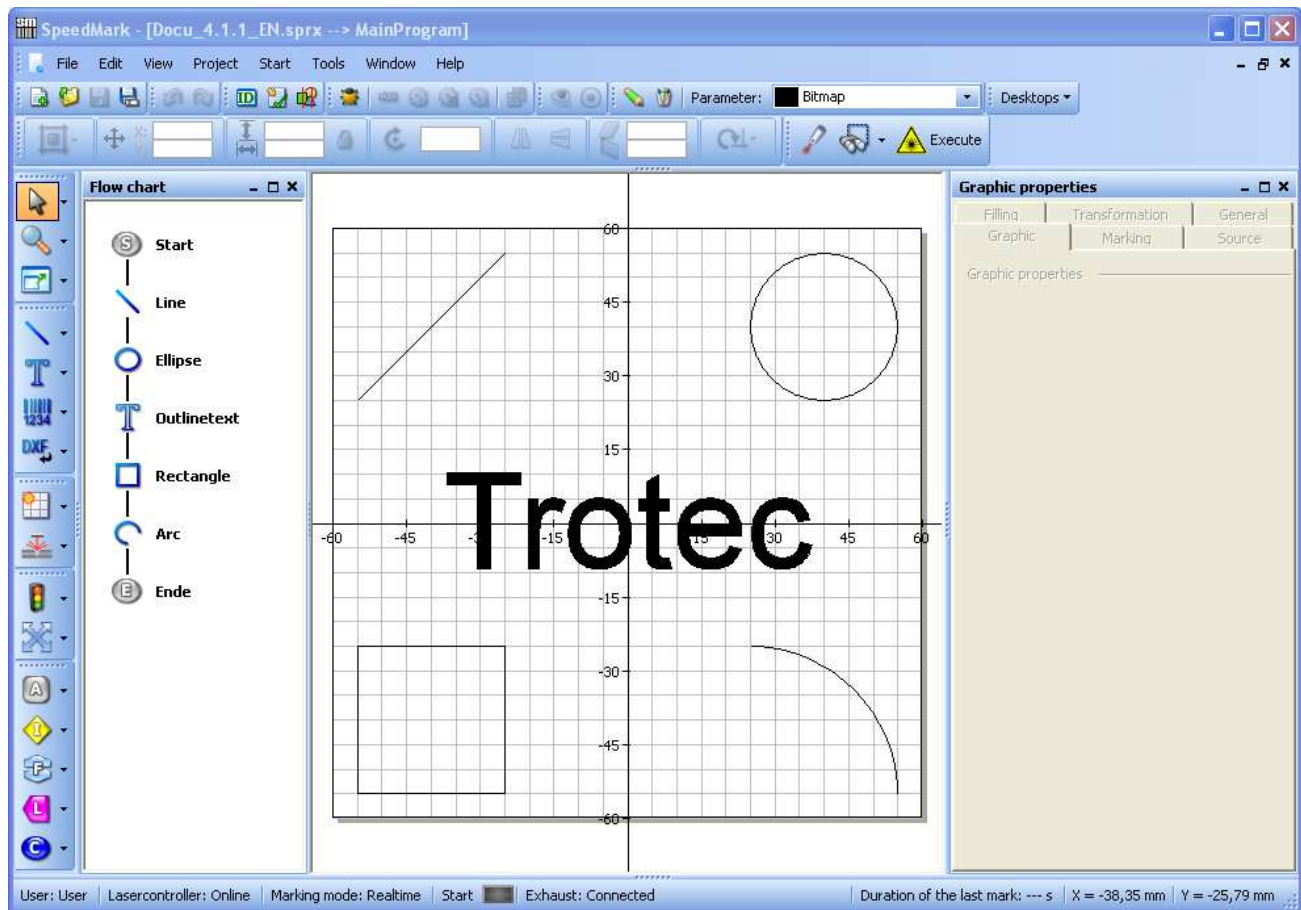
4.1 SpeedMark Programs

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, 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.

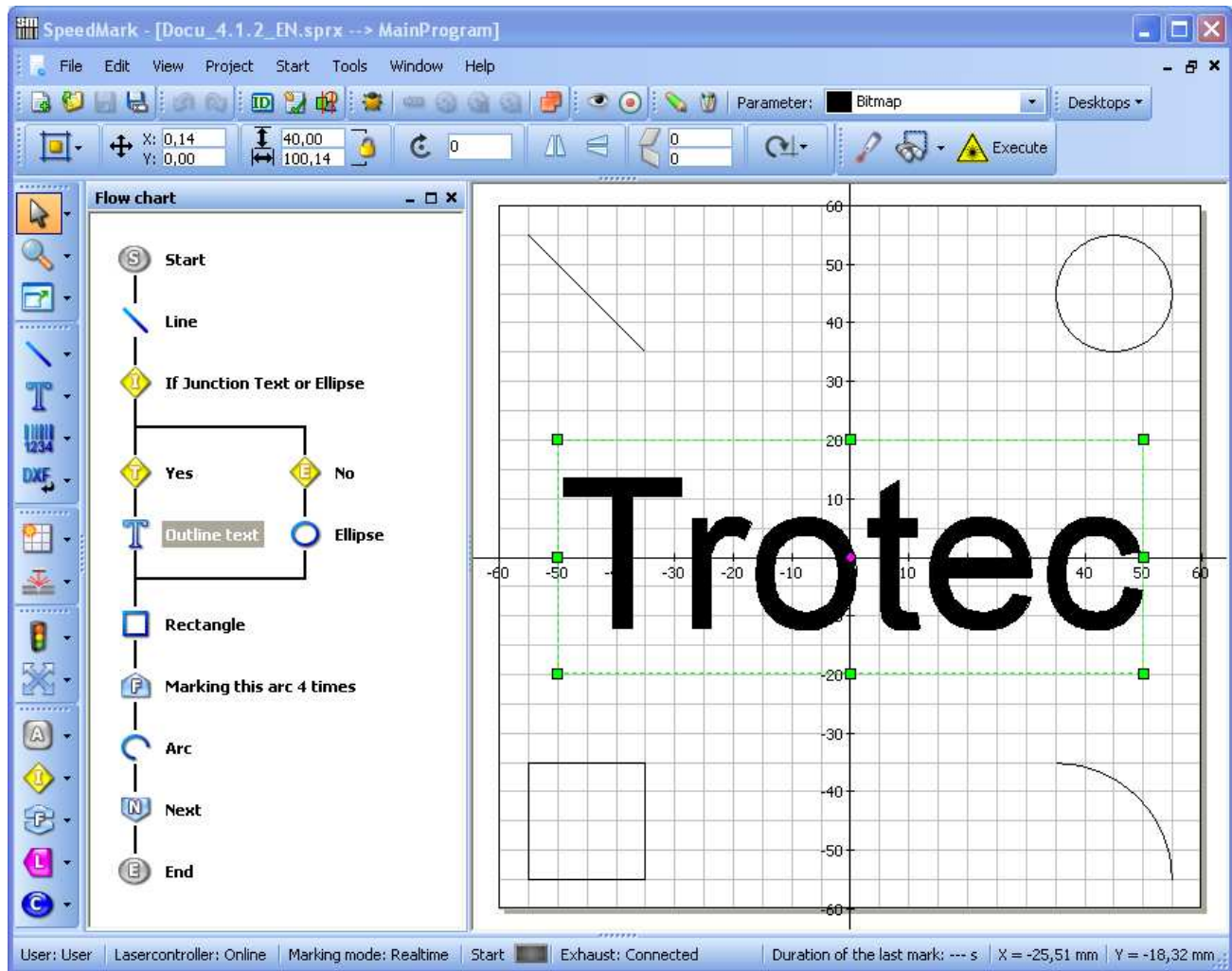
The flow may be adjusted by changing the order of the individual elements.



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.



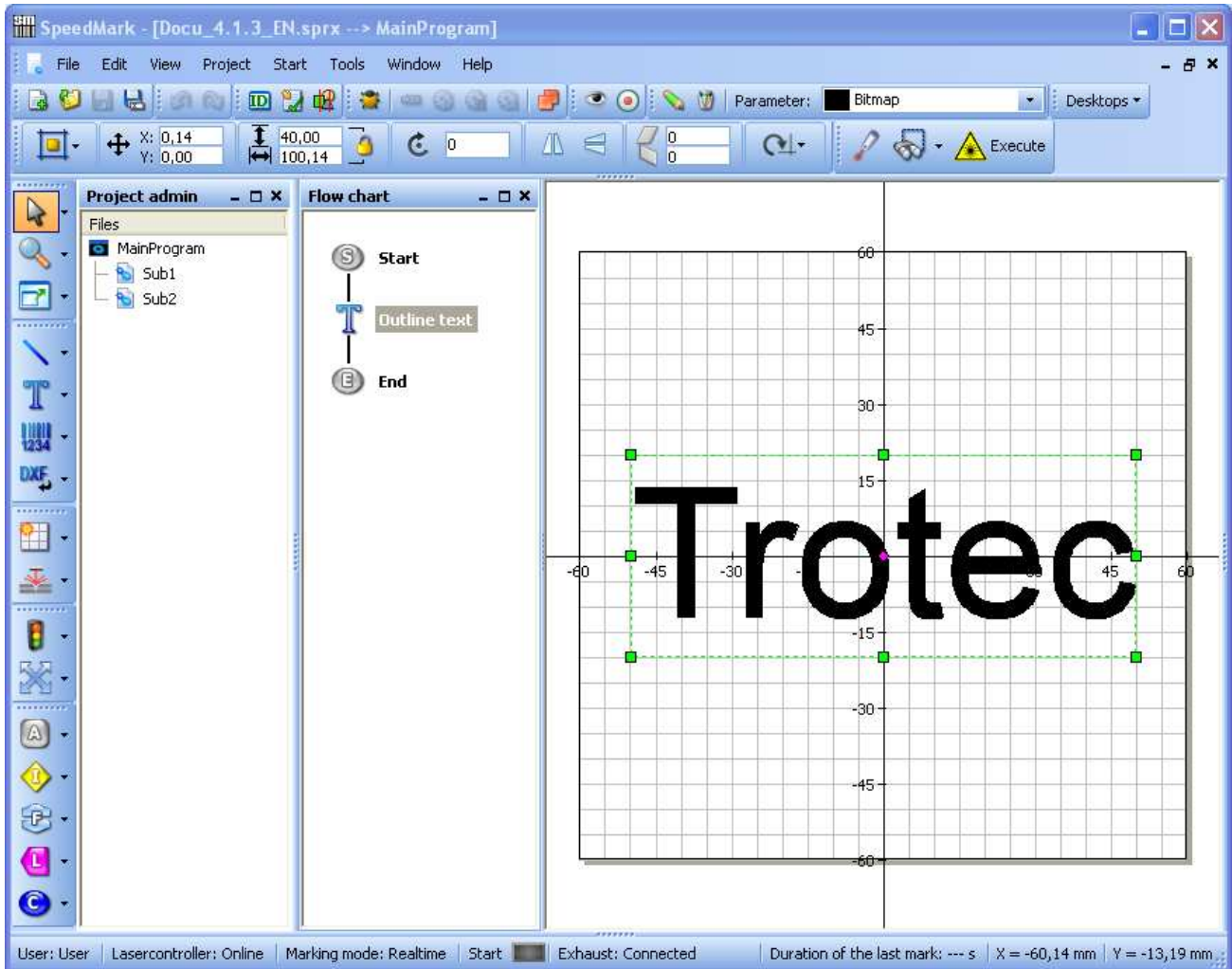
Rudimentary programming knowledge offers a distinct advantage with this type of laser marking. However, programming knowledge is not a requirement for the basic operation of the SpeedMark flow control.

More detailed descriptions of the use of dynamic programs can be found in Chapters 14 Basic flow chart programming on page 121 and 15 Simple Scripting on page 134.



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.



Advanced programming knowledge definitely 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 15 Simple Scripting on page 134.

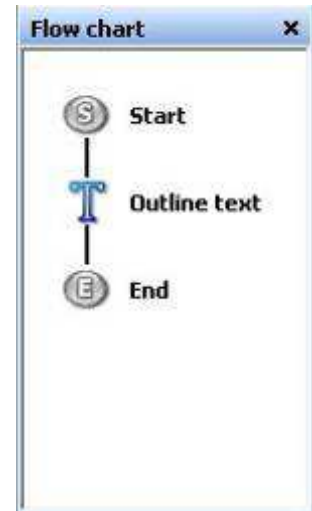
4.2 User Interface Windows

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.

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



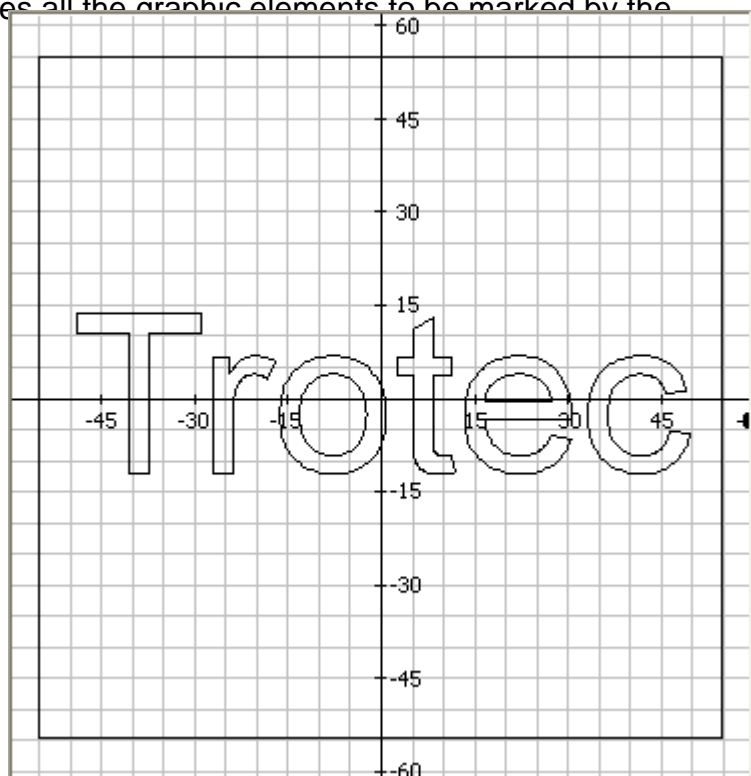
4.2.2 Drawing Interface

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 5 Editing Graphic Elements on page 30.



4.2.3 Graphic Properties

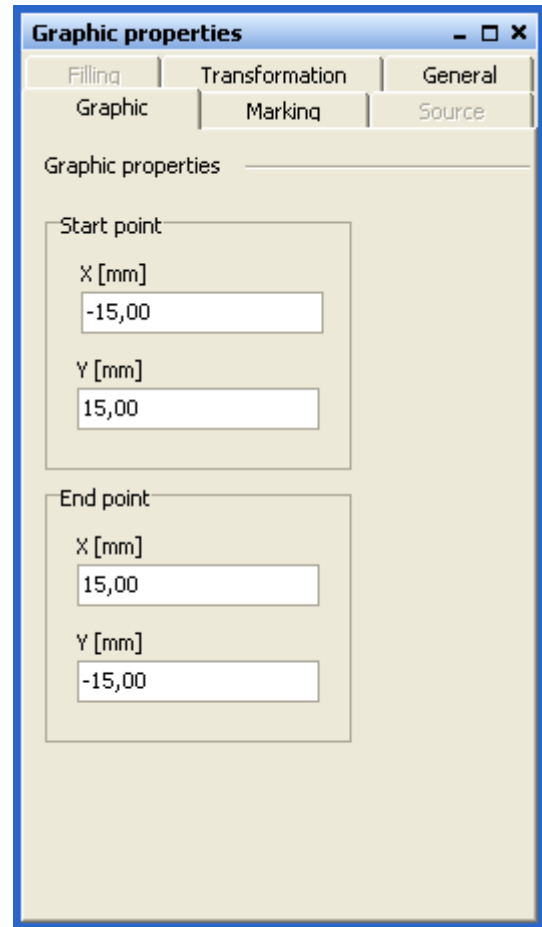
All SpeedMark graphic elements can be edited using the graphic properties in the Graphic properties window.

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 particular 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.³



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

³ In the SpeedMark default settings, the Tools toolbar is positioned vertically. However, it is presented horizontally in this document for ease of illustration.

4.3.1 Select and Zoom Tools



The Select tool is used to carry out various actions for changing the drawing interface view.

Tool	Name	Description
	Select	Selects one or more elements
	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 in order 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.⁴

Element	Name	Description
	Point	Creates a single point on the drawing interface
	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
	Outline Text	Creates an outline text element on the drawing interface

⁴ More information on the editing and application of graphic elements can be found in Chapter 5 Editing Graphic Elements on page 30.



	Barcode 1D	Creates a barcode on the drawing interface
	Barcode 2D	Creates a data matrix on the drawing interface
	Vector Graphic	Creates a vector graphic element imported from an existing file into the drawing interface
	Raster Graphic	Creates a raster graphic element imported from an existing file
	PDF	Creates a raster graphic element imported from an existing PDF 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.



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.⁵

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
	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

⁵ More information on the editing and application of control elements can be found in Chapter 13 Control elements on page 109

4.3.5 Programming Elements



Programming elements give SpeedMark programs a dynamic component. These elements can only be created in the flow chart.⁶

Element	Name	Description
	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
	Branch	Creates branches for adding alternative program flow
	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

⁶ More information on the editing and application of programming elements can be found in Chapter 15 Simple Scripting on page 134

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
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
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.
Insert		Pastes and element from the clipboard into the flow chart.

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 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 ⁷

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
Debug windows	The Debug Window menu item consists of several windows for controlling dynamic programs: <ul style="list-style-type: none"> • Variable Monitoring • Error Messages
Toolbars	The Toolbars menu item contains all tool bars available within

⁷ See also 4.2.3 Graphic Properties on page 18





	<p>SpeedMark:</p> <ul style="list-style-type: none"> • Standard • Selection tools • Graphic tools • Graphic operation tools • Control tools • Scripting tools • Execute • Debug • Marking parameters selection • Project • Undo/Redo • Desktops • Graphic status • Line width of graphics
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 ⁸
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

Further information on each of the individual windows can be found in Chapter 4.2 User Interface Window on page 17.












⁸ See also 17 Extensions on page 169



4.4.4 Project Menu

Menu item	Symbol	Description
Segmentation		Performs segmentation on the current graphic elements for usage with a movement axis.
Variables List		In SpeedMark it is possible to set variables as place holders for use within dynamic programs ⁹
Syntax Check		When dynamic programs are used, this menu item is able to determine whether the syntax of all dynamic components has been defined correctly ¹⁰
Pre- and Postprogram		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 ¹¹
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.

⁹ See also 14.2 Variables on page 122

¹⁰ See also Chapter 15 Simple Scripting on page 134




¹¹ See also 6.2 Border marking on page 64




4.4.6 Tools Menu

Menu item	Description
Switch User	Switches the current user using a login if the user rights control is activated
User Rights and Desktops	Allows the configuration of user rights control ¹²
Program Extensions	Opens the Program Extensions dialog for configuring the installed extensions ¹³
Laser system configuration	Opens the Components dialog to configure the installed modules and their associated components ¹⁴
Axis control	All configured axis can be resetted or controlled
Backup/Restore configuration	All configuration files will be backed up in a file and can be restored from this file
Settings	Opens the SpeedMark configuration dialog ¹⁵

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
Window List		Displays a list of all open windows (master program with all open sub-programs)

4.4.8 Help Menu

Menu item	Symbol	Description
Software registration		Registering of the SpeedMark software
About SpeedMark		Displays the start dialog containing the version of SpeedMark in use.

¹² See also 8 Desktops and User Rights Control on page 79

¹³ See also 17 Extensions on page 169

¹⁴ See also 10 Laser System Configuration on page 94

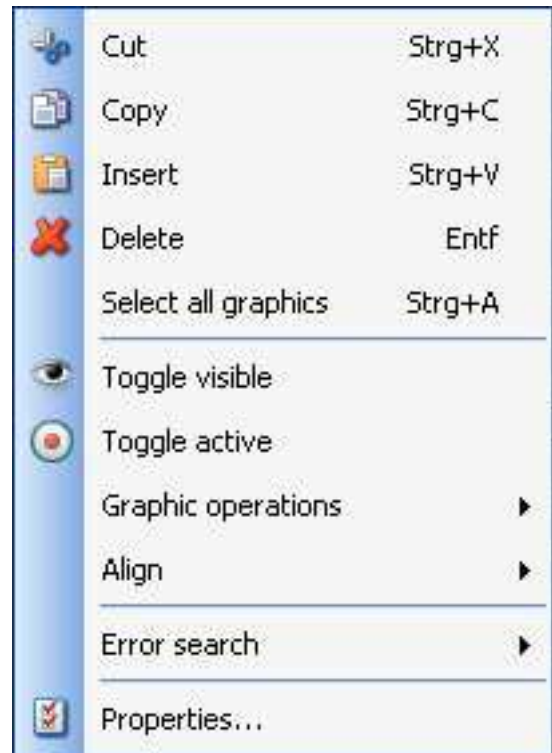
¹⁵ See also 9 Configuring SpeedMark on page 88



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

4.6.1 General

Ctrl+F4	Exit SpeedMark
Ctrl+L	Changing the user

4.6.2 Projects

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

4.6.3 Laser control

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



4.6.4 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
Arrow keys (flow chart)	Switch between the elements
Arrow keys (drawing interface)	Move graphic element 1 mm
Ctrl+Arrow keys (drawing interface)	Move graphic element 0,2 mm
Ctrl+T	Center selected graphic elements

4.6.5 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

4.6.6 Zoom graphic elements

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

4.6.7 Marking parameters

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

4.6.8 Function keys overview

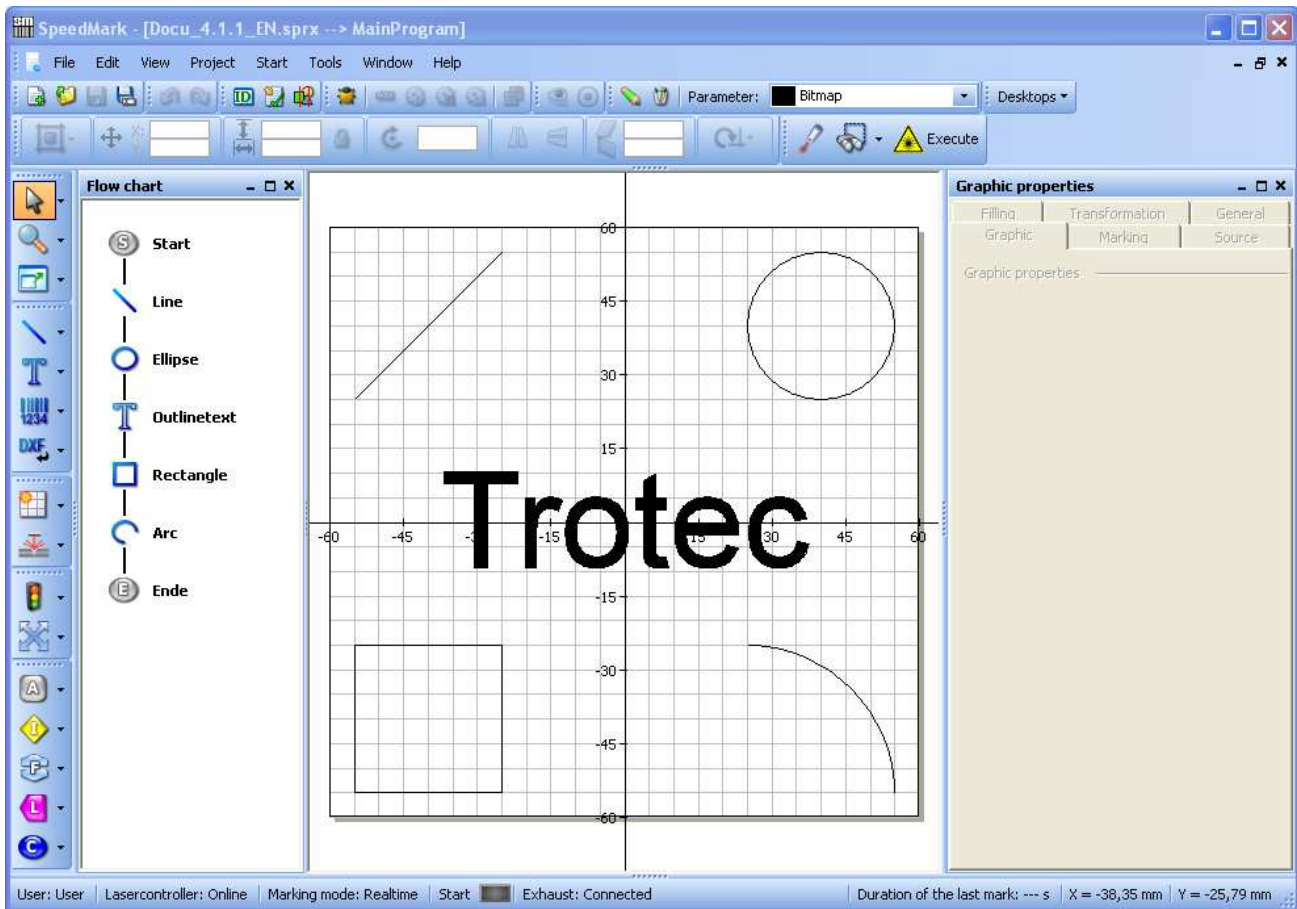
F1	F2	F3	F4
	Material data base	Project materials	Param select

F5	F6	F7	F8
			Quick mark

F9	F10	F11	F12
Border mark (all)	Border mark (pos)	Border mark (select)	Execute



5 Editing Graphic Elements



5.1 General

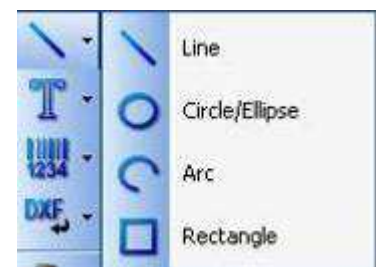
5.1.1 Creating a graphic Element

The Tools toolbar can be used to create new elements on the drawing interface and in the flow chart.¹⁶



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

Clicking once on an arrow opens a list containing all the graphic elements available for this group. 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.



¹⁶ In the SpeedMark default settings, the Tools toolbar is positioned vertically. However, it is presented horizontally in this document for ease of illustration.



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 back 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.

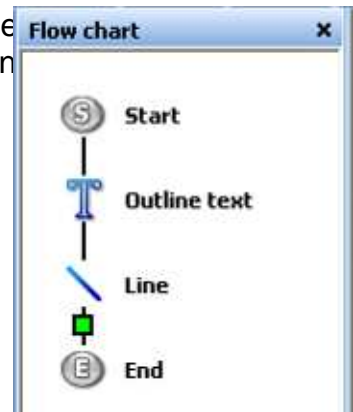


Creating an Element in the Flow Chart

To create a graphic element in the flow chart click on the graphic element 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 actually inserted.¹⁷

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 actually inserted.

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




Example line:



Click on the start position of the line with the mouse on the drawing interface but do not release the mouse button and continue to move the mouse cursor to the end position of the line. Then release the mouse button.

¹⁷ The layout and content of the Settings dialog for each of the graphic elements are described in Chapter 5.2 Creating and Editing Graphic Elements on page 37.

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

In order 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.

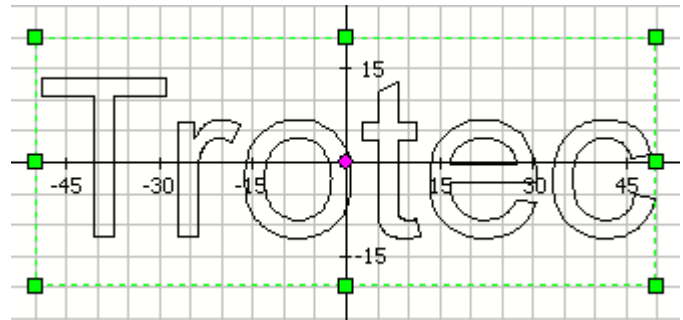
	Hand	Drags and drops the drawing interface into a new position
	Zoom	Zooms in to an area selected with this tool
	Next View	Switches to the next zoom view. If there is no further zoom view, this will not function
	Previous View	Switches back to the previous zoom view
	Magnify	Magnifies the zoom on the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

5.1.4 Editing Graphic Elements with the Mouse

The position and size 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.



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 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:



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.

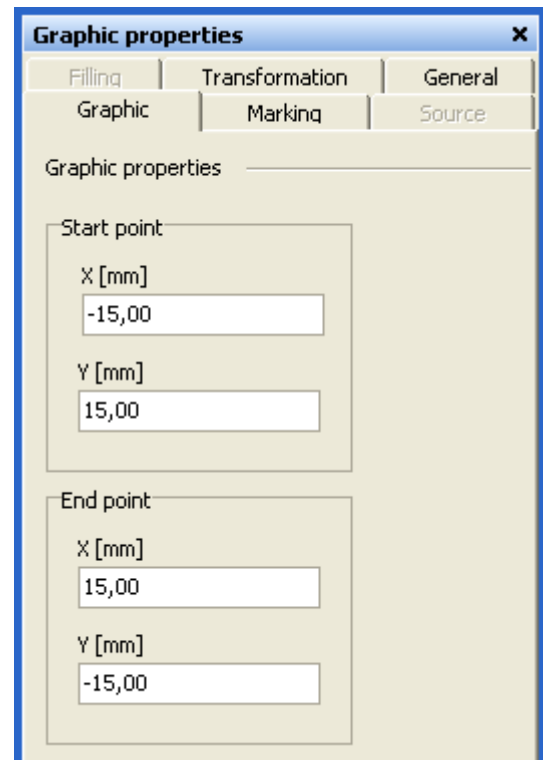
5.1.5 Graphic Properties

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.

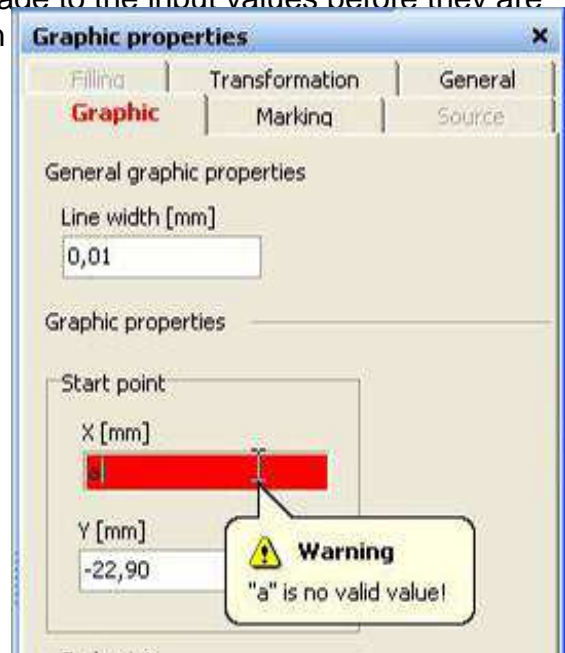
This window can be used to specify and adjust additional graphic element properties.

However, any adjustments made to these properties are restricted to the individually selected graphic elements.

The entered values are only applied by pressing the Apply button. **Selecting another graphic element discards the current adjustments without warning.**



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



It is not possible, however, to alter the parameters of several selected graphic elements using the Graphic Properties. This is only possible using the “Free Transformation” function described in the subsequent chapter.



5.1.6 Free Transformation


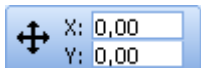
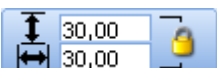
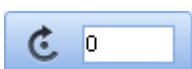

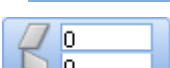



If not already open, the “Free Transformation” function can be opened using the View → Free Transformation¹⁸ menu item.



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
-  Position
-  Size
-  Rotation
-  Mirroring
-  Shearing
-  Advanced rotation

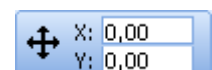
Anchor point

The anchor point defines from which point of a graphic transformation operations should be performed.



Position

In order to adjust the position, the X and Y values simply need to be changed.

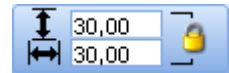


¹⁸ Please also refer to Chapter 4.4.3 View Menu on page 24



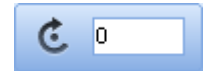
Size

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.



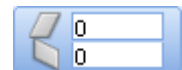
Mirroring

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.

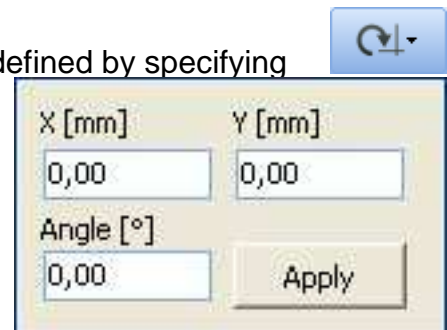


Advanced Rotation

In order 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
	Point
	Line
	Ellipse/Circle
	Curve
	Rectangle
	Text
	Outline Text
	Barcode
	Data Matrix
	Vector Graphic
	Raster Graphic
	PDF
	Import



The following chapters contain descriptions of how to insert the graphic elements in the flow chart as this option contains the most settings.¹⁹ Graphic elements such as point, line, ellipse and rectangle may all be created directly on the drawing interface.

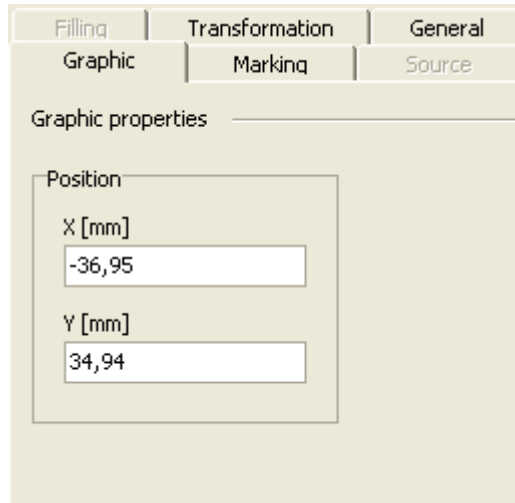
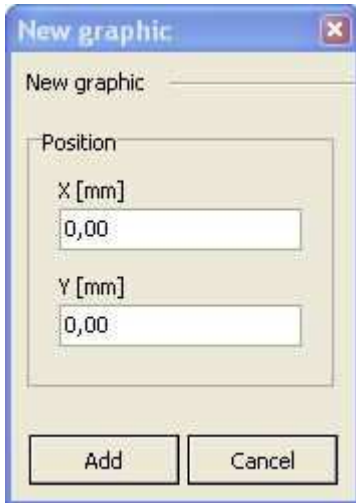
Complex graphics can be imported easily into SpeedMark using the Vector Graphics and Raster Graphic Elements.

This chapter specifically describes the special properties of the individual graphic elements, while the basic properties such as Filling, Transformation, Marking and Source are described in the following Chapter 5.3 Editing Basic Graphic Properties on page 58.

¹⁹ The graphic elements described can be selected using the Tools toolbar. A brief description of how to insert elements is contained in the previous chapter 5.1.1 Creating a graphic Element on page 30.

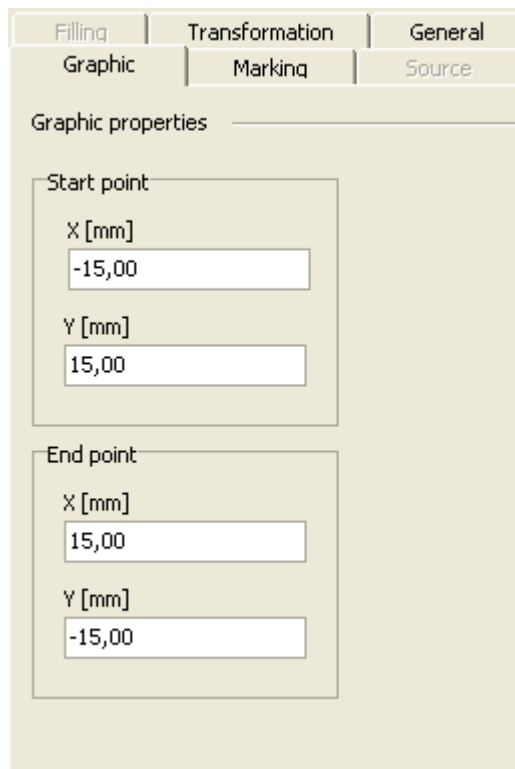
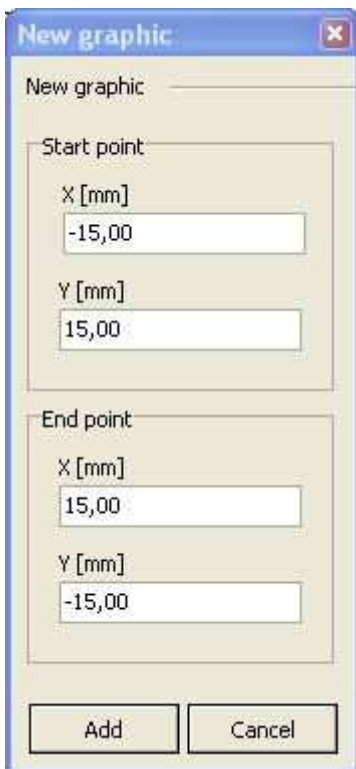
5.2.1 Point

Inserting a point opens the “New Graphic” dialog in which it is possible to specify the exact position of the point (X and Y input fields). The Graphic Properties window may be used to adjust this position retrospectively.



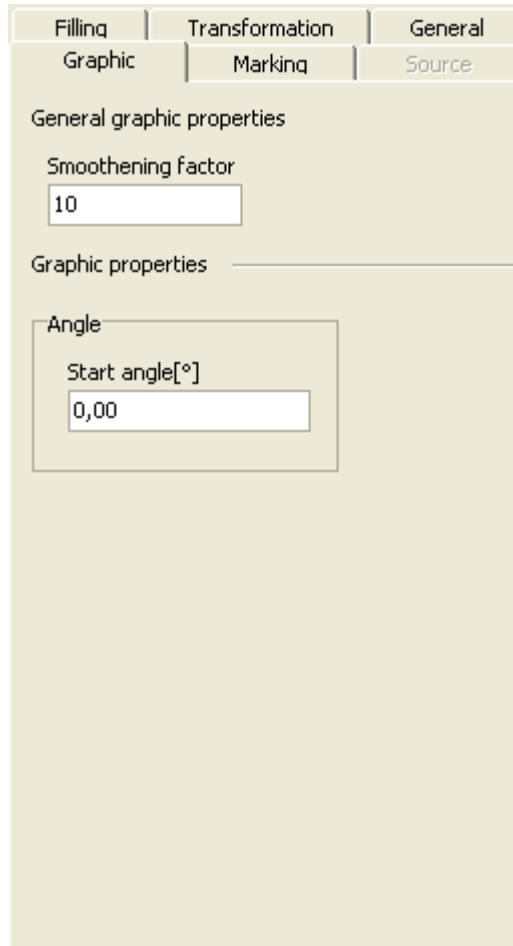
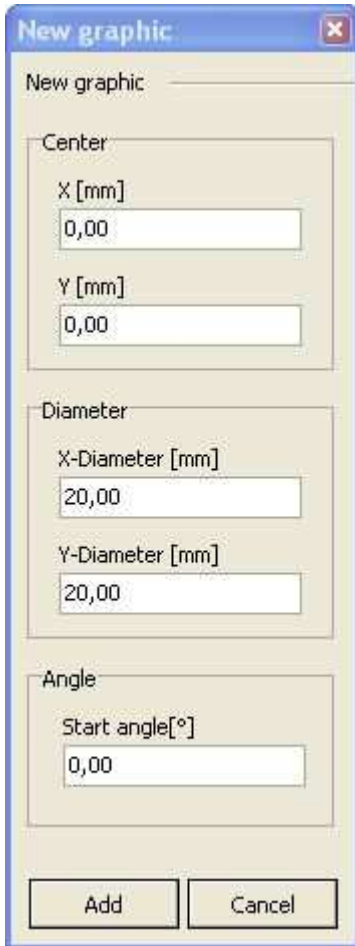
5.2.2 Line

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.



5.2.3 Ellipse/Circle

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.

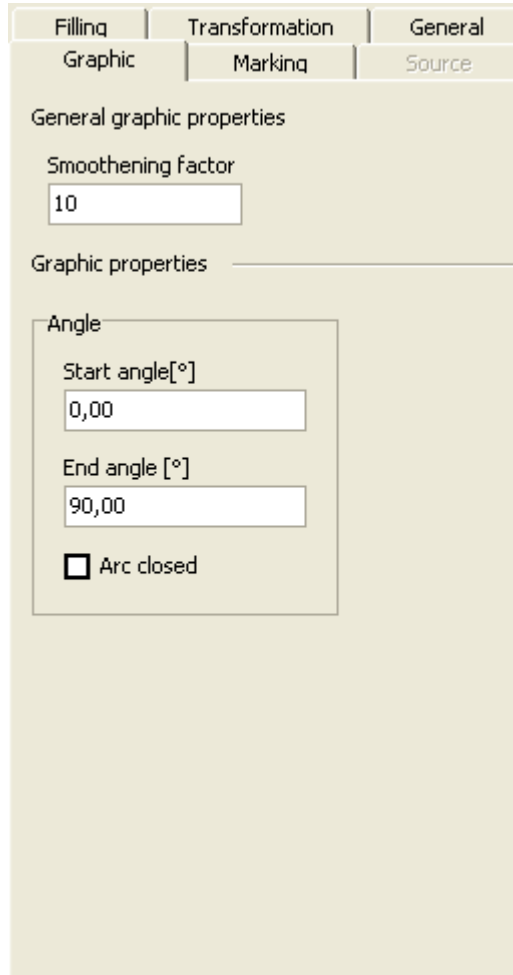
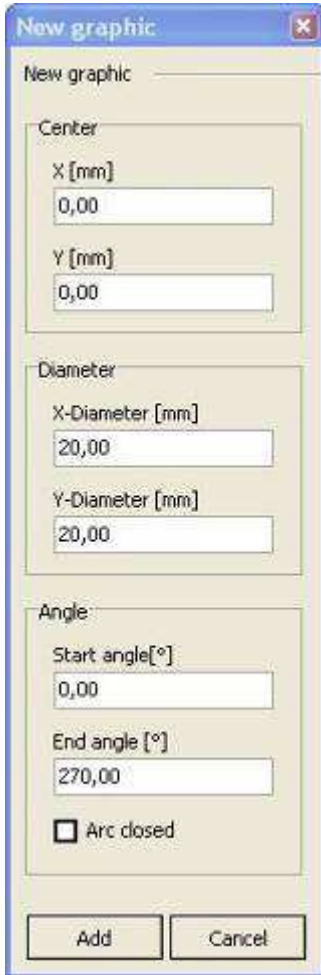


The starting angle of the ellipse/circle element is used to specify the point from which the laser should begin marking the element. This can be essential in time-critical applications in order to optimise flow. The default setting of 0° is usually sufficient.²⁰

²⁰In this instance, 0° usually represents the furthest right-hand point on the graphic element.

5.2.4 Arc

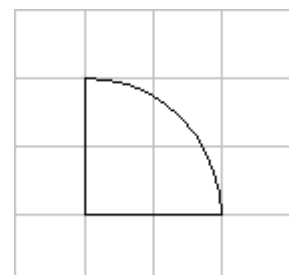
Inserting an arc opens the “New Graphic” dialog in which it is possible to specify the centre, diameter, starting/end angle and the arc closure. The Graphic Properties window may be used to retrospectively adjust the starting/end angle and the arc closure only. The other properties may be adjusted via 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.²¹

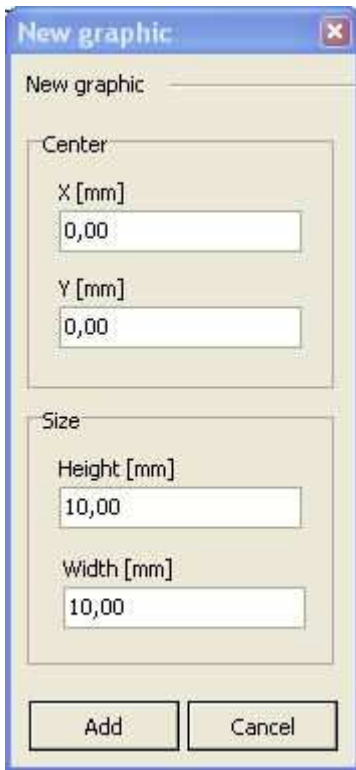


²¹ When the arc closure is deactivated, so are all the filling settings.



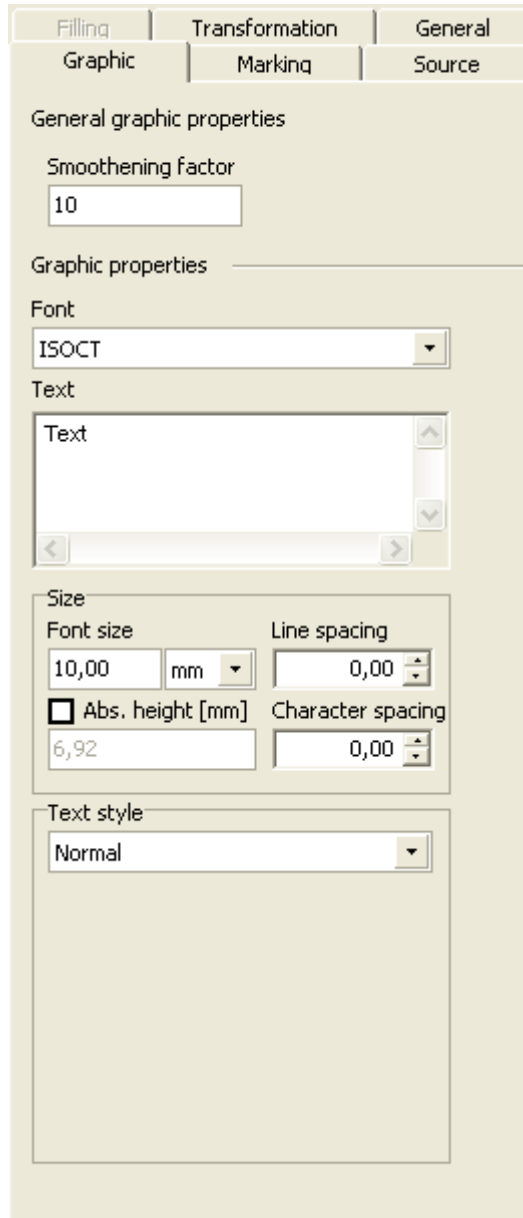
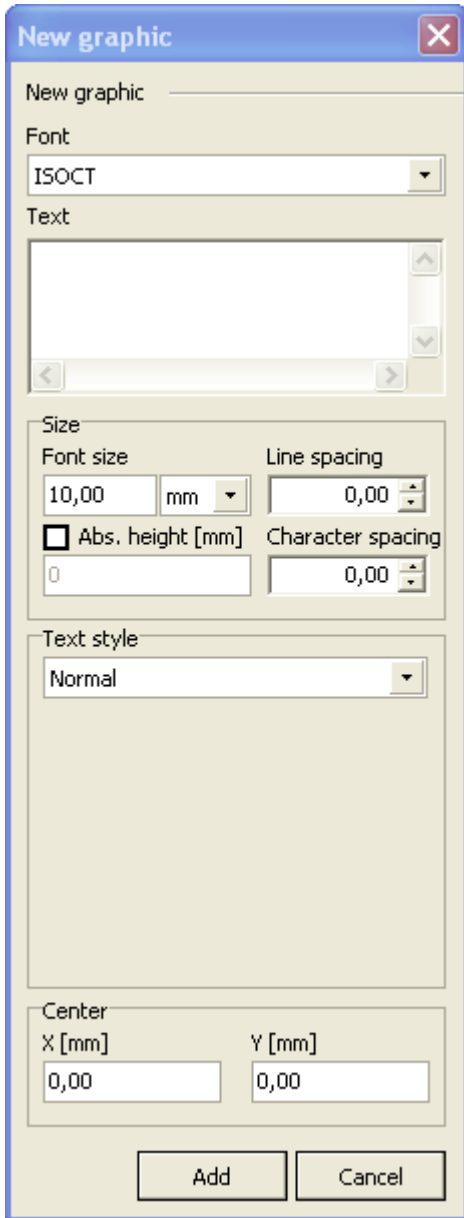
5.2.5 Rectangle

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.



5.2.6 Text

Inserting text opens the “New Graphic” dialog in which it is possible to specify the various text parameters. All of these parameters may likewise be adjusted retrospectively in the Graphic Properties window with the exception of 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.²² The following fonts are available in SpeedMark:

- ISOCT

²² Due to the use of single line fonts, text elements may not contain any filling.

- 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.

Text Style

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

Normal

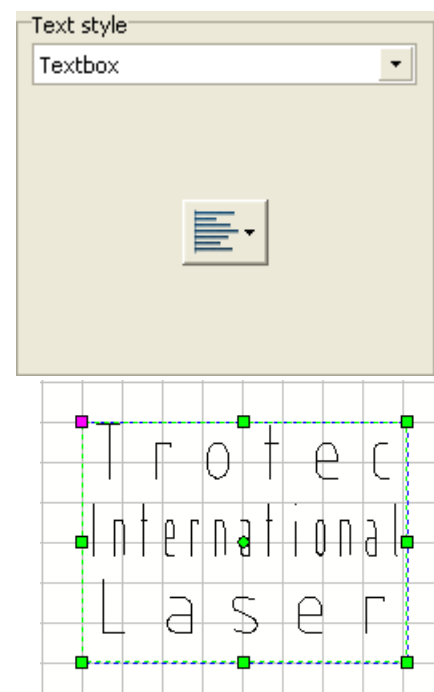
The text is displayed using the specified font, text and size parameters. These parameter also determine the behaviour of the element in relation to the overall size of the element and any transformations (i.e. when the size is adjusted, the size of the font adjusts itself automatically as the element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

Text box

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 alignment²³ (left, right, centred).

For example, any lines which do not fit into the text box are compressed so that they may displayed within the overall size. Any lines which do not fit into the text box are cut off.

This type of text style is mainly used for markings on a workpiece of a specific size.

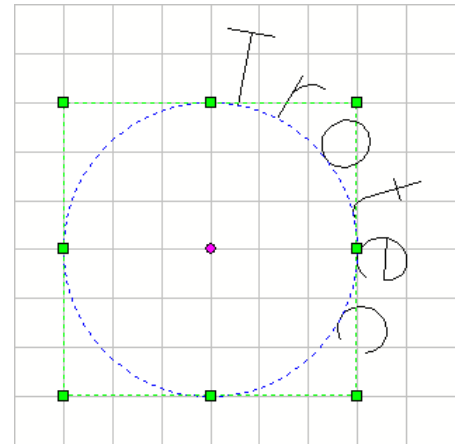
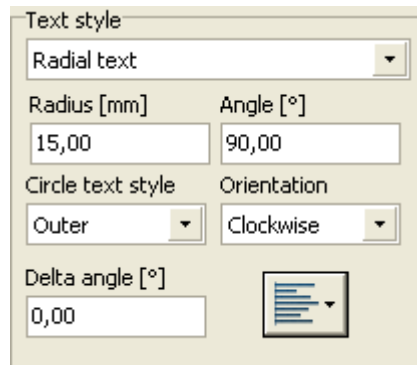


²³ Please refer to the button top right in the Text Style section.

Radial text

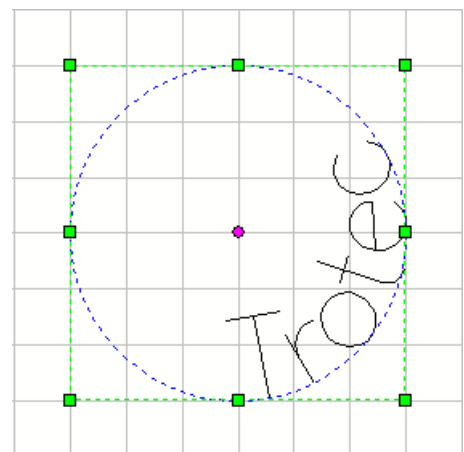
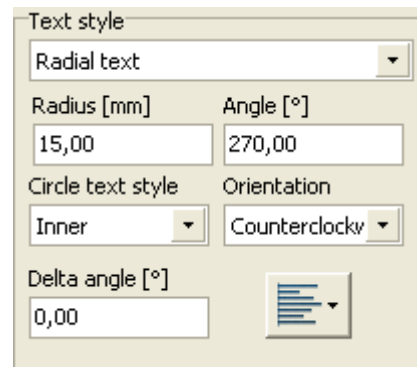
The radial text style is used to display the text in the form of a virtual ring marking defined by the Radius parameter. Only the first line of multiple lines of text is displayed.

With circle text style "Outer" the text is aligned on the outer side of the virtual ring.



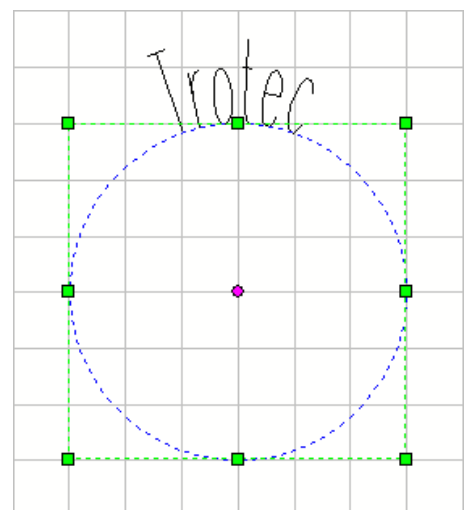
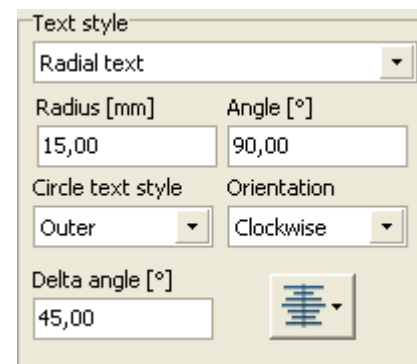
With circle text style "Inner" side of the virtual ring.

Additionally the orientation is set here to counterclockwise.



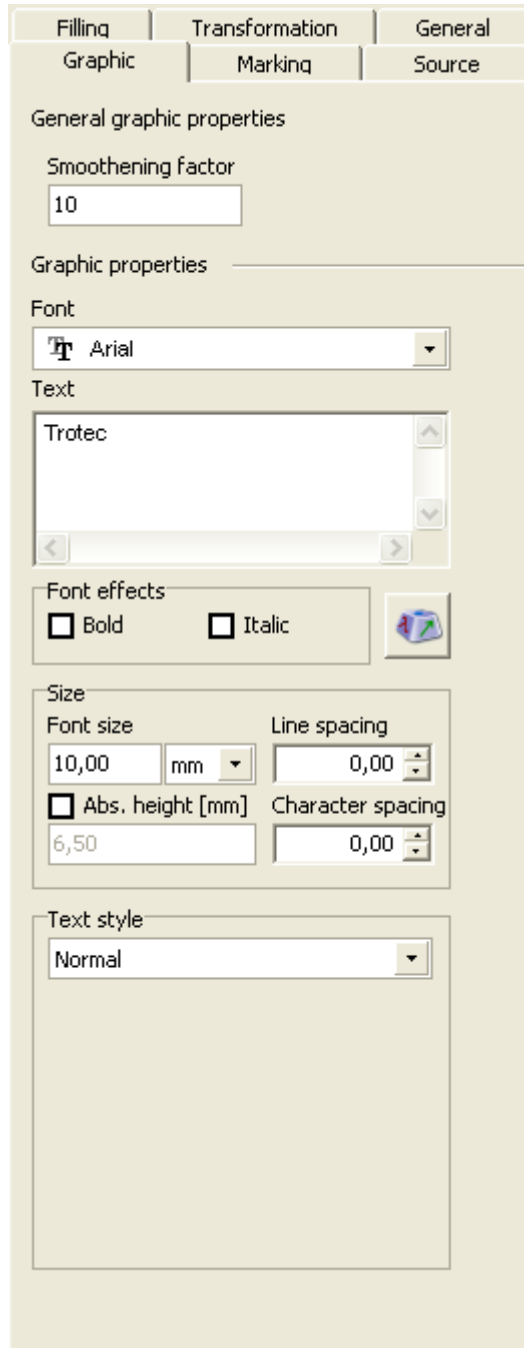
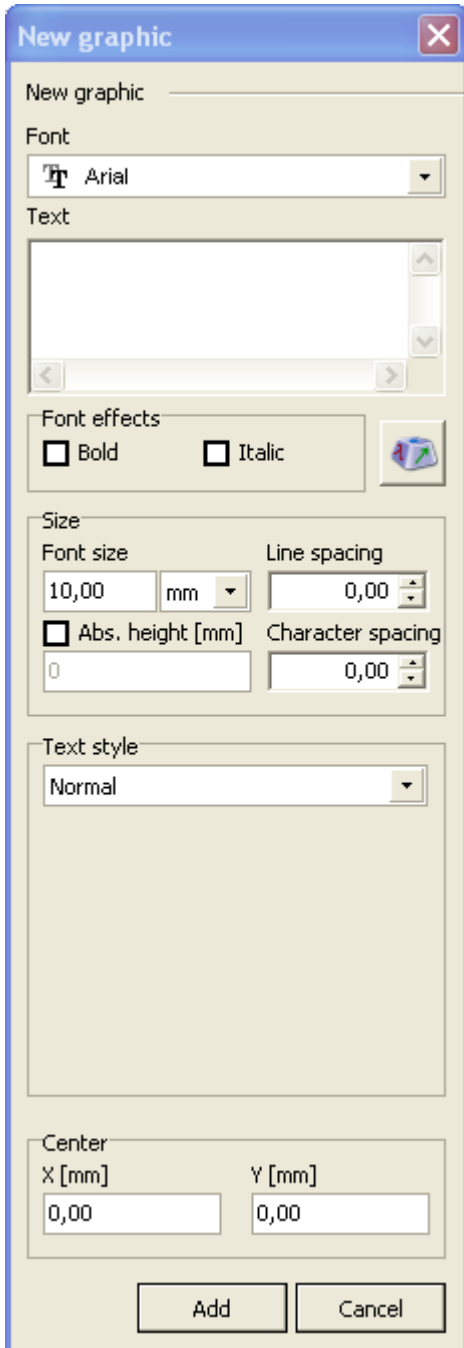
The option delta angle allows the reduction of the text length to a specified angle. Becomes the text length greater, the text will be compressed. With an angle value of 0° this option is deactivated.

Additionally with the button alignment it is possible to define if the text should be aligned centered, left or right to the angle.



5.2.7 Outline Text

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



Font

Outline Text elements may use any of the 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.

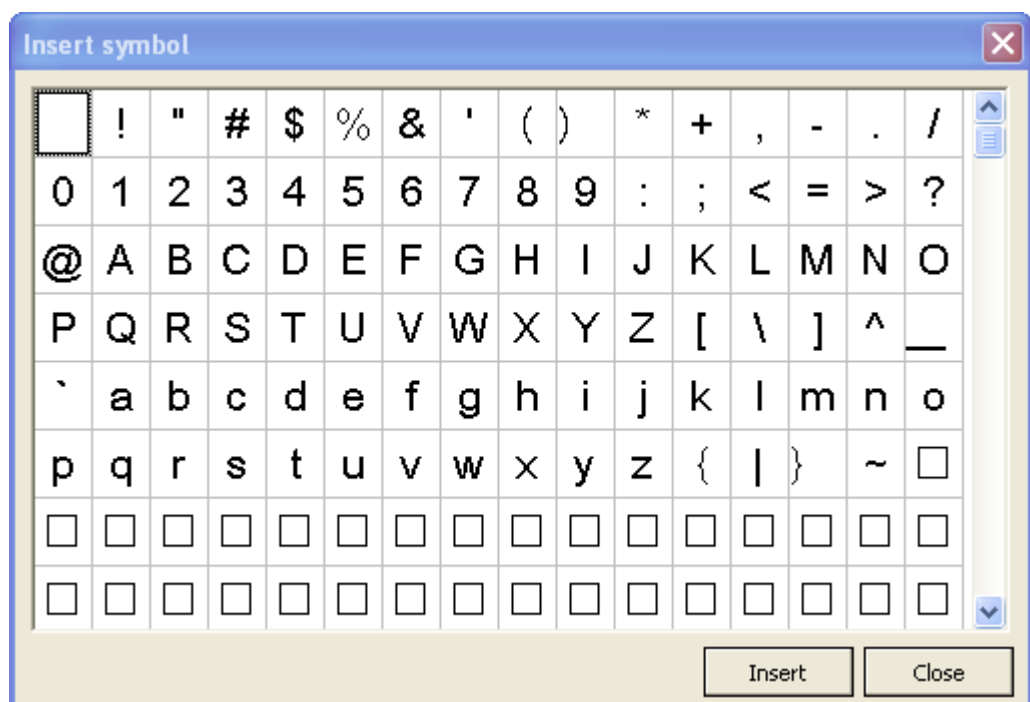
Font effects

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. In order to actually make an Outline Text element bolder, this text must be shaded.

Symbol table

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

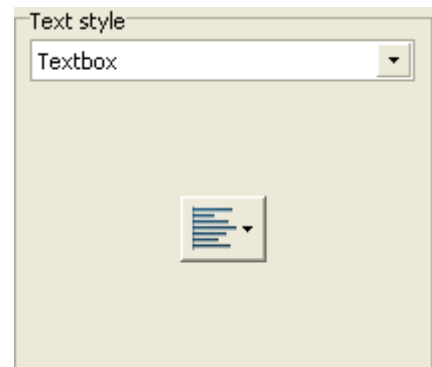
A text element may be displayed in various direction styles incorporating various display format properties.

Normal

The text is displayed using the specified font, text and size parameters. These parameter 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).

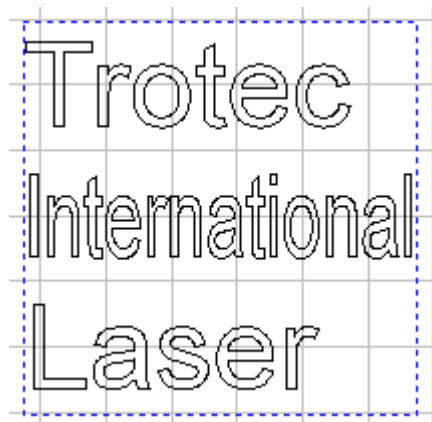
Text box

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 alignment²⁴ (left, right, centred).



For example, any lines which do not fit into the text box are compressed so that they may displayed within the overall size. Any lines which do not fit into the text box are cut off.

This type of text style is mainly used for markings on a work piece of a specific size.

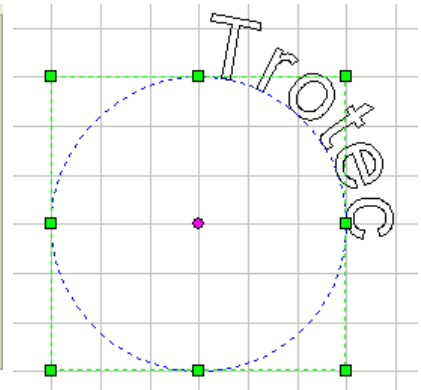
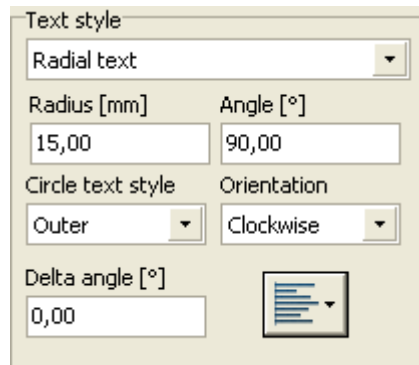


²⁴ Please refer to the button top right in the Text Style section.

Radial text

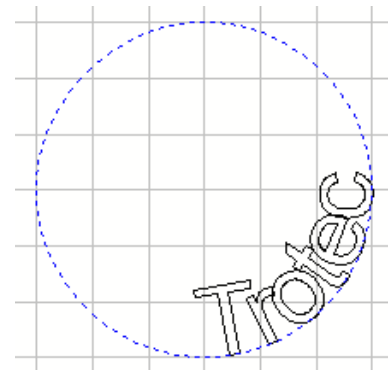
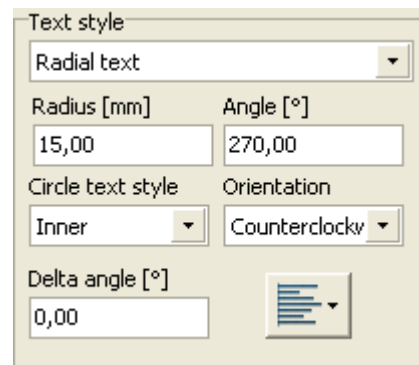
The radial text marking style is used to display the text in the form of a virtual ring marking defined by the Radius parameter. Only the first line of multiple lines of text is displayed.

With circle text style “Outer” the text is aligned on the outer side of the virtual ring.



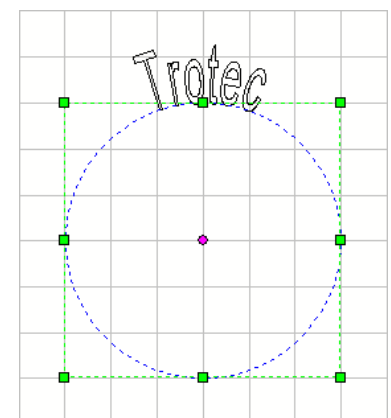
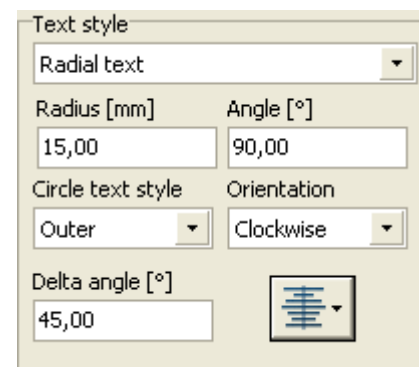
With circle text style “Inner” the text is aligned on the inner side of the virtual ring.

Additionally the orientation is set here to counter clockwise.



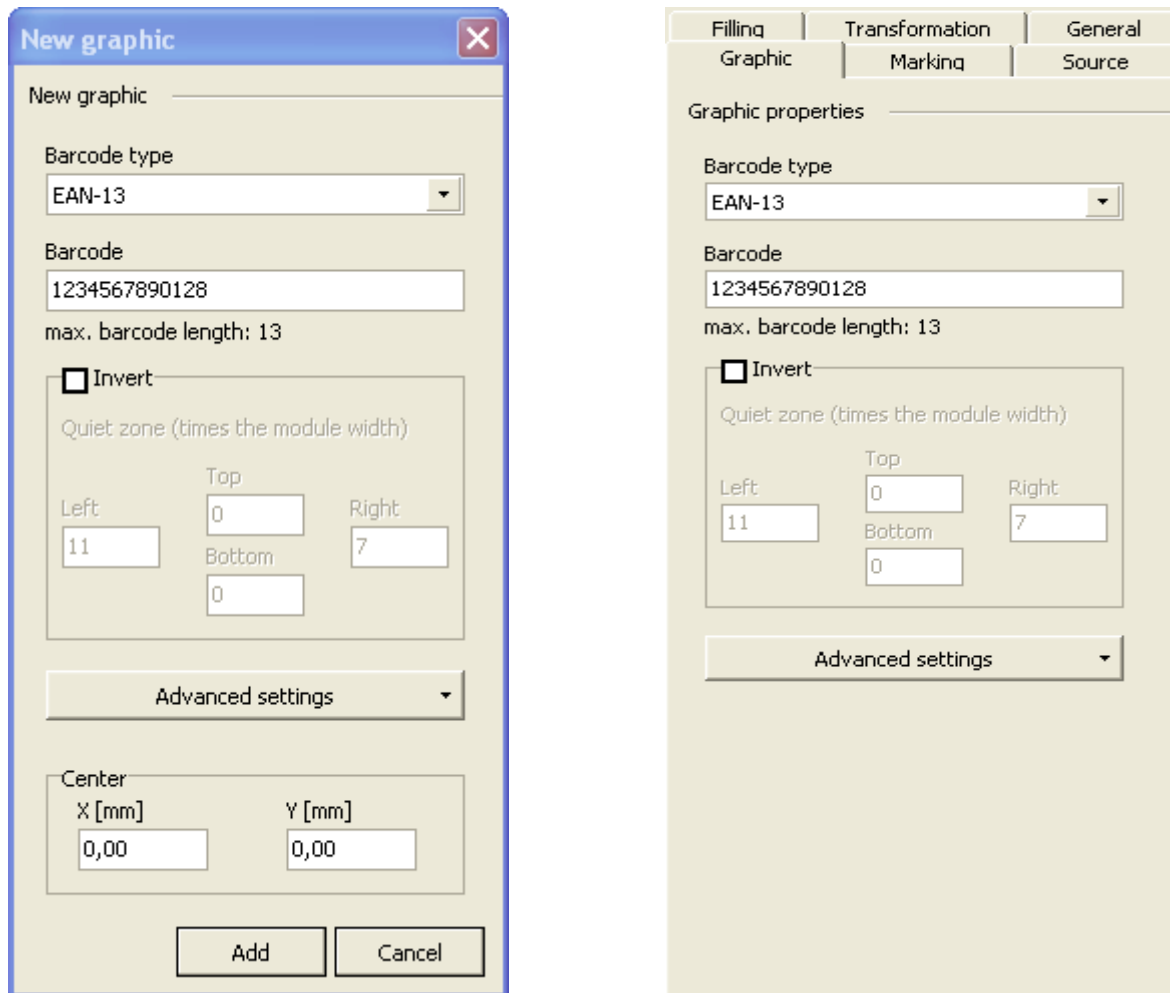
The option delta angle allows the reduction of the text length to a specified angle. Becomes the text length greater, the text will be compressed. With an angle value of 0° this option is deactivated.

Additionally with the button alignment it is possible to define if the text should be aligned centered, left or right to the angle.



5.2.8 Barcode 1D

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 19.1 Barcode 1D list on page 174.

Barcode

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

Invert

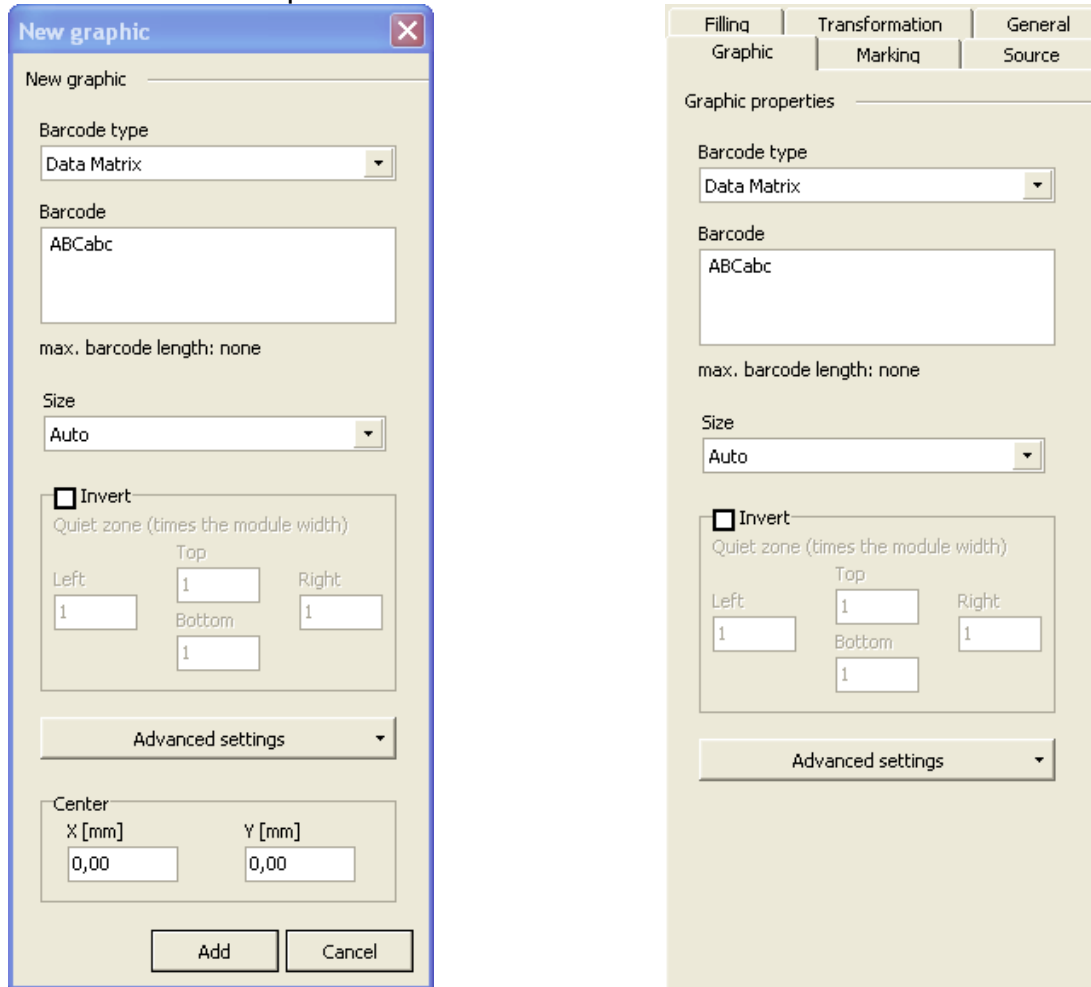
The Invert checkbox is used to indicate whether a barcode should be displayed inverted and which quiet zone settings should be used.

Advanced settings

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

5.2.9 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 19.2 Barcode 2D list on page 176.

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.

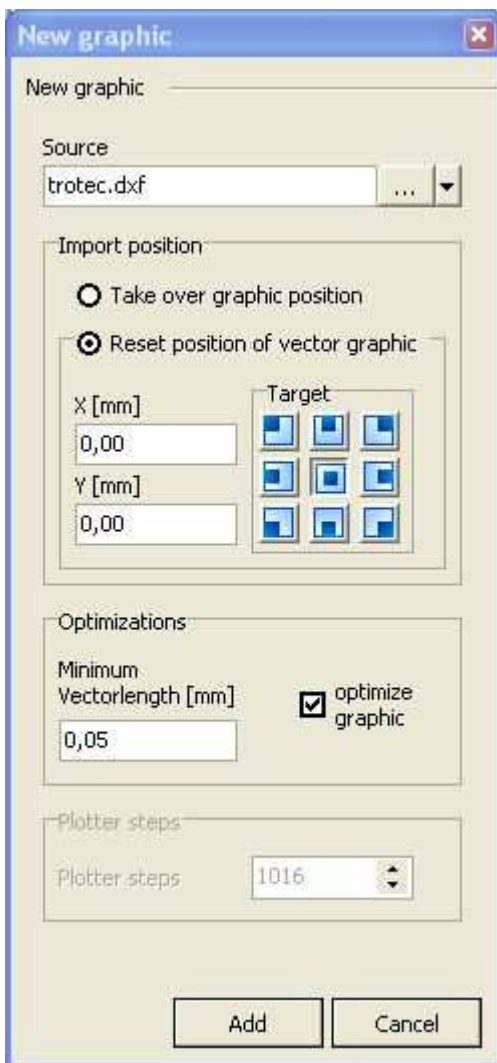
Advanced settings

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

5.2.10 Vector Graphic

The Vector Graphic element is used to import vector graphics from external programs (e.g. Corel Draw, AutoCad, ...). SpeedMark supports a variety of different import filters for transferring data.

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.



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.

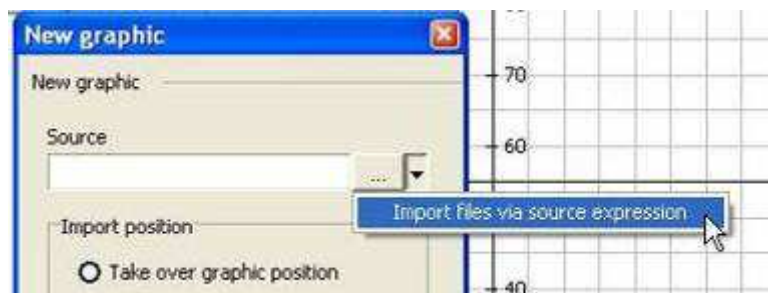
Source (New Graphic)

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 in order to import Corel Draw files²⁵)

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.²⁶



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.

²⁵ 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.

²⁶ Using Graphic Properties Source is described in more detail in Chapter 5.3.6 Source on page 62

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

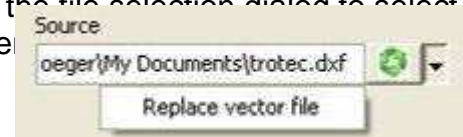
This setting is relevant to the import of HPLG files. It is used to specify the plotter steps required for importing (default value is 1016).

Source (Graphic Properties)

To update a vector file, press the green Update button. This reloads the selected vector file according to the given import settings. All previously performed transformations remain unchanged.



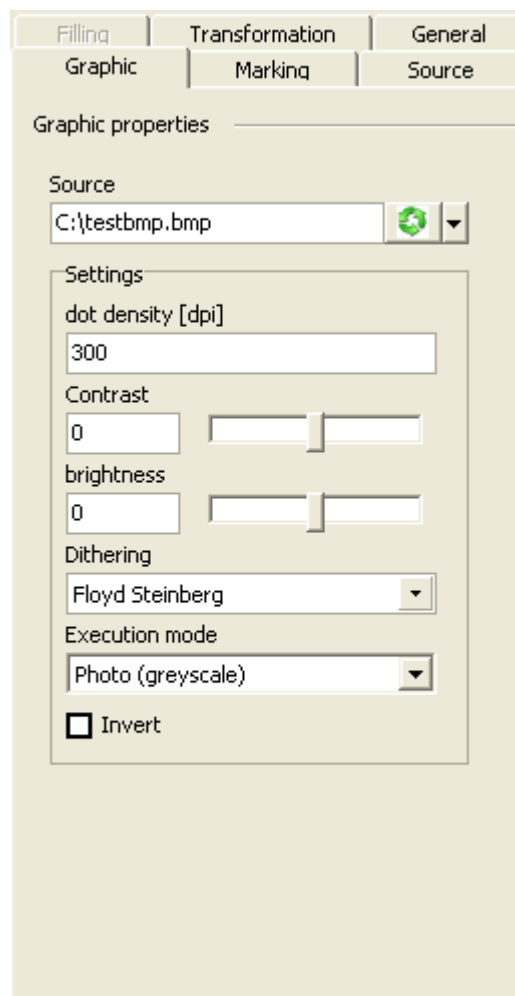
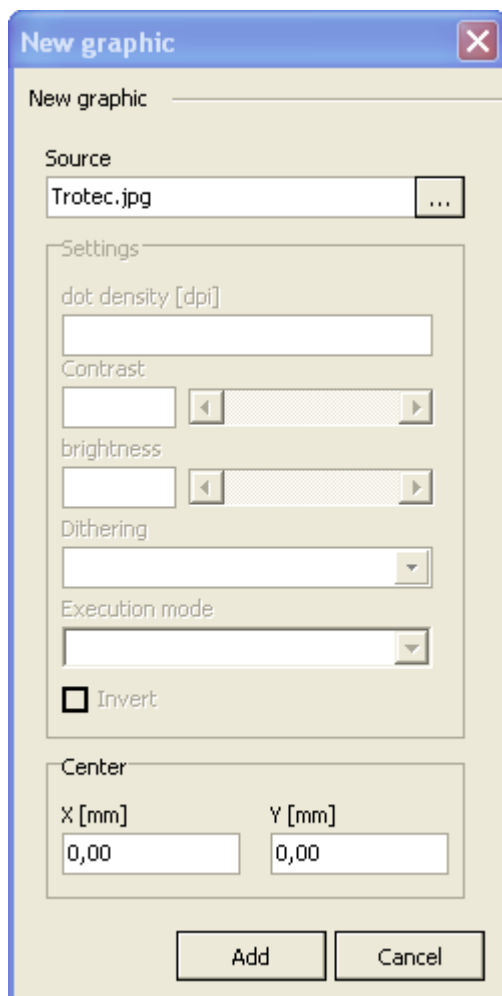
To replace a vector file, press the green arrow button. Use the file selection dialog to select a new file. This re-imports the new file according to the given import settings. All previously performed transformations remain unchanged.



5.2.11 Raster Graphics

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 in order 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
- Sierra
- Jarvin, Judice & Ninke
- Stevenson & Arche
- Burkes

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)
- Logo (Black/White)
Graphic will be vectorized and the found regions will be quickly marked with vectors (recommended for logos)

Inverted

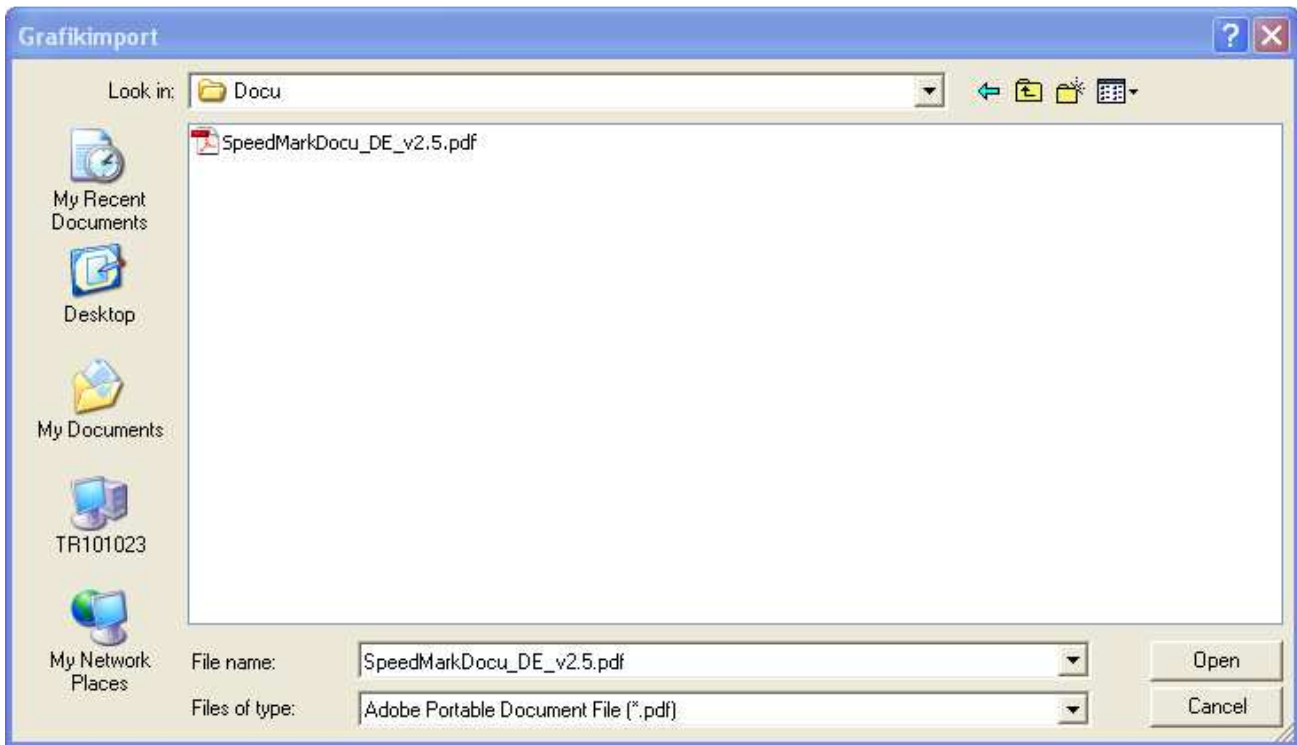
This specifies whether a raster graphic should be inverted or not.



5.2.12 PDF

The PDF graphic element supports the import of PDF files used for raster graphic elements.

A PDF file can be selected for importing using a file selection dialog.



Use the Import Graphic Wizard to set the necessary import settings such as Import DPI, Page and Import Position (Centre).

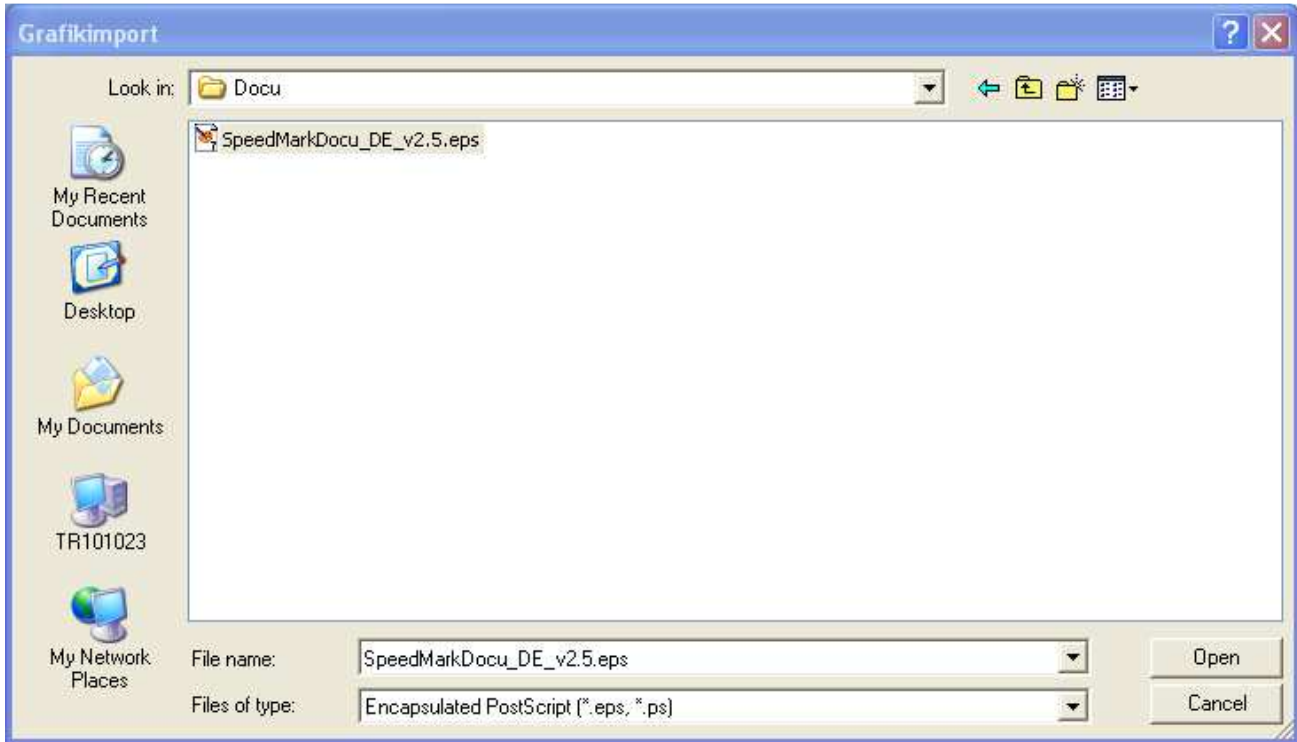
The imported PDF element is then available in SpeedMark as a raster graphic. All raster graphic settings can be found in the previous Chapter 5.2.11 Raster Graphics on page 54.



5.2.13 Import

Import Graphic Element supports the import of PDF and EPS files used for raster graphic elements.

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



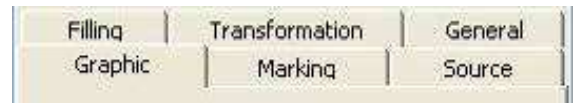
Use the Import Graphic Wizard to set the necessary import settings such as Import DPI, Page and Import Position (Centre).

The imported graphic element is then available in SpeedMark as a raster graphic. All raster graphic settings can be found in the Chapter 5.2.11 Raster Graphics on page 54.



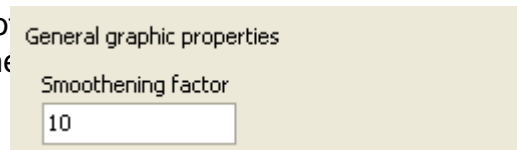
5.3 Editing Basic Graphic Properties

The Graphic Properties window not only offers the possibility of editing special graphic element properties, 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.

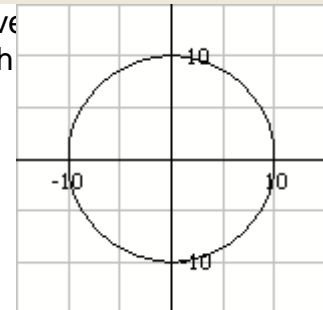


5.3.1 Basic Graphic Properties

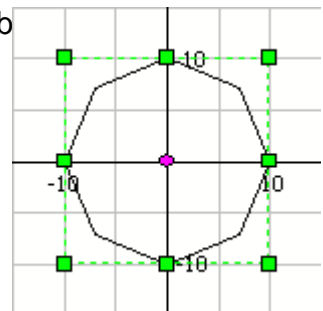
The Graphic tab contains the basic graphic properties of specific graphic properties of the selected graphic element.



The Smoothing Factor is used to determine how fine or coarse a curve of individual vector strokes. The adjacent example shows a circle with 10 sub-divisions per curve (four curves per circle).



The adjacent example shows a circle with a smoothing factor of 2 sub-



Under normal circumstances, a smoothing factor of 10 is sufficient for achieving an optimal marking.

Auto data apply

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

²⁷ Not all graphic elements support these general graphic properties

5.3.2 General

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

The Description section can be used to amend the standard title and the 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.

The Behaviour section determines the process flow of the graphic element. Breakpoint is used to specify whether the flow should be interrupted during debug mode²⁸ 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, on the other hand, displays the element on the drawing interface although it will not be marked by the laser unless it is actively set.

The Contour and Filling sections²⁹ provide basic information regarding the graphic element in terms of the number of points, number of jumps and overall vector length.

Graphic	Marking	Source
Filling	Transformation	General
Description		
Caption Outline text		
Note/Comment Trotec		
ID {C2D054EA-394E-4BF8-AB8B-36417A616CC}		
Behaviour		
<input type="checkbox"/> Breakpoint		
<input checked="" type="checkbox"/> Show graphic		
<input checked="" type="checkbox"/> Element is active		
Contour		
number of points	Length [mm]	
230	46,07	
number of jumps		
4		
Filling		
number of points	Length [mm]	
0	0,00	
number of jumps		
0		

²⁸ Further information on the debugging of programs can be found in Chapter 14.4 Debug Programs on page 128

²⁹ This section is only displayed for graphic elements containing filling.

5.3.3 Filling

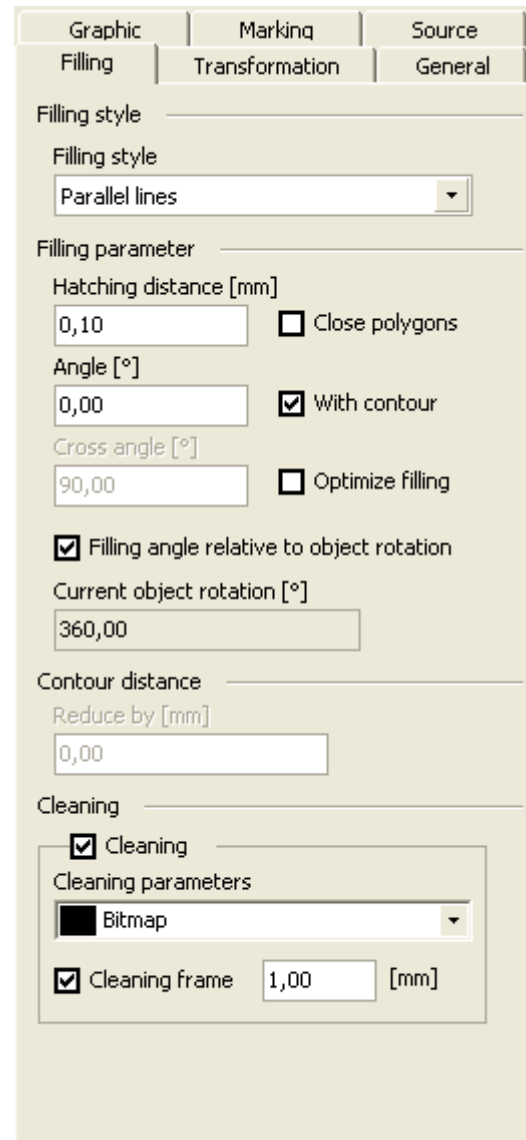
The Graphic Properties Filling tab contains all the parameters required to define the filling of a graphic element.³⁰

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	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 ³¹
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.



The filling lines may be shortened by the value entered in the Contour distance section.³² The Clean section may be used to process the graphic again with the laser and other marking parameters in order to remove any abrasion. Use this to specify the marking parameter set and the cleaning frame (outward extension of the contour).

³⁰ This tab is only available for shadable graphic elements.

³¹ In many instances, this means that the parallel filling of the optimisation process creates a bi-directional filling. This is a result of flow optimisation.

³² However, this function refers to the reduction of individual filling lines and not the outline itself.

5.3.4 Transformation

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

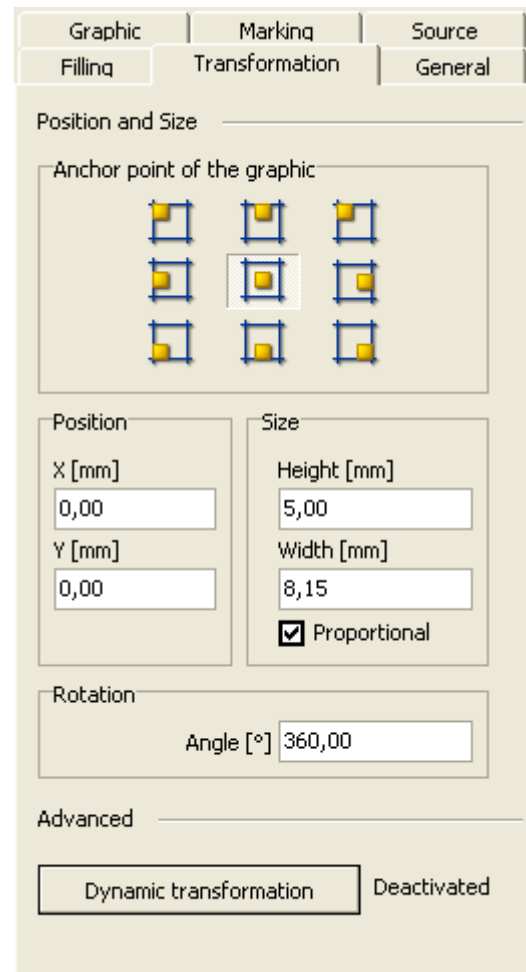
The anchor point of the graphic defines the fixed point around which the transformation should occur. This point is marked in purple in the selection marker³³.

The position may be adjusted by entering the appropriate values in the X and Y input fields.

The size may be adjusted by editing the values in the Height and Width input fields. Activating the Proportional option retains the aspect ratio of the graphic element.

The Object Rotation may be adjusted by entering an appropriate angle. Negative angles may also be entered.

Dynamic Transformation is used in conjunction with dynamic programs³⁴ and is explained in greater detail in the following chapters.



³³ See also 5.1.4 Editing Graphic Elements with the Mouse on page 32

³⁴ A detailed explanation on usage of dynamic Transformation can be found in chapter 14.5 Dynamic Positioning on page 130.

5.3.5 Marking

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

A detailed explanation of the marking parameters can be found in Chapter 7 Material Parameter Manager on page 69.

The section intensity adjustment is used to adjust laser settings like power and frequency without overwriting the material parameter settings.

The parameter settings section shows the current parameters used for this graphic element.



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

Filling	Transformation	General
Graphic	Marking	Source

Material parameter

Standard / Standard

Standard

Intensity adjustment

Power [0%] Speed [0%]

Parameter settings

Material group	Material
Standard	Standard
Name	Quality
Standard	100
Power [%]	Speed [mm/s]
100	2000,0
Frequency [kHz]	Iterations
50,00	3

5.3.6 Source

The Source settings are used to link dynamic data to graphic elements. For example, it is possible to set series text functions³⁵.

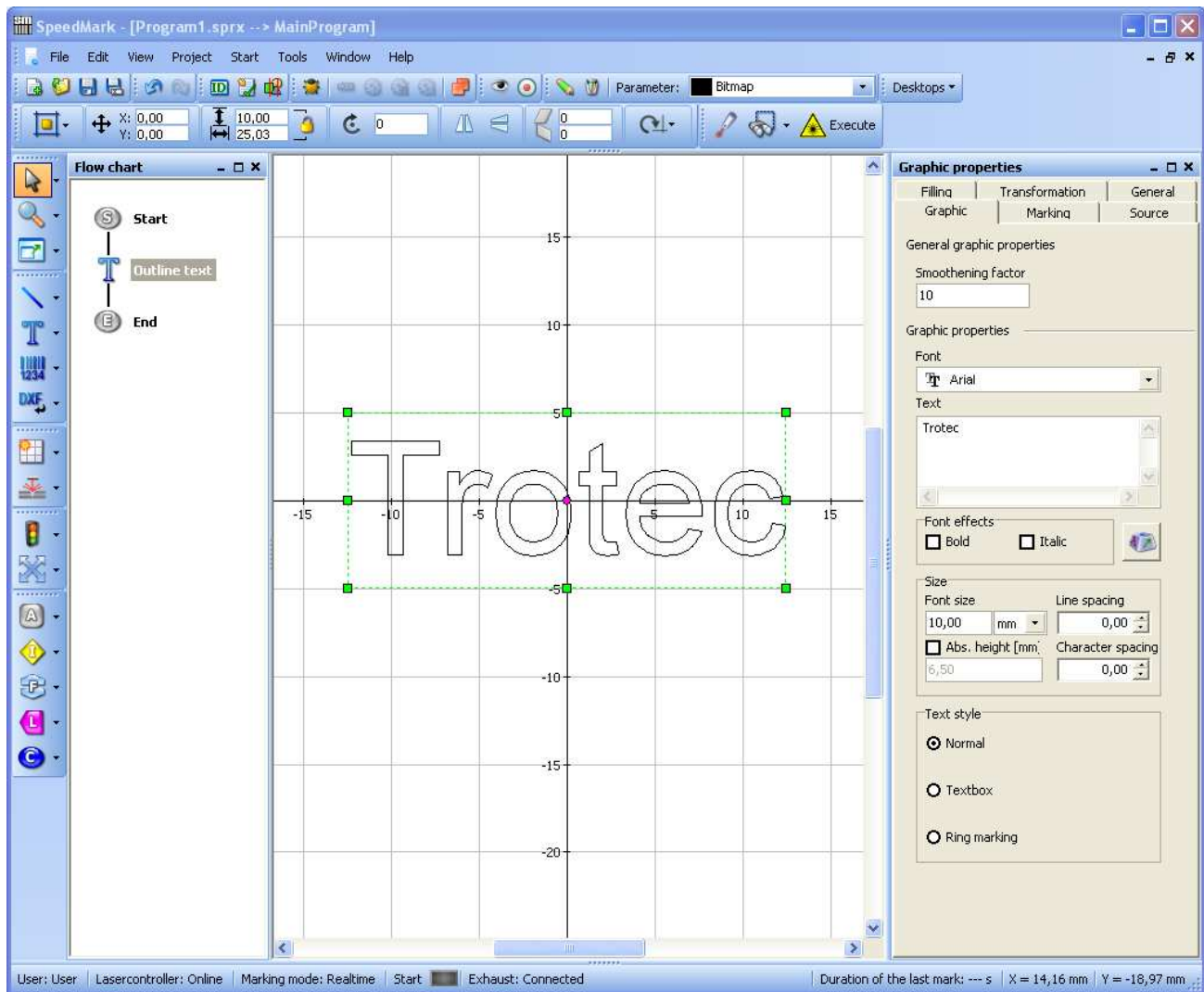
Filling	Transformation	General
Graphic	Marking	Source

Rule for text

Static text

³⁵ See also 12 Serial data and Dynamic Graphic Element Content on page 103

6 Marking with the Laser



6.1 Creating a Test Program

All of the following procedures are based on the simple program containing the Trotec text pictured above. The following steps must be carried out to create this program:

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 laser³⁶
5. Save the program using the File → Save As menu
6. The new program is now ready for processing the workpiece.
7. Prepare a suitable workpiece for marking.

³⁶ Represented by the rectangle surrounding the Trotec text.

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.

With border marking the outer bound of all graphics will be highlighted.

With border mark selected graphics only the outer bound of all selected graphics will be highlighted.

	Boder marking	F9
	Border mark positioning graphics	F10
	Border mark selected graphics	F11

With border mark positioning graphics the **contour** of all available positioning graphics will be highlighted³⁷.

In the subsequent “Border marking” dialog it is possible to change between the above mentioned options.

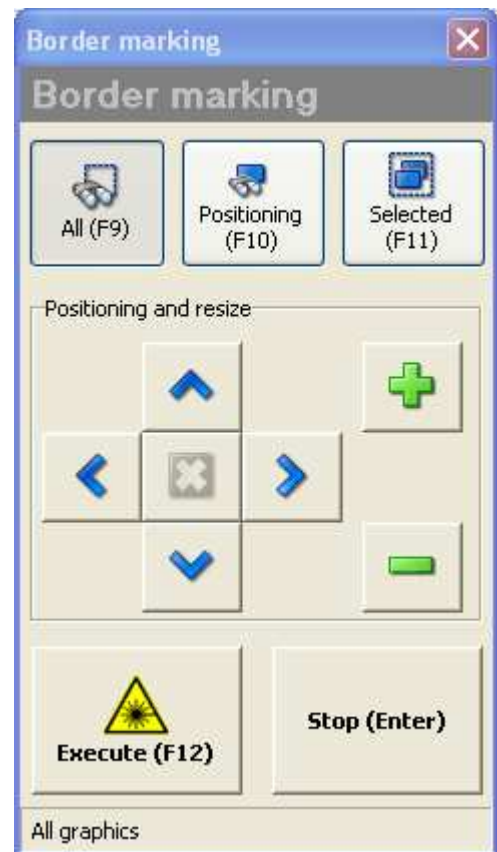
With “Positioning and resize” it is possible to adjust the graphic elements to the work piece.



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

With the button “Execute” all graphics will be marked directly.

With “Stop” the border marking ends.



³⁷ See also 7.3.2 Marking mode on page 74

6.3 Normal Program Execution



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

6.3.1 Start Program Execution and Marking

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

6.3.2 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.



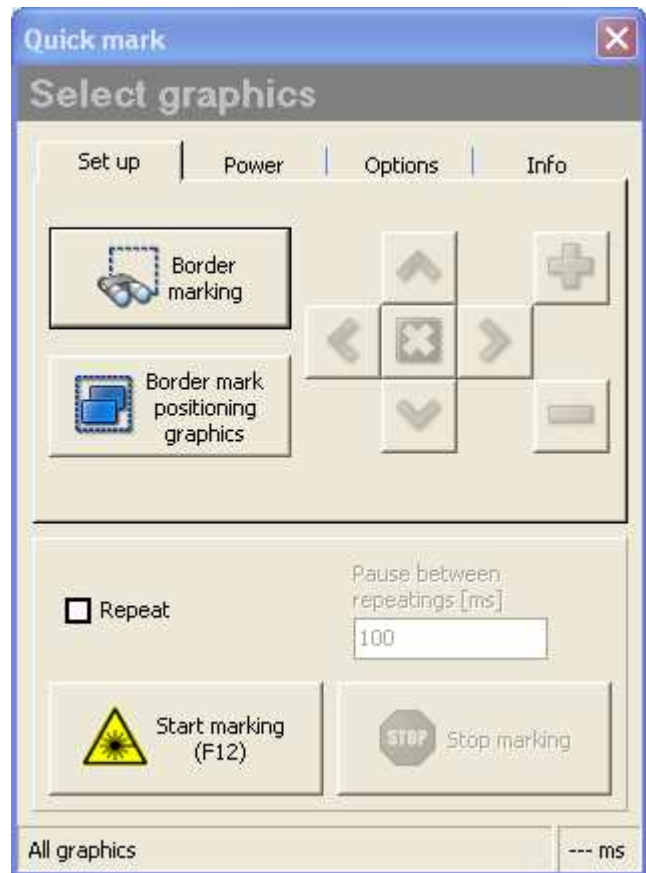
6.4 Quick mark



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.



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.

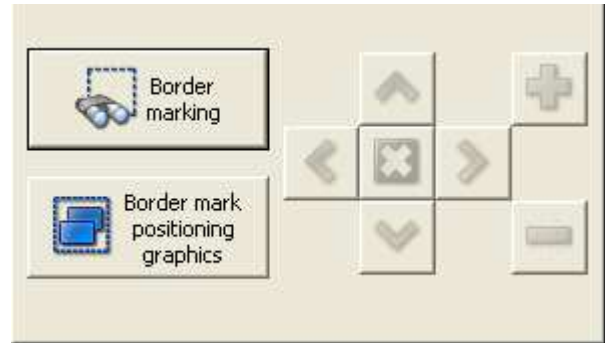


6.4.1 Set-Up Workpiece

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 laser³⁸.



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 Quick mark

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

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 are able to specify the pauses between the individual repetitions.

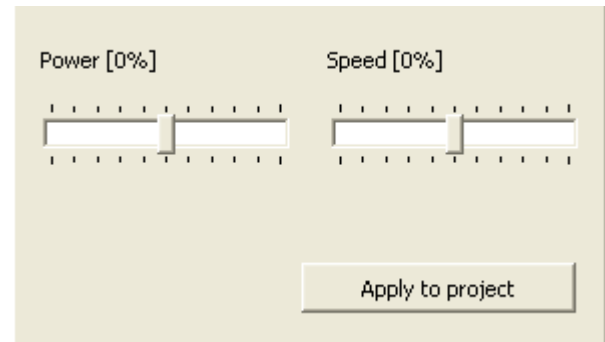


³⁸ Further information on material parameter property “Positioning” can be found in chapter 7 Material Parameter Manager in sub chapter Marking mode on page 74.

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 elements³⁹.

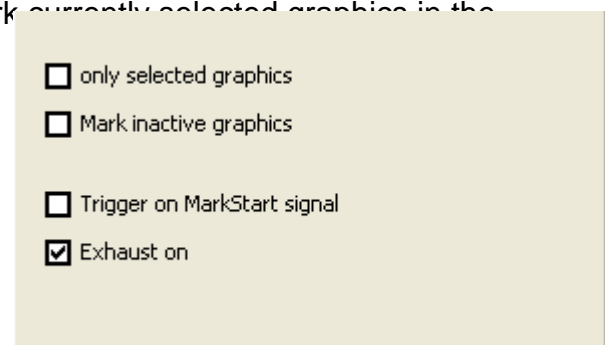


6.4.4 Options

The option “Only selected graphics” will only mark currently selected graphics in the drawing interface.

The option “Mark inactive graphics” allows the marking of inactive graphics.

The “Trigger on MarkStart signal” option causes SpeedMark to begin marking only once the MarkStart signal is issued.

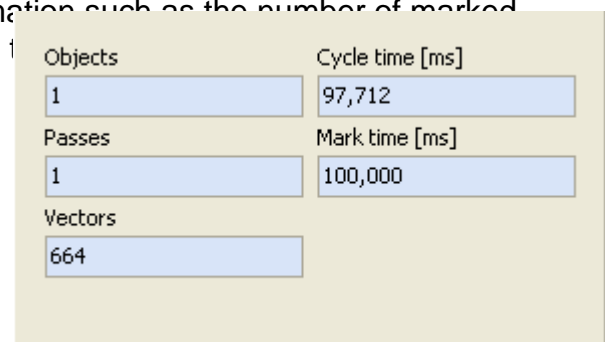


The option “Exhaust on” will start a connected exhaust before marking.

6.4.5 Marking Information

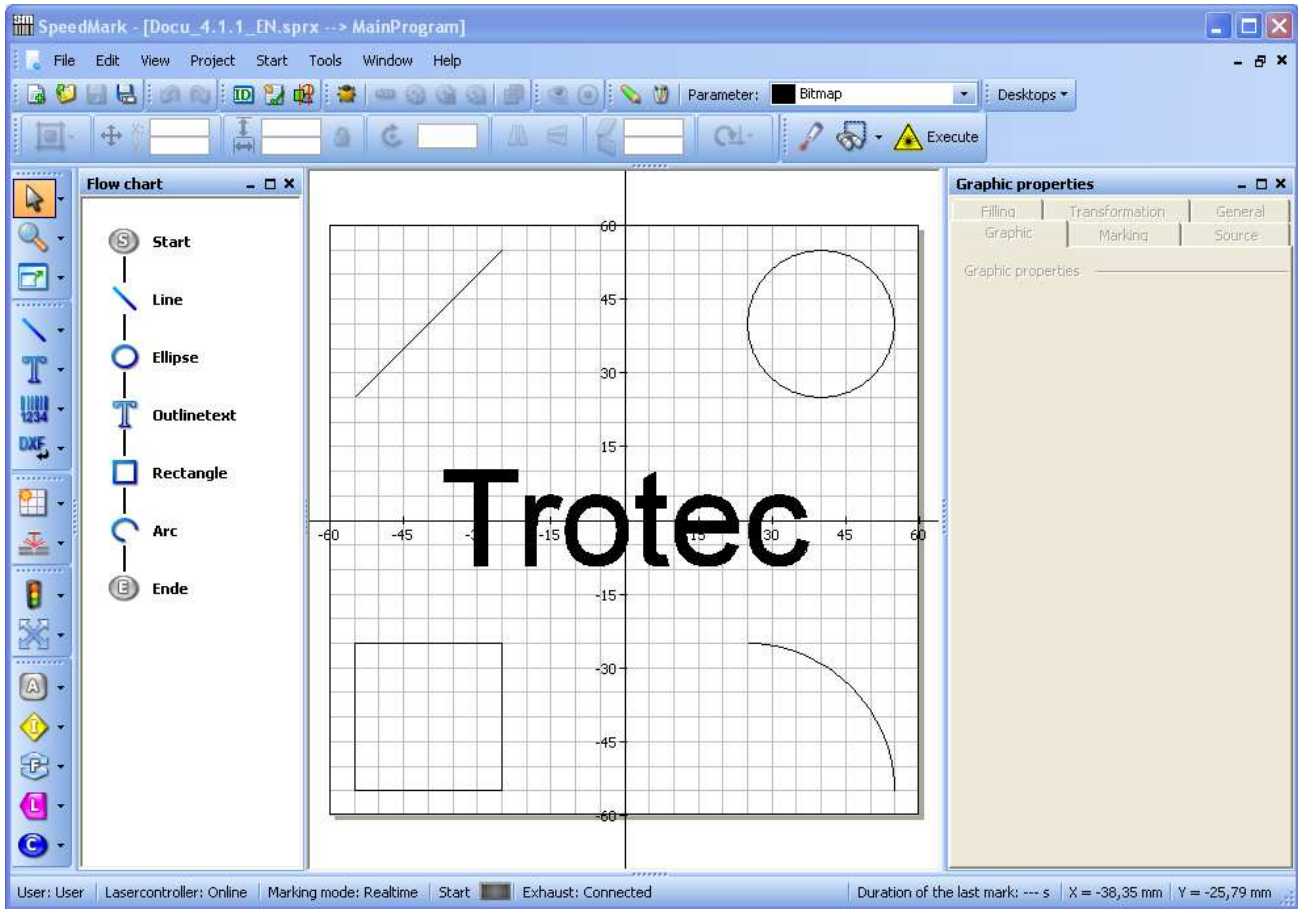
Once the marking is complete, all relevant information such as the number of marked objects, number of cycles, marked vectors, cycle time

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.



³⁹ See also 5.3.5 Marking on page 62

7 Material Parameter Manager

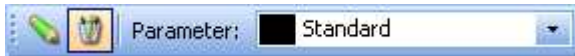


Material parameters can be used to adjust how the laser marks the workpiece. This chapter describes how the material parameters are defined and how they can then be applied to individual graphic elements.

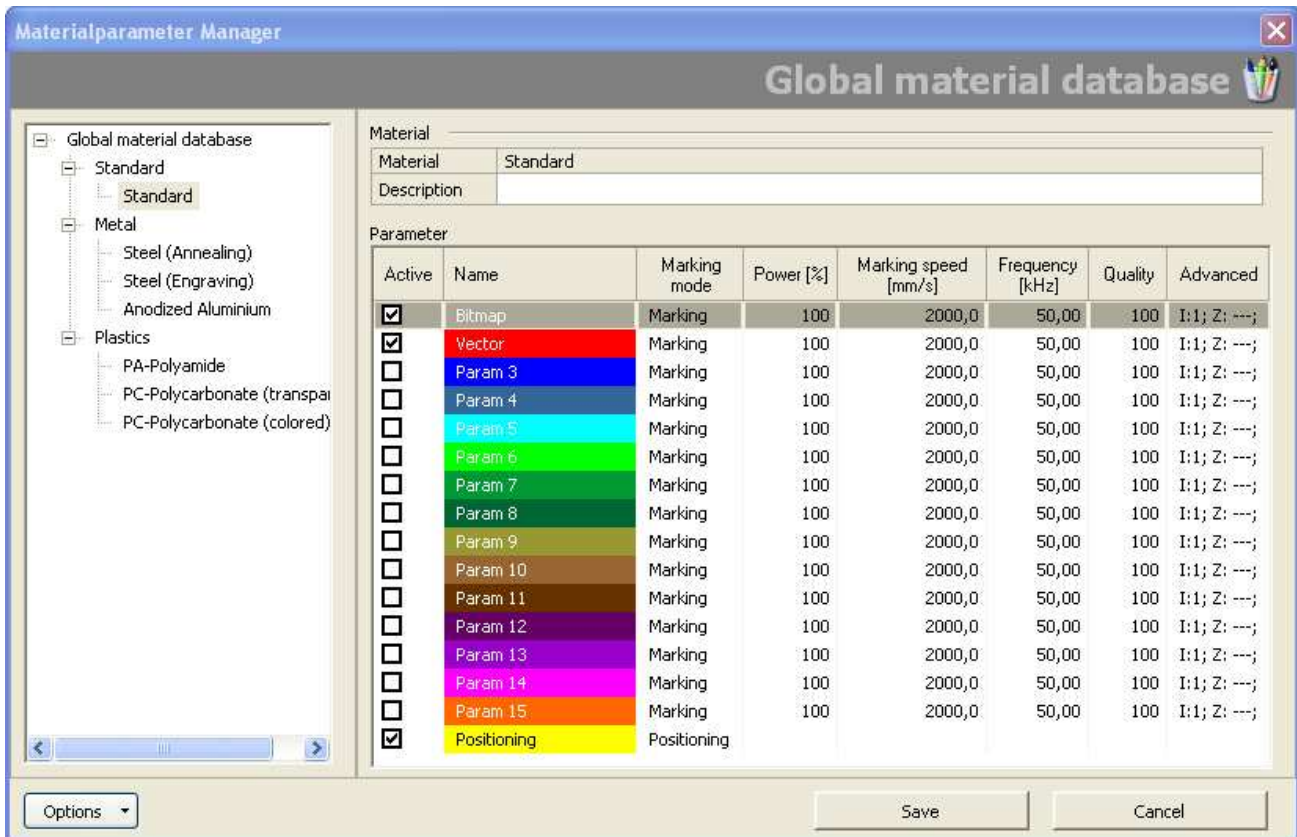
In SpeedMark there is the difference between global material database und local project material parameter:

- 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

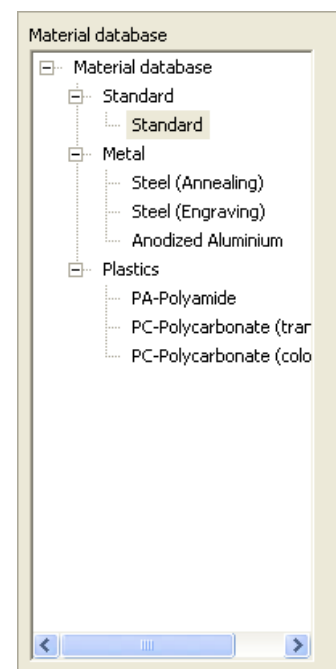


The global material database is available for all SpeedMark projects and allows the controlling of materials and the associated material parameters.



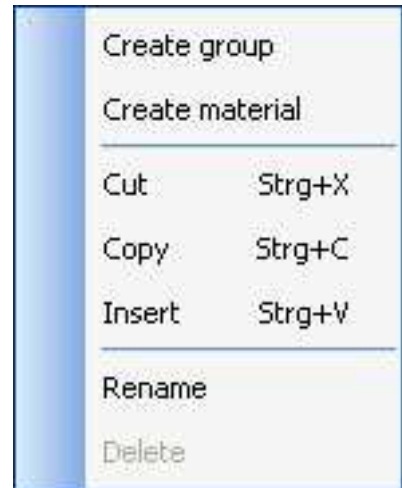
All used material parameters can be managed by the material parameter manager. If not already visible, this dialog can be opened using the View → Global material database menu or the marked buttons in the picture above.

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).

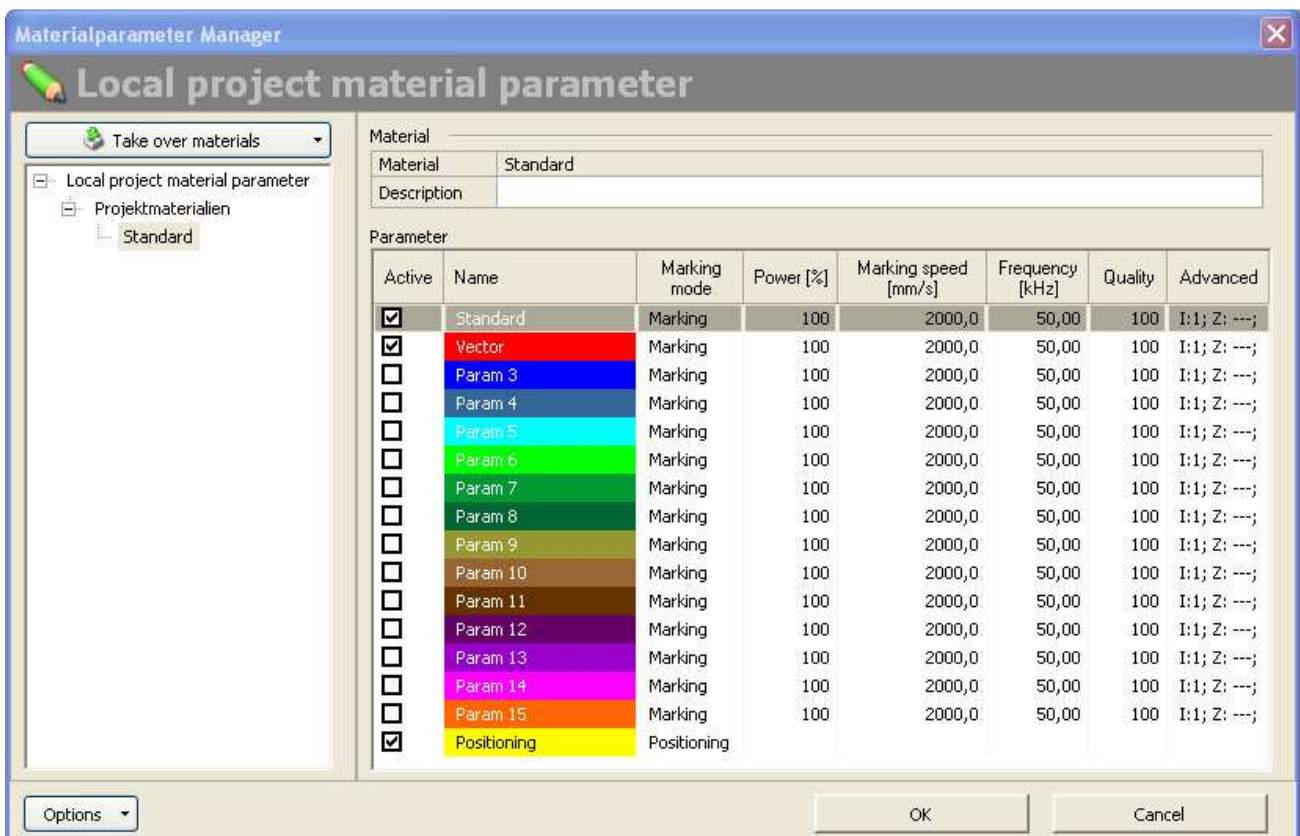


The material "Standard" can not be deleted.

7.2 Manage local project material parameter



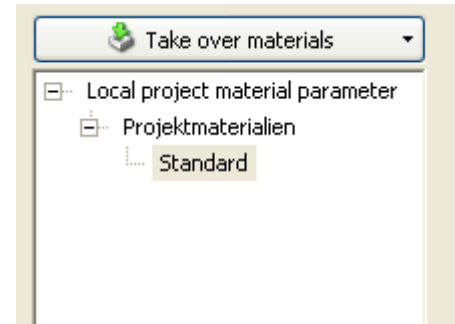
The local project material parameters are only available for one specific project.



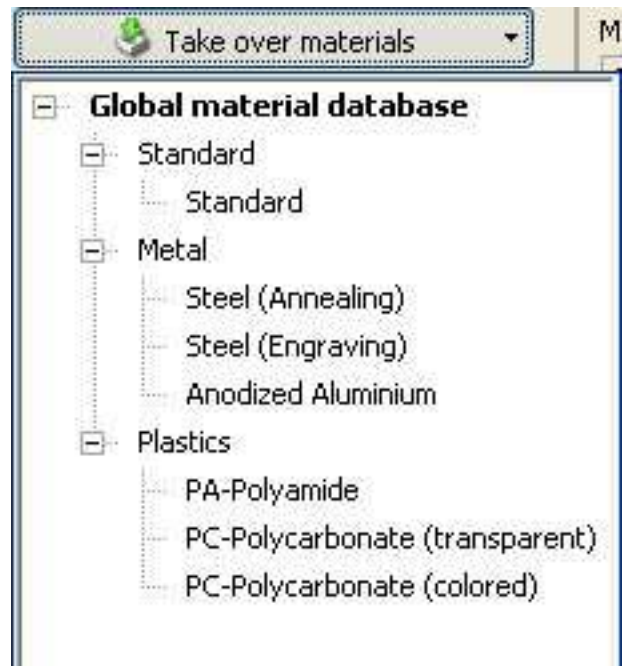


All used material parameters can be managed by the material parameter manager. If not already visible, this dialog can be opened using the View → Project material parameter menu or the marked buttons in the picture before.

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



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).



The material “Standard” can not be deleted.

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



7.3 Define Material Parameters

Material							
Material		Standard					
Description							
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	I:1; Z: ---;
<input checked="" type="checkbox"/>	Vector	Marking	100	2000,0	50,00	100	I:1; Z: ---;
<input type="checkbox"/>	Param 3	Marking	100	2000,0	50,00	100	I:1; Z: ---;
<input type="checkbox"/>	Param 4	Marking	100	2000,0	50,00	100	I:1; Z: ---;
<input type="checkbox"/>	Param 5	Marking	100	2000,0	50,00	100	I:1; Z: ---;
<input type="checkbox"/>	Param 6	Marking	100	2000,0	50,00	100	I:1; Z: ---;
<input type="checkbox"/>	Param 7	Marking	100	2000,0	50,00	100	I:1; Z: ---;
<input type="checkbox"/>	Param 8	Marking	100	2000,0	50,00	100	I:1; Z: ---;
<input type="checkbox"/>	Param 9	Marking	100	2000,0	50,00	100	I:1; Z: ---;
<input type="checkbox"/>	Param 10	Marking	100	2000,0	50,00	100	I:1; Z: ---;
<input type="checkbox"/>	Param 11	Marking	100	2000,0	50,00	100	I:1; Z: ---;
<input type="checkbox"/>	Param 12	Marking	100	2000,0	50,00	100	I:1; Z: ---;
<input type="checkbox"/>	Param 13	Marking	100	2000,0	50,00	100	I:1; Z: ---;
<input type="checkbox"/>	Param 14	Marking	100	2000,0	50,00	100	I:1; Z: ---;
<input type="checkbox"/>	Param 15	Marking	100	2000,0	50,00	100	I: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:

- Active, 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 can not 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. The following options are available:

- Marking
The graphic element will be marked with the specified laser system parameters
- Positioning
The graphic element will NOT be marked with the laser. It will only be used for positioning of the work piece⁴⁰.

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.



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.⁴¹

⁴⁰ See also 6.4.1 Set-Up Workpiece on page 67.

⁴¹ Values normally range between 20 kHz and 80 kHz.

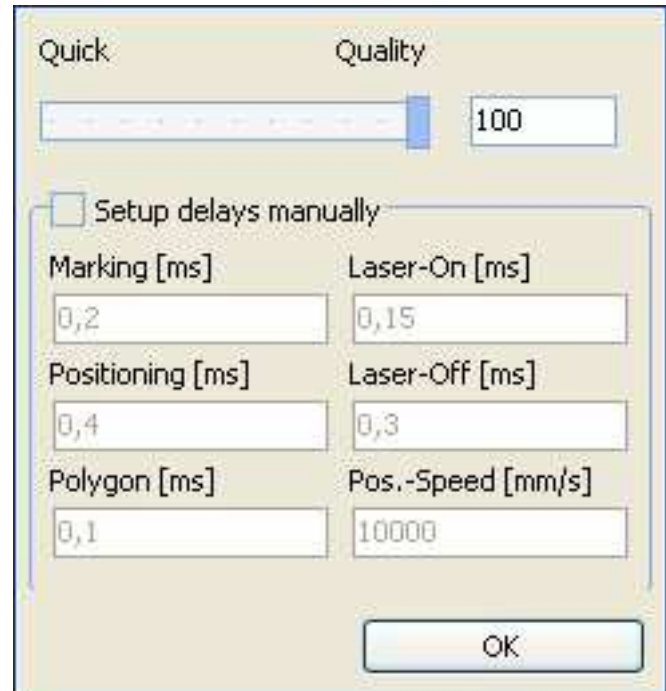


7.3.4 Quality - Delay Parameters⁴²

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

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.

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.⁴³

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.

⁴² 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.

⁴³ This time difference between the laser and the scanner head arises from the fact that the mirrors must first be sped up at the beginning of a movement thus causing a time delay.



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:

- In order to prevent a burning effect at the start of a marking process as the scanner head still has to bring the mirrors up to the preset marking speed. A suitably high positive value should be selected⁴⁴
- 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.⁴⁵

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.

Scanner delays

Scanner delays determine the behaviour of the scanner head in relation to the movement of the mirrors.

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.

⁴⁴ However, if too high a value is selected, the first part of the vector will not be marked.

⁴⁵ Using negative values for the laser on delay extends the overall marking time.





Marking Delay

Although the marking speed is normally lower than the jump speed, a drag delay will occur during marking. In order 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.

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.

Delay Value Guidelines⁴⁶

When setting the delay values, ensure that the following guidelines are observed in order to avoid problems:⁴⁷

1. The laser off delay must be longer than the laser on delay. Otherwise, laser control errors may occur.

$$LOffD > LOnD$$

2. The marking delay must be greater than the difference between the laser off delay and the laser on delay.

$$MarkD > LOffD - LOnD$$

7.3.5 Advanced

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

The other values like colour are for information purposes.

Iterations	1
Z-Offset	---
Color name	Black
Color value R	0
Color value G	0
Color value B	0
<input type="button" value="OK"/>	

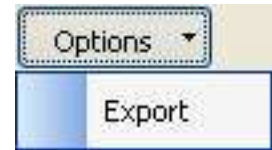
⁴⁶ These guidelines apply primarily to the use of a TLC2 control card. Please refer to the relevant guidelines in the documentation of any other control card you may be using.

⁴⁷ More detailed information on these guidelines can be found in the relevant documentation for your TLC2 card.



7.4 Exporting Material Parameters

With the export option it is possible to write the whole material database into a csv file⁴⁸.



7.5 Applying Material Parameters to Graphic Elements

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

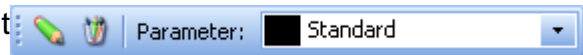
7.5.1 Setting Material Parameters using Graphic Properties

The Marking tab in Graphic Properties can be used to set material parameters to the graphic element using the material parameter manager.



7.5.2 Setting Material Parameters using the Toolbar

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

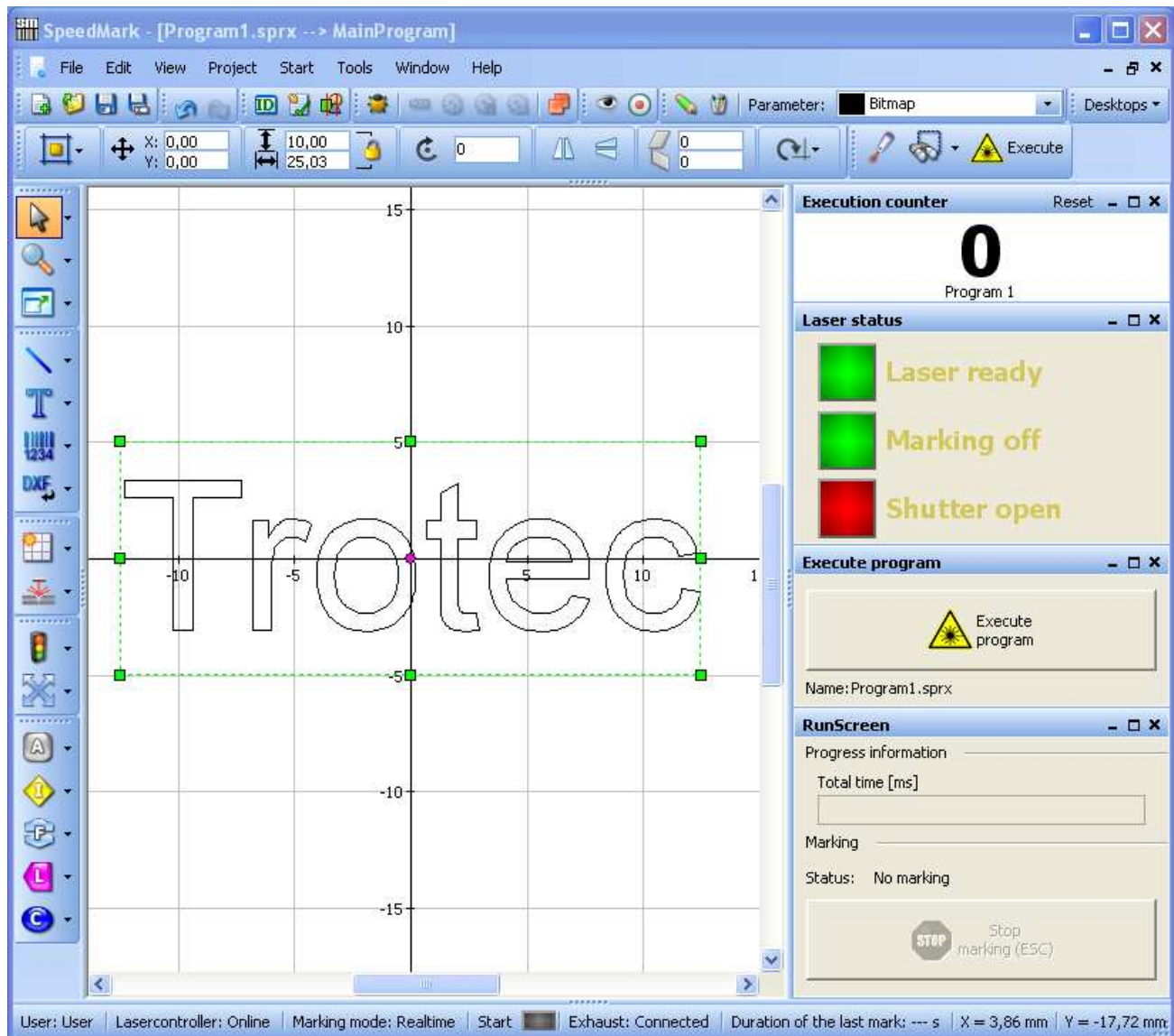


The selected parameter is also automatically allocated to any newly inserted graphic elements.

The material parameter manager is easily opened using the marker symbol on the right-hand side.

⁴⁸ These files can be opened with a text editor or Microsoft Excel and similar programs.

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 configuration⁴⁹.



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	Comment
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

8.2.1 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.



⁴⁹ When upgrading from a previous SpeedMark version this presetting may be differ. In this case contact your system administrator.

8.2.2 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.



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

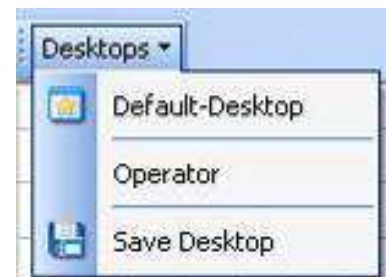
The Desktop Manager can be used to save user interface layouts for use in other applications (as described in the previous chapter).

8.3.1 Creating and Selecting Desktops Using the Toolbar

The Desktop toolbar can be used to select the standard desktop and previously saved desktops (e.g. operator), and to save current desktops.

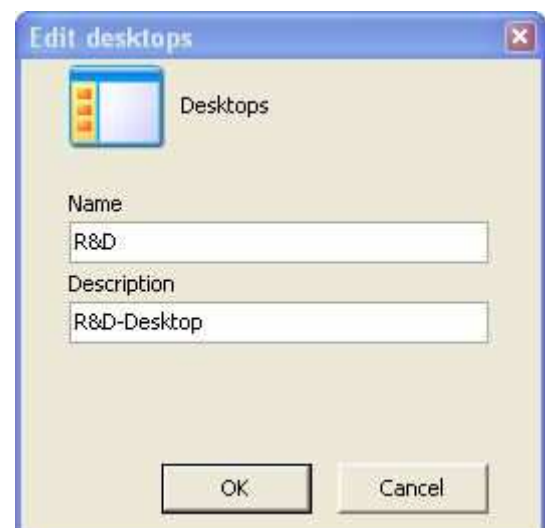
This menu consists of three parts:

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

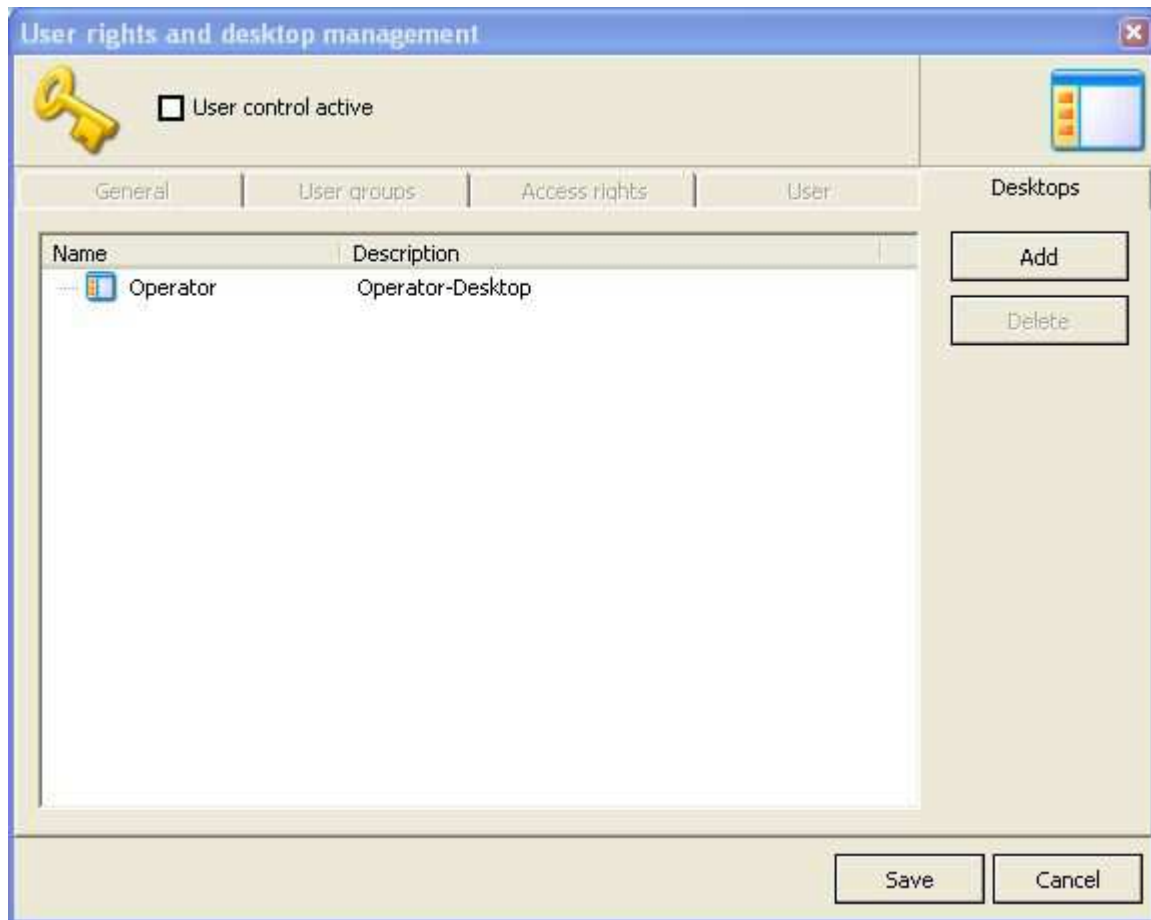


“Save Desktop” can be used to save the current user interface as a desktop. The adjacent dialog may be used to assign a name and description to the created desktop. The desktop is created by pressing the OK button.

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.



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.

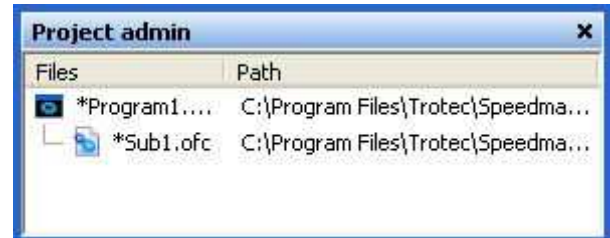


8.4 SpeedMark Windows

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

8.4.1 Project Management

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



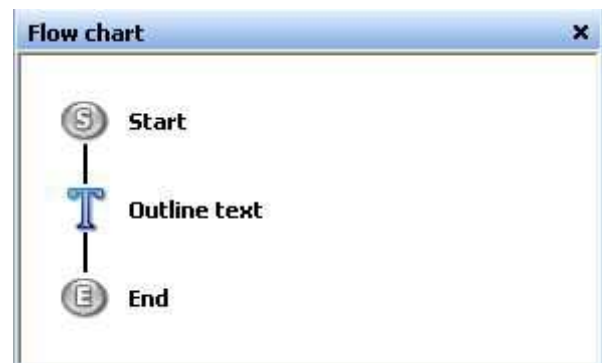
8.4.2 Graphic Properties

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.



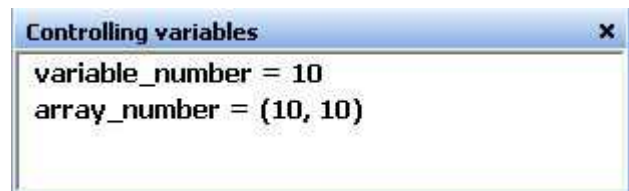
8.4.3 Flow chart

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



8.4.4 Controlling Variables

The Variable Monitoring window displays the values of all the defined variables during the debugging process.



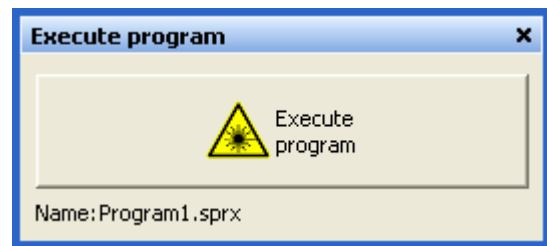
8.4.5 Error Messages

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



8.4.6 Execute Program

The Execute Program window executes the current SpeedMark program.



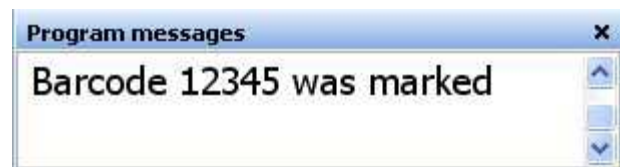
8.4.7 Internal RunScreen

The Internal RunScreen window is used to interrupt the current program. It displays the overall flow time when the program is complete.



8.4.8 Program Messages

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



8.4.9 Program Log

The “AddProgramLogText” program command can be used to issue log entries in this window. The entries are displayed in different formats depending on the log level.



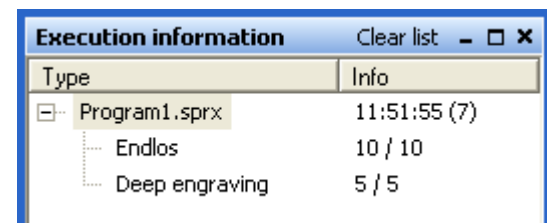
8.4.10 Execution counter

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



8.4.11 Execution info

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



8.5 User Groups

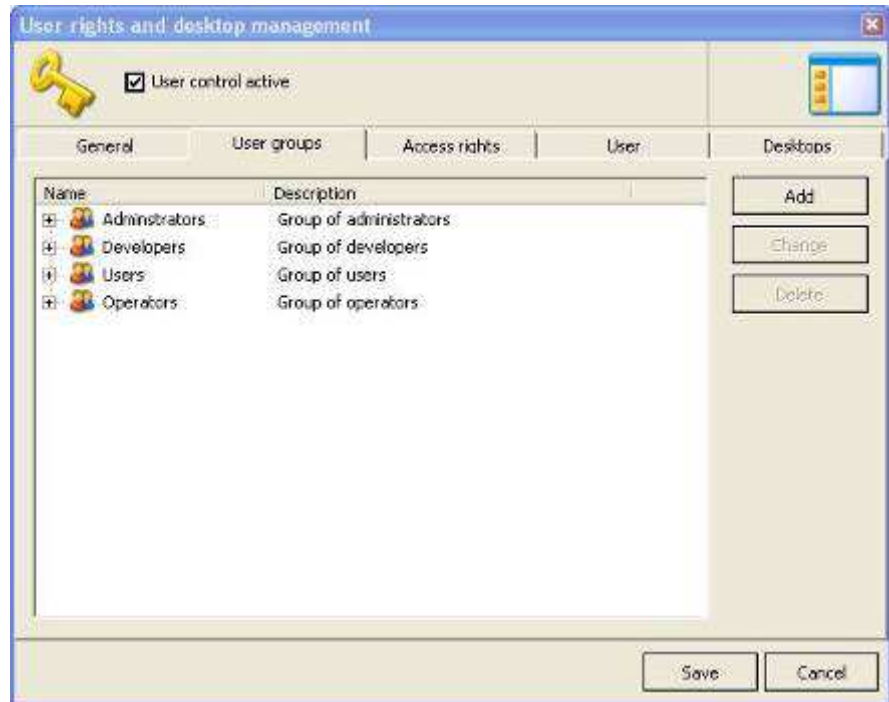
Via the menu: Tools → User Rights and Desktops it is possible to open the User Rights Management dialog.

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

The Add button can be used to add new user groups.

The Edit button can be used edit existing user groups.

The 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.



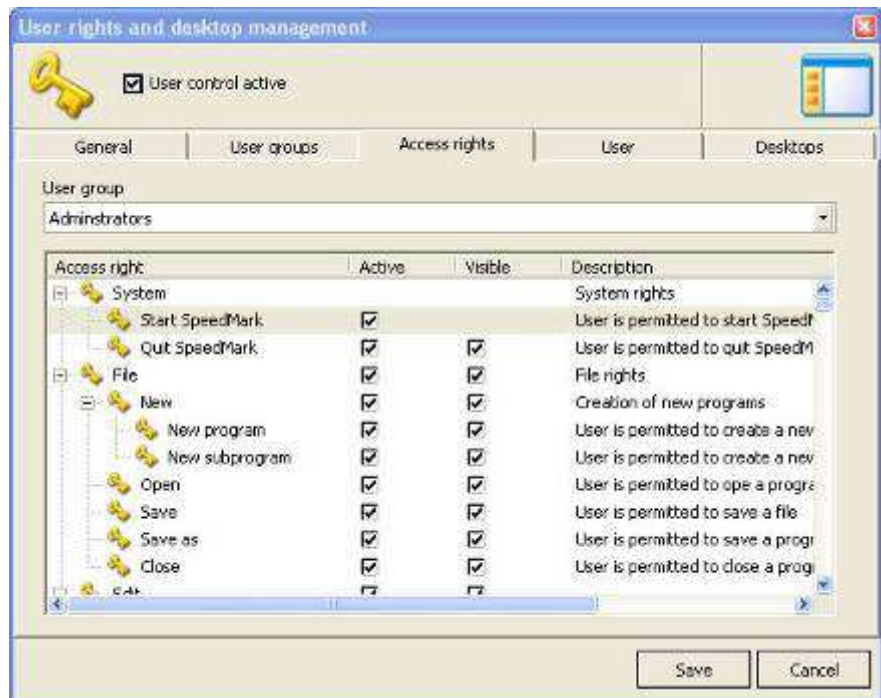
If one of the users of this user group now registers with SpeedMark, it automatically switches to this set desktop.



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 also whether menu items should be visible or invisible.



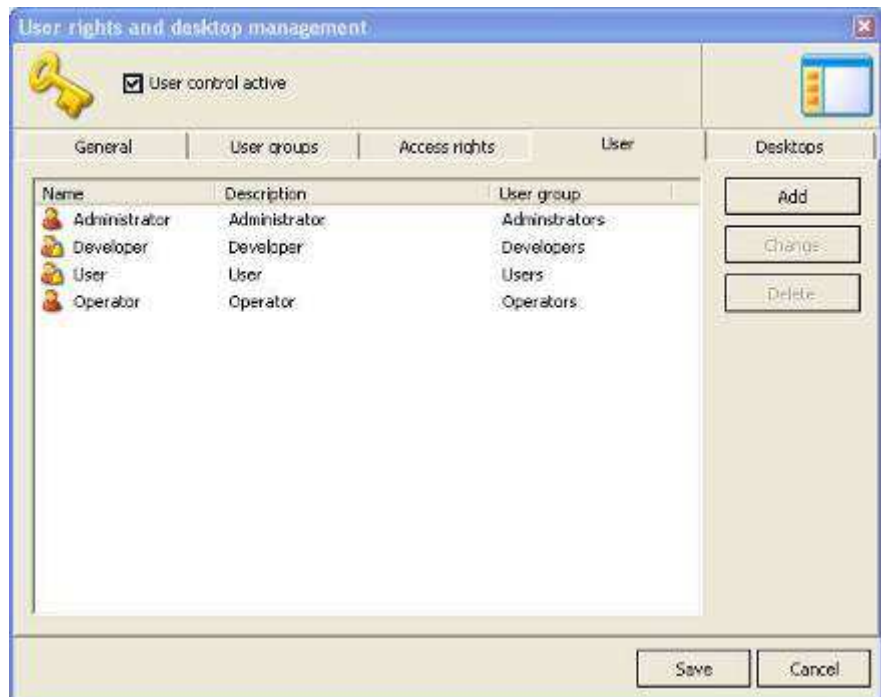
8.7 Users

SpeedMark users may be created and edited in the Users tab.

The Add button can be used to add new users.

The Edit button can be used edit existing users.

The Delete button can be used to delete existing users.



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

The following properties may be specified for a user:

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

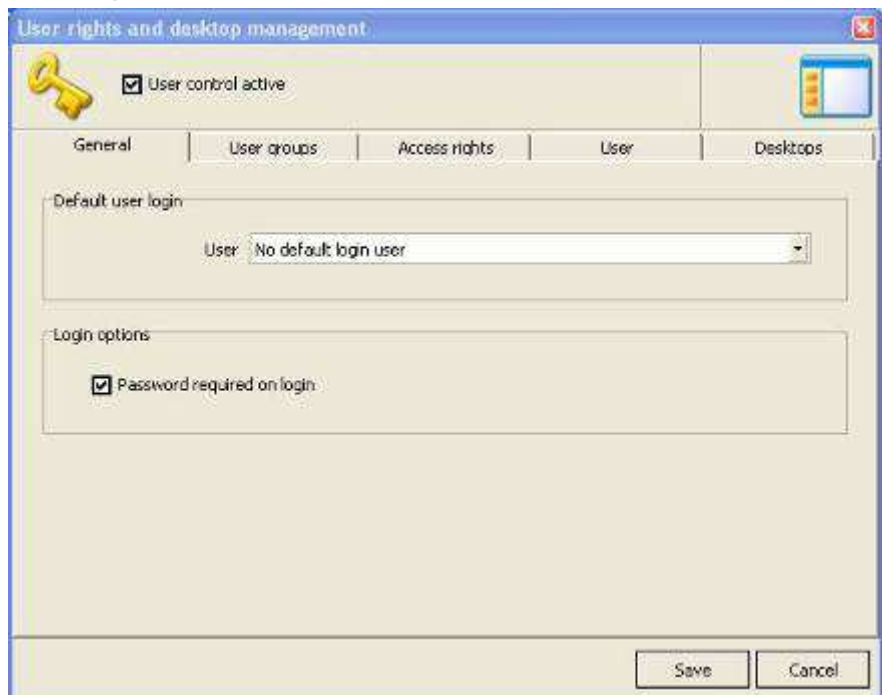


8.8 Basic User Rights Settings

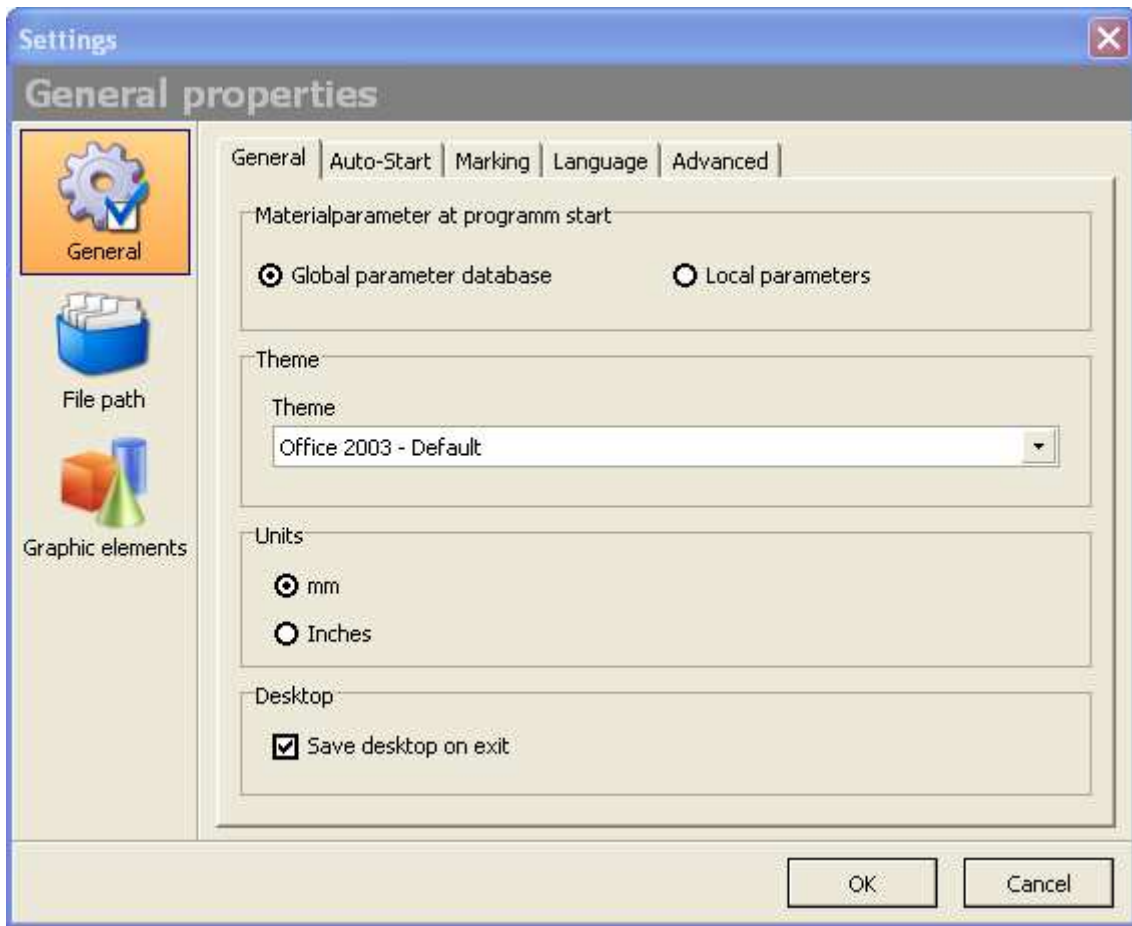
The basic user rights settings are used to define user control behaviour in more detail.

The Standard User Login option is used to specify a user registered automatically when SpeedMark starts.

The Password Required for 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.

In order to be able to adapt better to customer requirements, SpeedMark supports a range of different themes. The following themes are available for selection:

- Standard
- Office 2003 – Standard
- Office 2003 – Blue
- Office 2003 – Silver
- Office 2003 – Black

The Units section is 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).

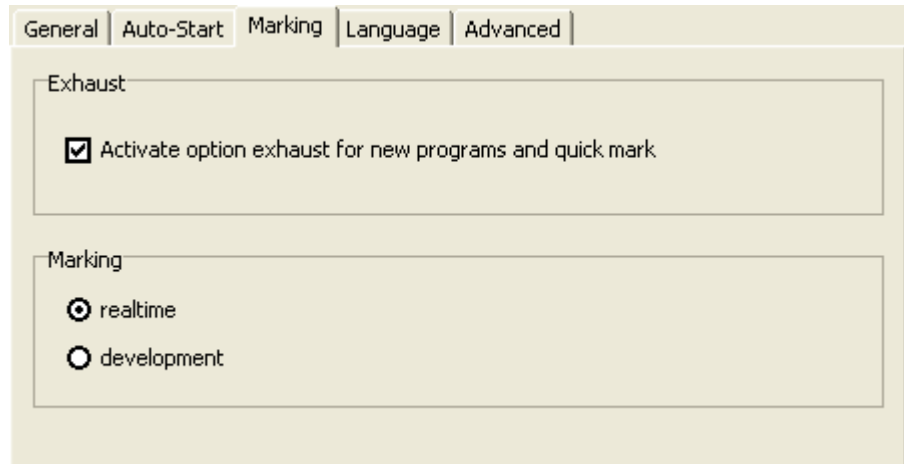
9.1.3 Marking

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

Use the Marking option to specify whether SpeedMark programs should be executed in production mode or development mode.

Development mode checks the program flow more thoroughly during the set up and development of SpeedMark programs, but takes longer to execute.

Production mode optimises all graphic elements and transfers them to the laser system control card, allowing the SpeedMark program to be executed more quickly.

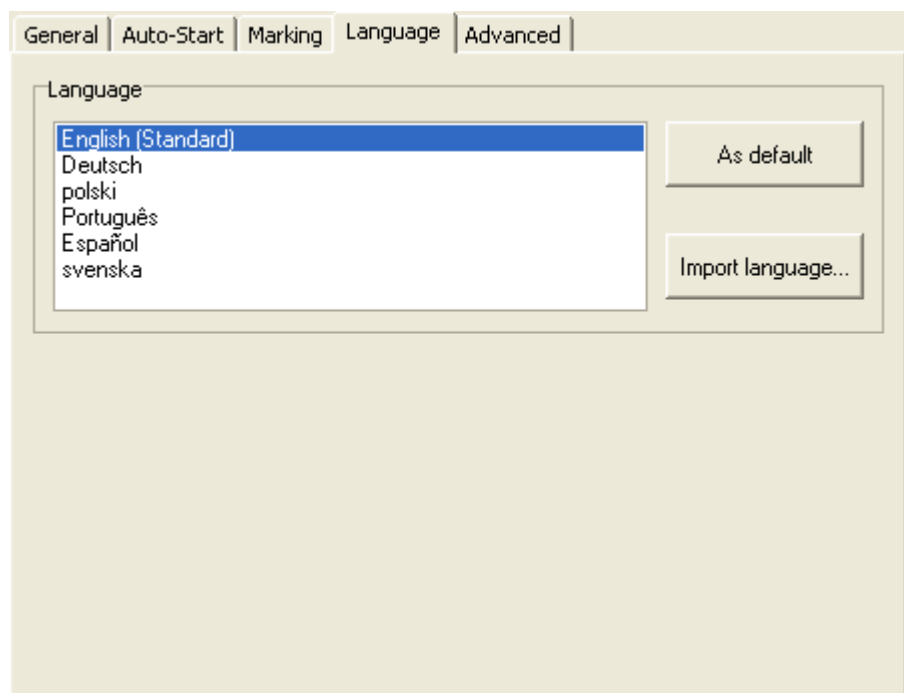


9.1.4 Language

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.

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.”

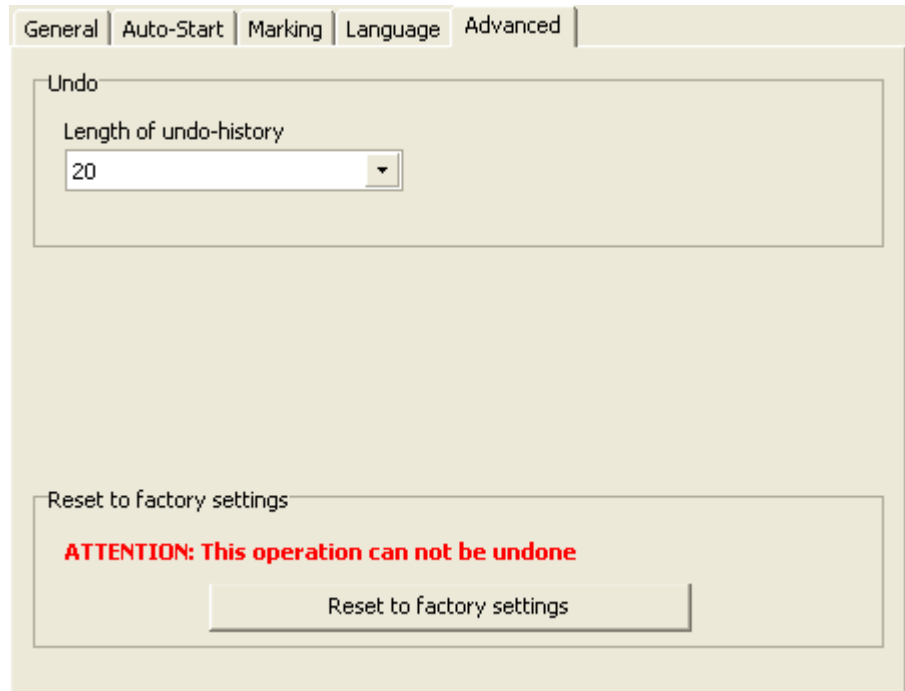




9.1.5 Advanced

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.



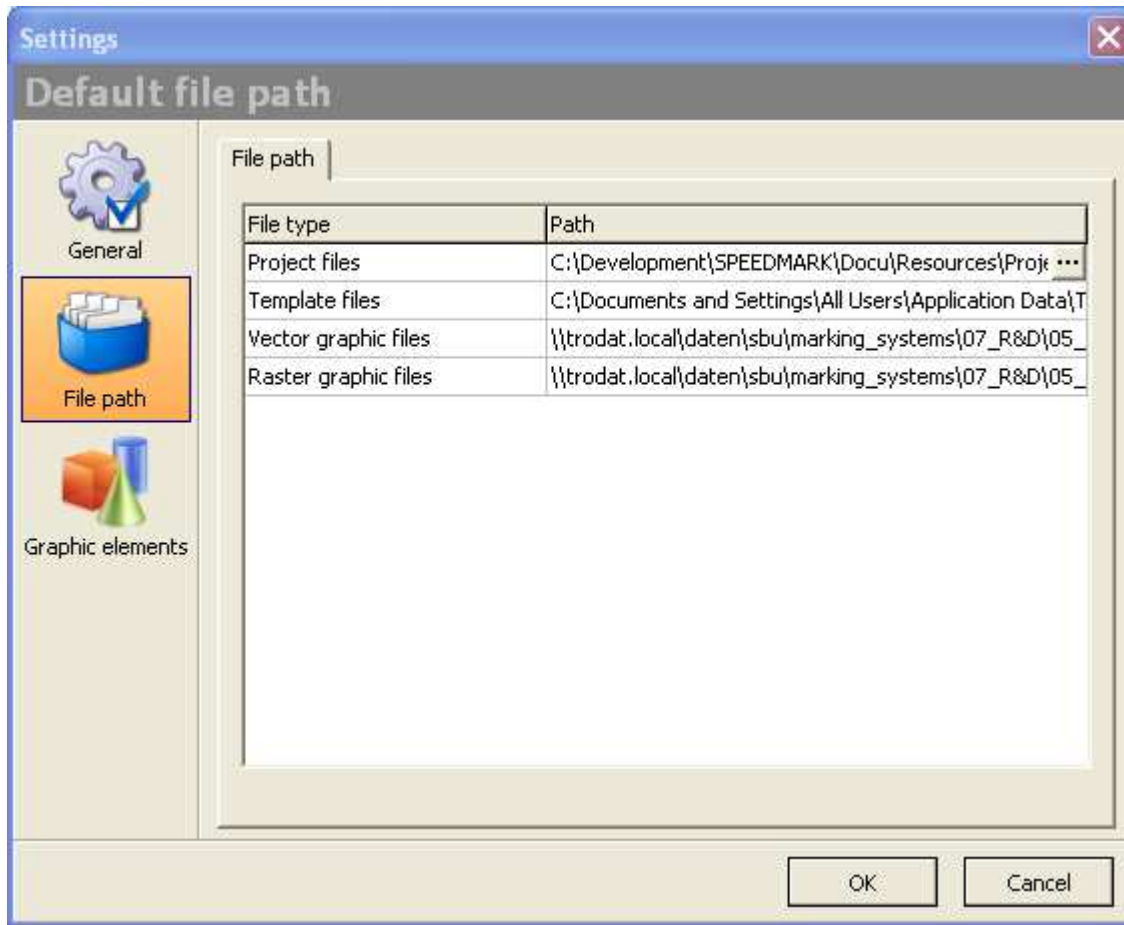
With the button “Reset to factory settings” it is possible to reset all made changes.



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



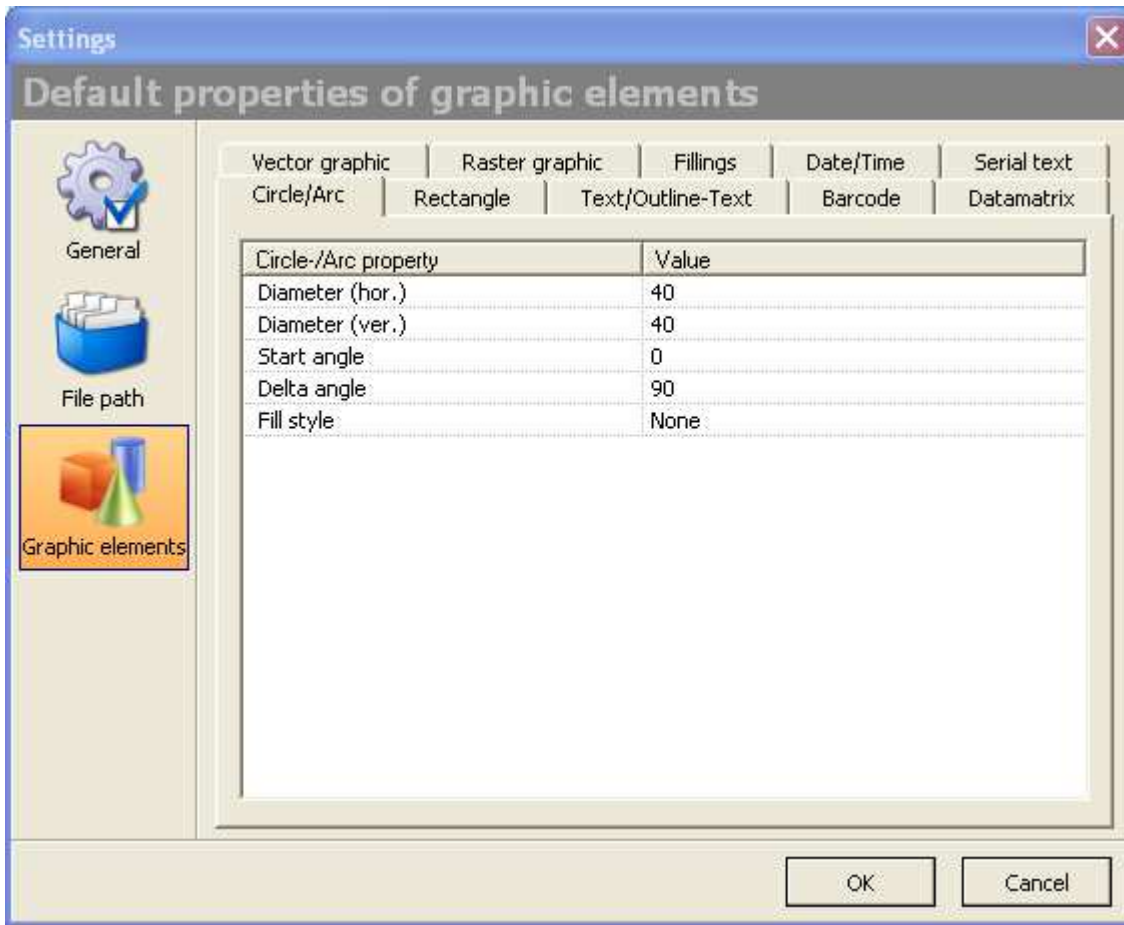
The default file path option allows the definition of paths which will be used in file open and file save operations.

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



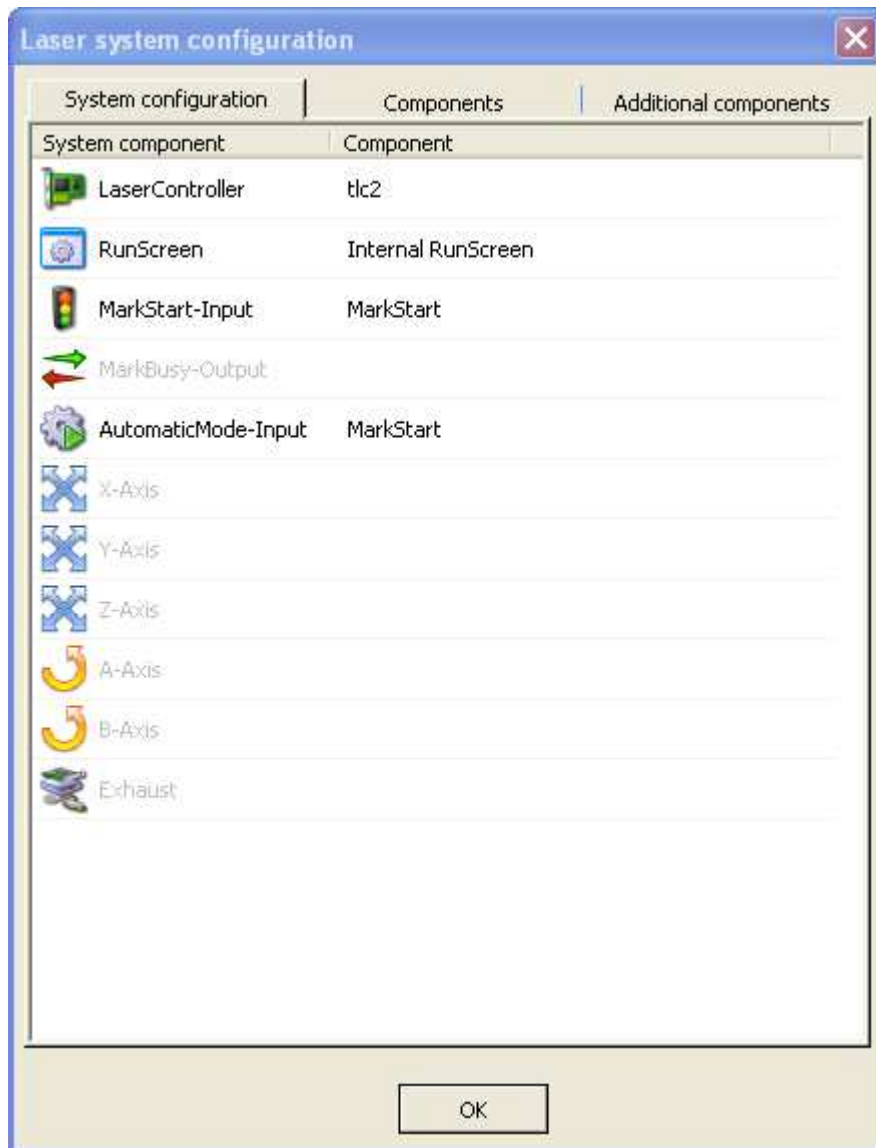
The default properties of graphic elements allow the specification of default values which will be used when creating new graphic elements.

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

10 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.

If this operation is locked by user rights, change to the administrator level (see chapter 8.1 Initial user rights on page 80).

10.1 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.

System configuration	Components	Additional components
System component	Component	
LaserController	tlc2	
RunScreen	Internal RunScreen	
MarkStart-Input	MarkStart	
MarkBusy-Output		
AutomaticMode-Input	MarkStart	
X-Axis		
Y-Axis		
Z-Axis		
A-Axis		
B-Axis		
Exhaust		

The following component types are available:

- LaserController: Controls the laser
- RunScreen: Dialog control during program execution
- MarkStart-Input: External signal to start marking
- MarkBusy-Output: Sets the marking busy signal
- AutomaticMode-Input: Controls the automatic program execution⁵⁰
- X-Axis: Axis for planar segmentation
- Y-Axis: 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.

⁵⁰ See also 13.1.1 Options of the start element on page 110.

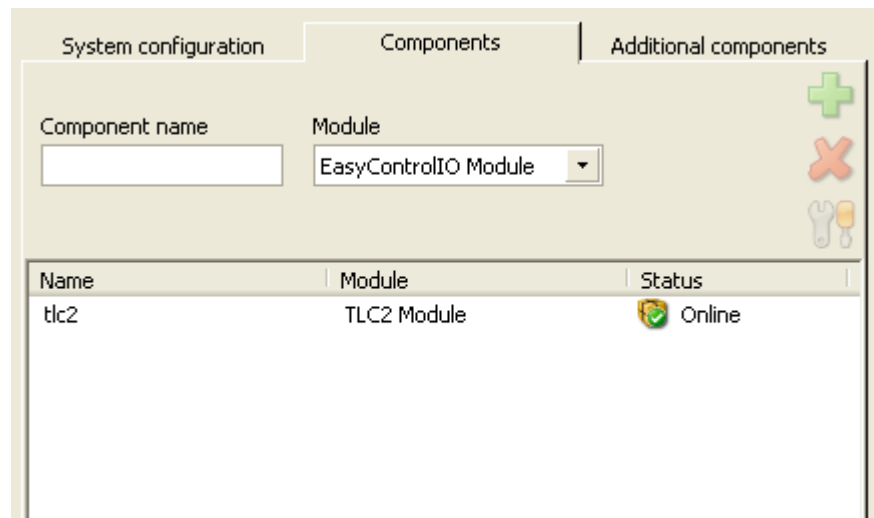
10.2 Components

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. 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 them⁵¹.

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



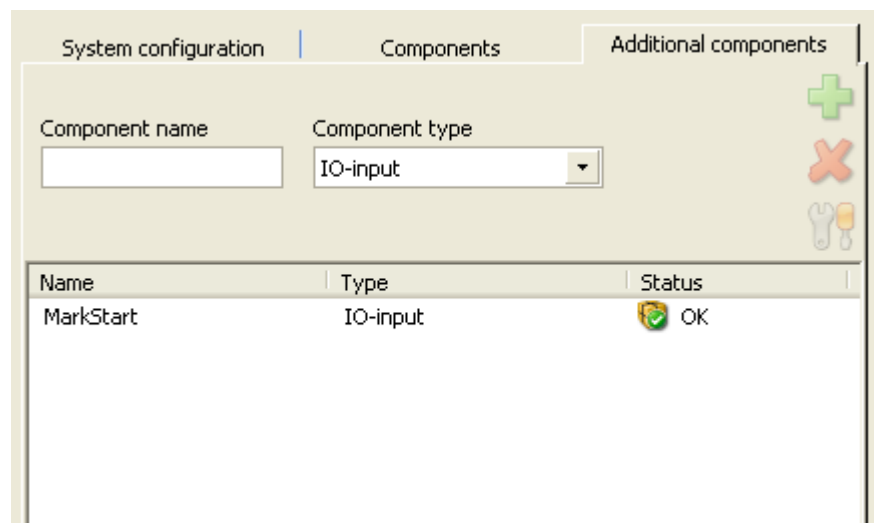
10.3 Additional components

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

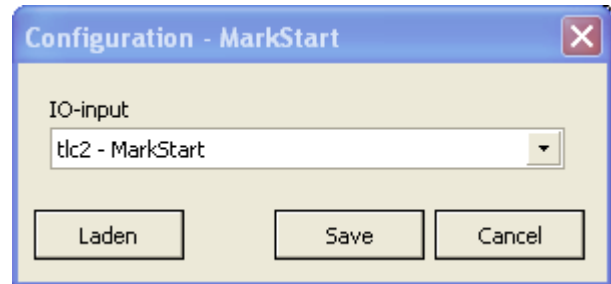
hardware component. In most cases that will be the TLC2-card, but it also could be the IO-Input of a Relop-IO-card. Due to this abstraction within SpeedMark a MarkStart is available and the real origin of the signal can be configured.



⁵¹ A detailed description for configuring of modules can be found in chapter 16 Modules and Components on page 141.

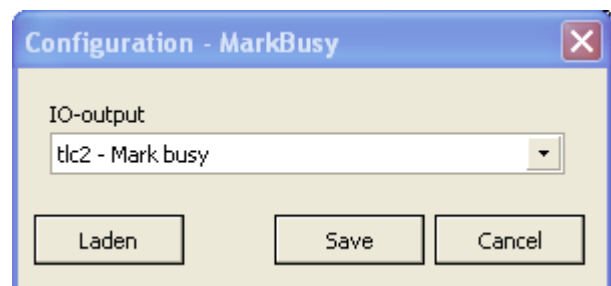
10.3.1 Component type: IO-Input

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.



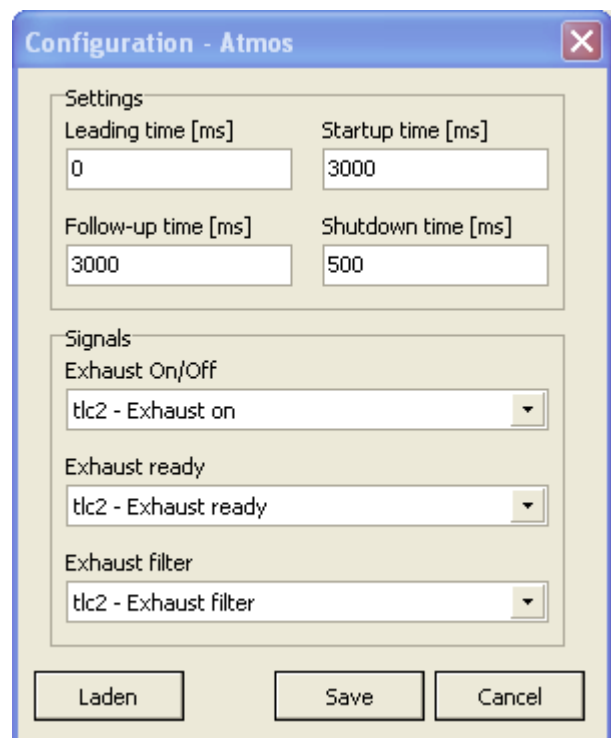
10.3.2 Component type: IO-Output

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.

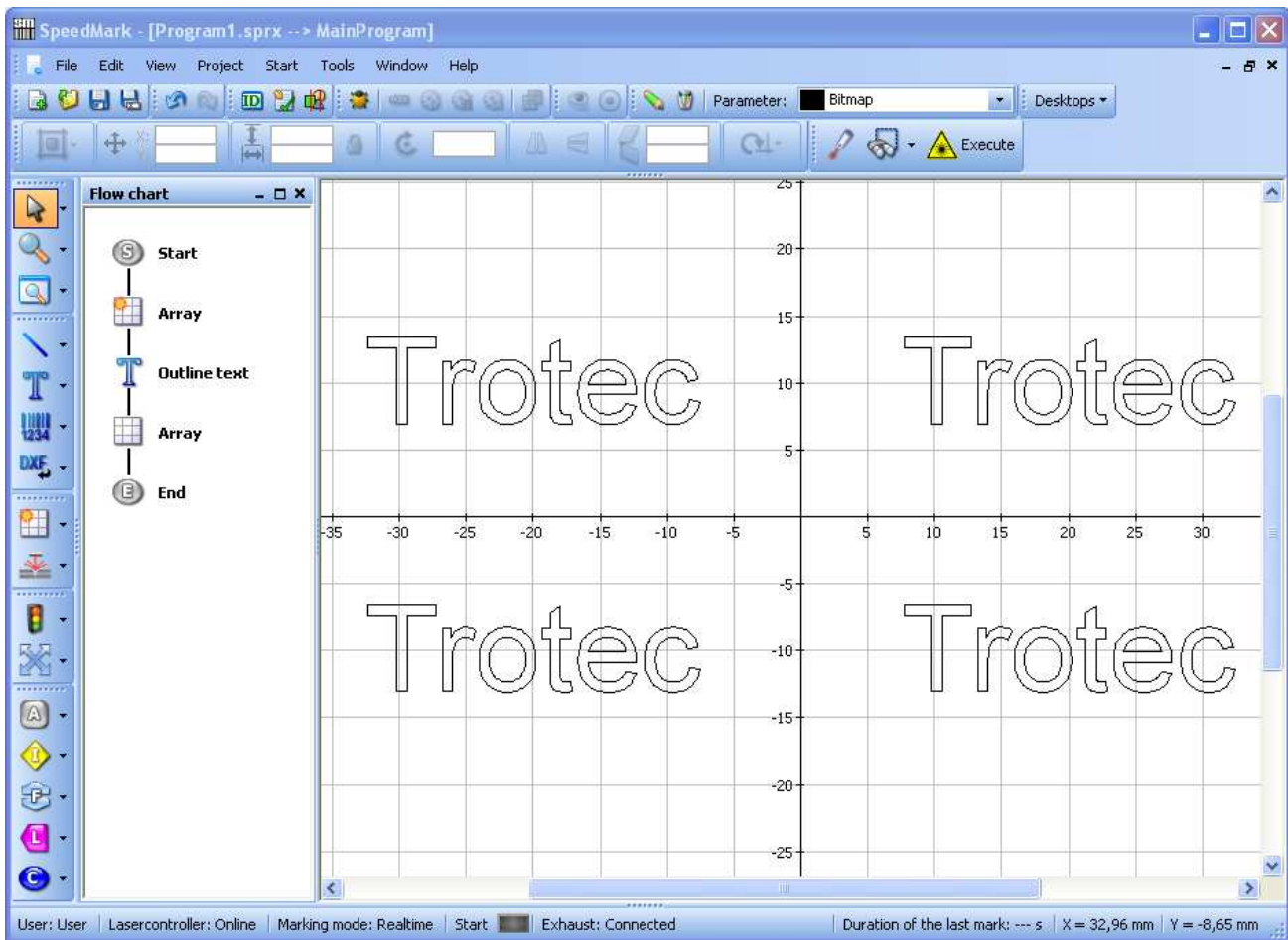


10.3.3 Component type: Exhaust

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



11 Graphic operations

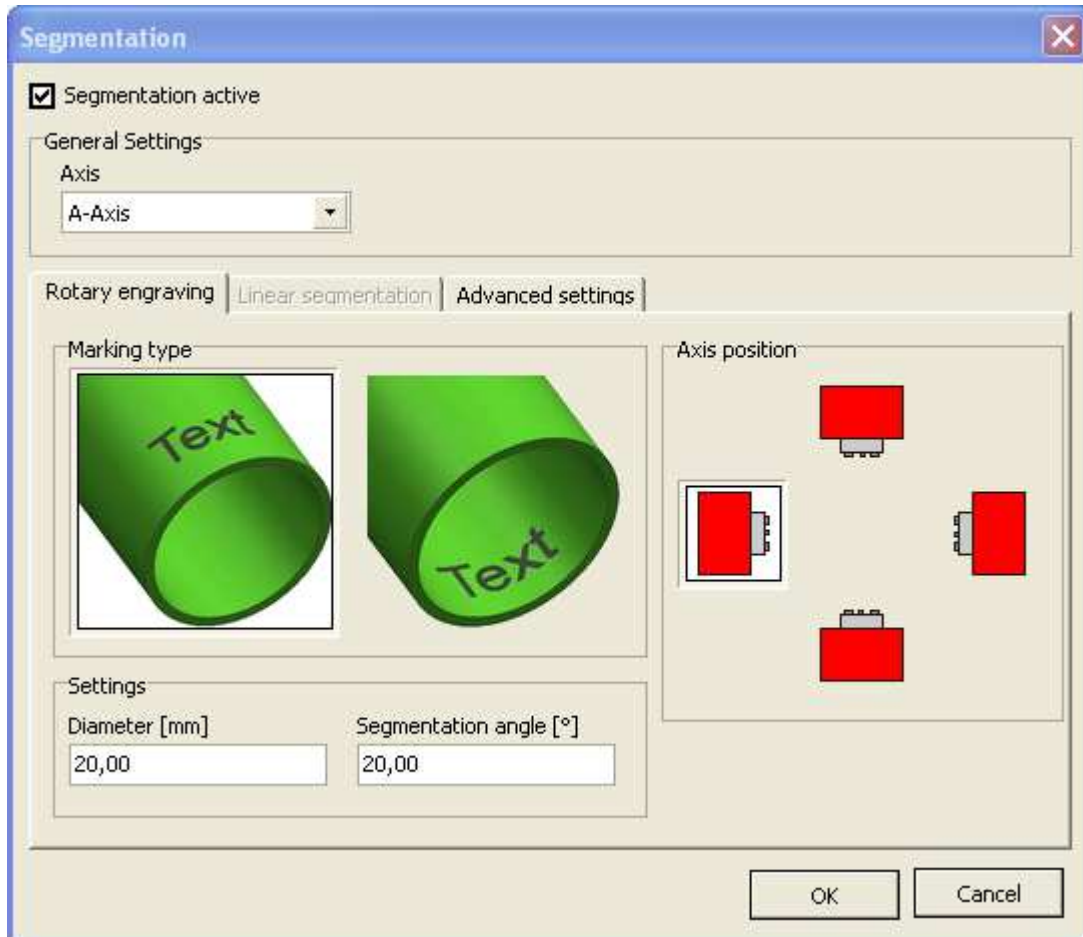


With graphic operations it is possible to change the execution of graphic elements:

- Segmentation
- Deep engraving
- Array

11.1 Segmentation

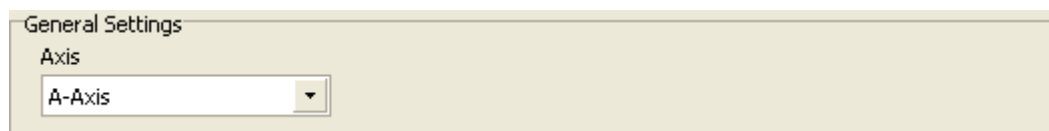
Segmentation allows the marking of work pieces which are moved or rotated with an axis during the marking process.



11.1.1 Setup segmentation

The segmentation can be configured via menu point Project → Segmentation. First of all the checkbox segmentation active must be set.

In the general settings will be defined which axis will be



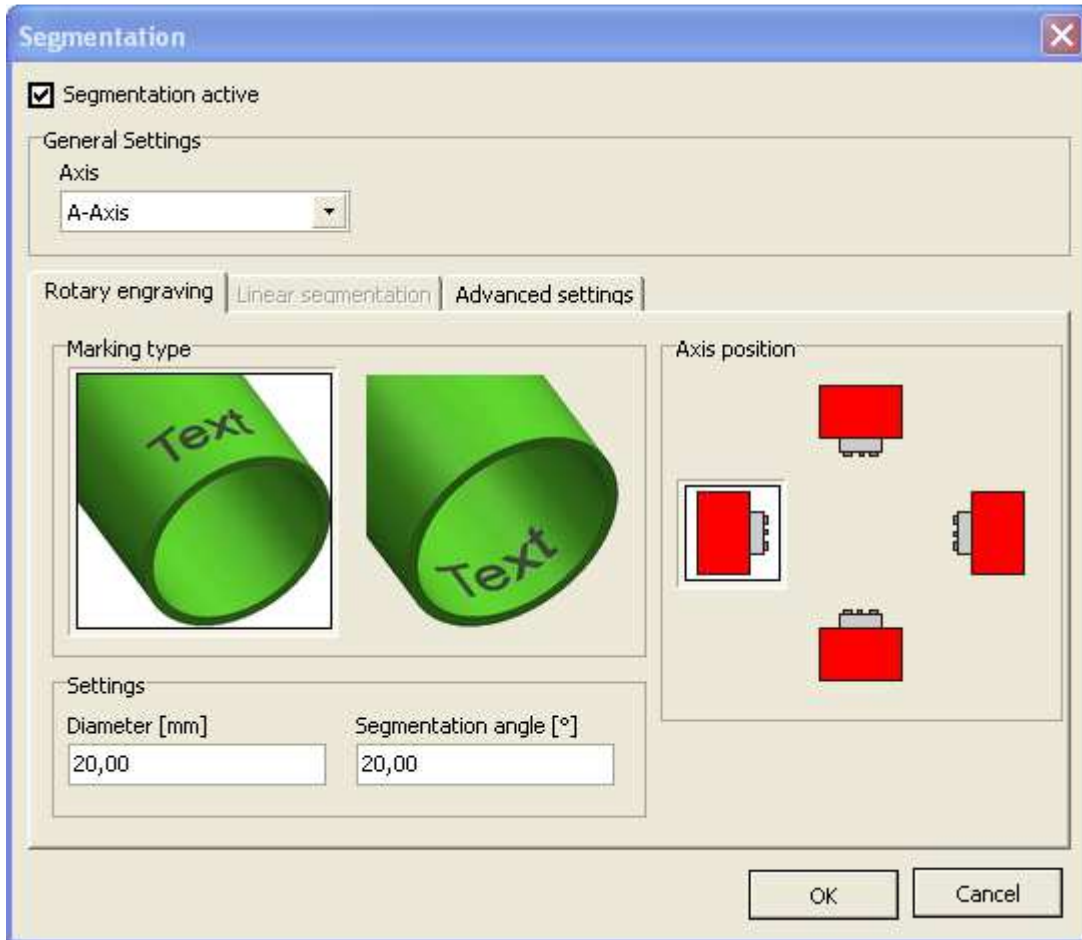
used for the motion. The available axis must be configured before usage⁵².

SpeedMark automatically detects if the used axis is a rotation or planar axis⁵³.

⁵² See also chapter 10 Laser System Configuration on page 94.

⁵³ The options rotary engraving and linear segmentation will be enabled depending on the chosen axis type.

11.1.2 Rotary engraving



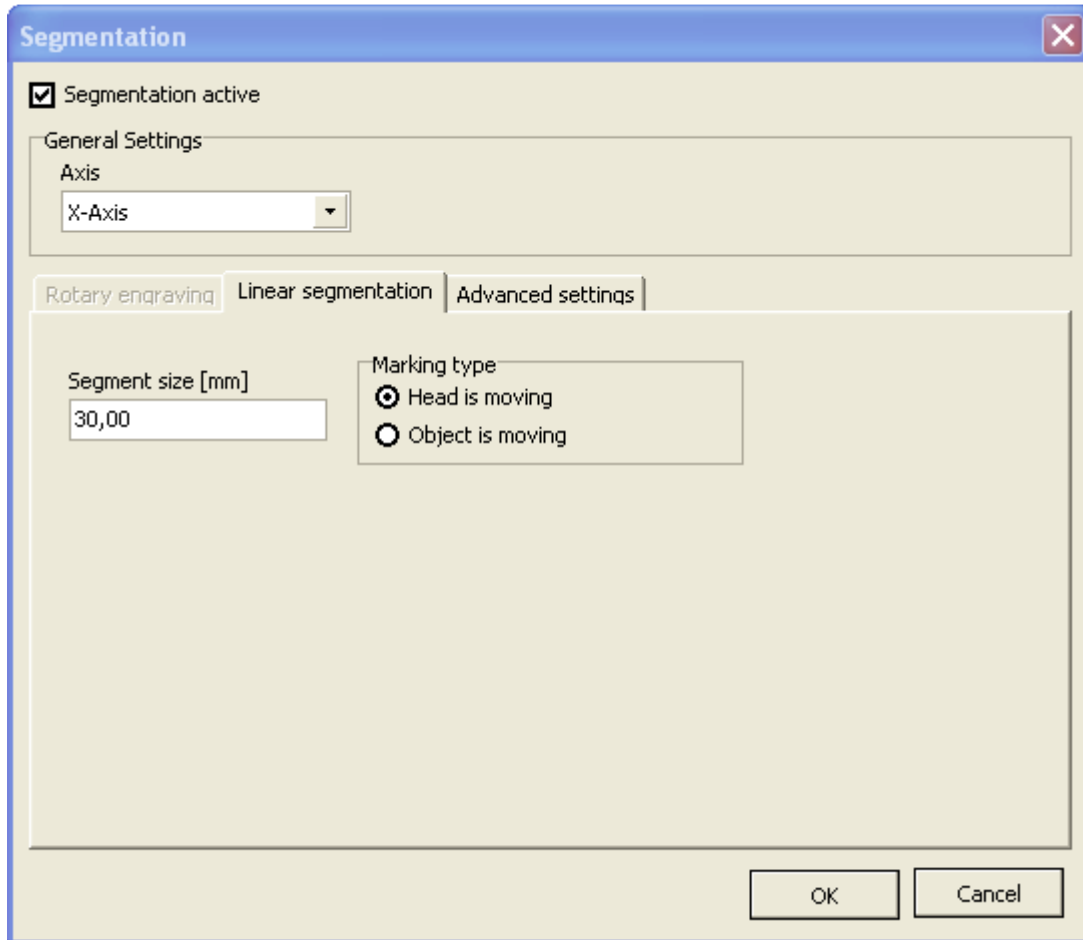
For the rotary engraving the marking type respectively the movement direction can be defined.

The diameter und the segmentation angle define the maximum size of the markable field and the width of the used segments.

Further on the axis position must be configured in relation to the marking field.

The marking with the laser and the control of the axis will be automatically done by SpeedMark during program execution.

11.1.3 Linear segmentation

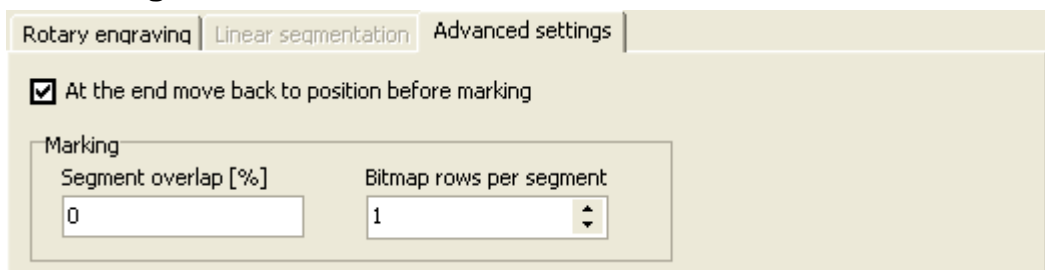


For the linear segmentation only the segment size must be defined.

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

11.1.4 Advanced settings

Can be defined that at the end of the marking the axis should be moved back to the root position.



Additionally a segment overlap and the bitmap rows per segment can be defined.

11.2 Graphic Array

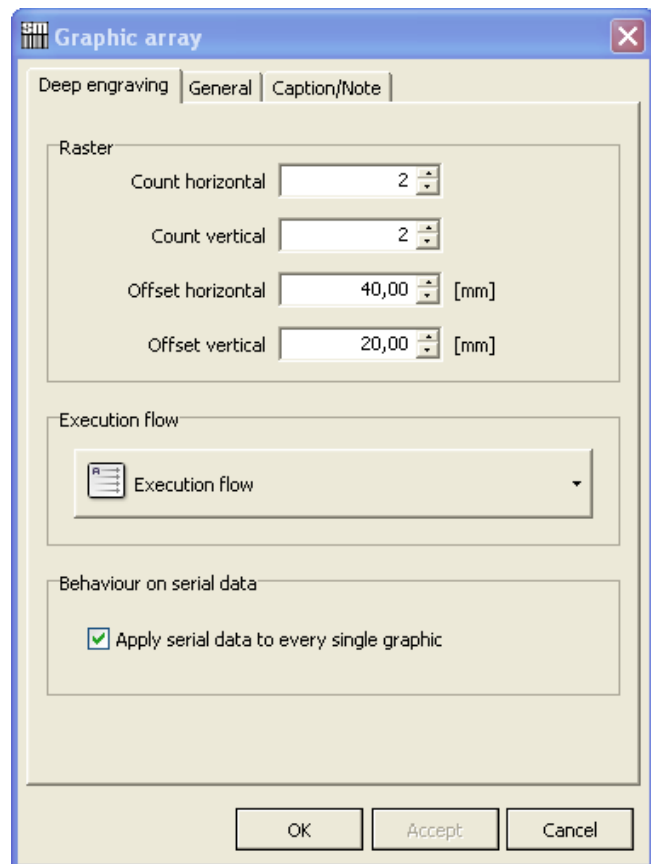


The graphic operation array can be selected from the toolbar graphic operations⁵⁴.

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.



11.3 Deep Engraving



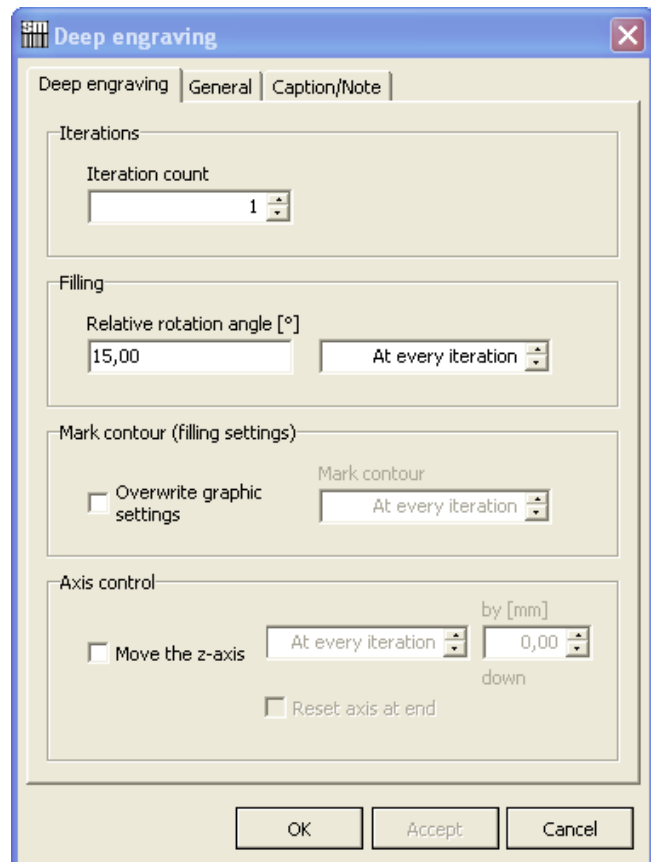
The graphic operation deep engraving is as well selected by the toolbar graphic operations.

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.

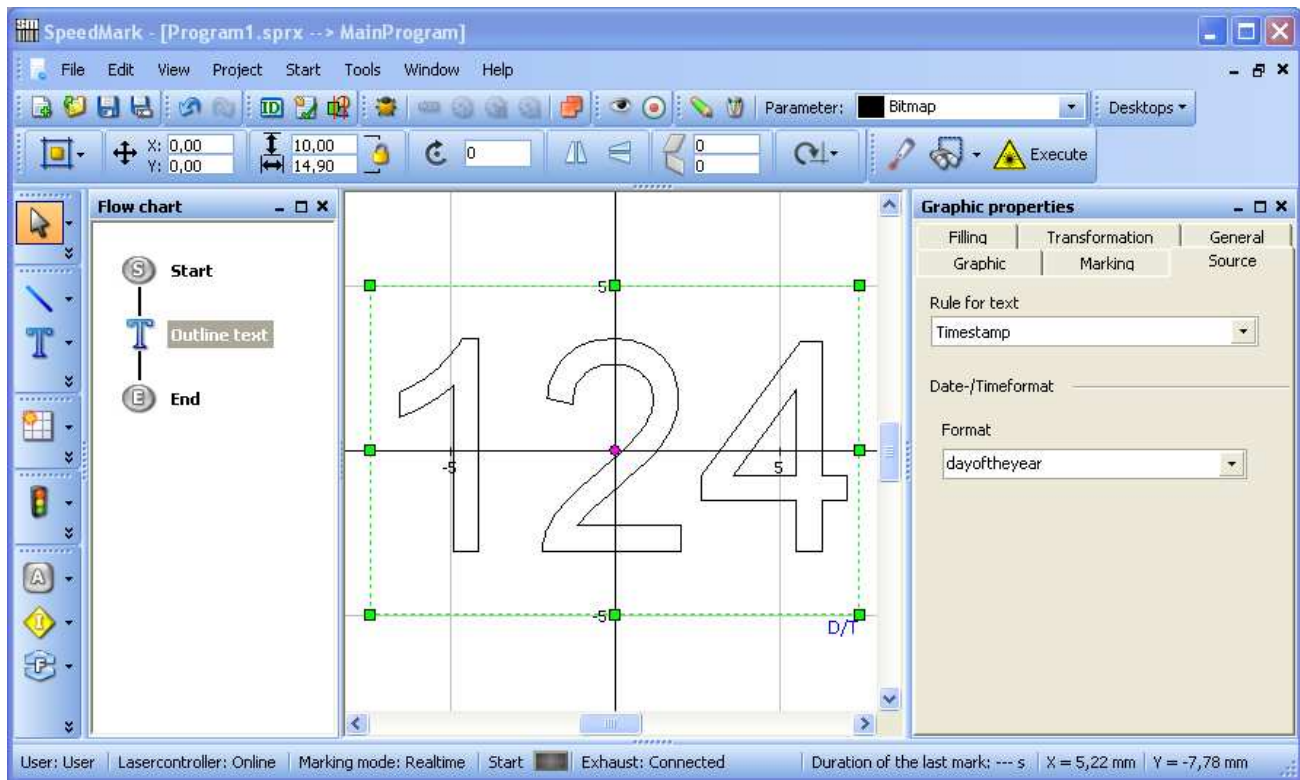
The option mark contour of the filling settings can be overwritten.

Additionally with the axis control it is possible to move the z-axis.



⁵⁴ See also 4.3 Tools Toolbar Functions on page 18

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.

A graphic element must be selected in order to select dynamic graphic element content. Then the Source tab can be used to select the relevant content type.⁵⁵

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

- Serial number
- Expressions
- File expressions
- Serial file
- Time stamp

⁵⁵ 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.

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.⁵⁶

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.

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.

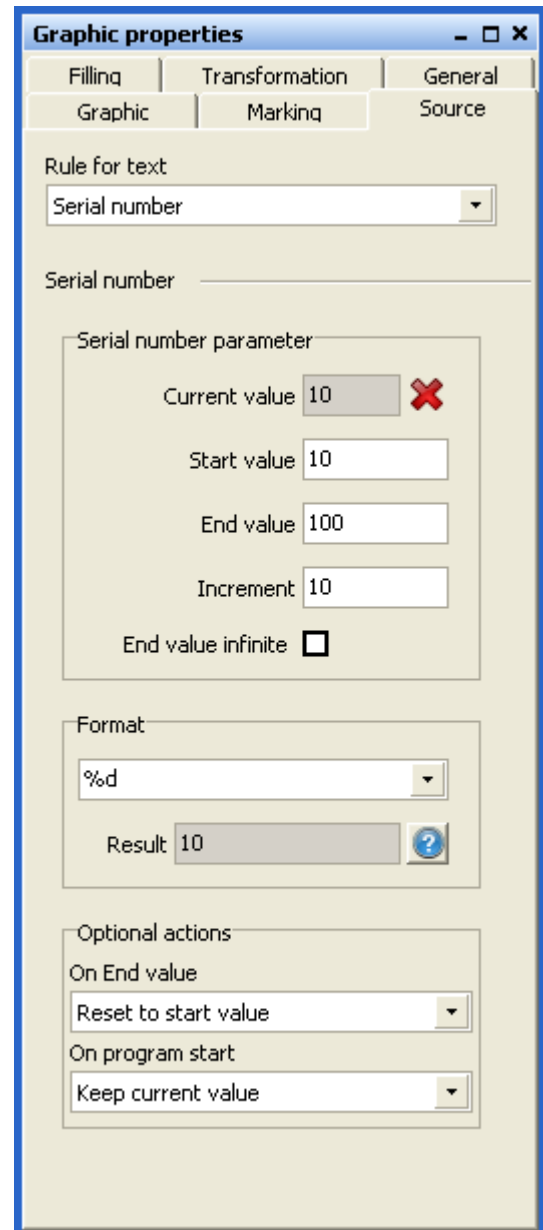
Optional Actions allow actions to be carried out on specific events:

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

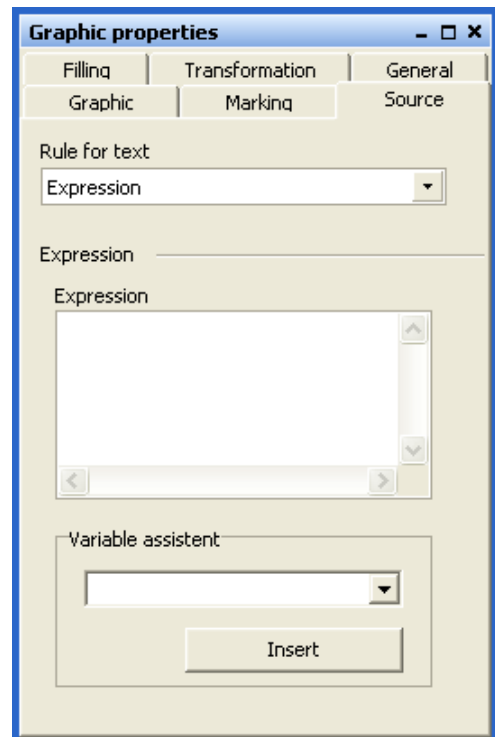


⁵⁶ SpeedMark currently only supports whole decimal numbers as serial text.

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.⁵⁷

To aid operation, a Variable Wizard is available in order to quickly request a list of all available variables.



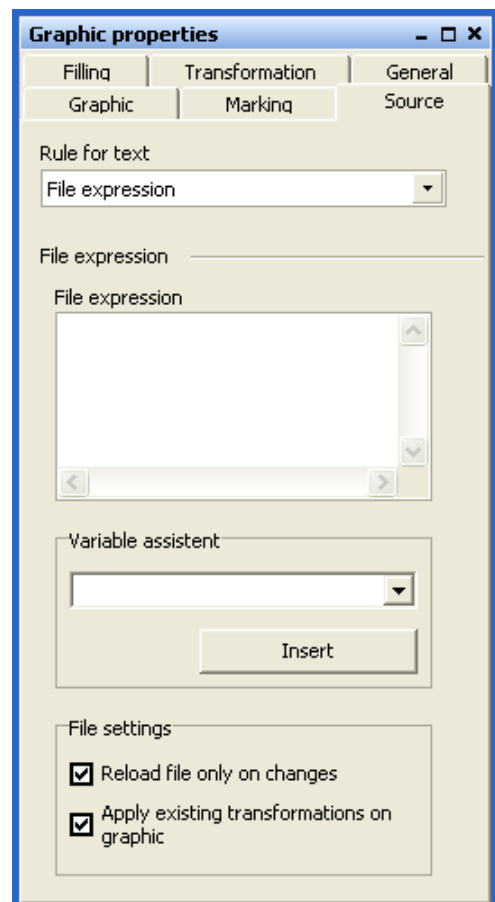
12.3 Dynamic Loading of Vector Graphics

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.

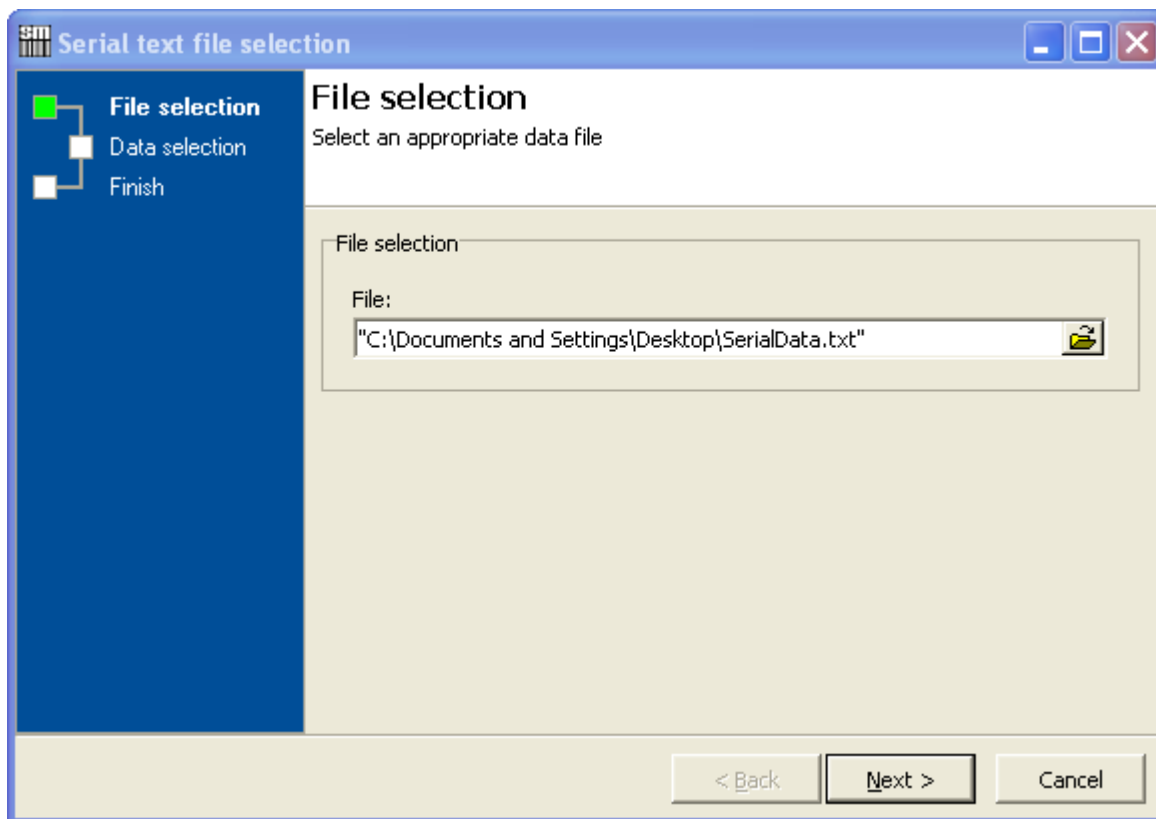
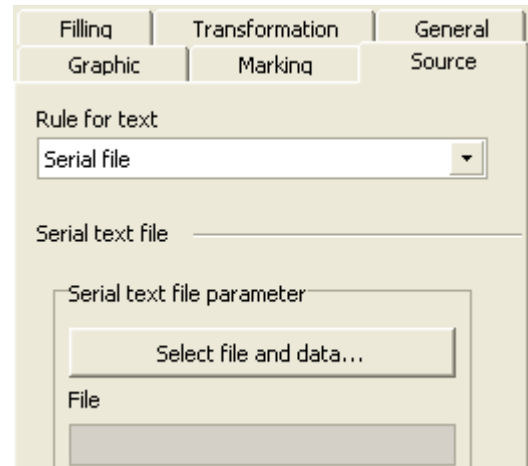


⁵⁷ Information on defining and creating calculated values and functions can be found in Chapter 15 Simple Scripting on page 134

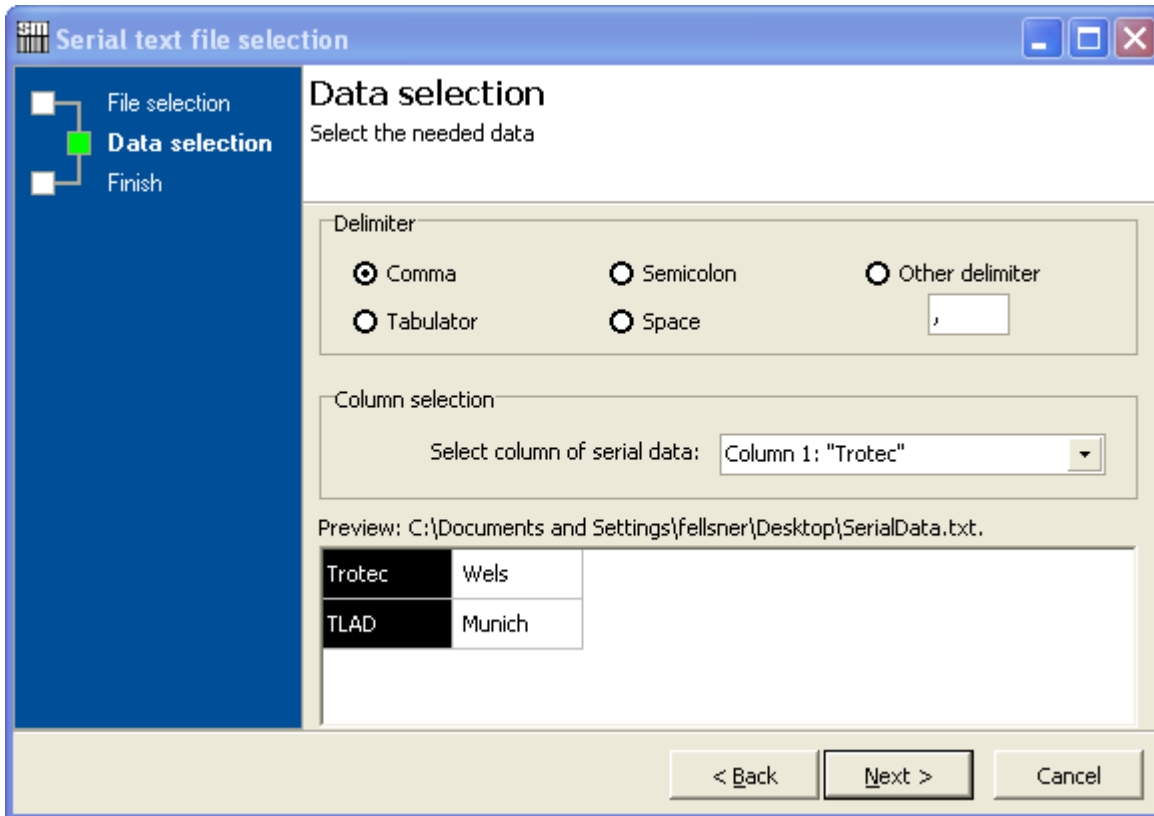
12.4 Serial file

The Expressions source content makes it possible to replace the content of a graphic element with the content of a CSV file.

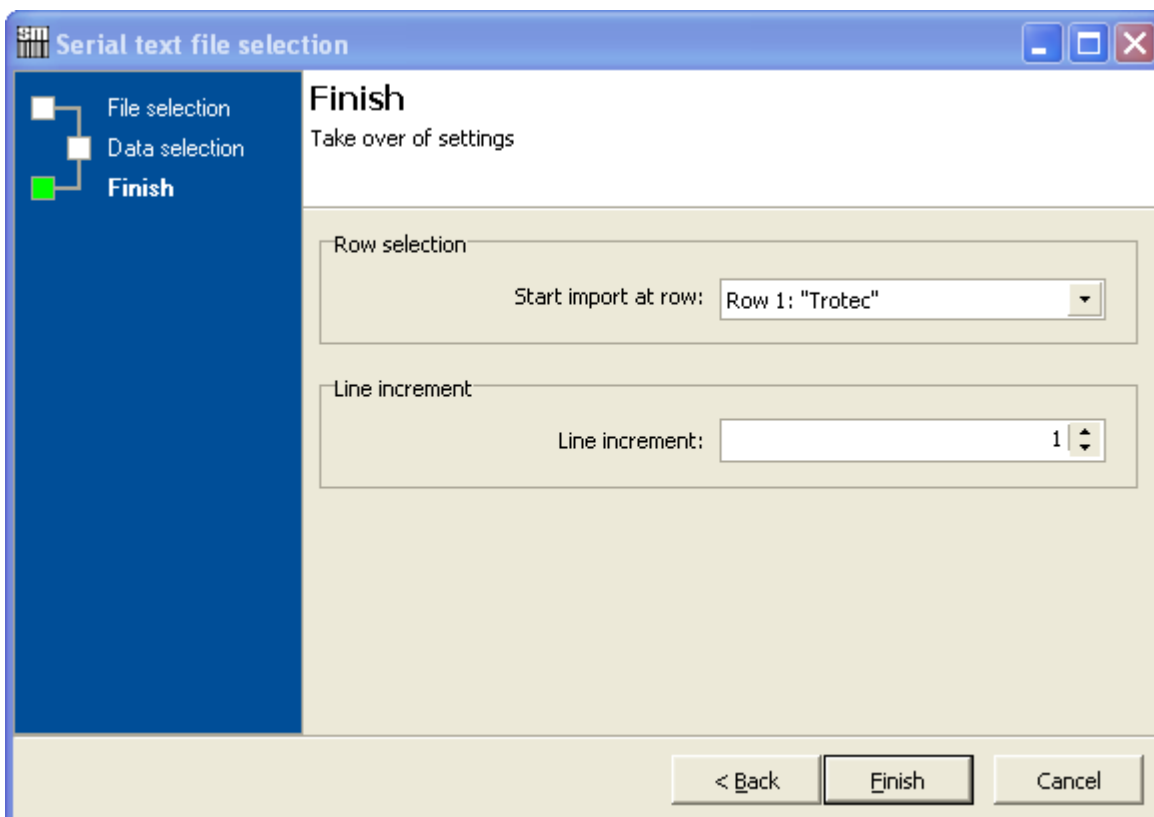
With the button “Select file and data” the wizard for selection of file and data will be started.



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 is defined.



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

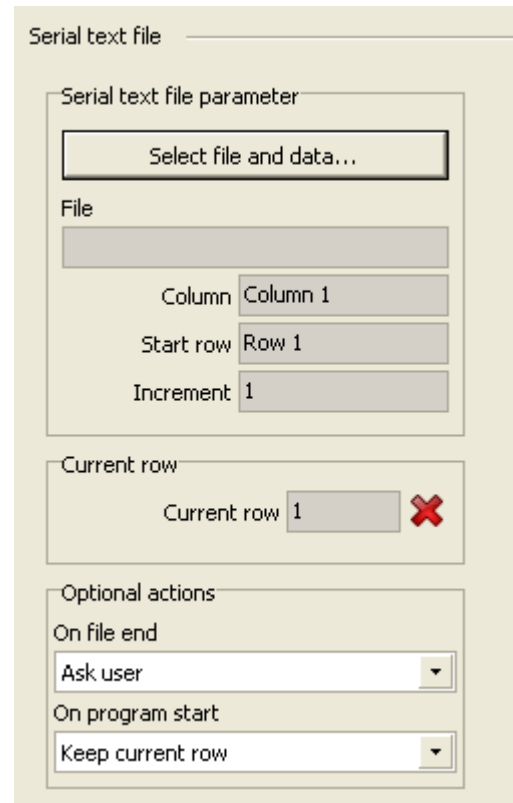
Optional actions allow actions to be carried out on specific events:

On File Value

- Reset to start row
- Ask User
- End program

On Program Start

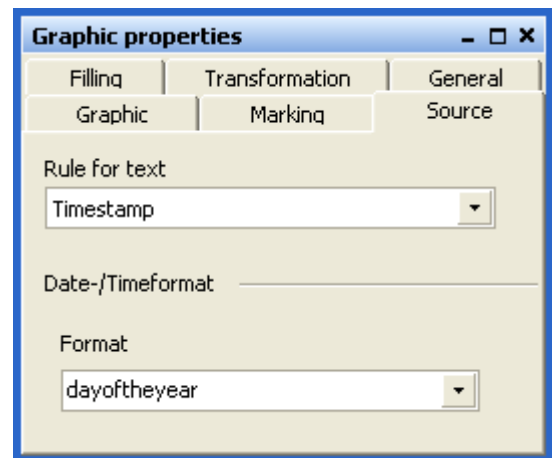
- Reset current row to start row
- Keep current row
- Ask for start value



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.



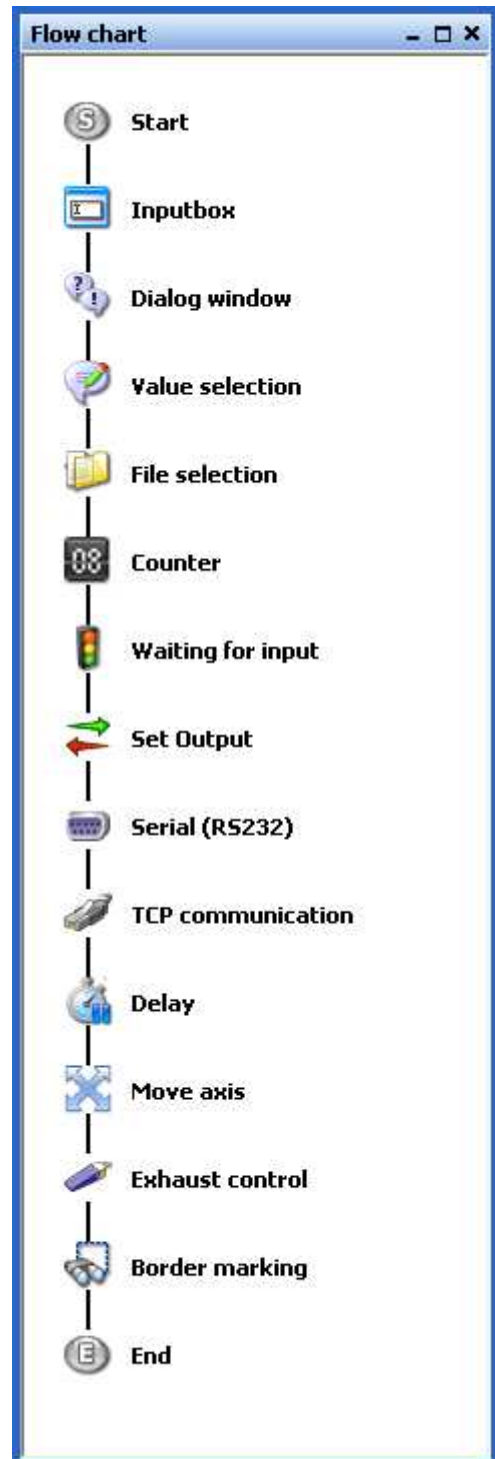
13 Control elements

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

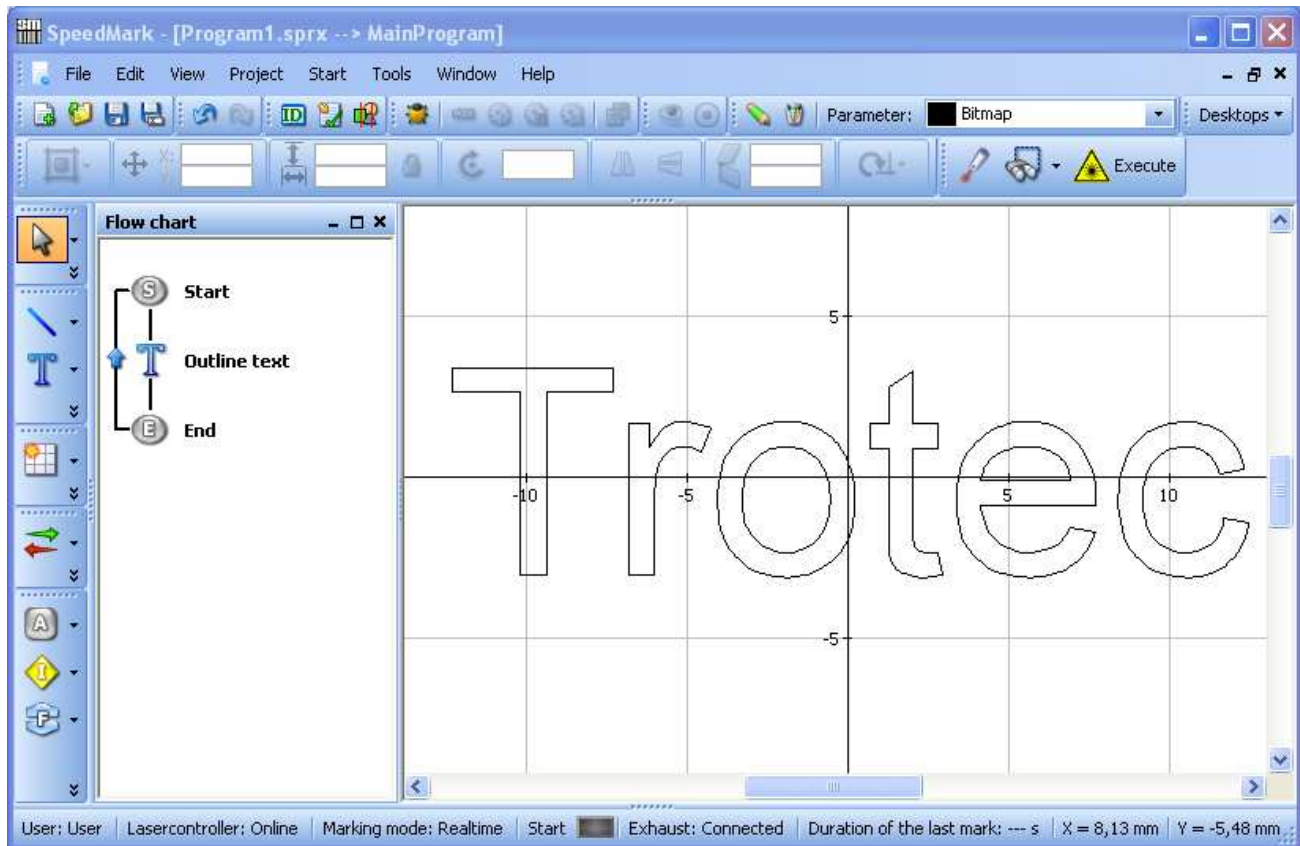
Each of the properties dialogs can be opened by double-clicking the mouse.

The following control elements are available:

- Start-Element
- Inputbox
- Dialog windows
- Value selection
- File selection
- Counter
- Waiting for signal
- Set IO-Output
- Serial (RS232)
- TCP communication
- Delay
- Move axis
- Exhaust control
- Border marking



13.1 Start element



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

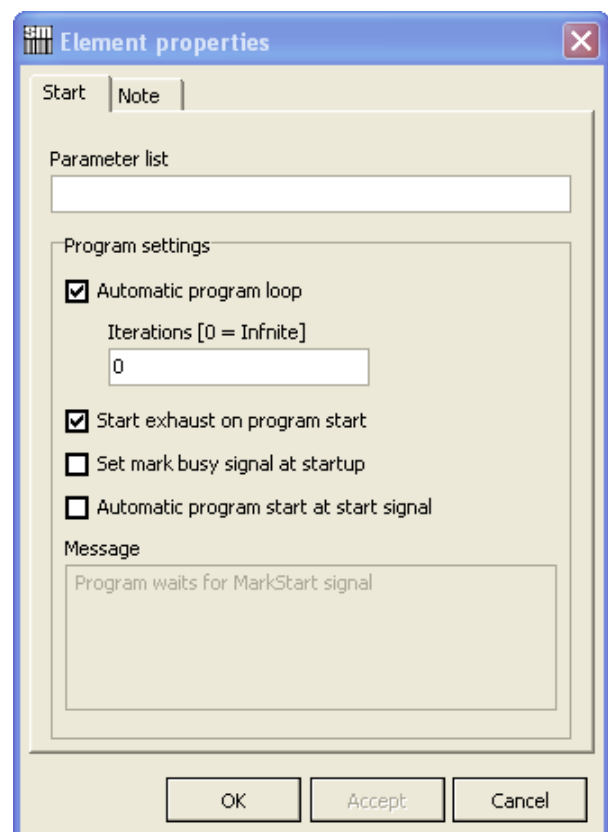
13.1.1 Options of the start element

The automatic program loop repeats the program as long as it is not cancelled.

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

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

The option automatic program start 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.



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.

In order 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.

The screenshot shows the 'Element properties' dialog box for an 'Inputbox' control. It has a 'General' tab and contains the following fields and options:

- Window title:** Inputbox
- Input prompt:** Input
- Target variable:** (empty dropdown menu)
- Default value:** (empty text field)
- Take value from target variable:**
- Input mask section:**
 - Input mask:** (empty text field with a question mark icon)
 - Save literal character:**
 - Space character as:** _
 - Mask test section:**
 - Test input:** (empty text field)
 - Input result:** (empty text field)
 - Show dialog:** (button)
- Example masks table:**

Telephone	(0 61) 03979	!(999 99) 99999
Phone extension	-2010	!-9999
Zip code	508 501 50	000\ 000\ 00
ZIP, german	D-63225	D-00000
ZIP, international	CH-50000	>cc-99999
Date	30.11.93	!90/90/00
Time, short	13:45	!90:00
Time, long	19:30:59	!90:00:00
Personal number	555-55-5555	000\ -00\ -0000
Type number	TypNr: 987-01	TypNr: 000-00

Buttons at the bottom: OK, Apply, Cancel.

13.3 Dialog window



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

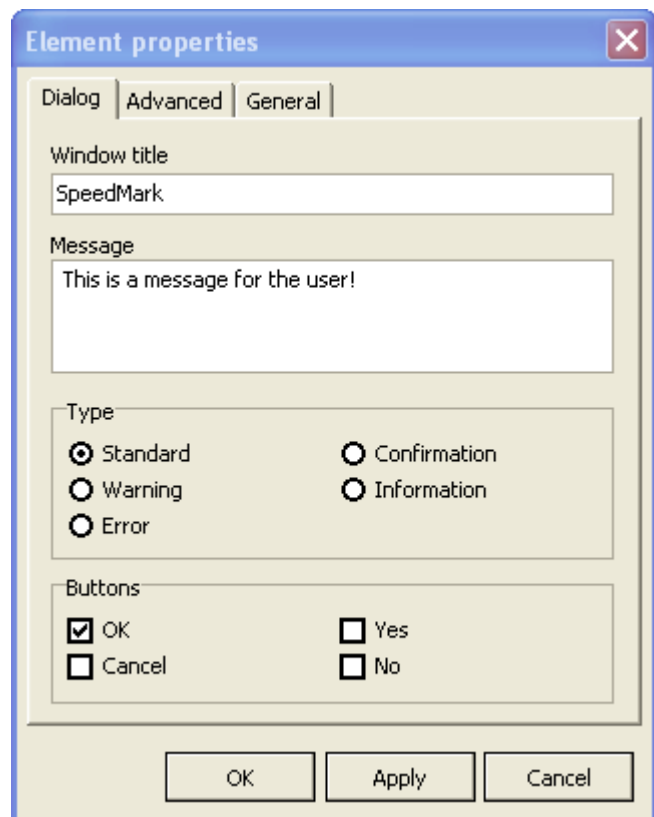
It is possible to define the message type like:

- Standard
- Confirmation
- Warning
- Information
- Error

As well as the shown buttons:

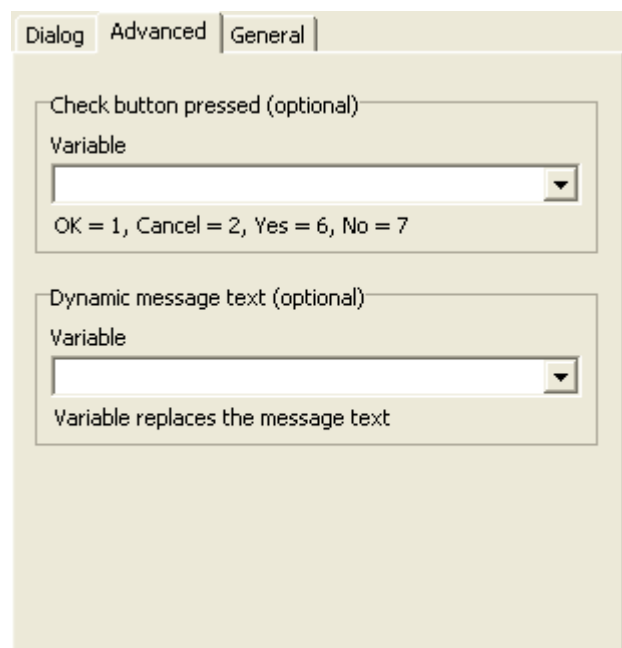
- OK
- Cancel
- Yes
- No

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

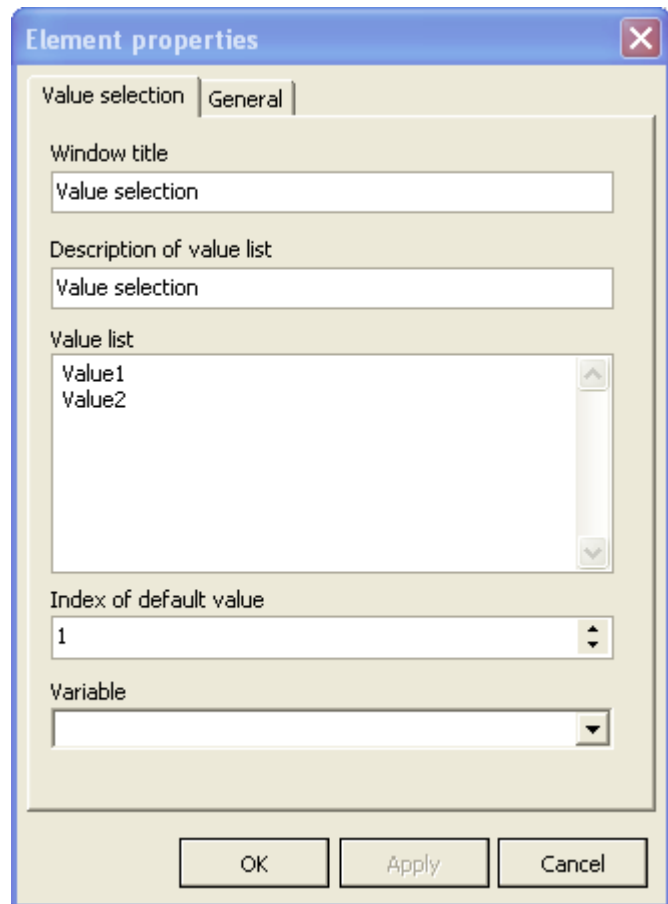


The value selection control element creates a window with a value list the user can choose on single value.

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.



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



13.5 File selection



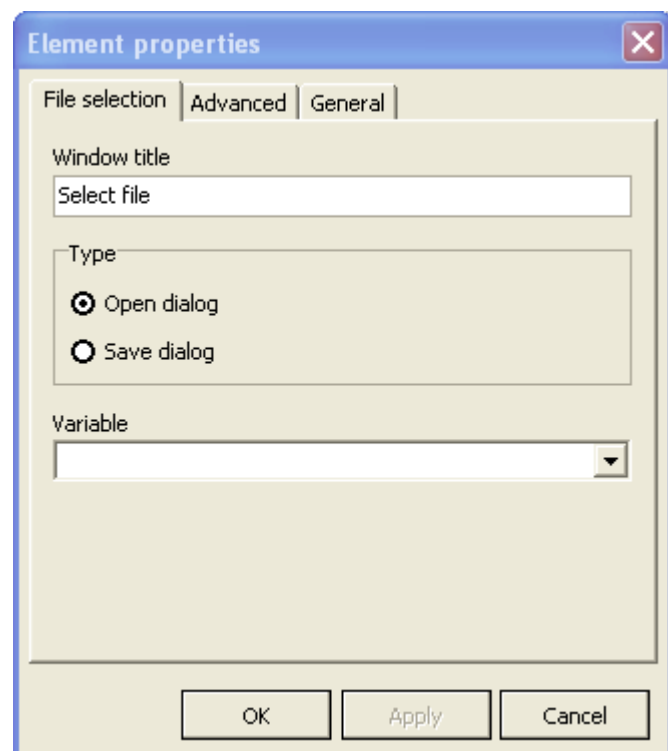
The file selection control element creates a window where the user can choose a filename.

The following file selection types are possible:

- Open dialog
- Save dialog



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

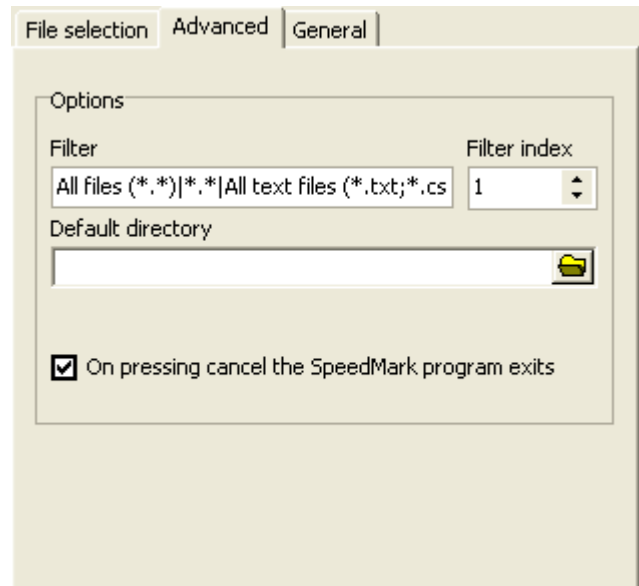




In tab advanced it is possible to define a filter for file extensions in the following form:

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

Additionally it is possible to define a default directory.



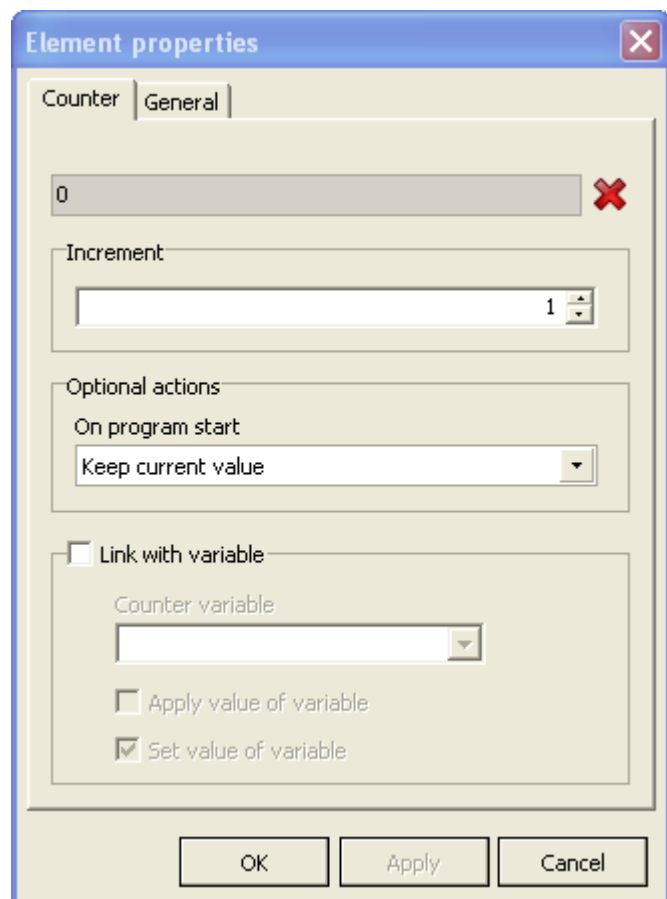
13.6 Counter



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 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





13.8 Set I/O Output

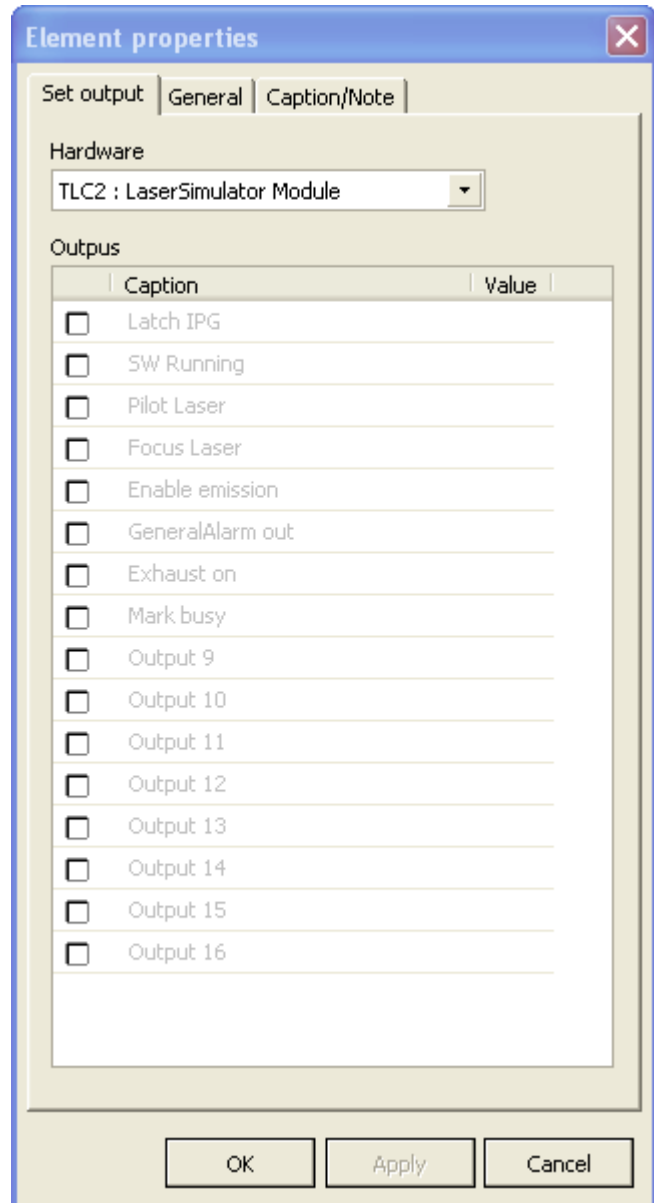
  This control element sets an I/O output of a system-configured I/O card.

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.



13.9 Serial (RS232)



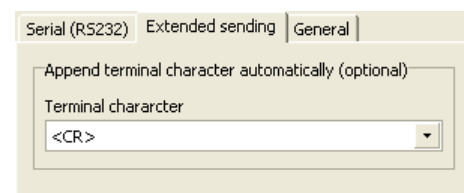
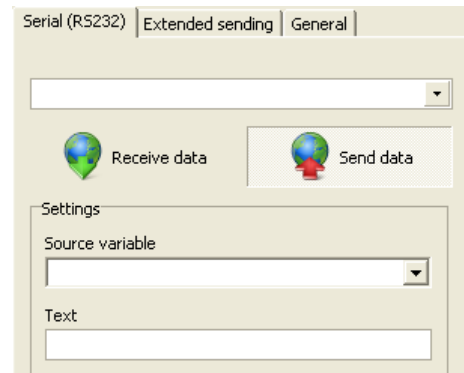
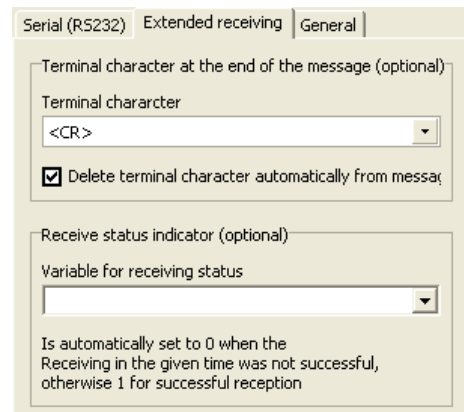
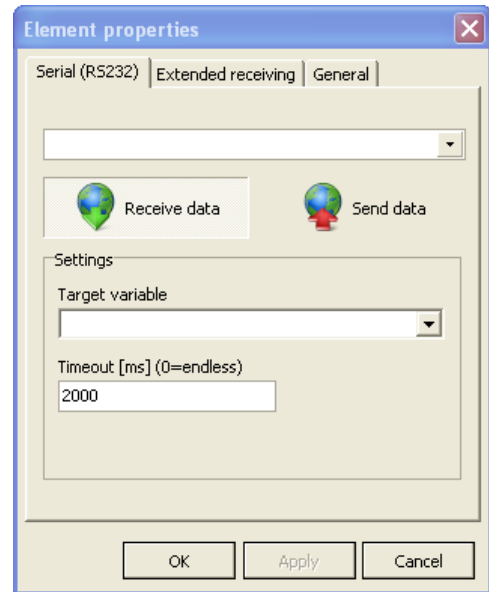
The control element Serial (RS232) allows the sending and receiving of data via a serial port. (This port must be defined as described in chapter 16 Modules and Components on page 141 and in chapter 16.9 COM Port on page 164)

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 variable⁵⁸.

In tab “extended sending” a terminal character can be defined.



⁵⁸ When using a source variable the value in input field text is ignored

13.10 TCP communication

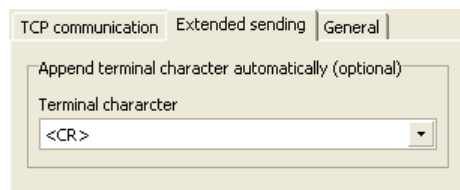
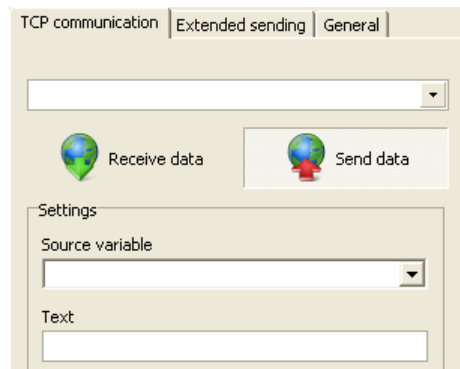
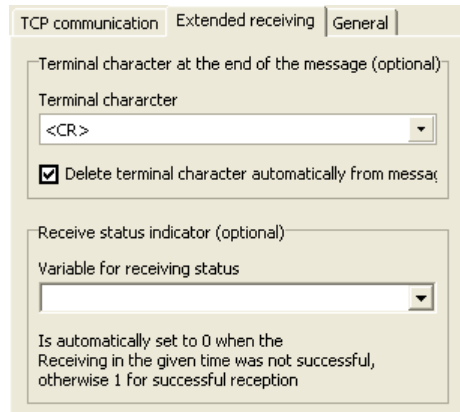
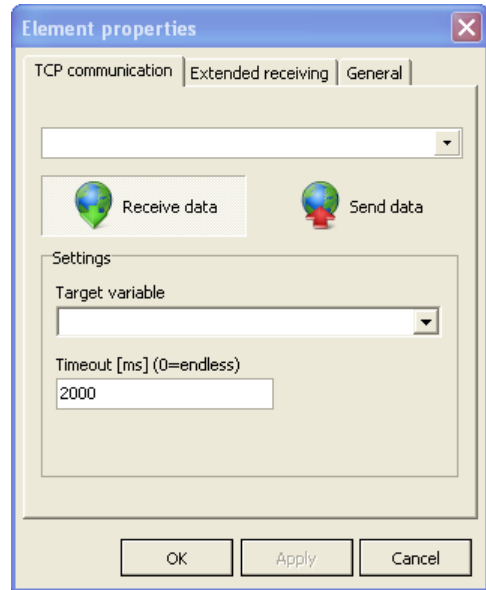
The control element TCP communication allows the sending and receiving of data via network. (This TCP port must be defined as described in chapter 16 Modules and Components on page 142 and in chapter 16.10 TCP Module on page 166)

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 variable⁵⁹.

In tab “extended sending” a terminal character can be defined.



⁵⁹ When using a source variable the value in input field text is ignored

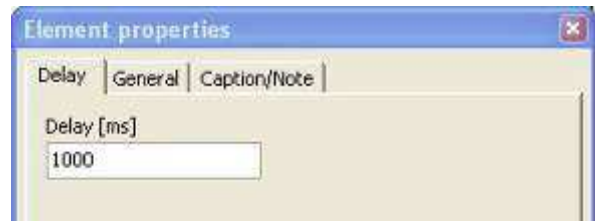
13.11 Delay



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

This value may be specified in the Time field.

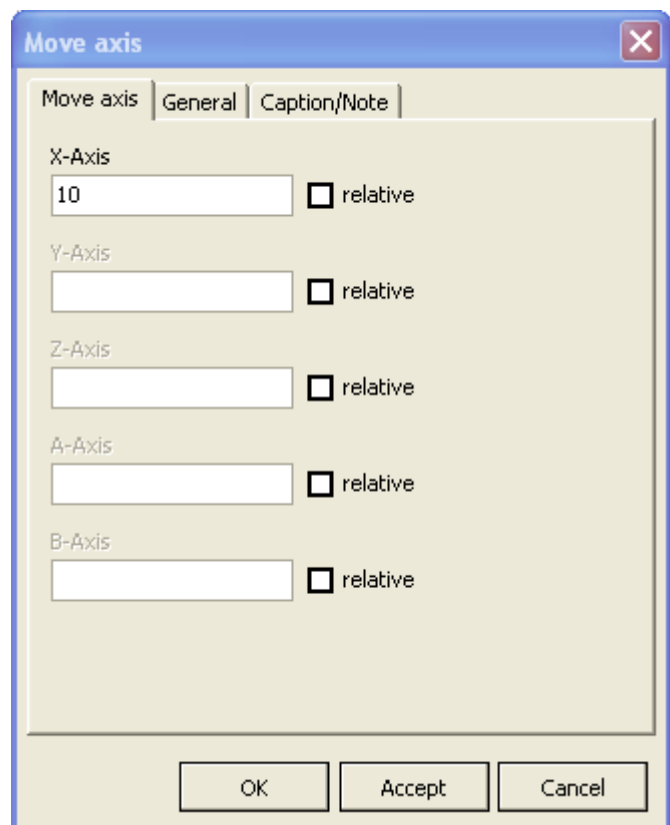
This control element is usually used when external systems (e.g. axes) require specific time spans before proceeding with the actual marking.



13.12 Move axis



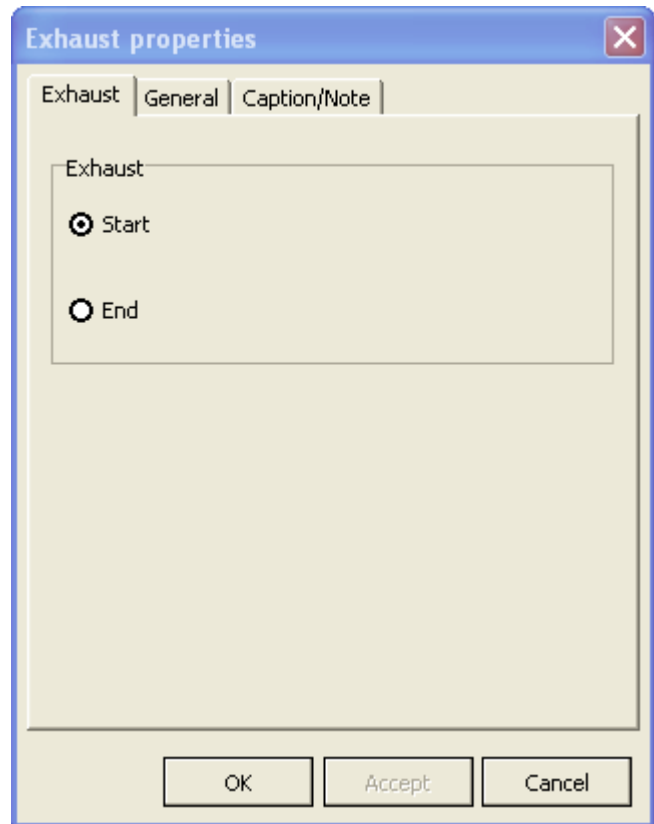
The move axis control element allows a simple control of connected axis.



13.13 Exhaust control



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

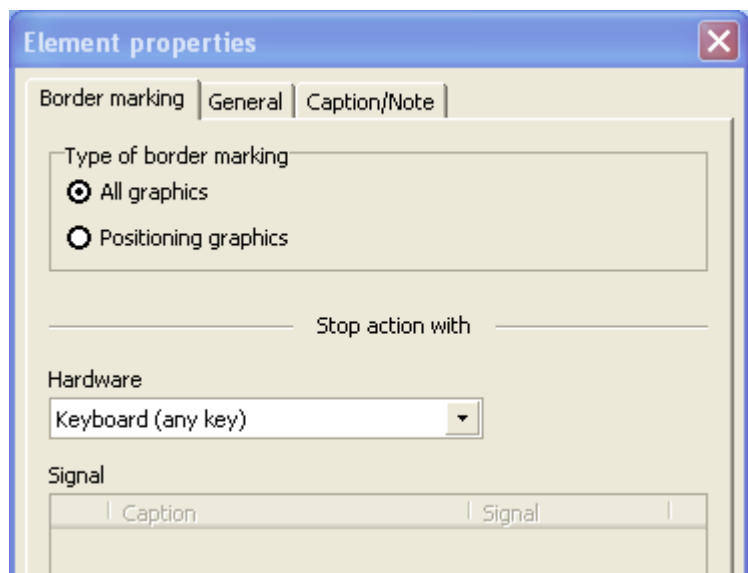


13.14 Border marking



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

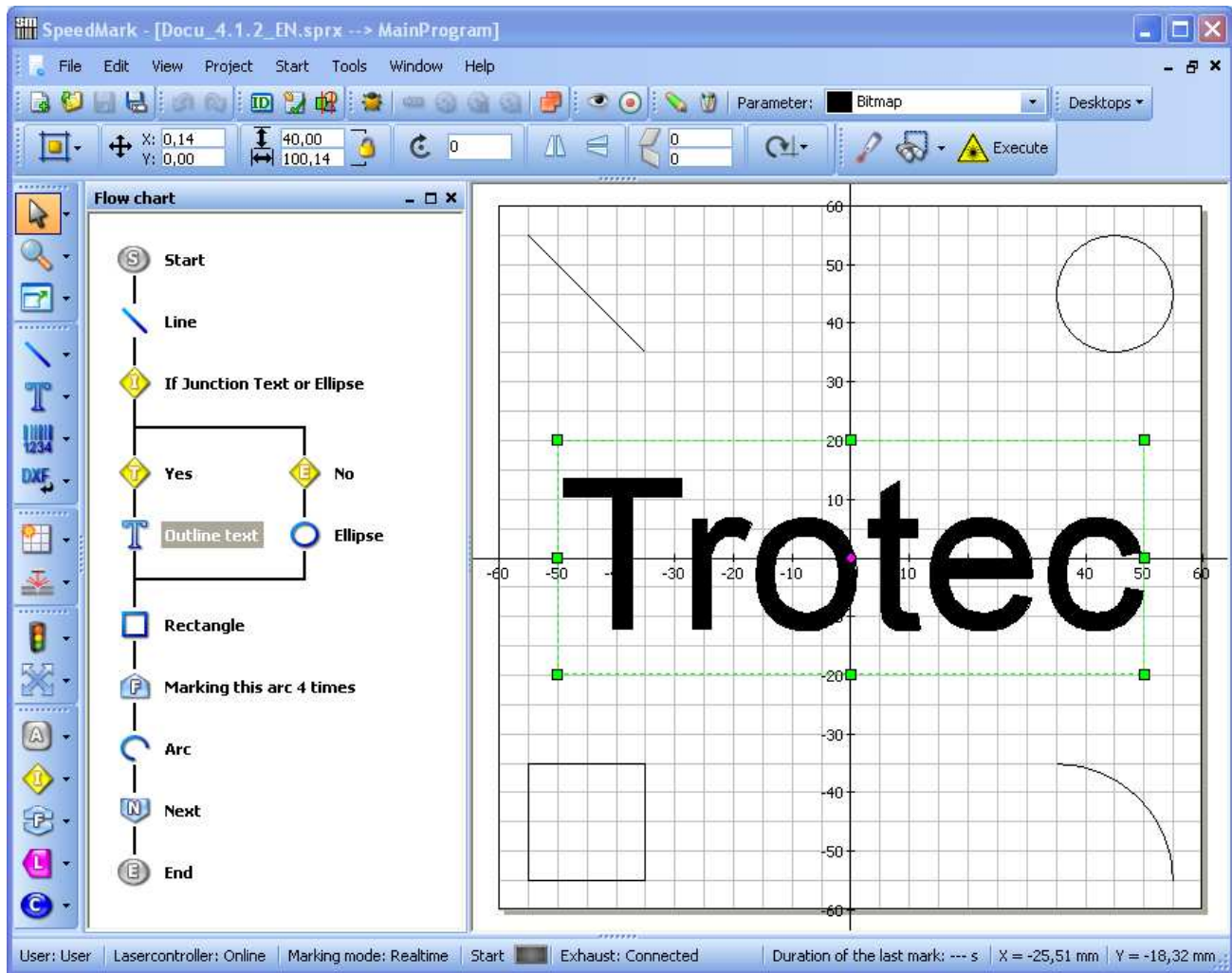
It can be determined on which signal the execution resumes.





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.⁶⁰



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.

⁶⁰ Additional programming methods can be found in Chapter 15 Simple Scripting on page 134.

14.1 General

The Tools toolbar can be used to create new control and programming elements in the flow chart.⁶¹ 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.

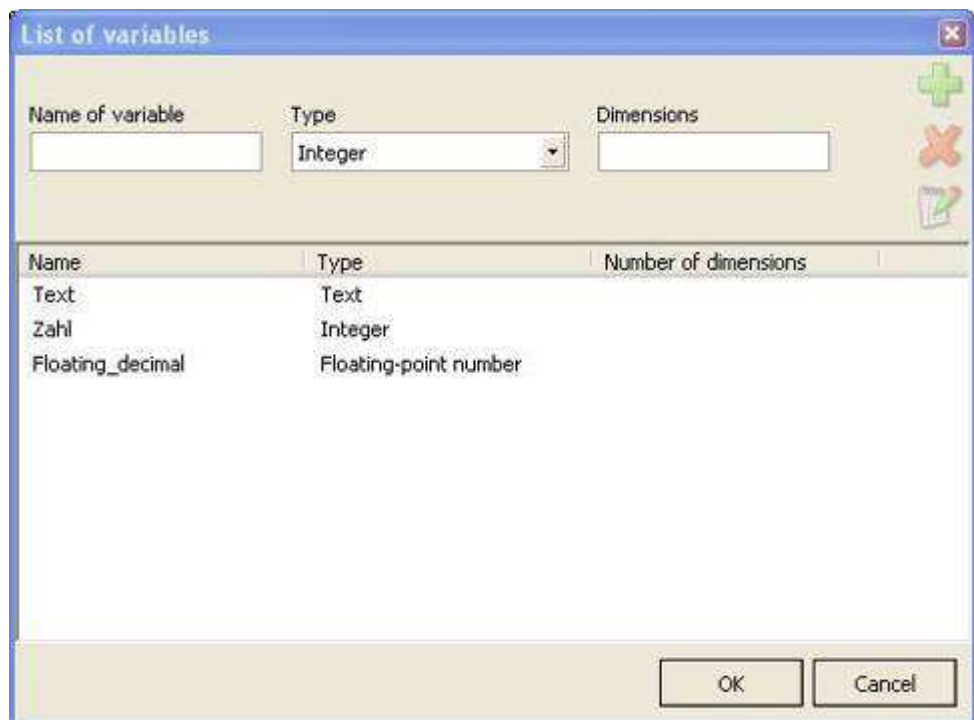
All available control and programming elements are located on the toolbar beginning with the traffic light symbol (Wait for Signal). An arrow is located next to each symbol and clicking once on an arrow opens a list containing all the graphic elements available for this group.

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.

⁶¹ In the SpeedMark default settings, the Tools toolbar is positioned vertically. However, it is presented horizontally in this document for ease of illustration.



14.2.1 Creating Variables

To create variables, enter a unique name for the variable in the Variable Name field.⁶² Then select a suitable variable type from the adjacent list.

SpeedMark supports the following types of variable:⁶³

Type	Description
Integer	4-byte integer ($-2^{31} \dots 2^{31}-1$)
Text	String consisting of ASCII/ANSI symbols
Floating-point number	8-byte real number ($5.0 \cdot 10^{-324} \dots 1.7 \cdot 10^{308}$)
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.

14.2.2 Editing Variables

In order 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.

In order 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.

14.2.3 Deleting Variables

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

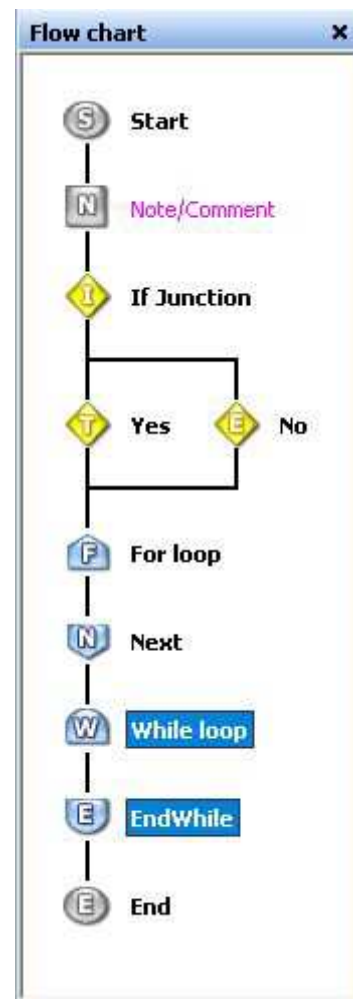
⁶² A variable name may only be allocated once within a SpeedMark program.

⁶³ The use of matrix variables is described in more detail in document “SpeedMark Scripting Reference”.

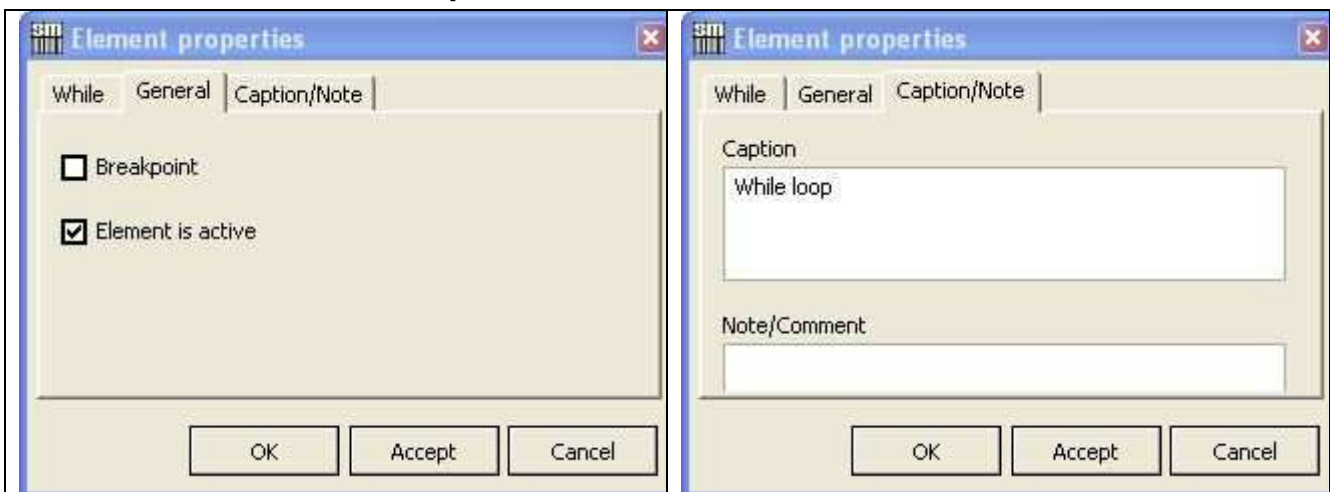
14.3 Basic Programming Elements⁶⁴

The programming elements give SpeedMark programs a dynamic component.

You can open the properties dialog for each of the elements with a double click.



14.3.1 Basic Element Properties



The Basic Element Properties tab is used to specify whether the element should have a breakpoint,⁶⁵ whether the element is active and which title and comment should be displayed.

⁶⁴This chapter describes only the basic programming elements. All advanced programming elements are described in detail in Chapter 15 Simple Scripting on page 134.

⁶⁵ Further information on breakpoints can be found in Chapter 14.4 Debug Programs on page 128.



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



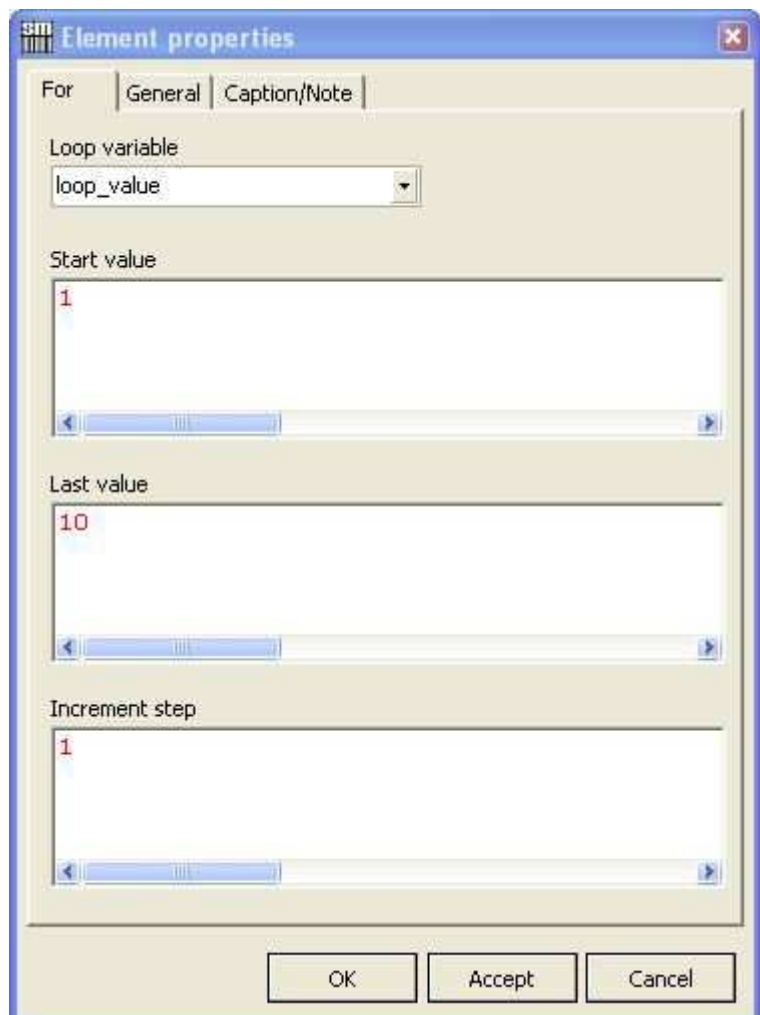
The Incremental Loop enables a repetition of the part of the program within the loop with definable parameters.

In order to set the incremental loop, a loop variable must be specified (by making a selection in the Loop Variable combo box)

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



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

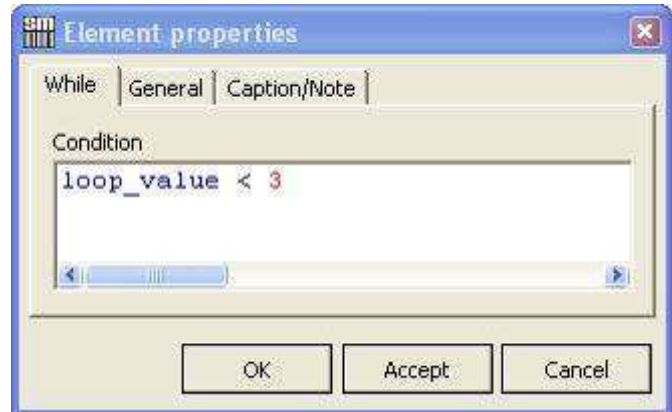


14.3.5 Conditional Loop



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.

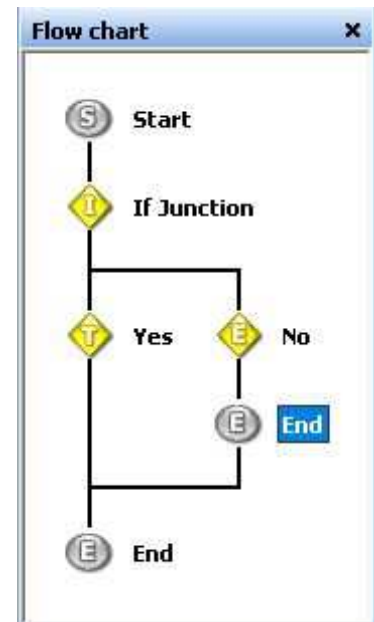


14.3.6 Program End



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

In order 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

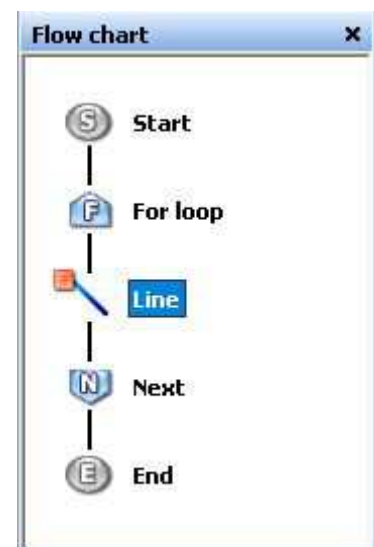
SpeedMark stops the current program execution when it reaches breakpoints and the program developer is able to evaluate the current progress, view variable values and investigate any errors.

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.⁶⁶

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.


⁶⁶ Re-executing the function deletes the breakpoint again.


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.

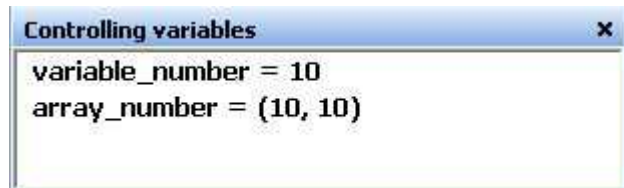
 Continue Program causes SpeedMark to continue with the program without interruption until the next breakpoint.

 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.



```
Controlling variables x
variable_number = 10
array_number = (10, 10)
```

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.



```
Error messages x
""Test' invalid integer value"
```

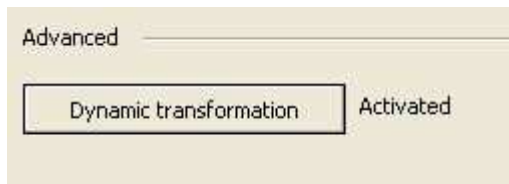
14.5 Dynamic Positioning

Dynamic positioning uses variables to dynamically adjust the:

- Position
- Size
- Rotation

of graphic elements while a SpeedMark program is running.

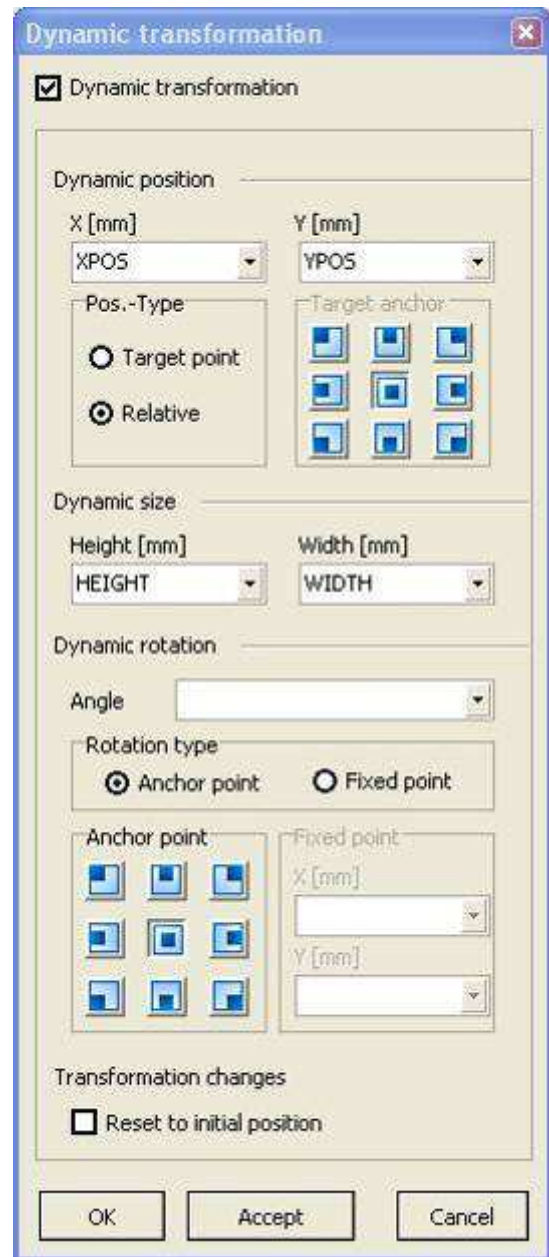
The dynamic transformation of each graphic element is specified in the Transformation tab in Graphic Properties.⁶⁷



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



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



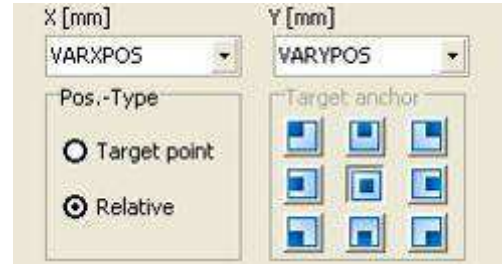
⁶⁷ Information on editing the transformation of graphics can be found in 5.3.4 Transformation on page 61



14.5.1 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.

14.5.2 Size

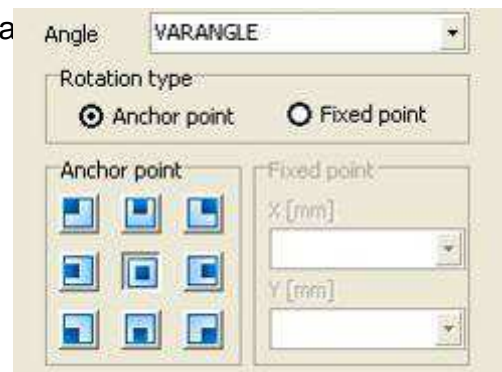
The size of the graphic element may also be dynamically from the combo boxes.



14.5.3 Rotation

To execute a dynamic rotation it is possible to select a variable.

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





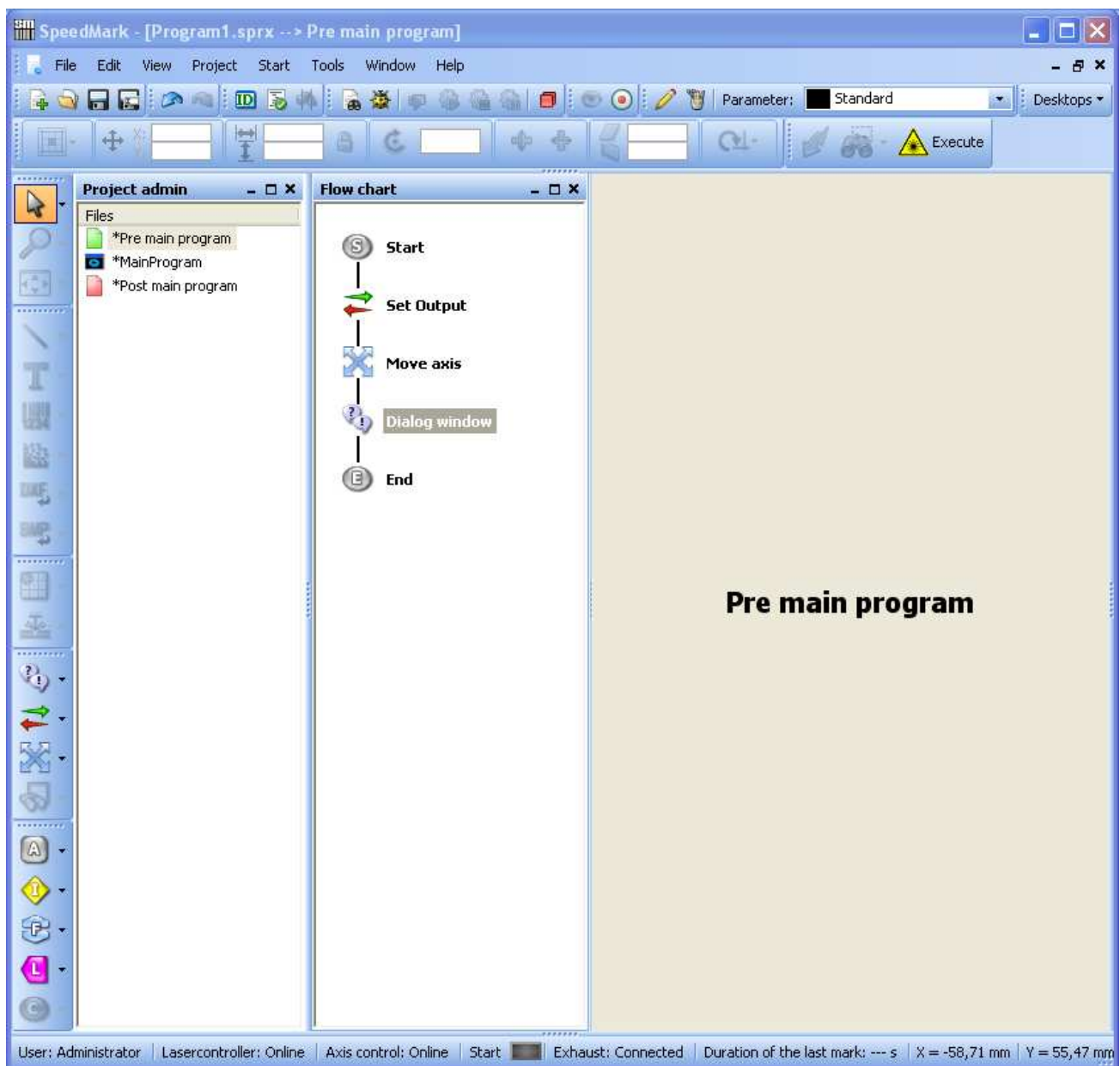
14.6 Pre- and Post program

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

14.6.1 Pre-Program

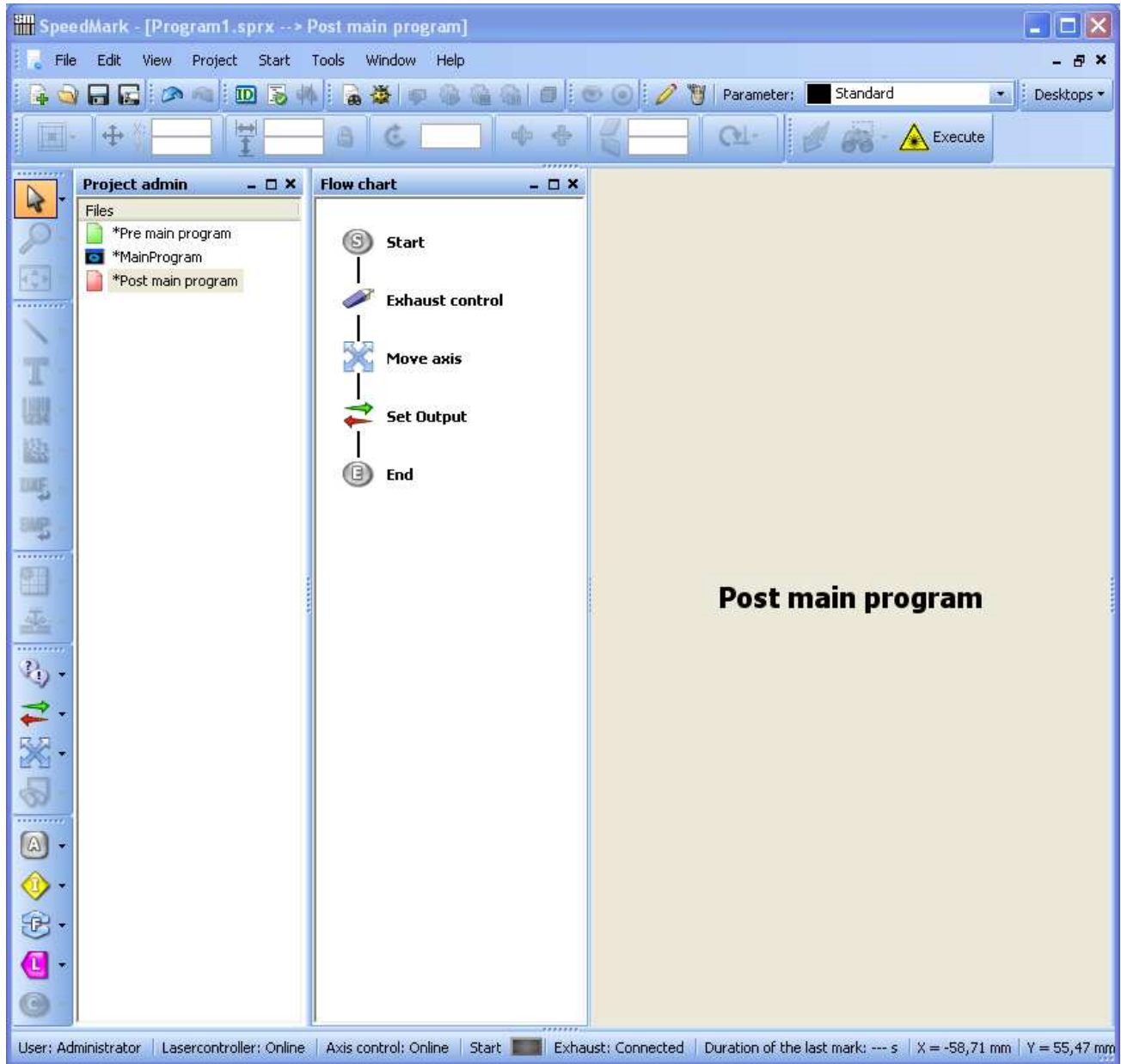
It is not possible to insert graphics into the pre program. This section serves only for initializing the system before the actual program execution.





14.6.2 Post-Processing

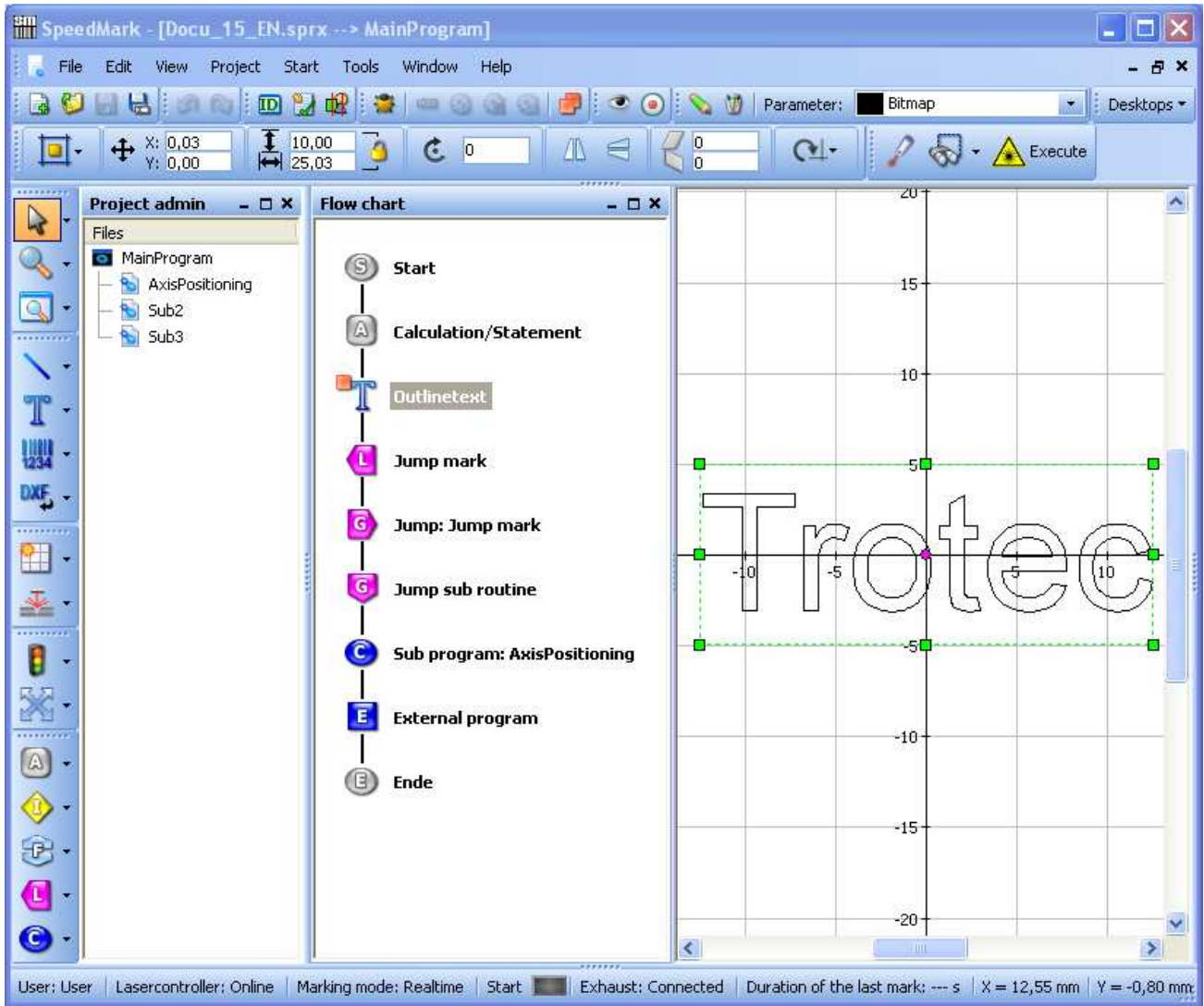
It is not possible to insert graphics into the post program. This section serves only for shutting down the system after the actual program execution.





15 Simple Scripting

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



Advanced programming knowledge definitely 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

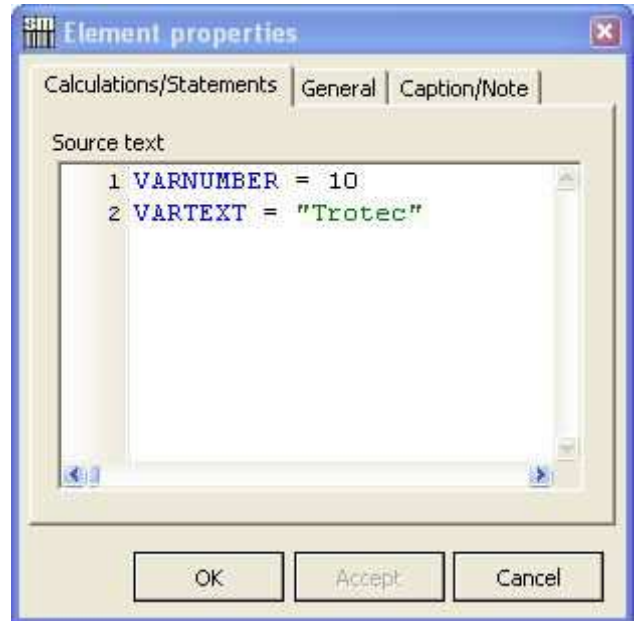
15.1.1 Calculation/Allocation



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 15.2 Scripting on page 138.



15.1.2 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.



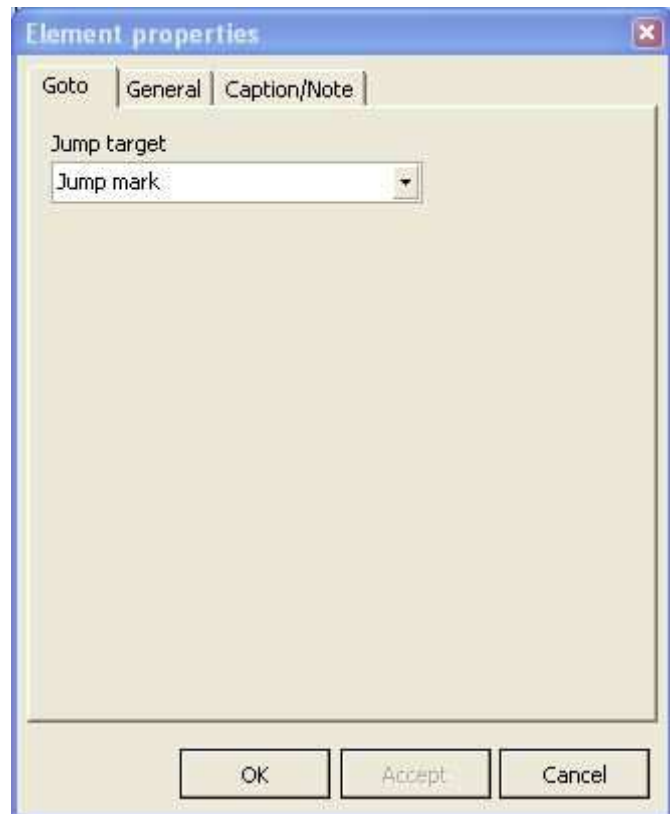
15.1.3 Jump to Jump Label



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.



15.1.4 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.

15.1.5 Jump Back out of Sub-Routine



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



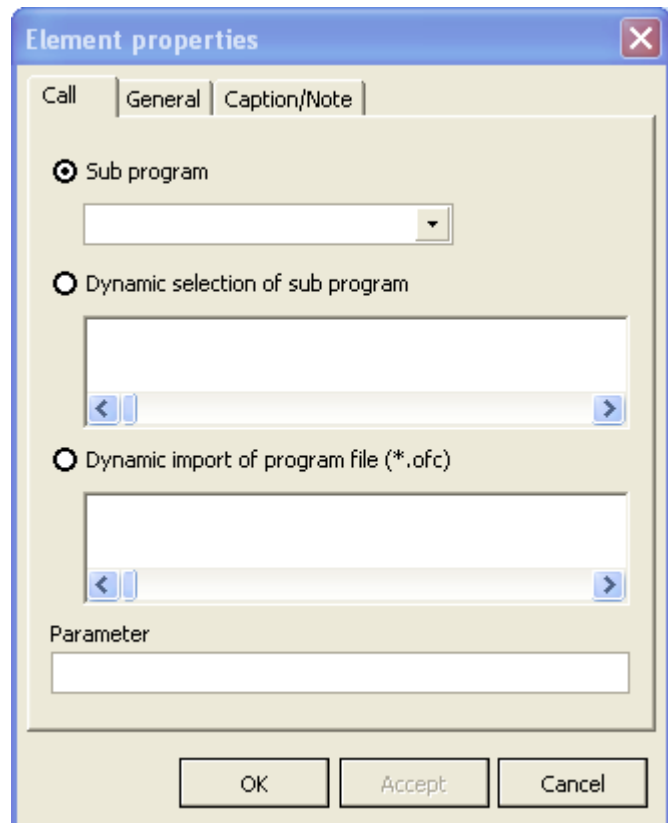
15.1.6 Sub-Program

C 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.⁶⁸

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.

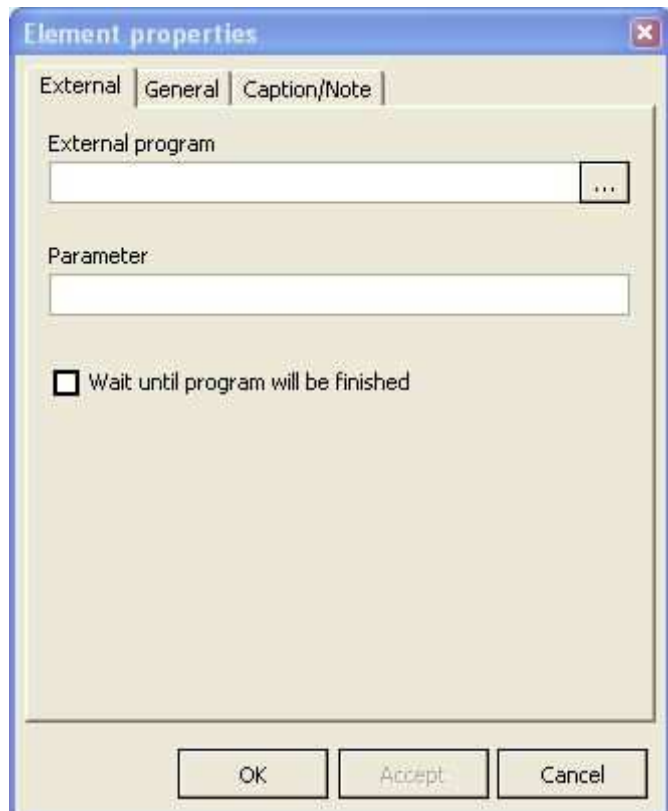


15.1.7 External Program

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

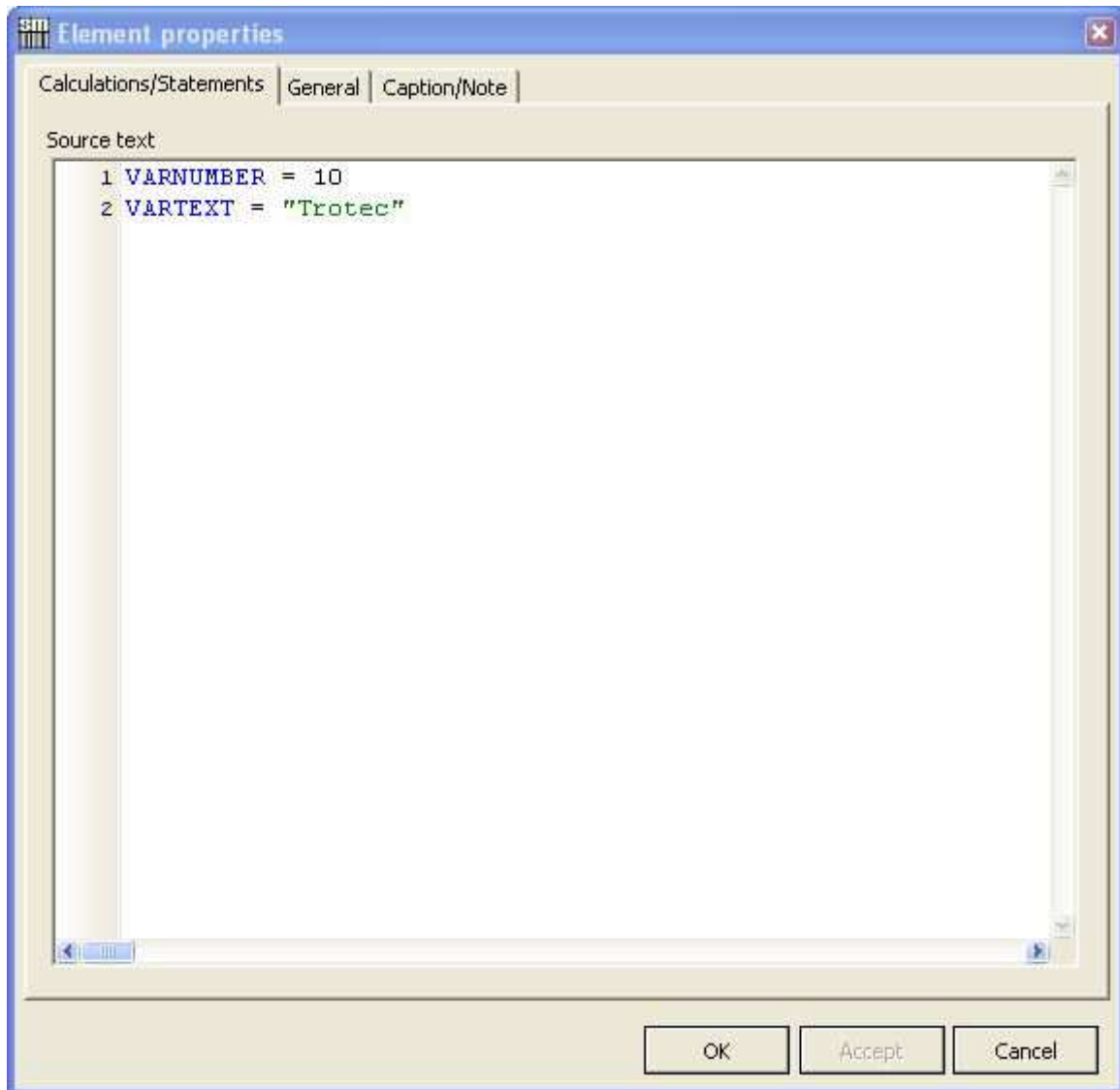
It is also used to give the application command line parameters.

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



⁶⁸ Further information about requesting sub-programs can be found in Chapter 15.3 Master Programs and Sub-Programs on page 139

15.2 Scripting

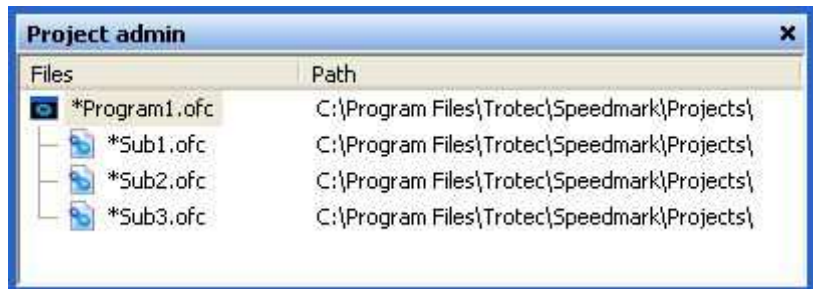


SpeedMark scripts may be used to fully automate program execution.

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 Specifying Transfer Parameters

To dynamise 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

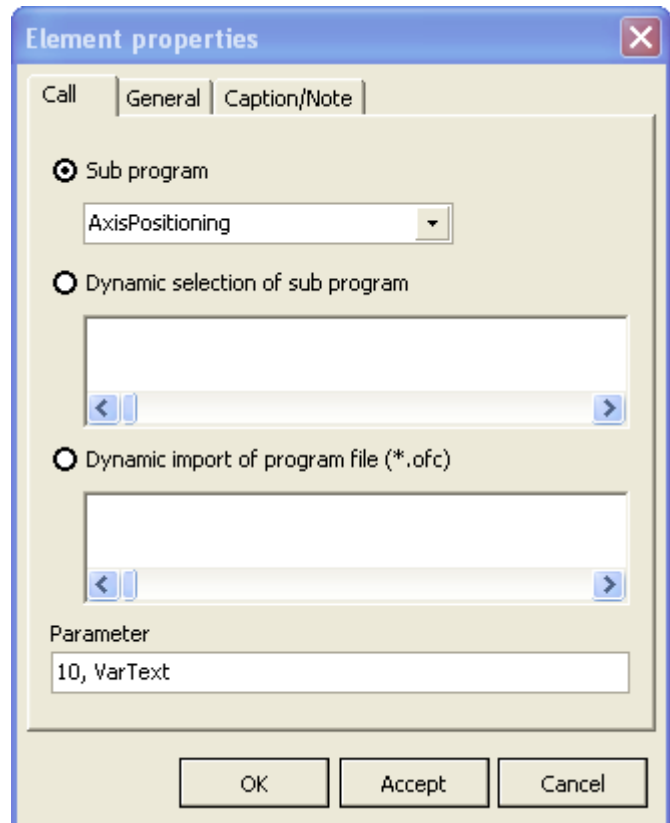
In the example above, the VarText value is transmitted back to the master program on completion of the sub-program.

15.3.3 Opening a Sub-program

Sub-programs can be opened by the master program and other sub-programs using the Sub-Program programming element.⁶⁹

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.

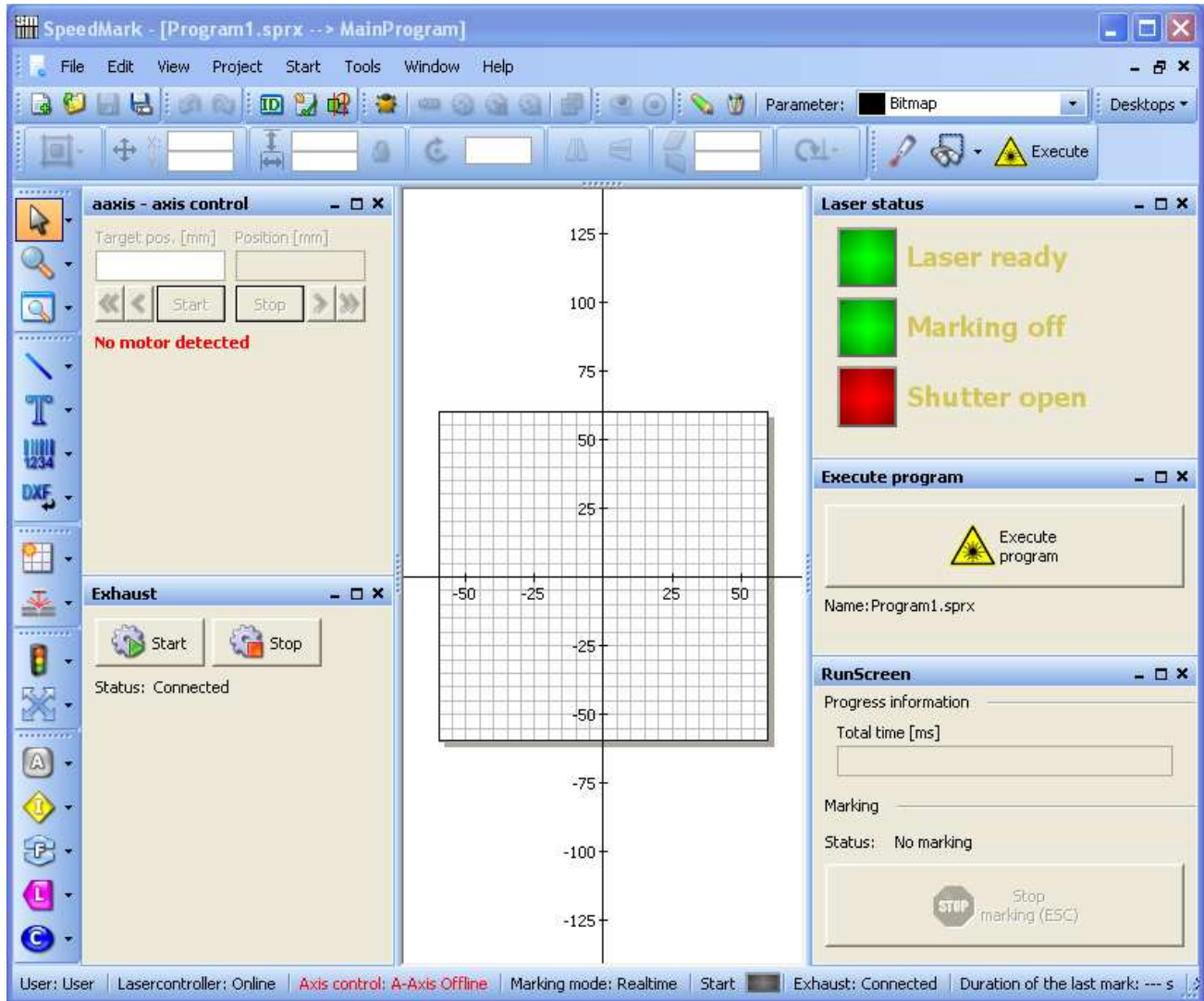


In the case of reference parameters, a variable must be entered when the sub-program is requested.

⁶⁹ Please also refer to 15.1.6 Sub-Program on page 137

16 Modules and Components

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



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.

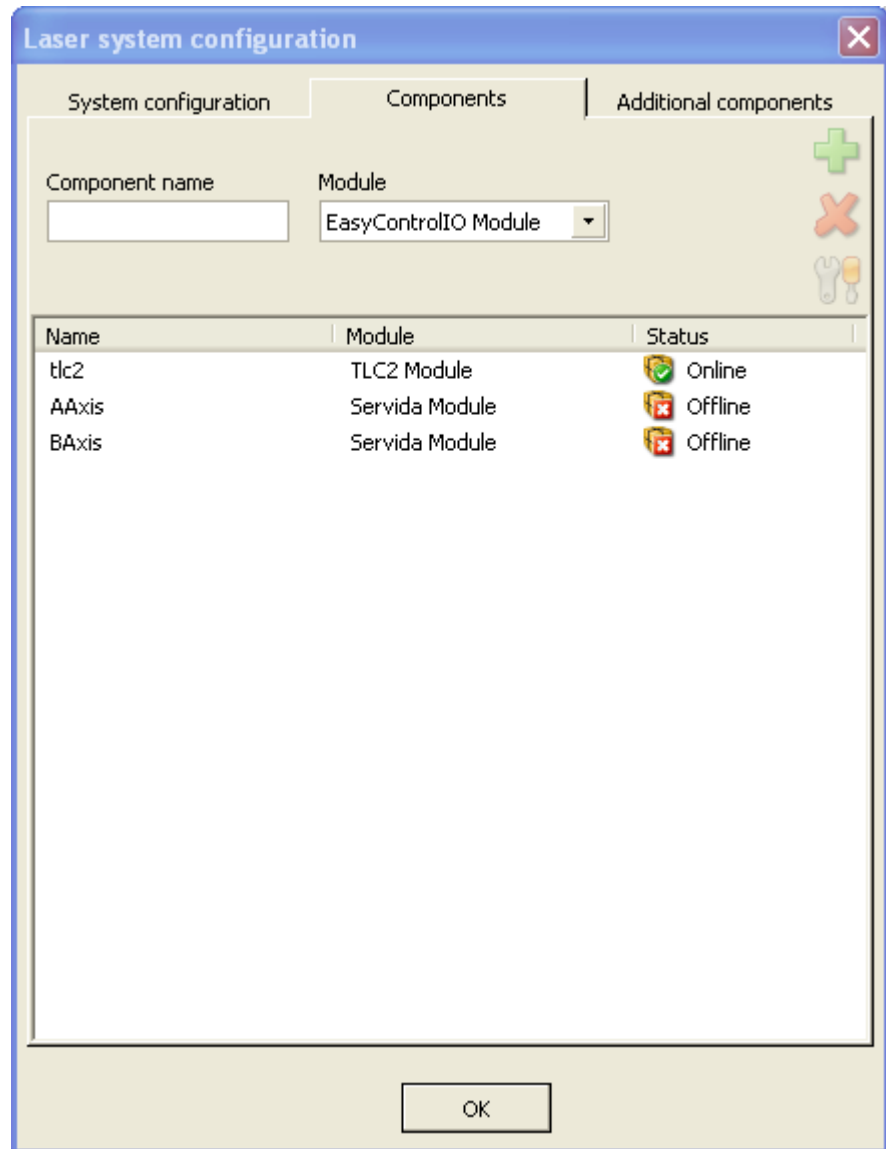
16.1 Component list

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.

In order 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.



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.

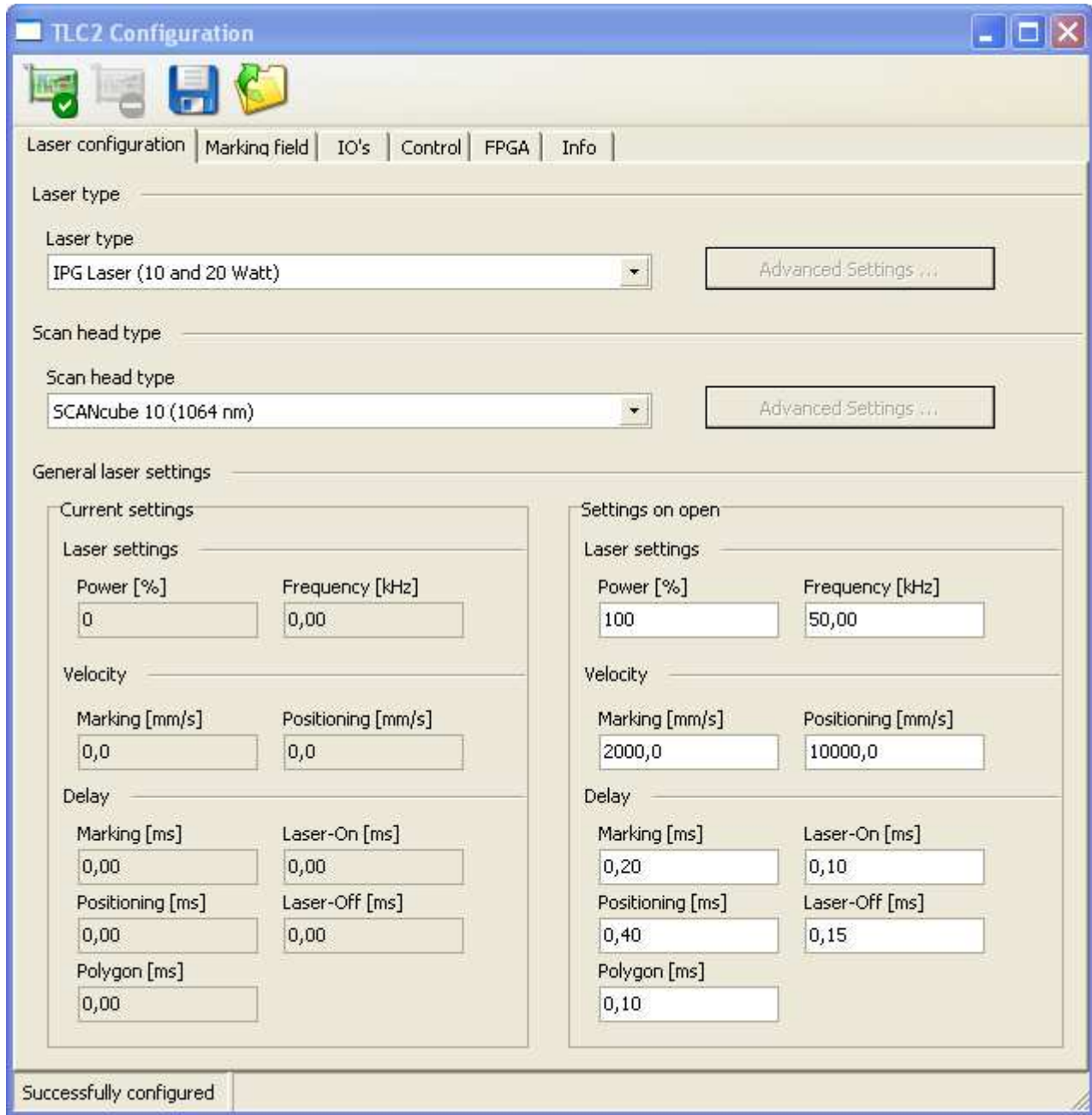
16.3.1 Functional Range of Module

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 current 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
	Save	Saves the configuration contained in a .ini file.
	Load	Load the configuration in the specified .ini file.



Laser Type (Laser configuration)

Laser type
IPG Laser (10 and 20 Watt) Advanced Settings ...

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)

Scan head type
SCANcube 10 (1064 nm) Advanced Settings ...

Defines the used scan head type.

Current Laser Settings (Laser Configuration)

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

Current settings

Laser settings

Power [%]	Frequency [kHz]
100	50,00

Velocity

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

Delay

Marking [ms]	Laser-On [ms]
0,35	-0,07
Positioning [ms]	Laser-Off [ms]
0,25	0,35
Polygon [ms]	
0,05	



Settings On Opening (Laser Configuration)

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 7 Material Parameter Manager on page 69.

Settings on open	
Laser settings	
Power [%]	Frequency [kHz]
100	50,00
Velocity	
Marking [mm/s]	Positioning [mm/s]
2000,0	10000,0
Delay	
Marking [ms]	Laser-On [ms]
0,35	-0,07
Positioning [ms]	Laser-Off [ms]
0,25	0,35
Polygon [ms]	
0,05	

Scanning lens type (Marking field)

Scanning lens type

Defines the used scanning lens type

Field distortion (Marking Field)

Laser configuration | **Marking field** | IO's | Control | Info

Field distortion

Correction file

Program file

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 particular TLC2 card properties. This file is delivered with SpeedMark and the TLC2 card.

Field Borders (Marking Field)

Maximum field border size Height [mm] <input type="text" value="128"/> Width [mm] <input type="text" value="128"/>	Working area Height [mm] <input type="text" value="120"/> Width [mm] <input type="text" value="120"/>	Field border wizard <input type="button" value="Field border wizard"/> <input type="button" value="Field grid for distortion"/> <input type="button" value="Pilot laser wizard"/>
---	--	--

The laser system field borders are essentially defined by the optics used. The Field Borders Wizard is used to calculate these borders incrementally.



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 <input type="checkbox"/> Activate field transformation		
Rotation Angle [°] <input type="text" value="0,00"/>	Shifting X-Offset [mm] <input type="text" value="0,00"/> Y-Offset [mm] <input type="text" value="0,00"/>	Mirroring <input type="checkbox"/> Horizontal mirroring <input type="checkbox"/> Vertical mirroring

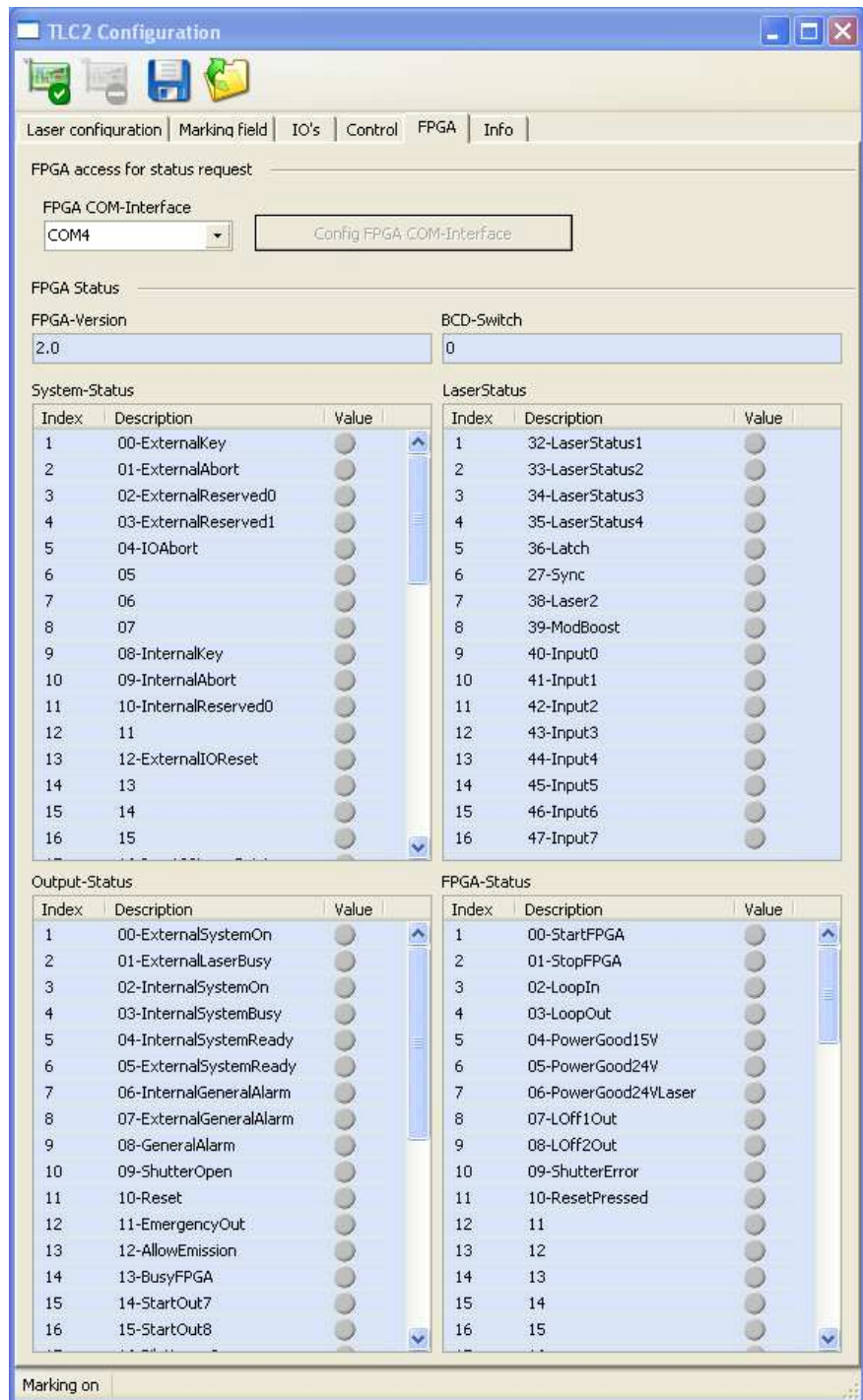
The field transformation of the marking field enables the transformation of the actual marking field compared to the marking field shown in SpeedMark.



FPGA

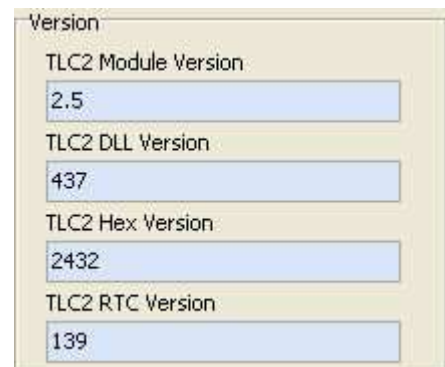
The tab-sheet FPGA shows a detailed overview of the current state of the laser system.

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

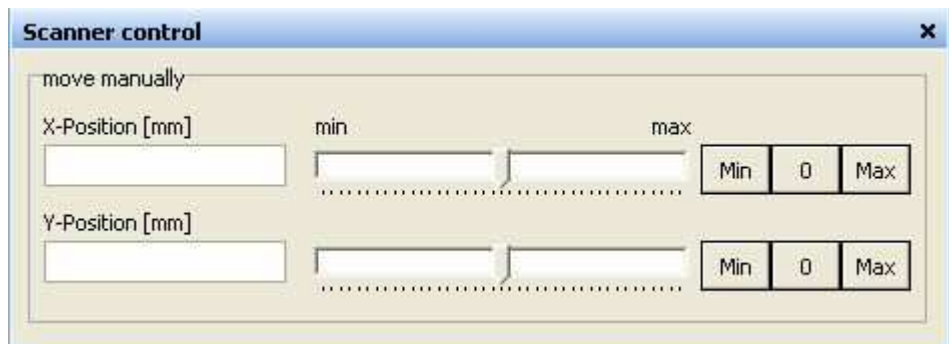
Laser Status

The current status of the laser is displayed in SpeedMark using the Laser Status window.

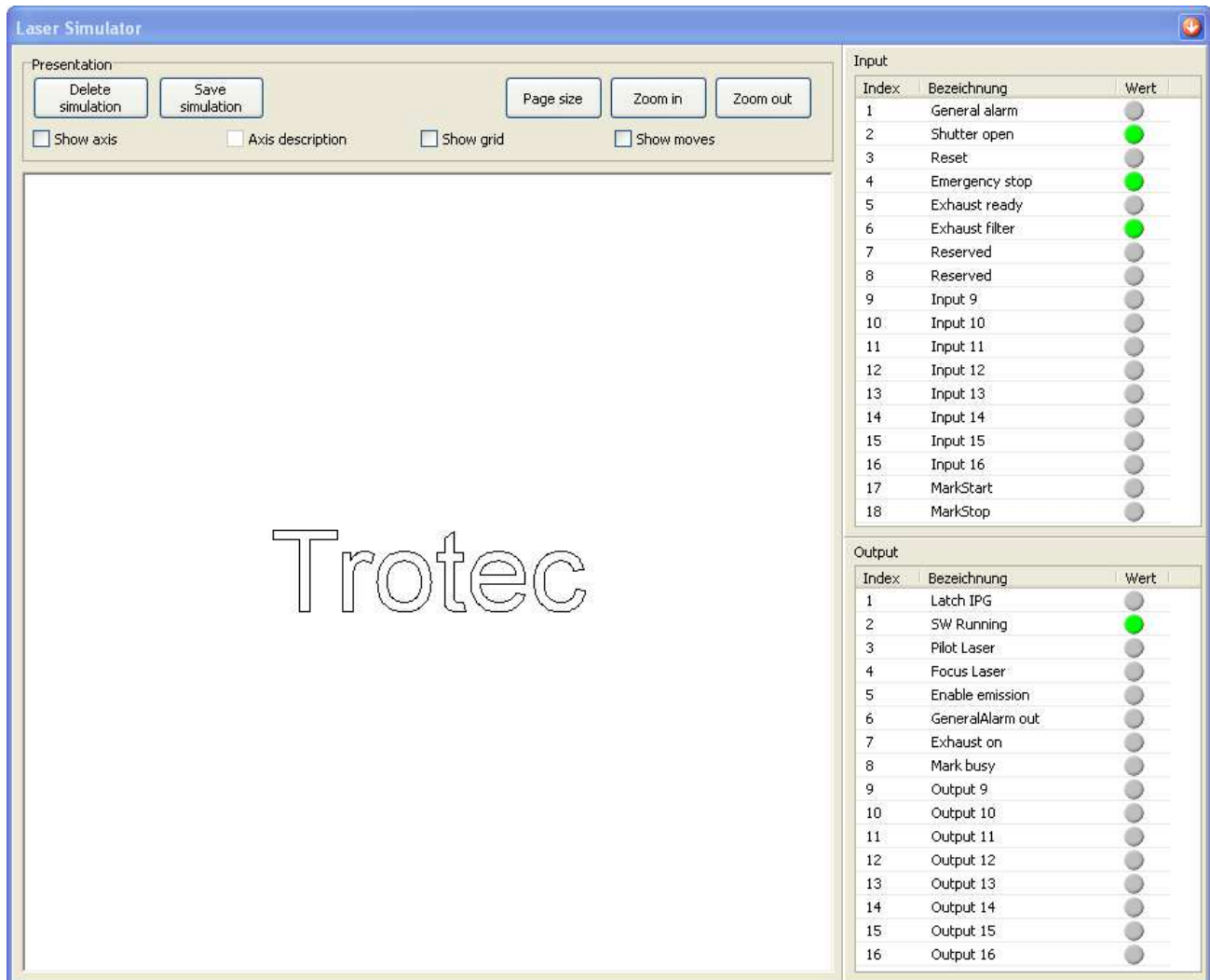


Scanner Control

This window is used to manually move the mirrors for test and maintenance purposes.



16.4 Laser Simulator



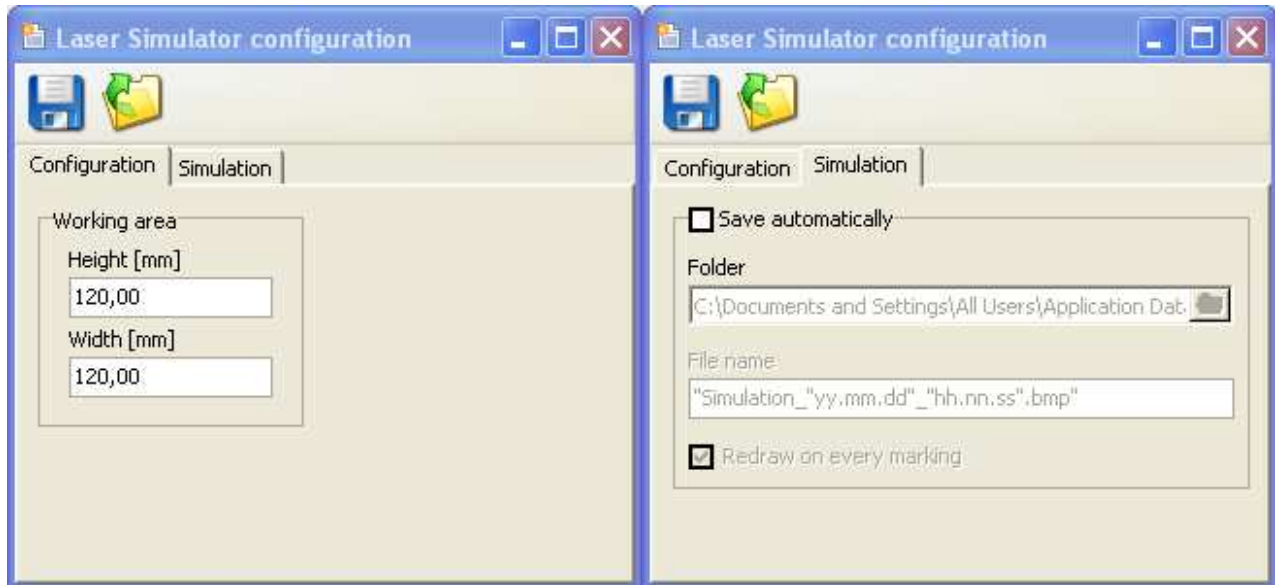
The LaserSimulator module and associated components allows the usage of SpeedMark without laser system for testing purposes or work preparation.

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 current status

16.4.2 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 save

It is possible to automatically save simulations as bitmap files.

16.4.3 SpeedMark Windows

Laser Status

The current status of the laser is displayed in SpeedMark using the Laser Status window.



16.5 Servida Axis Control



The Servida⁷⁰ module and associated components support the control of Servida motors used to control axial and curved engravings.

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

⁷⁰ 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.



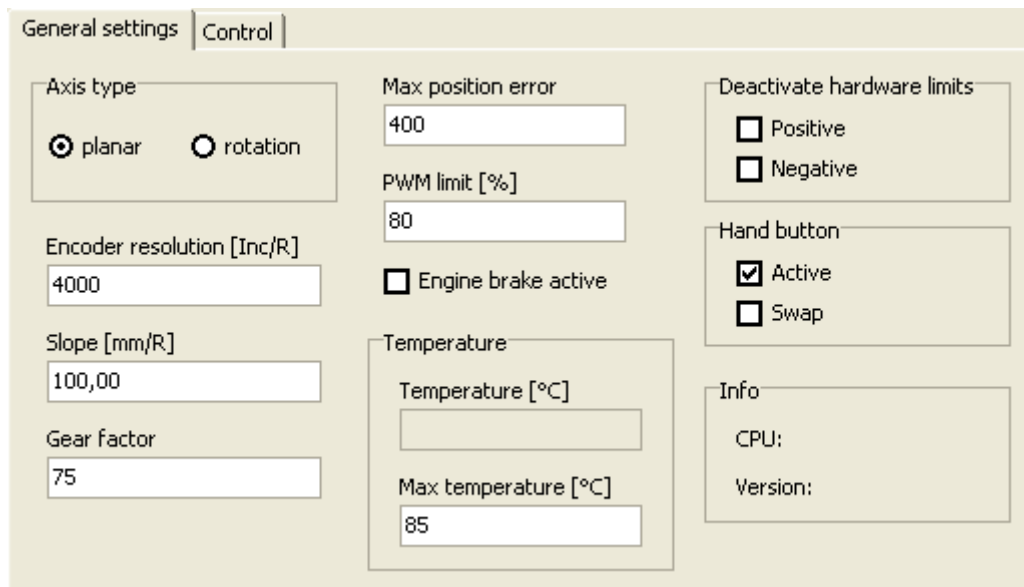
16.5.2 Configuration

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
	Configuration	Configuration of the COM port
	Save	Saves all configurations
	Load	Loads all configuration settings

General Settings



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
Info	Additional motor information

Control

The screenshot shows the 'Control' tab of the software interface. It is divided into several sections:

- Motion:** Move speed [mm/s] (20,7), Hand speed [mm/s] (10,3), Acceleration (400), PID values (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] (5,2), Acceleration (100), Direction (radio buttons for negative and positive), Referencing button, Index distance.
- Status:** A list of status indicators with checkboxes, including In motion, In Position, InPos-TimeOut, Historical positive/negative limit, Index report available, Position wrap around, Position error, Temperature error, Motor off, Index active, Positive/negative limit active, Math overflow, Array index error, Syntax error, PWM limit, EEPROM checksum, and a Reset button.
- Position Control:** Target pos. [mm] and Position [mm] input fields, Start and Stop buttons, a position scale from 0,00 to 300,00 with navigation arrows.
- Inputs/Outputs:** A grid of status indicators for Interlock, Endswitch POSITIVE, Automatic mode, Hand button POSITIVE, Ready, Endswitch NEGATIVE, and 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-Window	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	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 does not use any windows in SpeedMark.

16.7 RunScreen



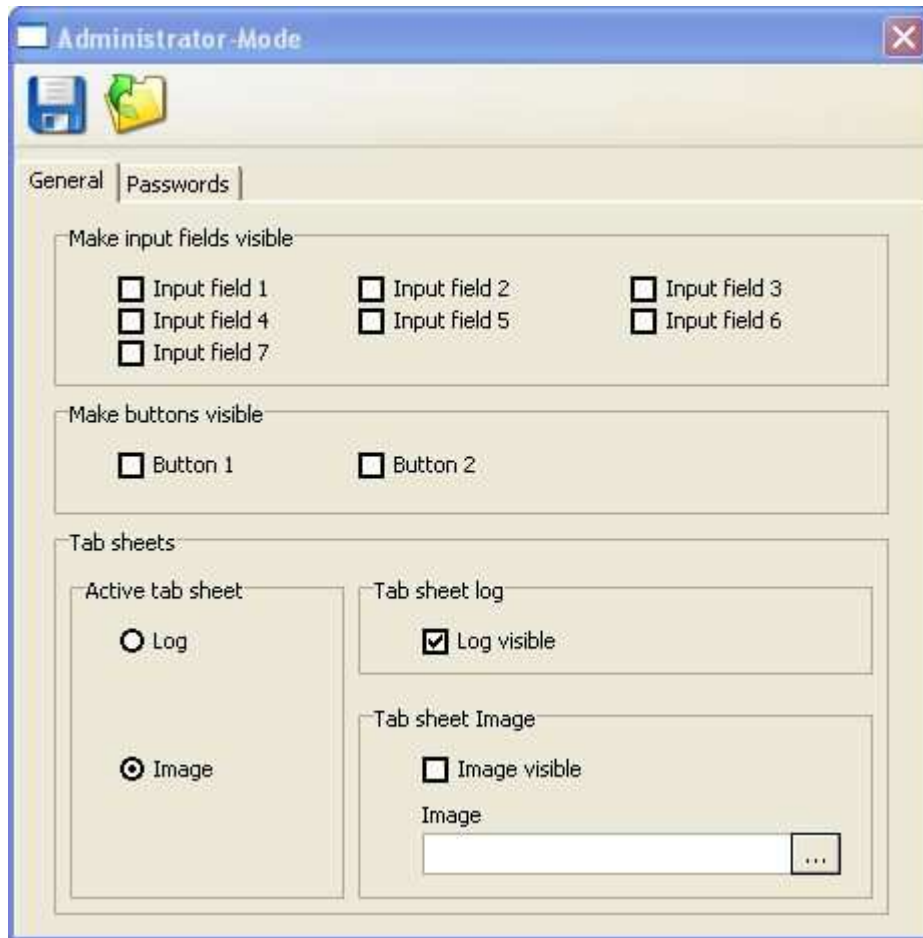
The RunScreen module and associated components generate a configurable dialog while a SpeedMark program is being processed.

16.7.1 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

16.7.2 Configuration



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
Active Tab	Selects the active tab
Log Tab Visible	Specifies that the Log tab should be visible
Image tab visible	Specifies that the Image tab should be visible
Image	Selects the image displayed in the Image tab.





Passwords

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 with various options to continue processing with the interrupted program.

16.7.3 SpeedMark Windows

The RunScreen module does not support any windows in SpeedMark.



16.8 Profibus

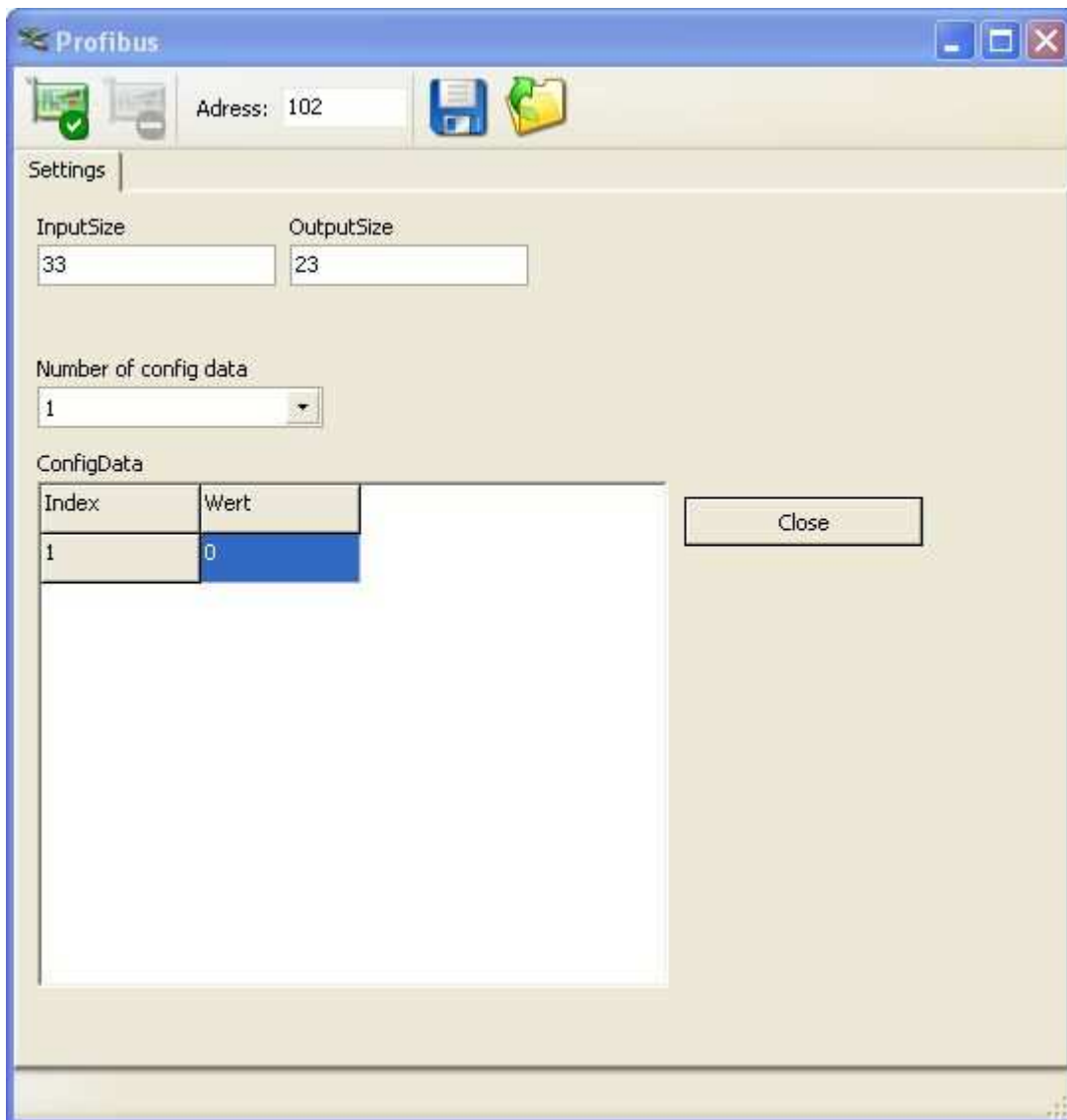
The Profibus module and associated components support the control of a Profibus card.

16.8.1 Functional Range of Module

The Profibus I/O module fulfils the following functions:

- Control of a slave Profibus card
- Communication with a master Profibus

16.8.2 Configuration





Configuration Control



Tool	Name	Description
	Open	Tries to created a connection to the Profibus
	Close	Closes an open connection
	Card	Address used by the PC to communicate with the Profibus.
	Save	Saves all configurations
	Load	Loads all configuration settings

Settings

Setting	Description
Input Size	Used to specify the number of bytes received
Output Size	Used to specify the number of bytes sent
Number of ConfigData	Number of data modules
ConfigData	Configuration of data module

16.8.3 SpeedMark Windows

The Profibus module does not use any windows SpeedMark.



16.9 COM Port

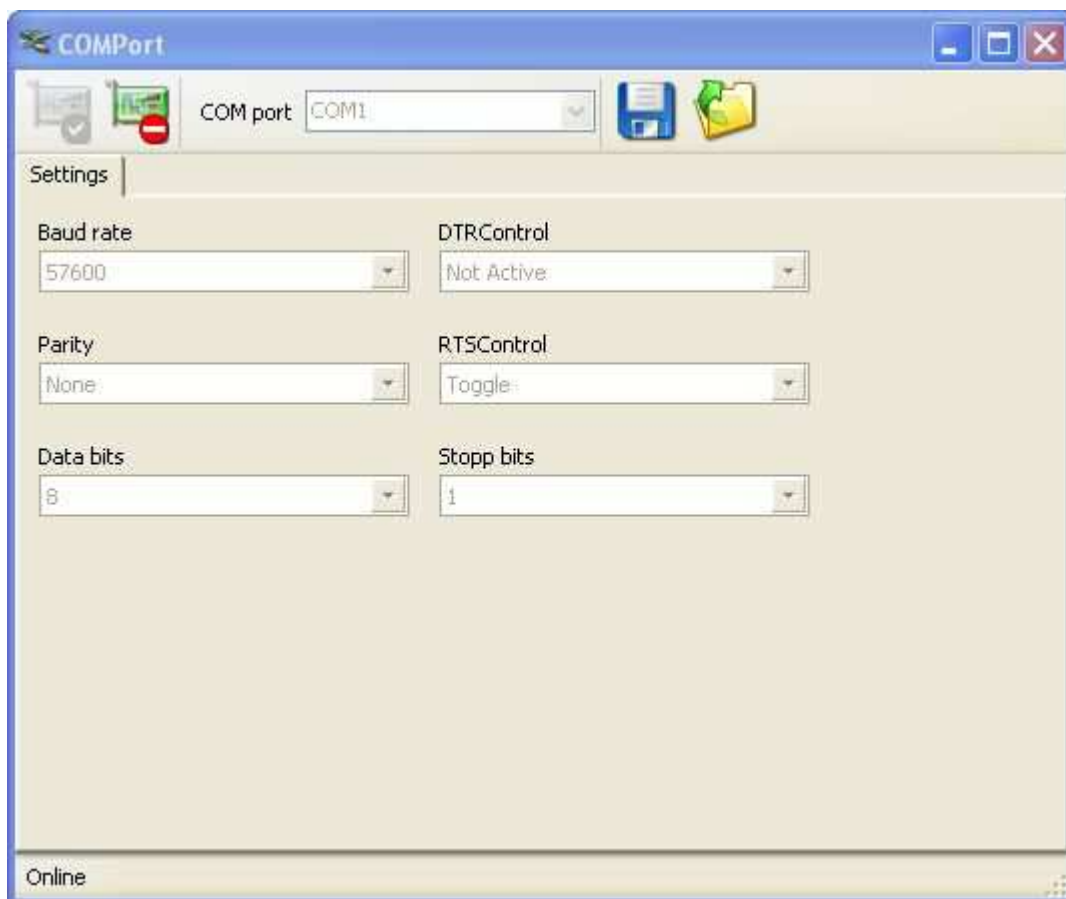
The COM port module and associated components support the control of the COM ports available on the PC system.

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

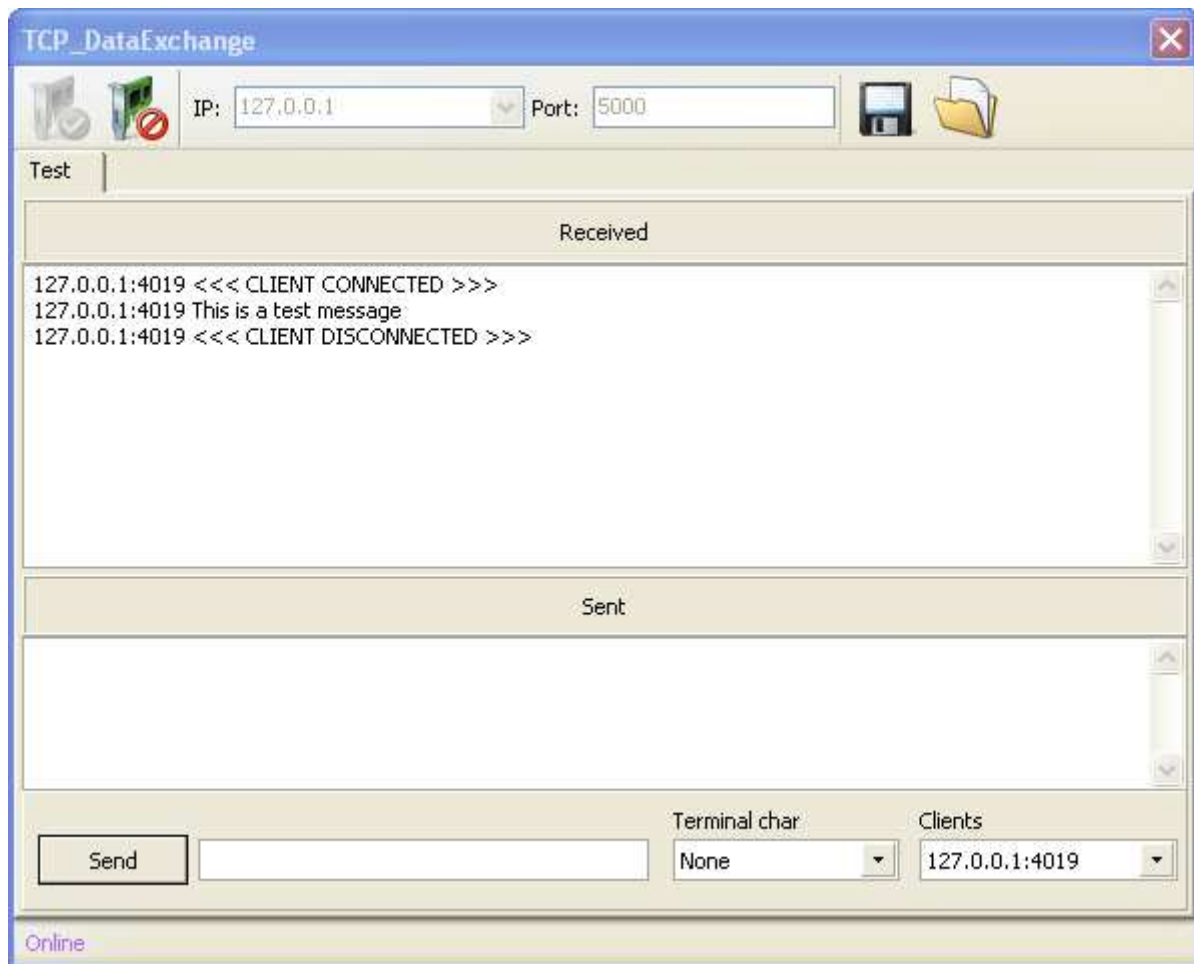
The TCP module and associated components support the data exchange through built in network capabilities.

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 setup⁷¹

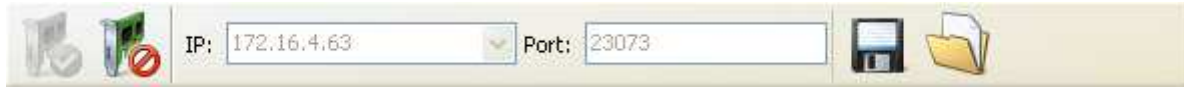
16.10.2 Configuration



⁷¹ See <SpeedMark install folder>\Utilities\TCPServerClient\TCPClient.exe



Configuration Control



Tool	Name	Description
	Open	Opens a channel on the PC to receive and send data
	Close	Closes an open connection
	IP address	IP address of this computer
	Port	Communication port
	Save	Saves all configurations
	Load	Loads all configuration settings

16.10.3 SpeedMark Windows

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

Save

Load

Description

Saves all configurations

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

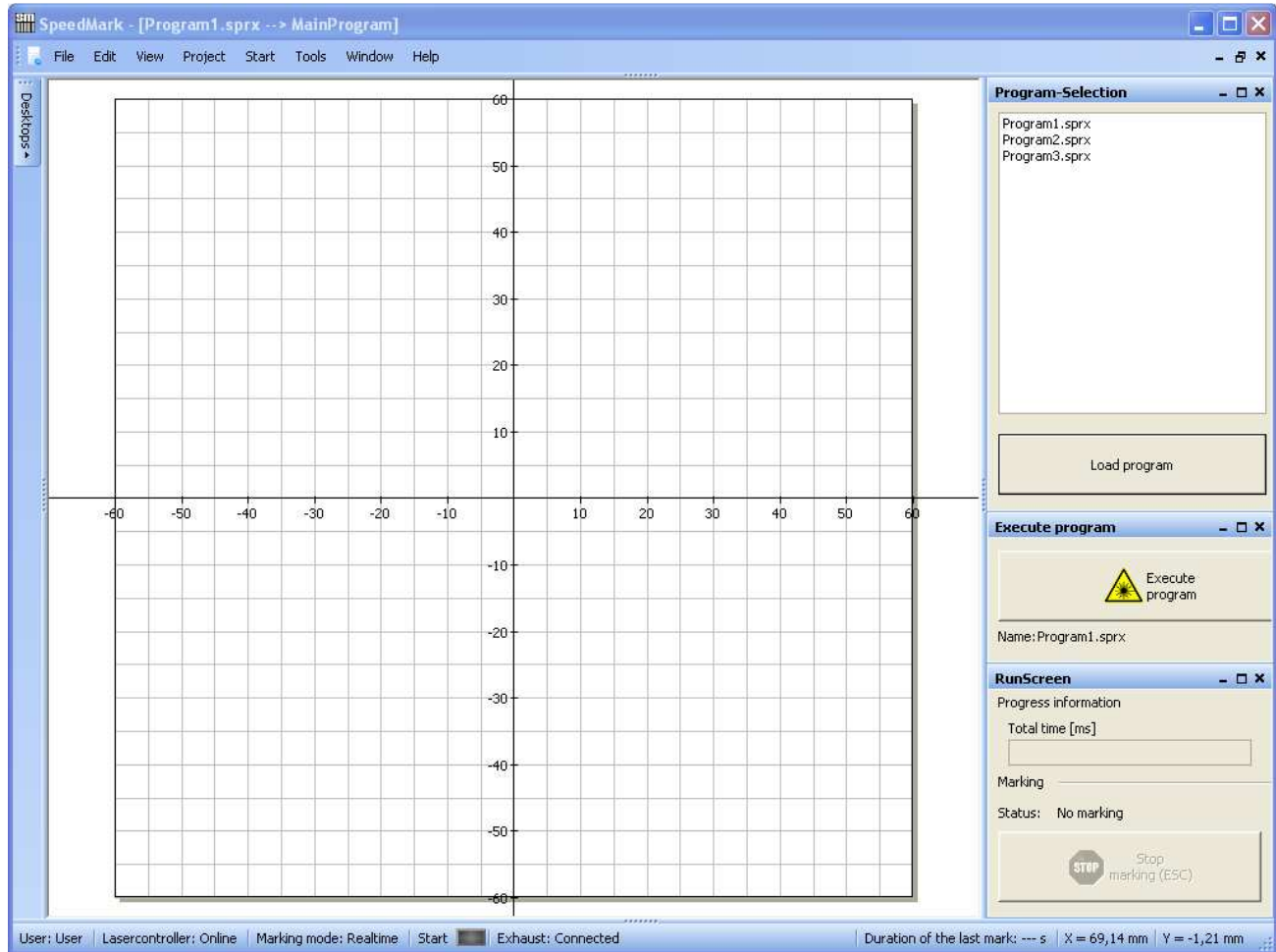
The axis simulator module does not use any windows in SpeedMark.





17 Extensions

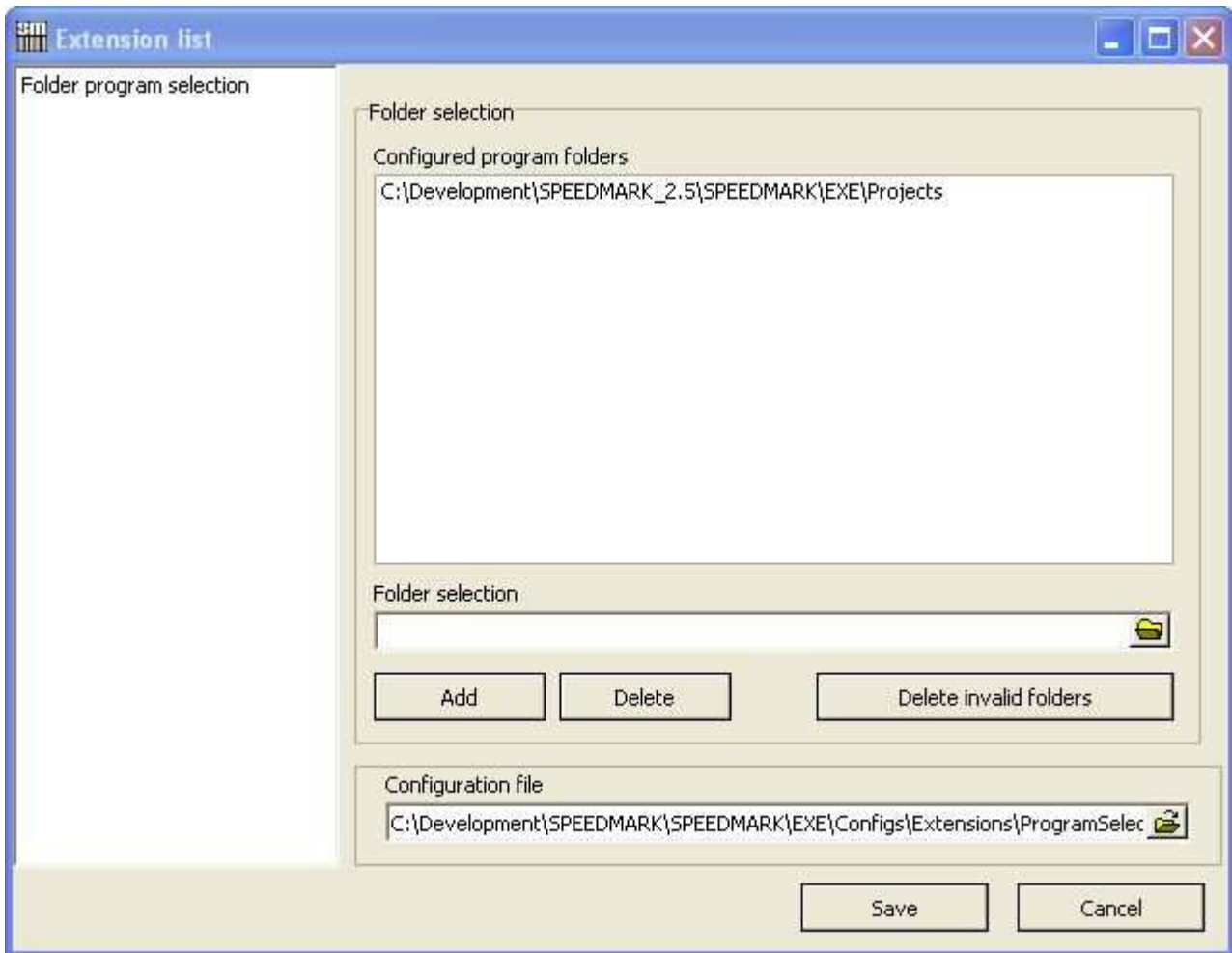
Extensions are used to provide additional functions within SpeedMark.



In contrast to modules, extensions directly increase the functional range of SpeedMark. It is therefore also possible 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

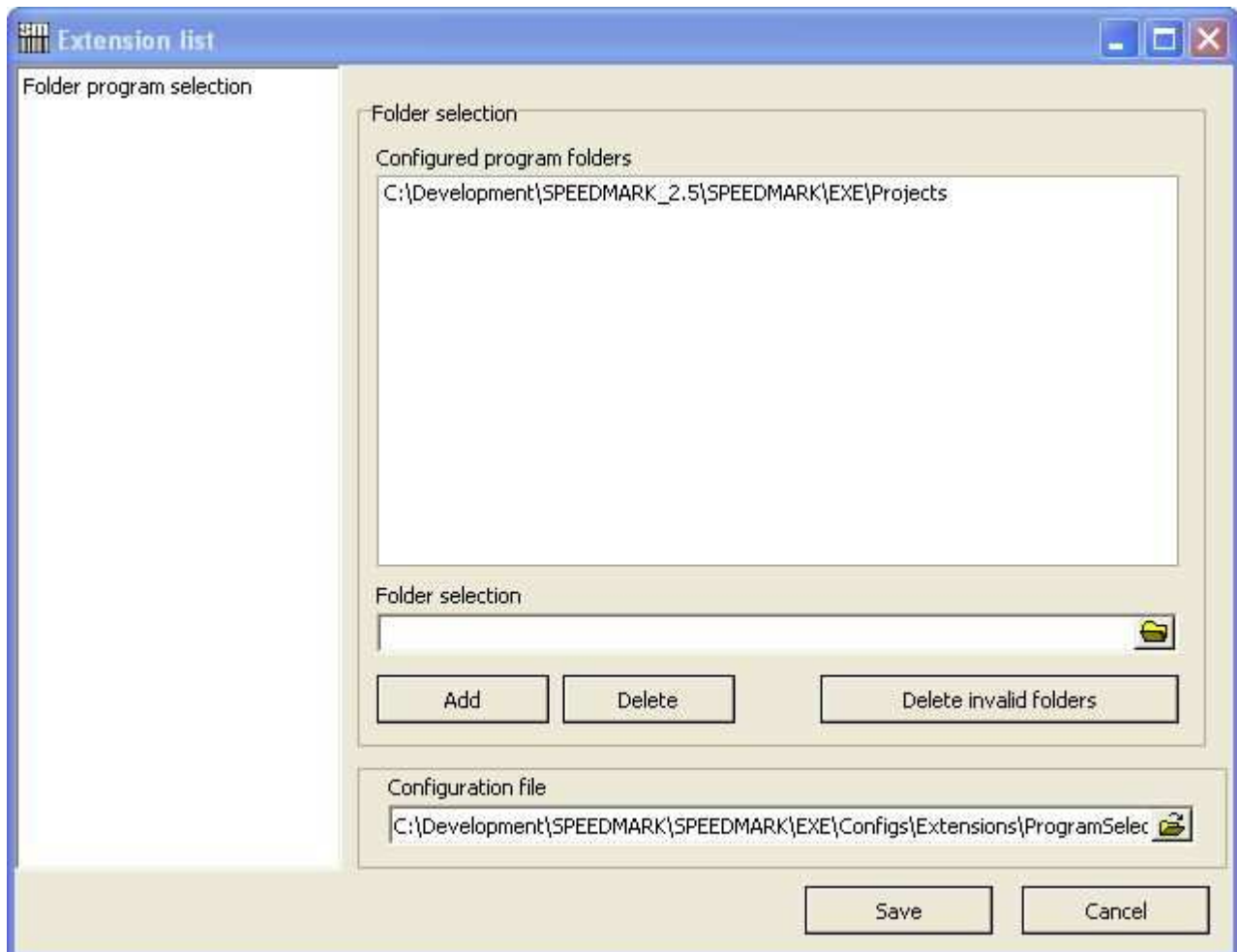
The program selection extension is used to make a simple selection of SpeedMark programs from a configurable directory list.

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





Directory Selection

Directory Selection displays a list of all configured directories which can be used to search for SpeedMark programs.

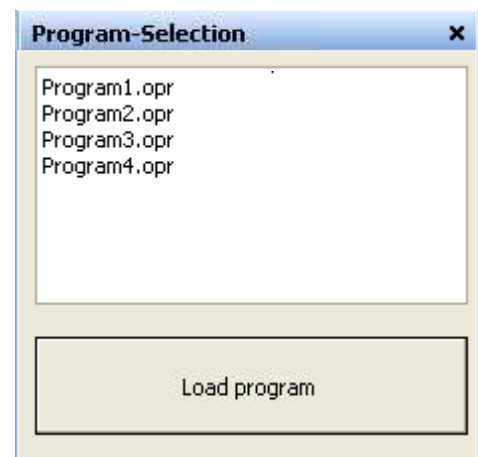
The Directory Selection input field is used to specify directories which are added to the list using the “Add” button.

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 Appendix: 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.

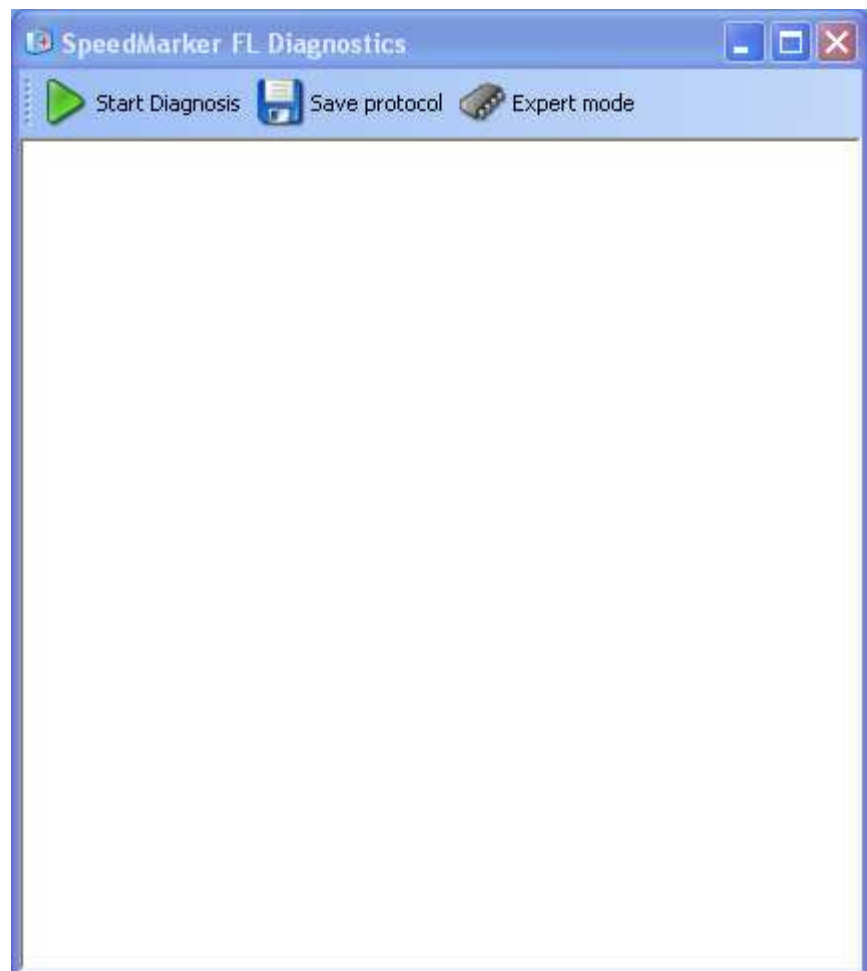
These programs can be found under the SpeedMark installation directory in the folder Utilities.

18.1 SpeedMarkerDiagnostics

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.



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 Appendix: Barcodes

19.1 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)
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 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



20 Appendix: Command line parameters

Command line structure:

SpeedMark.exe key1:value 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
recreatmaterialdatabase	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