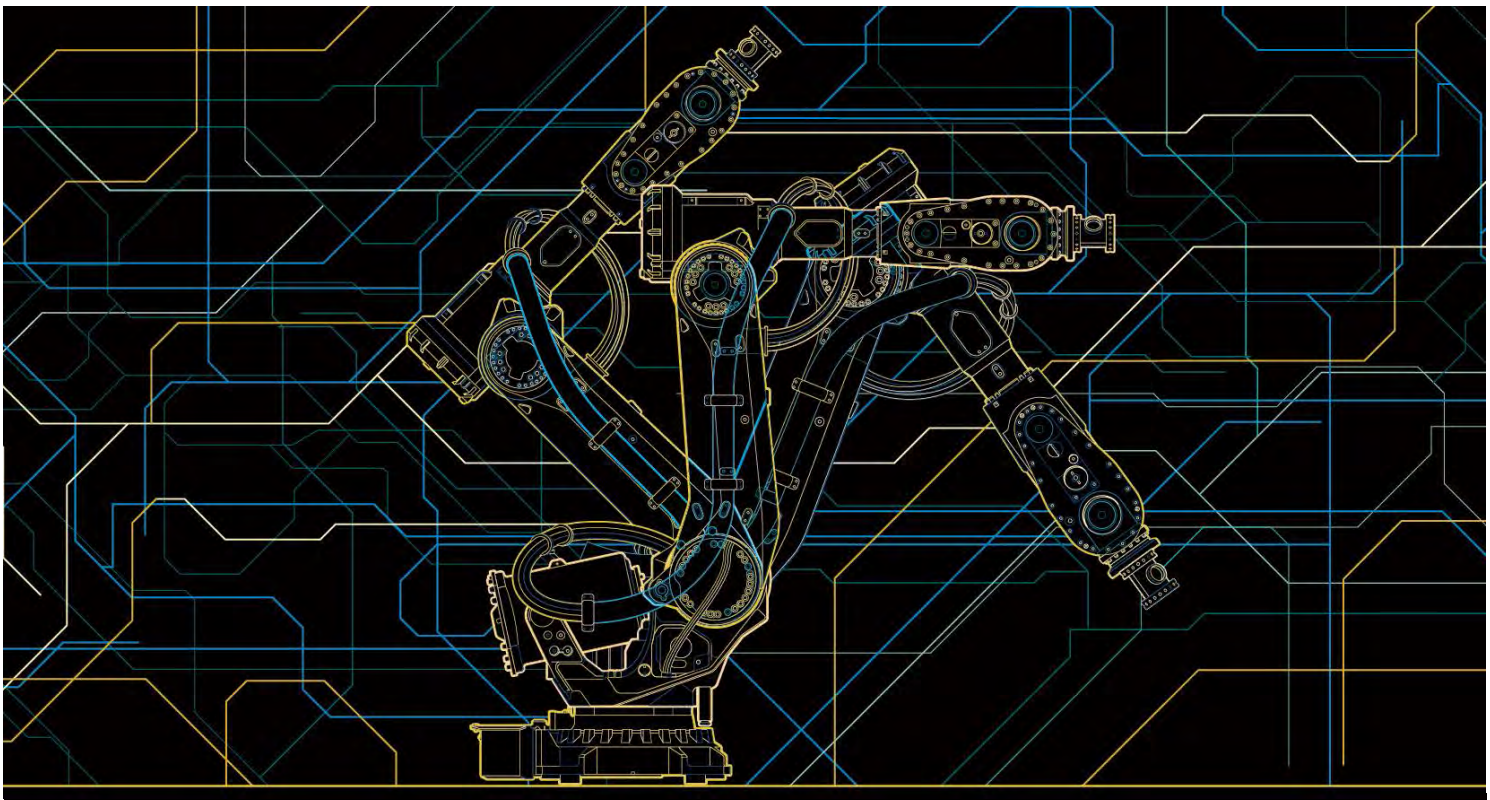

Application manual
FeedLine Light

Power and productivity
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Application manual
FeedLine Light

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Revision: A

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ABB AB
Robotics Products
Se-721 68 Västerås
Sweden

Table of contents

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Overview of this manual

About this manual

This manual describes FeedLine Light, which is part of the option FlexMT.

Usage

User manuals are used to understand how to use the product, for example to install, configure, or operate.

Users

This manual is intended for:

- Personnel that are responsible for installation and configuration of robot systems
- Programmers
- Service engineers

Trademarks

FlexMT is a trademark of ABB.

PickMT is a trademark of SVIA, Svensk Industriautomation AB.

References

Reference	Document ID
Product specification - FlexMT	*3HAC049820-001*
Product manual - FlexMT	*xyz-1*
Product manual - IRB 2600	*3HAC035504-001*
Product manual - IRB 4600	*3HAC033453-001*
Application manual - PickMT	*3HAC051771-001*
Product manual - Safety center for FlexMT	*3HAC051769-001*
Application manual - PickMT with ABB robot	*3HAC051770-001*
Application manual - FeedLine Light	*3HAC052311-001*

Revisions

Revision	Description
-	First edition.
A	Minor corrections.

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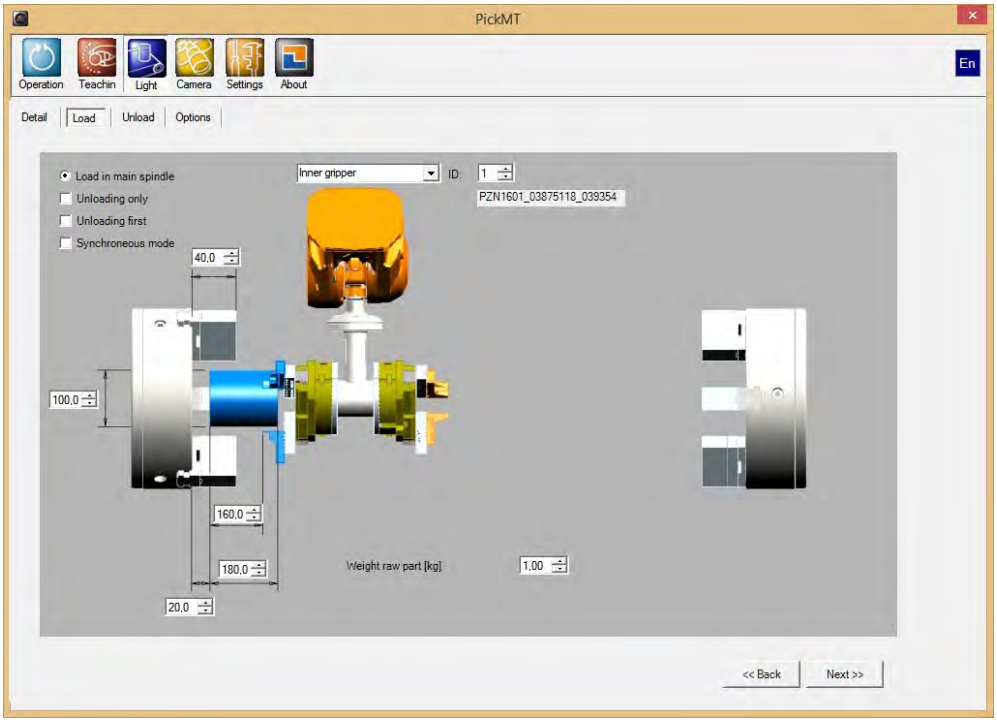
1 FeedLine Light

1.1 General information

FeedLine Light is an automation concept especially designed for lathe applications.

FeedLine Light makes it possible to load and unload blanks and pipes with 6-axis robots for a CNC controlled lathe without the need of programming. Automation cells are fully managed from an especially designed interface where key data such as the blank dimensions, gripper data and the lathe's chuck data is provided in an intuitive and simple way via a graphic interface.

The interface uses data and designations that are well-known and established terms when it comes to CNC programming. This makes it possible to control loading and unloading of new blanks and pipes without knowing about robot programming. Teachin is carried out in a way that feels intuitive and obvious to operators who are used to programming CNC machines.



The concept means that the raw material is placed on a conveyor belt in the robot cell.

The blanks'/pipes' positions are identified using SVIA's in-house developed and well-established vision system, PickMT, which guides the robot to pick the parts directly from the buffer belt. The robot is equipped with a double gripper with three finger gripping with adjustable fingers.

One gripper is used to pick and load the material whilst the other is used to pick out finished machined parts and place them on a buffer belt out of the cell. The position of the fingers can be adjusted to manage the raw material and finished

Continues on next page

parts with varying diameters. When a new part is taught and diameter specified, the system states the position the gripper fingers should be in.

FeedLine Light is an easy and economical step into automation with 6-axis robots

Even customers without any previous experience of 6-axis robots and who lack the skills to program robots themselves can make use of flexible automation. FeedLine Light even makes automation of short series with different types of blanks and pipes possible. In addition, CNC operators can easily and quickly operate loading and unloading.

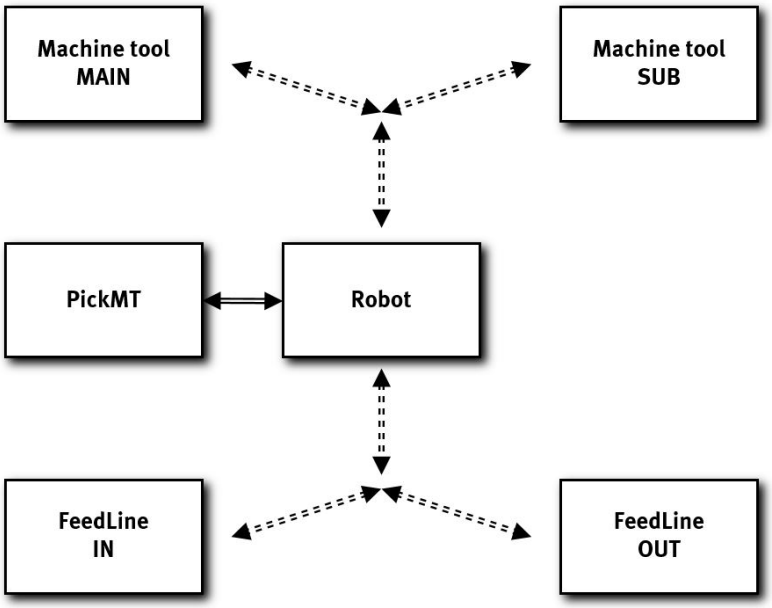
Easy to upgrade

One limitation in a FeedLine Light system is that only rotation symmetrical parts can be handled by the system. For customers who, in the future, come across other types of parts that need loading with the correct rotation or where different types of post processing (e.g. deburring, marking or air cleaning) are required, the software for the system can easily be upgraded to a fully functional SVIA FeedLine system with all the possibilities and the flexibility that characterise FeedLine.

Over the last 10 years, SVIA has installed more than 80 FeedLine installations, mostly in machine tending applications, and the concept makes it possible to handle both vertical blanks and horizontal shafts as well as cast goods with completely deviating geometries in the same system without mechanical changeovers.

1.2 System make up

A FeedLine Light system is usually made up as follows:



Typical make up of a FeedLine Light

The operator interface for FeedLine Light can be displayed in two ways:

- Integrated in PickMT (and then run on the PickMT computer)
- On the lathe's operator's panel as a "Master" to the PickMT part. There it is possible to choose parts, start and stop the system, and teachin of new parts.

1.3 Operating mode

The following standardised operating modes are supported by the FeedLine Light software:

- First loading in main spindle, then unloading from main or sub spindle
- First unloading from main or sub spindle, then loading in main spindle
- No loading, but unloading from sub spindle (used with bar feeders)
- Handling of left overs
- After unloading the selected options are carried out according to the options chosen under the Options tab
- Both one and two spindle lathes are supported

1.4 General operation

The general operation of PickMT, as well as installation and configuration, is described in the PickMT product manual.

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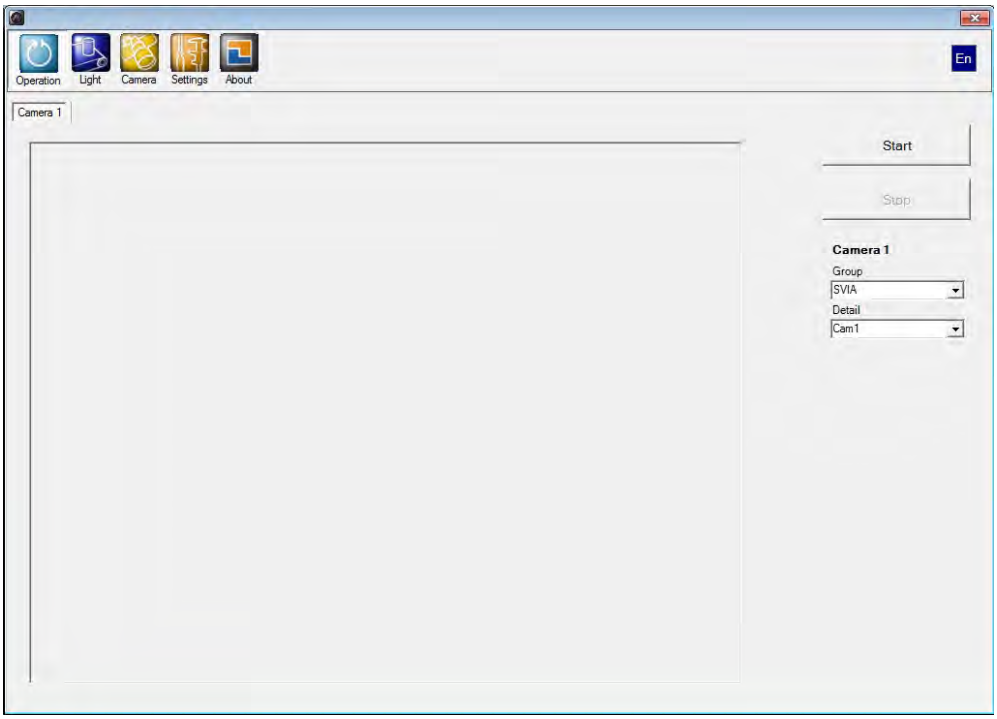
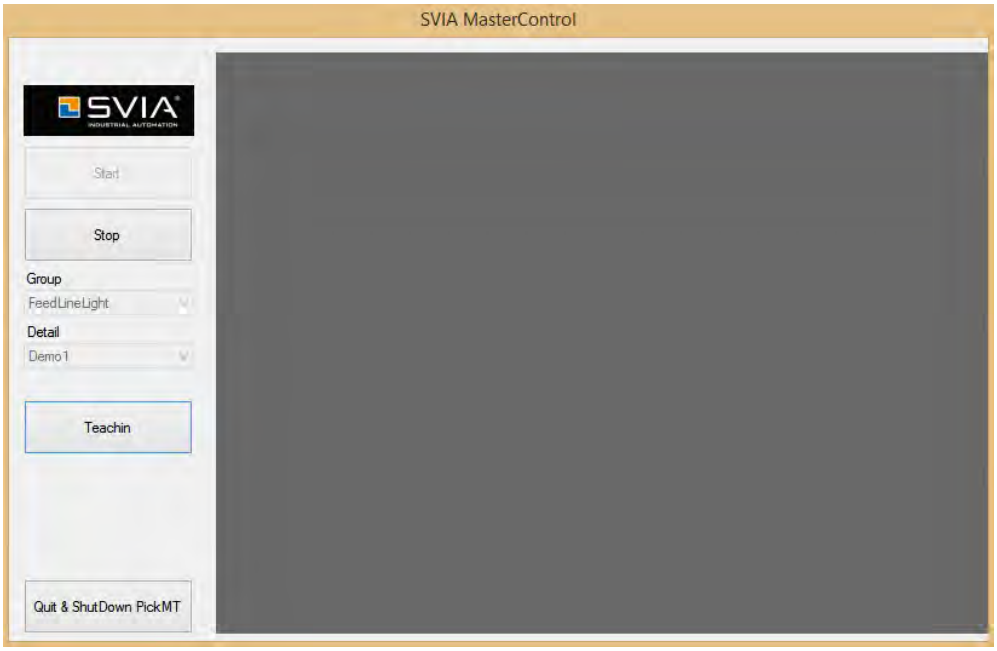
2 Operation

The following operation tab appears when a FeedLine Light system is integrated in PickMT:



The following operation tab appears when a FeedLine Light system is integrated in the lathe operator's panel:

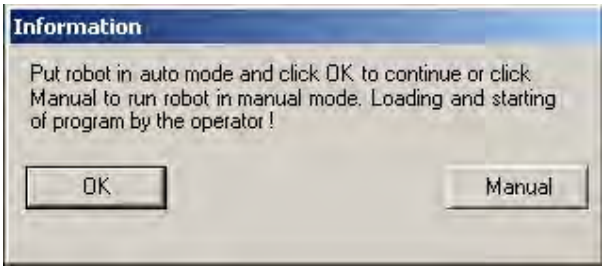


The drop-down 'Group' menu is used to select the current group. The drop-down 'Detail' menu is used to select the detail to be run.

Continues on next page

2.1 Start

To start the system you must first select a detail and then click on ‘Start’. If an ABB robot is connected to PickMT the correct program will be loaded and the robot will start automatically. However, this requires that the robot is set to “Auto”. If the robot is not in “Auto” mode the following dialogue box will appear.



To start the system and load the program, put the robot in “Auto” mode and then click on ‘OK’. To start the system and run the robot at reduced speed, click on ‘Manual’. Note that PickMT will not load the program that belongs to the detail when ‘Manual’ mode is selected. In this case the correct program must be loaded and started manually. Note that the program must be started from the beginning. In a Multi camera system the system must have been started at least once with robot in “Auto” mode in order to load all modules correctly.

If a robot make other than ABB is connected to PickMT, the correct program must be loaded and started manually on the robot control panel.

2.2 Stop

To stop the system, click on ‘Stop’.

If an ABB robot is connected to the system the robot will also stop if it is set to ‘Auto’ mode. Pressing ‘Stop’ will not make the robot stop immediately; it will only stop at the end of the cycle or after a certain time. To stop the robot immediately you must use the stop button on the robot or, if an emergency situation has arisen, use the emergency stop.

If another robot is connected to the system the robot must be stopped at the robot operator’s panel.

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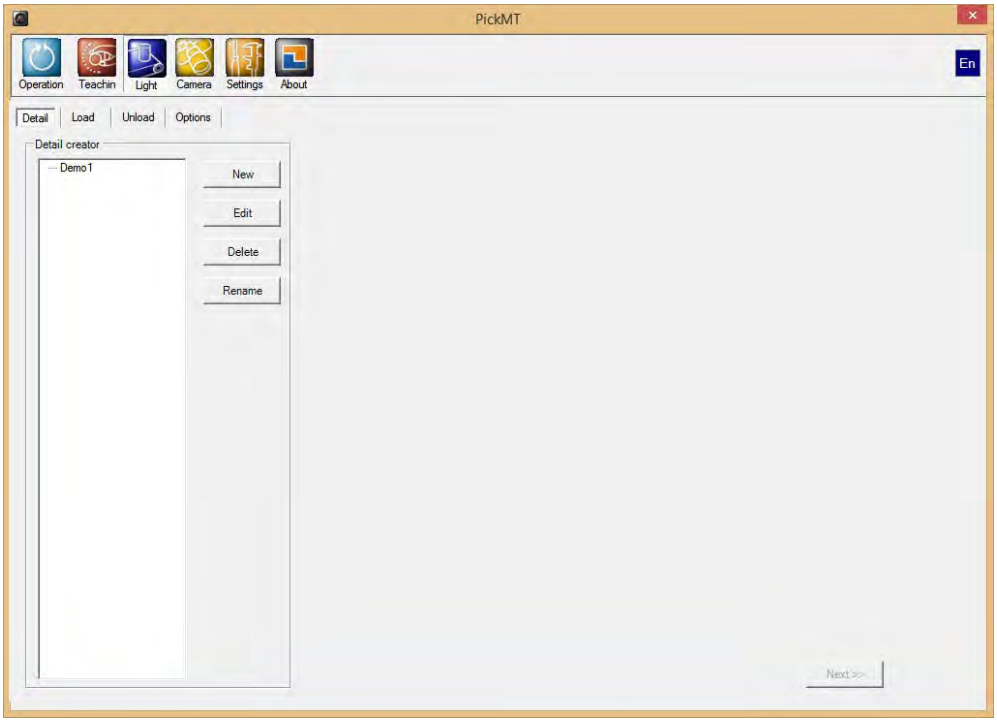
3 TeachIn

3.1 Part handling

To teachin parts in PickMT, the operator clicks on the FeedLine Light icon in the upper menu row.

To teachin parts in the operator's panel of the lathe, the operator clicks "Teachin".

The following window appears:

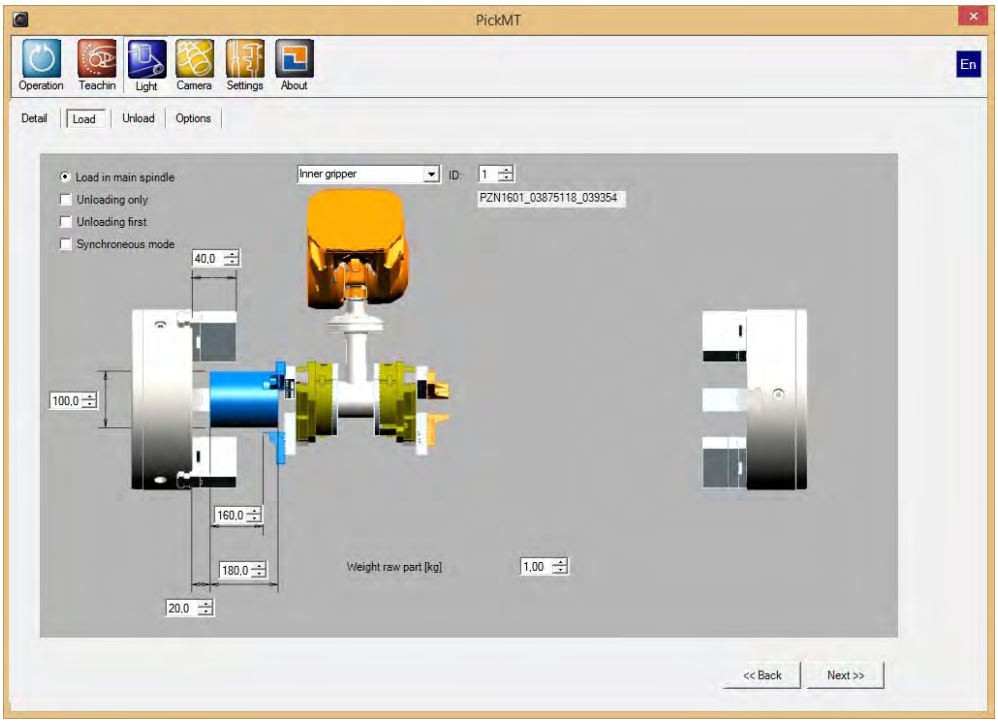


The operator sees a list of all FeedLine Light parts that are in the system. To change a part, it must be highlighted and "Edit" clicked.

The operator can also:

- create new parts by clicking "New" and then specifying the new name
- rename parts by clicking "Rename" and then specifying the new name
- delete parts by clicking "Delete" and then confirming the deletion.

3.2 Loading part



All essential dimensions for loading a part are specified in the user interface:

- Diameter and height of the raw material
- Grip height for the raw material (TCP for the gripper fingers is assumed to be at the lower edge of the fingers)
- The protrusion of the chuck fingers and the insertion depth of the part
- Part weight

In addition, the type of gripping is specified (internal/external) as well as the ID number of the gripper fingers.

Usually the new raw material is loaded first and the finished part is unloaded later (se description below). Instead, the finished part can be unloaded first on demand from the operator by marking ’Unload first’.

When turning from bar material the option ’Unloading only’ can be activated.

As an option, activation codes for user-defined sequences can be sent to the robot.

If necessary, the system can be operated in synchronous mode by activating the option ’Synchronous mode'. In this operating mode, a part is picked from the in belt, the sub spindle is emptied, the robot leaves the machine, the machine docks from the main spindle to the sub spindle, the robot loads the main spindle, and leaves the previously retrieved part on the out belt.

Normal loading procedure:

- Robot retrieves part by camera
- Robot loads new part in machine
- Robot rotates and retrieves finished part in machine with its empty gripper

Continues on next page

- Robot exits the machine, performs any options and leaves finished part on out belt.

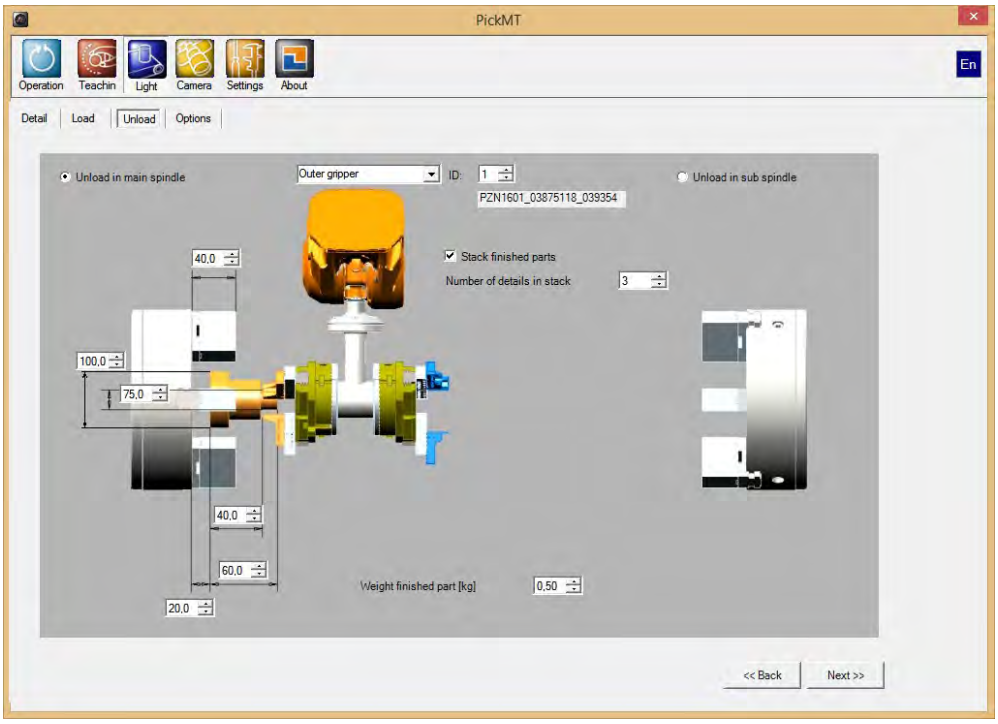
If part weight exceeds allowable robot load, or if if there is no space for a new part in the machine, at the same time that a finished part is to be retrieved, tick the 'Unload first' option. Also tick this option if the robot only has a single gripper.

Loading procedure during 'Unload first':

- Robot enters the machine and retrieves finished part
- Robot exits the machine, performs any options and leaves finished part on out belt.
- Robot retrieves part by camera
- Robot enters the machine and loads new part in machine
- Robot exits the machine

Note that this method of loading is significantly slower and should only be selected if loading cannot be carried out in the normal way.

3.3 Unloading part



All essential dimensions for unloading a part are specified in the user interface:

- Diameter and height of finished part
- Grip height for the finished part (TCP for the gripper fingers is assumed to be at the lower edge of the fingers)
- The protrusion of the chuck jaws and the insertion depth of the part
- Finished part weight

In addition, the type of gripping is specified (internal/external) as well as the ID number of the gripper fingers.

As an option, activation codes for user-defined sequences can be sent to the robot.

The grip diameter and outer diameter for a finished part can differ and are specified separately.

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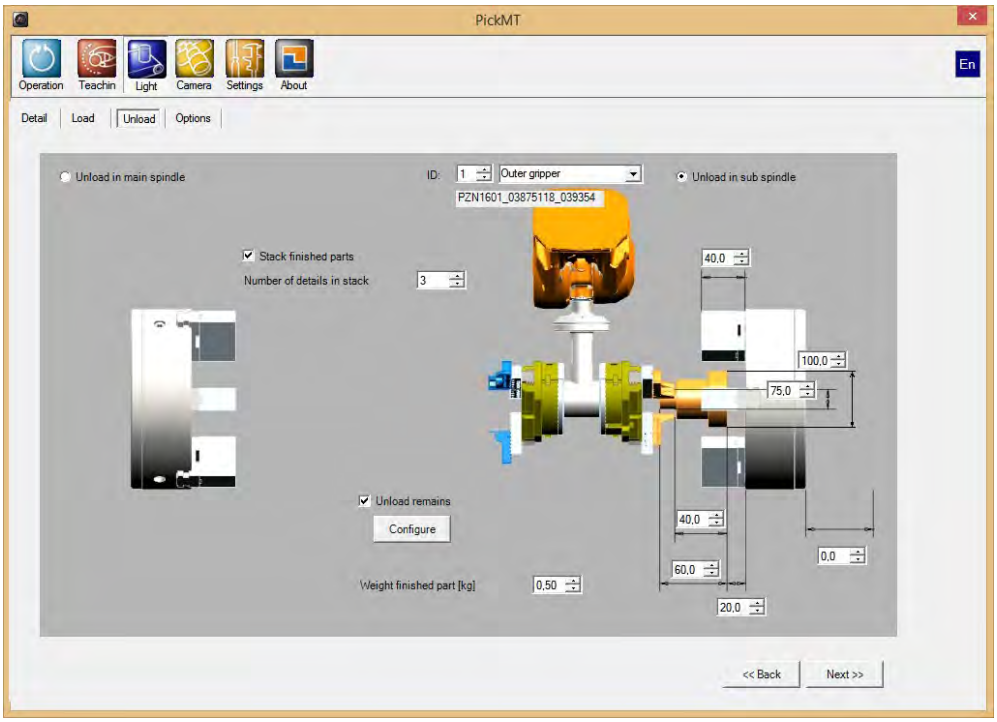
Stacking of finished parts can be activated if necessary. Number of parts per stack is then specified.



When activating unloading from sub spindle, a spindle offset can be specified.

The grip diameter and outer diameter for a finished part can differ and are specified separately.

Stacking of finished parts can be activated if necessary. Number of parts per stack is then specified.

Handling of left over parts can be activated if necessary. Dimensions for handling left over parts is then specified by clicking ’Configure’.

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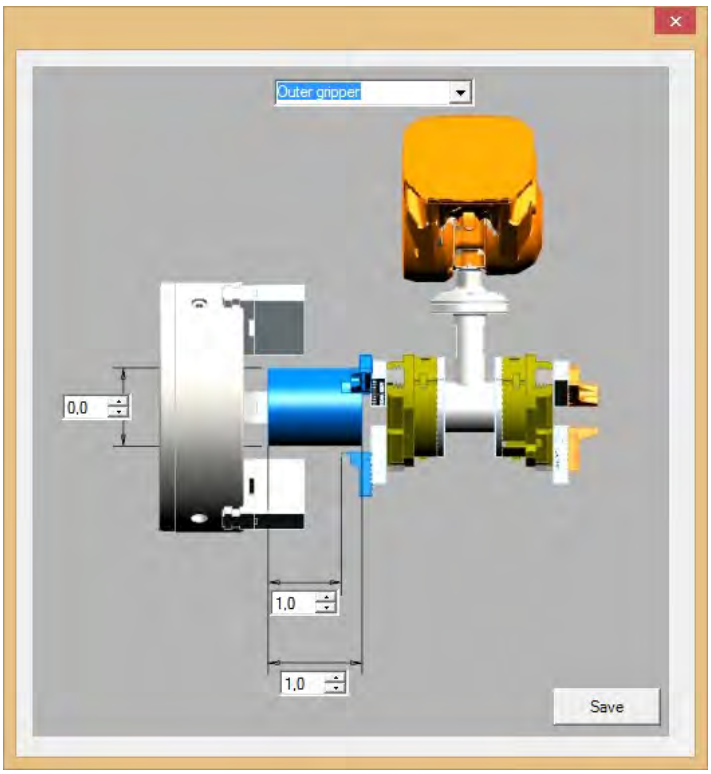
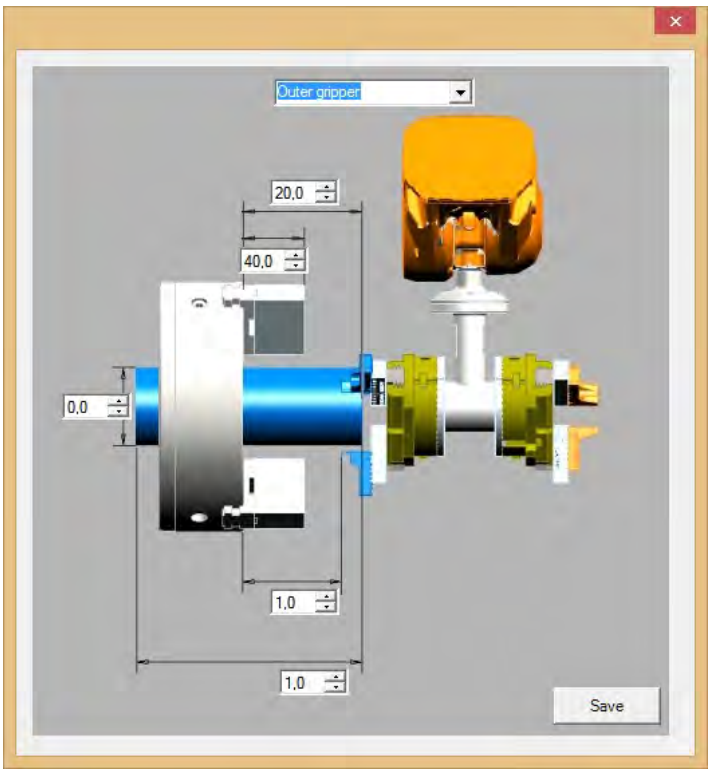
3.3 Unloading part
Continued

Unloding of left over parts is done tith the loading gripper.



Dimensions when unloading left over parts when the robot has loaded parts.

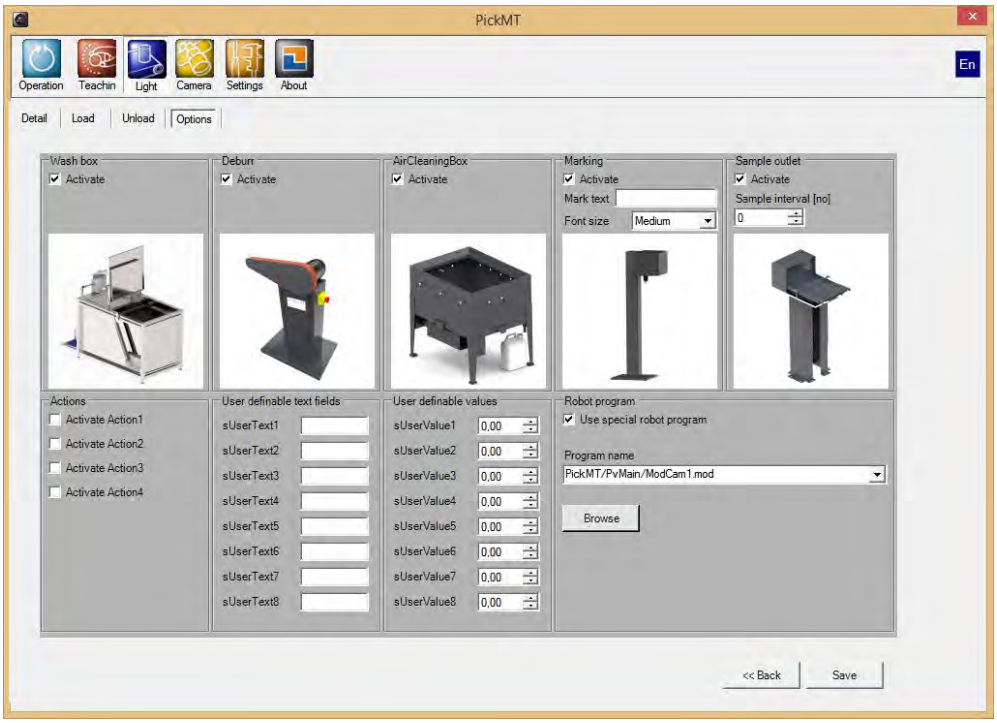


Dimensions when unloading left over parts during bar feeding.

3.4 Options

There are a number of options for FeedLine Light. The options for the actual machine are displayed in the options tab. If there are no options for the machine the options tab does not appear at all. The following options are available for a FeedLine Light:

- Wash box
- Deburr
- Air cleaning box
- Marking
- Sample outlet
- Extra Actions
- Special robot Program



Options are performed just before the part is left on the out belt. If several options have been selected they are performed in the order defined in the robot program. If this order is not suitable, a simple adjustment in the robot program is required. Note that Extra Actions and special robot program are different regarding function, read more in the respective description.

Continues on next page

3.4.1 Wash box

When wash box has been activated, the robot will run washing of the part. No extra robot programming is required for simple operation, the part information that is already entered determines how the robot is to perform washing. More complex washing must be programmed for each part and called using the special robot program feature.

3.4.2 Deburr

When deburr has been activated, the robot will run deburring of the part. Due to the complexity of deburring operation it must be programmed for each part and called using the special robot program feature.

3.4.3 Air cleaning box

When air cleaning box has been activated, the robot will run air cleaning of the part. No extra robot programming is required for simple operation, the part information that is already entered determines how the robot is to perform air cleaning. More complex air cleaning must be programmed for each part and called using the special robot program feature.

3.4.4 Marking

When marking has been activated, the robot will mark the part using the marking machine. Mark text for the part is entered in the ’Mark text’ field. In addition, there are three predefined sizes for the text, Small, Medium and Large which allow different sizes of mark text depending on part. These text sizes correspond to three setup files in the marking controller.

The maximum number of characters for the mark text will change depending on the selected font size. If too many characters are entered, the mark text will automatically be shortened to the maximum length, in addition a warning appears that the maximum length has been reached.

No extra robot programming is required for simple operation, the part information that is already entered determines how the robot is to perform marking. More complex marking must be programmed for each part and called using the special robot program feature.

3.4.5 Sample outlet

When sample outlet is activated the robot leaves a sample part in the sample outlet at regular intervals. Sample interval indicates how many parts are to be produced before the next sample part is to be left.

3.4.6 Extra actions

This option contains four completely user definable functions that are undefined from start. If there is a further option or function that is not suitable for the previous ones, this can be especially programmed and added to the robot program in the correct place. The four activation boxes can then be connected with the new function(s). This then makes it possible to activate the special functions for selected parts.

If these special functions are used together with any of the above, the internal order of these depends on where in the robot program the new function is inserted.

3.4.7 Special robot program

In the standard FeedLine Light system, robot movement is controlled by the module ModCam1.mod, which contains standard movements in their standard workflow.

In some cases, changes are required that affect the flow in the cell and other additions that are not suitable for the aforementioned options. In these cases a special part-specific robot program is used. Ticking 'Use special program in robot' allows you to select a special robot program on the robot that is adapted for the specific part.

Each special program must be programmed and tested before being selected on the options page. Because the program is fully part specific other options can be placed in the robot program according to your own requirements.

4 Commissioning

During commissioning, PickMT is commissioned in the normal way according to the PickMT manual. In addition to this, the following instructions should be followed.

Continues on next page

4.1 Robot

FeedLine Light assumes a specific geometry and coordinate system in the robot to work optimally. The FeedLineLight.sys module must be adapted to the actual cell's geometry.

The variable names in FeedlineLight.sys must not be changed, as PickMT transfers data to these variables.

The section below describes the setup and necessary settings.

Continues on next page

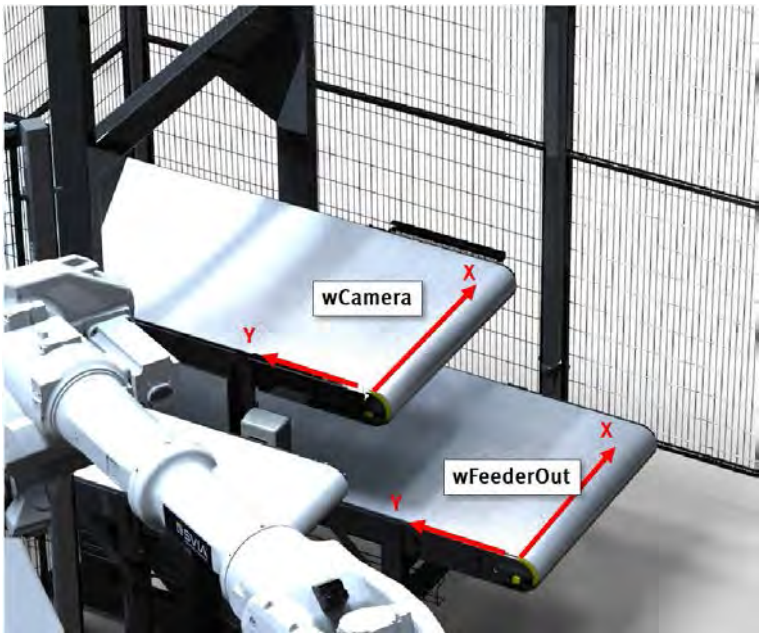
4.1.1 Coordinate system

The following coordinate system is used in a FeedLine Light system:

- The robots base coordinate system must be horizontal (not angled), preferably with either the X or Y axis parallel with the front of the lathe.
- wCamera1: Coordinate system for picking from feeder in belt, calibrated according to the PickMT manual.
- wFeederOut: Coordinate system for leaving on out belt. The X-axis is above the rotation roller's shaft, the Y-axis is at the left belt edge and in the belt's direction of movement, the Z-axis points upwards.

Perform a standard 3-point calibration of wFeederOut. Select correct calibration tool, depending on which griper is holding the calibration tool (Gripper1: tCalibTool1, Gripper2: tCalibTool2).

Then, call the routine CalibFeederOut in module Calibration.sys and follow instructions. On request, point out the zero position for leaving parts on the outconveyor. The system will use the zero position tool orientation when leaving parts.



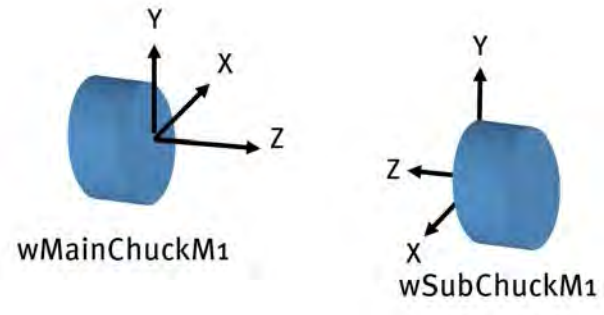
- wMarker: Coordinate system for marking station, calibration similar to wFeederOut (routine CalibMarker, place zero position at the marking pins working position).
- wAirClean: Coordinate system for air cleaning box, calibration similar to wFeederOut (routine CalibAirClean, place zero position in the center of the air cleaning box, on a height where air cleaning of a parts lower end shall start).
- wSample: Coordinate system for sample outlet, calibration similar to wFeederOut (routine CalibSampleOutlet, place zero position in the center of the outlet, where the center of parts shall be placed).

Continues on next page

4.1.1 Coordinate system
Continued

- wDeburr: Coordinate system for deburring units, calibration similar to wFeederOut (routine CalibDeburr, place zero position at the outmost tip of the deburring tool).
- wWasher: Coordinate system for washing box, calibration similar to wFeederOut (routine CalibWasher, place zero position in the center of the washing box, on a height where washing of a parts lower end shall start).
- wMainChuckM1: Coordinate system for first lathe's left chuck (main spindle).
- wSubChuckM1: Coordinate system for first lathe's right chuck (sub spindle).

The coordinate system's X-Y plane for a chuck must be at the front edge of the chuck, with x=0,y=0 at the chuck's rotation shaft. See diagram.



Perform a standard 3-point calibration of wMainChuckM1. Calibration tool must be placed in Gripper1 (tCalibTool1). Gripper 2 shall be used for gripping part.

Then call the routine CalibMainChuck in module Calibration.sys and follow instructions. On request, a part must be gripped with the main chuck. Position the robot so that this part can be gripped by the robot gripper, precisely centered. Confirm to the calibration routine. From the current robot position, wMainChuckM1 is moved to be located exactly in the main spindles center.

Perform a standard 3-point calibration of wSubChuckM1. Calibration tool must be placed in Gripper2 (tCalibTool2). Gripper 2 shall be used for gripping part.

Then call the routine CalibSubChuck in module Calibration.sys and follow instructions. On request, a part must be gripped with the sub chuck. Position the robot so that this part can be gripped by the robot gripper, precisely centered. Confirm to the calibration routine. From the current robot position, wSubChuckM1 is moved to be located exactly in the sub spindles center.

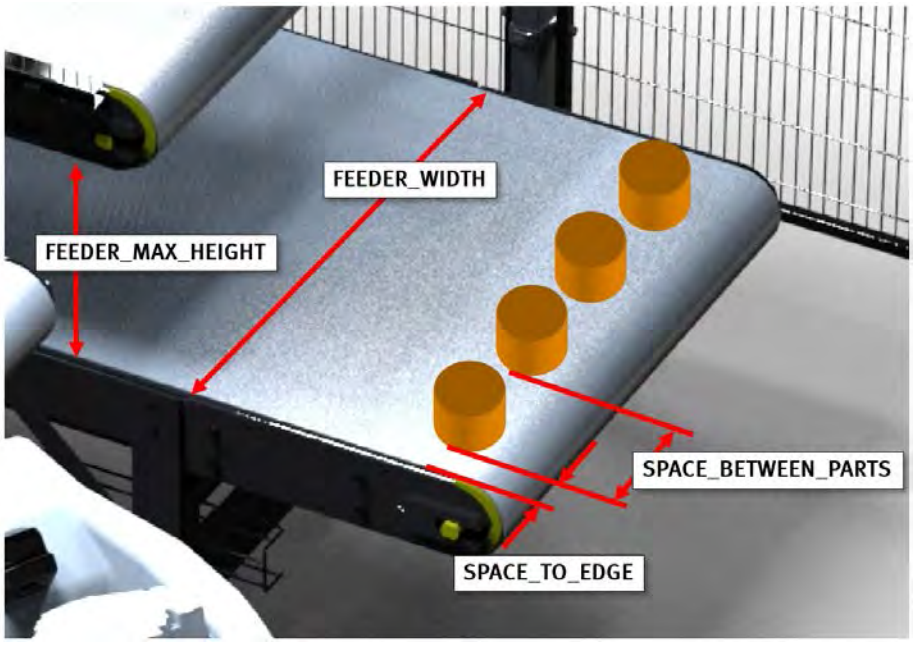
If the sub spindle is movable, the calibration must be checked, so that the z-axis in wMainChuckM1 is in line with the robot z-coordinate, even for long movements.

- wRegrip: Coordinate system for regrip station. Standard 3-point calibration.
- wTurnStation: Coordinate system for turning station. Standard 3-point calibration.

4.1.2 System constants

The FeedLineLight.sys module contains some constants that are used to add parts to the out belt. All dimensions are in mm.

- FEEDER_WIDTH: Width of out belt.
- FEEDEROUT_SPEED: Out belt speed in mm/s
- SPACE_BETWEEN_PARTS: Space to be left between parts on the out belt.
- SPACE_TO_EDGE: Minimum distance between belt edge and part
- FEEDER_MAX_HEIGHT: Maximum height of parts that are placed or stacked on the out belt.
- MIN_RAW_PART_DIAMETER: Minimum permitted part diameter.
- Compensation of load-induced deviations. Close to loading position, put a reasonable additional weight on the gripper and measure the load induced lowering of the robot arm.
  - LOAD_COMPENSATE_DIST: Load induced lowering of robot arm, in mm.
  - LOAD_COMPENSATE_WEIGHT: Load that was used for measuring LOAD_COMPENSATE_DIST.



Finally, there are constants that determine start size for the robot's different work zones. All the values describe degrees for robot shaft 1.

- ZONE_HOME_START: Start of home zone
- ZONE_HOME_STOP: End of home zone
- ZONE_FEEDLINE_START: Start of Feedline zone
- ZONE_FEEDLINE_STOP: End of Feedline zone
- ZONE_OUTBELT_START: Start of out belt zone
- ZONE_OUTBELT_STOP: End of out belt zone

Continues on next page

4.1.2 System constants
Continued

- ZONE_DOOR_START: Start of door zone
- ZONE_DOOR_STOP: End of door zone
- ZONE_MACHINE_START: Start of machine zone
- ZONE_MACHINE_STOP: End of machine zone
- ZONE_MARKER_START: Start of marker machine zone
- ZONE_MARKER_STOP: End of marker machine zone
- ZONE_WASHER_START: Start of wash box zone
- ZONE_WASHER_STOP: End of wash box zone
- ZONE_AIR_CLEAN_START: Start of air cleaning box zone
- ZONE_AIR_CLEAN_STOP: End of air cleaning box zone
- ZONE_SAMPLE_OUTLET_START: Start of sample outlet zone
- ZONE_SAMPLE_OUTLET_STOP: End of sample outlet zone

4.1.3 Gripper

The following gripper is used in a FeedLine Light system:

- tCalibTool1: calibration gripper that attaches to Gripper1
- tCalibTool2: calibration gripper that attaches to Gripper2
- tGripper1: Used when loading and handling raw materials.
- tGripper2: Used when unloading and handling finished parts.

4.1.4 Zones and zone points

The robot's working range is divided into logical zones. These are positioned as wedges around robot shaft 1 and should be contiguous:

- ZONE_HOME: The home zone for the robot, the robot can reach its home position within this zone. pViaHome is the handover point in the zone.
- ZONE_DOOR: Door zone for the robot, the robot can reach the service position from this zone. pViaDoor is the handover point in the zone.
- ZONE_FEEDLINE: Zone in which FeedLine is. pViaFeedLine is the handover point in the zone.
- ZONE_OUTBELT: Because the out belt is not always positioned together with the in belt, the out belt has its own zone. pViaOutbelt is the handover point in the zone.
- ZONE_MACHINE : Zone in which the machine is. pViaMachine is the handover point in the zone.
- ZONE_MARKER: Zone in which the marker machine is. pViaMarker is the handover point in the zone.
- ZONE_WASHER: Zone in which the wash box is. pViaWasher is the handover point in the zone.
- ZONE_AIR_CLEAN : Zone in which the blow box is. pViaAirClean is the handover point in the zone.
- ZONE_SAMPLE_OUTLET : Zone in which the sample part is. pViaSampleOutlet is the handover point in the zone.

Zone checks and division are in the MainModule::CheckPos. sequence. The movement between the zones is performed in the MainModule:: sequence MoveRobotTo .

Both sequences must be adapted during commissioning of a new FeedLineLight.

4.1.5 Further points

- pHome: home position for the robot in standby mode.
- pMaintenance: This point is used when the robot is ordered to go to service mode. The point must be reachable from pViaDoor.
- jpSoftwareSynPos: Synchronisation of the SafeMove system is regularly carried out here. This point can usually be added to the same place as pHome.

4.1.6 Sequences

Standardised sequences are used to load and unload parts in the machine, using the part data from PickMT. These sequences must be checked prior to each commissioning.

Standard sequences are based on the machine being loaded from the front. If the machine is loaded from above or anything else is unusual, some adjustment must be made.

- LoadMachine_MAIN
- LoadMachine_MAIN_UnLoad_SUB
- UnLoadMachine_MAIN
- UnLoadMachine_SUB
- UnloadMachine_MAIN_Load_MAIN
- UnloadMachine_LeftOverPart

Further sequences take care of communication, system checks, logic distribution, and similar. This might also need changing.

- CheckSystem: Handles overall checks, e.g. entry control and stop
- MachineAction: Handles commands to machine tool
- MachineWait: Awaits desired status from machine tool
- MachineCheck: Checks current status on machine tool

4.1.7 Worldzones

Some WorldZones can be used to verify the robot's presence in certain areas and to block certain movements.

The following zones are predefined for convenience and must be configured during commissioning.

- SafeZone: The robot could be started from here directly. Connected to DOF_SafeZone.
- HomeZone: Indicates robot home position. Connected to DOF_HomeZone.
- MachineZone: Robot is inside of machine tool. Connected to DOF_LoaderOut.
- ForbiddenZone: The zone that e.g. lies above the area that the robot needs to move. Prevents the robot moving through this zone.

4.2 PickMT

In addition to PickMT's basic configuration the following other settings must be made:

Continues on next page

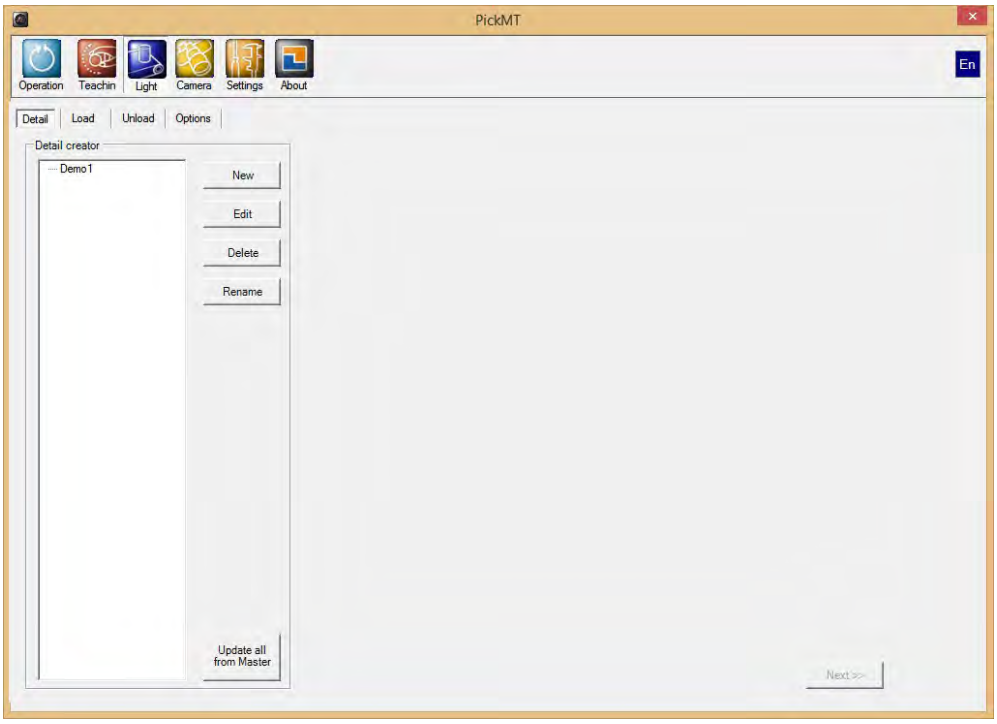
4.2.1 Master Part

The part ”FeedLineLightMaster” must be taught in the ”Masters” group. Each time a FeedLine Light part is saved, the base values are readout from this master part and adapted for that specific taught part.

This applies, for example, to settings for exposure times, image preparations, advanced position settings, accuracy demands, settings for collision monitoring etc.

However, this does not apply to settings for the appearance of the part and grip data.

An update of all parts must be made after a change to the master part. This update is made in the FeedLine Light window. Hold the Ctrl key down, so that the ”Update all from master part” becomes visible. Click on it, and all parts are updated.



A change to the master part’s teachin requires the full version of PickMT. Contact SVIA for assistance, if necessary.

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5 Appendix A: Configuration

The instructions below are for SVIA's own technicians and integrators and for information. The customer usually need not enter this configuration.

The instructions below assume knowledge of the general setup of SVIA's system and handling of XML files.

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5.1 FeedLine Light configuration

For operation of FeedLine Light, the file FeedLineLight.xml file must be configured. If an external operator's panel is used, this file must be available for both PickMT and MasterControl.

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5.1.1 Basic data

Indicate whether overlap between gripper fingers is to be checked or not.

Also indicate whether the lathe has a sub spindle or not.

Indicate for each option if it is used in the machine or not. The options are air cleaning box, wash box, marking unit, sample outlet, deburr, actions and special program for robot. If marking is to be used, the maximum mark text lengths for small, medium and large must also be specified. These are connected to the mark data files that are used in the marker machine.

Details	
BaseData	
[COMMENT]	This section contains some base data on the setup.
[COMMENT]	checkGripperChuckOverlap: Specifies if finger/chuck overlap shall be tested and warned for
checkGripperChuckOverlap	true
[COMMENT]	isTwoSpindleMachine: Specifies machine type
isTwoSpindleMachine	true
[COMMENT]	hasActions: Activates selection of action 1-4
hasActions	true
[COMMENT]	hasBlowBox: Activates blow box option
hasBlowBox	true
[COMMENT]	hasWashBox: Activates wash box option
hasWashBox	true
[COMMENT]	hasMarkingUnit: Activates marking option
hasMarkingUnit	true
[COMMENT]	Additional data for marking unit
MarkingUnit	
textLengthSmall	20
textLengthMedium	15
textLengthLarge	10
[COMMENT]	hasSamplePart: Activates sample part option
hasSamplePart	true
[COMMENT]	hasRobotSpecialProgram: Activates option to choose special robot program
hasRobotSpecialProgram	true
[COMMENT]	hasDeburrUnit: Activates deburr unit option
hasDeburrUnit	true
[COMMENT]	hasUserData: Activates user data option
hasUserDataValue	true
UserDataValue	
[COMMENT]	userVariableNums: Number of numeric user variables. Valid numbers are 1-8
userVariableValues	8
hasUserDataText	true
UserDataText	
[COMMENT]	userVariableStrings: Number of string user variables. Valid numbers are 1-8
userVariableTexts	8

5.1.2 Gripper data

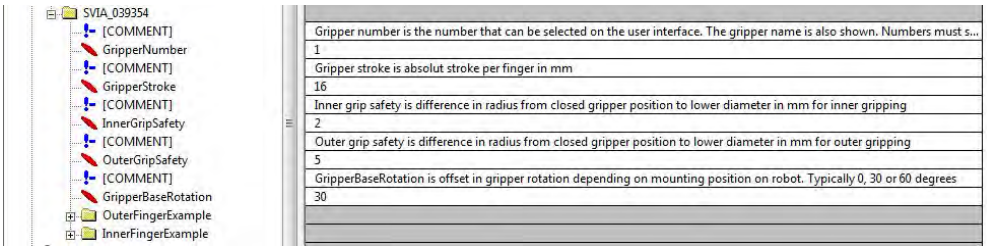
In a FeedLine Light system the gripper data must be known to be able to perform collision checks and to provide information to the operator on how the gripper fingers are to be positioned on the robot.

The accompanying FeedLineLight.xml already contains gripper data for standard gripper fingers. The standard fingers that are not to be used must be removed for the relevant application.

If special fingers are used, these must be defined.

The GripRanges interface contains individual sections for each gripper used. If necessary, copy existing gripper data to a new gripper. The name of the section is the name that then appears in the FeedLine Light interface.

Each section for a gripper contains basic data about the gripper as well as set up of the gripper fingers. The following basic parameters are used:



- GripperNumber: Serial number for gripper data. Must start at 1 and must be continuous for each gripper that is configured. It is this number that can then be selected in FeedLine Light's user interface.
- GripperStroke: Stroke per finger in mm.
- InnerGripSafety: Used when gripping from inside. Indicates the safety distance between the gripper fingers in the closed position and the minimum diameter that can be gripped. Typically 2mm - 3mm. See the images further on.
- OuterGripSafety: Used when gripping from outside. Indicates the safety distance between the gripper fingers in the open position to the largest diameter that can be gripped. Typically 2mm - 3mm. See the images further on.
- GripperBaseRotation: Indicates rotation of the gripper when installing the robot. Used when the gripper is drawn in PickMT. Typically 0°, 30°, 60° or 90° (D in the image below).

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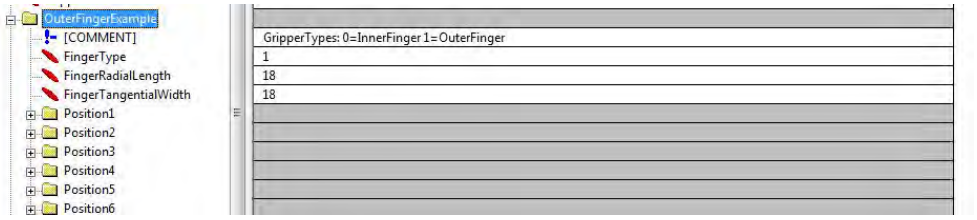
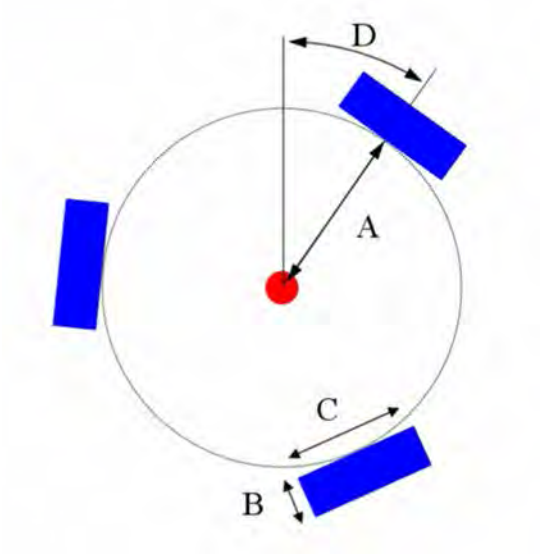
Each section for a Grip finger contains basic data about the grip finger as well as set up of the positions. The following basic parameters are used:

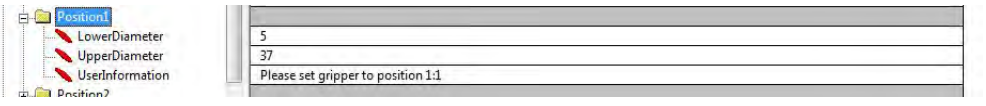


- FingerType: Specify 0 for internal gripping and 1 for external gripping.
- FingerRadialLength: Specify the length of the finger in radial direction in mm (B in the image below).
- FingerTangentialWidth: Specify the width of the finger in mm (C in the image below).



Each position for a gripper finger is used for a certain diameter range.

- LowerDiameter indicates minimum gripper diameter for the finger position
- UpperDiameter indicates maximum gripper diameter for the finger position
- UserInformation is the text that appears when the operator selects a part. The operator then knows in which position the gripper finger is to be positioned to run the part.



UpperDiameter and LowerDiameter must, as a rule, be positioned so that the gripper ranges for the different positions do not overlap each other. They must instead be positioned adjacent to each other.

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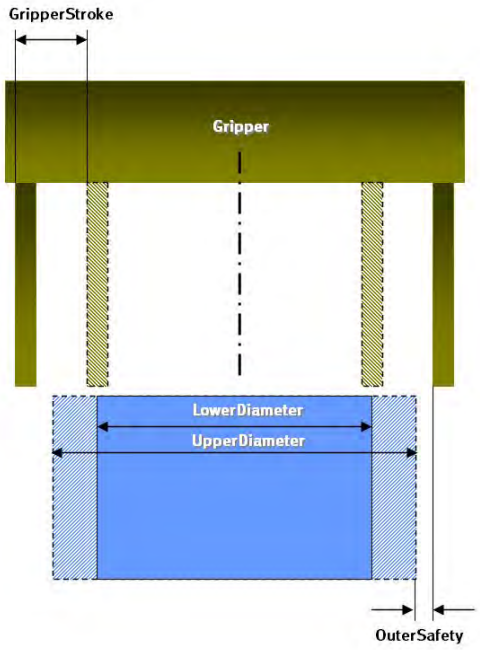
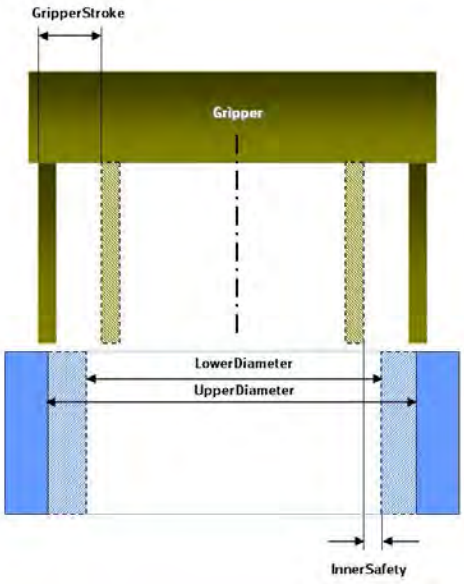
5.1.2 Gripper data
Continued

The association between the parameters for a gripper range during external gripping can be seen in the image below:



The association between the parameters for a gripper range during internal gripping can be seen in the image below:

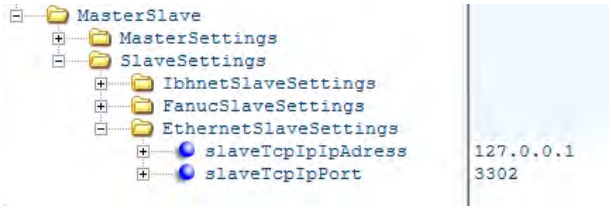


5.2 Operation with external operator panel

5.2.1 MasterSlave.xml

If a FeedLine Light is controlled from the external operator's panel, PickMT must be configured as SlaveEthernetIP.

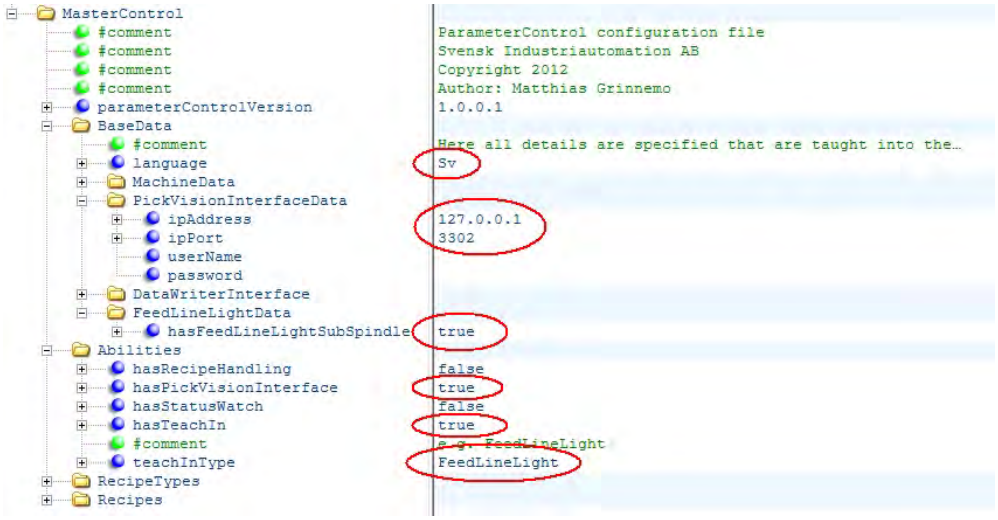
The configuration file MasterSlave.xml must then contain valid data for the external panel's IP number as well as the port it is to communicate on.



5.2.2 MasterControl.XML

If a FeedLine Light is controlled from the external operator's panel, the following parameters must be changed in MasterControl on this operator's panel.

- Specify language as per customer wishes.
- Specify the PickMT computer's IP address as well as the port number (same if given in MasterSlav.xml).
- Indicate whether the lathe has a sub spindle or not.
- The values for the "hasPickMTInterface", "hasTeachIn" and "teachInType" parameters are given according to the image below.



5.2.3 FeedLineLight.XML

The FeedLineLight.xml file must be configured. If an external operator's panel is used, this file must be available for both PickMT and MasterControl.

5.2.4 MasterControl operation side

In the operation tab for SVIA MasterControl it is possible to replace the image with SVIA's logo with any image with the same format.

5.3 Backup

5.3.1 FeedLineLight

The FeedLineLight.xml file is backed up in two stages each time it is saved. The backup copies are in the same place (”\Configuration”) as the main file.

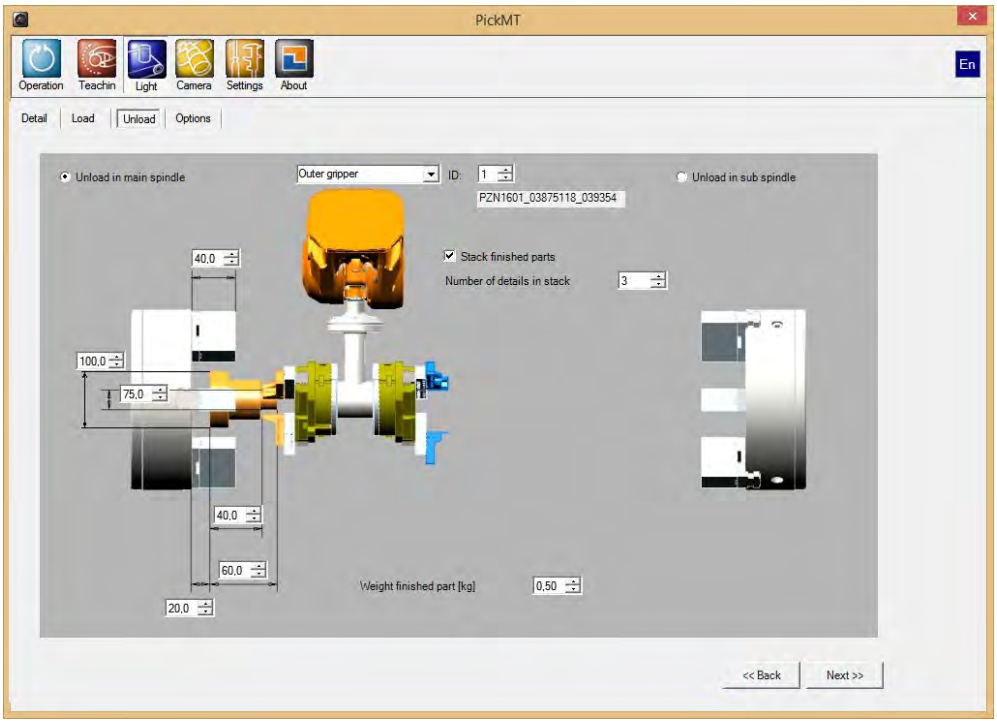
Regularly save this file in a safe place to protect yourself from any data losses.

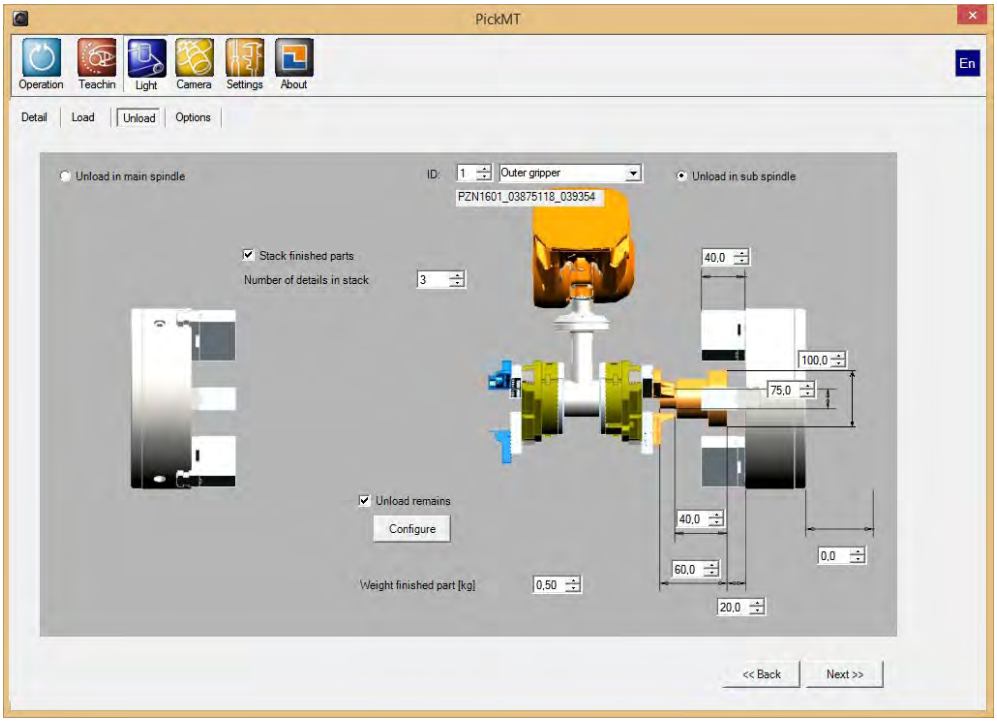
5.3.2 Robot

Regularly create a backup of the robot and save this file in a safe place to protect yourself from any data losses.

5.4 Communication variables robot

Writing of variables to the robot occurs according to the following diagram:





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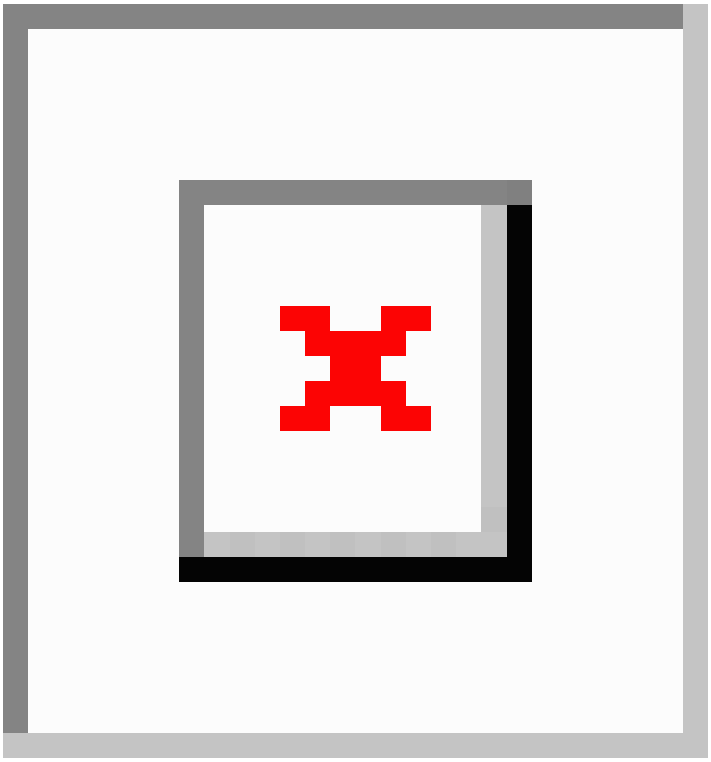
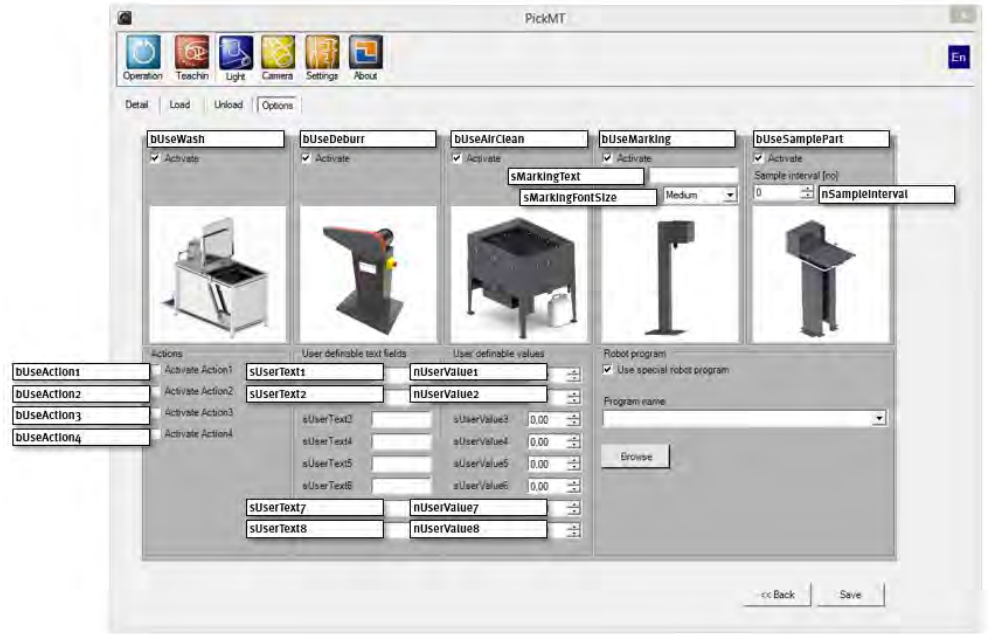
5.4 Communication variables robot

Continued





6 Appendix B: Own notes

Contact us

ABB AB
Discrete Automation and Motion
Robotics
S-721 68 VÄSTERÅS, Sweden
Telephone +46 (0) 21 344 400

ABB AS, Robotics
Discrete Automation and Motion
Nordlysvegen 7, N-4340 BRYNE, Norway
Box 265, N-4349 BRYNE, Norway
Telephone: +47 51489000

ABB Engineering (Shanghai) Ltd.
No. 4528 Kangxin Hingway
PuDong District
SHANGHAI 201319, China
Telephone: +86 21 6105 6666

www.abb.com/robotics

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