



ROBOTICS

Operating manual

Painting PowerPac



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Operating manual

Painting PowerPac

RobotStudio 2019.3

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Original instructions.

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Overview of this manual

About this manual

This manual contains information and instructions for installing, configuring, programming, and running Painting PowerPac.

Usage

This manual should be used during installation and configuration of Painting PowerPac. It describes Painting PowerPac and includes step-by-step instructions to perform the tasks.

Who should read this manual?

This manual is intended for:

- System integrators
- End Customers
- Offline Programmers
- Robot Paint and service technicians
- ABB engineers

Prerequisites

The reader should:

- Have experience with RobotStudio
- Have experience of installation and configuration work
- Good skills in the IRC5 robot controller and RAPID programming

References

References	Document ID
<i>Operating manual - RobotStudio</i>	3HAC032104-001
<i>Operating manual - Troubleshooting IRC5</i>	3HAC020738-001
<i>Technical reference manual - RAPID Instructions, Functions and Data types</i>	3HAC050917-001
<i>Technical reference manual - RAPID Overview</i>	3HAC050947-001
<i>Technical reference manual - RAPID kernel</i>	3HAC050946-001
<i>Technical reference manual - System parameters</i>	3HAC050948-001
Operating manual, IRC5P RW6.0	3HNA025117-001

Other references

References	Description
http://www.robotstudio.com/forum/	RobotStudio Support Forum

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Revisions

Revision	Description
-	First revision.
A	Updated for 6.04 release. Rearranged the chapters and most sections are updated.
B	Updated for 6.06 release. Following are the updates: <ul style="list-style-type: none">• Updated the section Licensing on page 19.• Updated the section Manage Workpiece on page 55.• Updated the section Distribution rules on page 89.
C	Updated for 6.06 SP1 release. Following is the update: <ul style="list-style-type: none">• Updated the section Generating a report on page 81.
D	Updated for 6.07 release. Following are the updates: <ul style="list-style-type: none">• Updated the section Manage brush parameters on page 53.• Added the section Manual Paint Stroke on page 47.• Added the section Modify JointTarget on page 37.
E	Updated for 6.08 release. Following are the updates: <ul style="list-style-type: none">• Updated the section Graphical user interface on page 13.• Updated the section Conveyor tracking on page 77.• Updated the section Target reachability on page 41.
F	Updated the references. Added the Operating manual, IRC5P RW6.0 – 3HNA025117-001.
G	Updated for RobotStudio 2019.1 release. Following are the updates: <ul style="list-style-type: none">• Added the section Verify the robot motion on page 43.• Updated the section Manual Paint Stroke on page 47.
H	Updated for RobotStudio 2019.3 release. Following is the update: <ul style="list-style-type: none">• Updated the section Semi automatic path generation on page 44.• Updated the section Identify panels on page 58• Updated the section Creating a Spray Fan table on page 73• Deleted the section Editing a Spray Fan table.

Safety

Safety of personnel

A robot is heavy and extremely powerful regardless of its speed. A pause or long stop in movement can be followed by a fast hazardous movement. Even if a pattern of movement is predicted, a change in operation can be triggered by an external signal resulting in an unexpected movement.

Therefore, it is important that all safety regulations are followed when entering safeguarded space.

Safety regulations

Before beginning work with the robot, make sure you are familiar with the safety regulations described in the manual *Operating manual - General safety information*.

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1 Introduction

1.1 About Painting PowerPac

Overview

The Painting PowerPac is an add-in of RobotStudio which is used to edit the paint programs. It provides functions to connect, fetch and transfer files to the robots on the shop floor. This enables the software to be used as a tool on the shop floor to edit the programs without disturbing the ongoing production.

Use Painting PowerPac for controlling a range of features, such as:

- Fetching paint programs from the robots on the shop floor into RobotStudio
- Editing of Paint path
- Verify target position reachability and trigger events
- Setting and editing of trigger events
- Simulating paint programs
- Transferring files to robots
- Enabling user login based access to features

1 Introduction

1.2 Terms and concepts of Painting PowerPac

1.2 Terms and concepts of Painting PowerPac

Terms and concepts

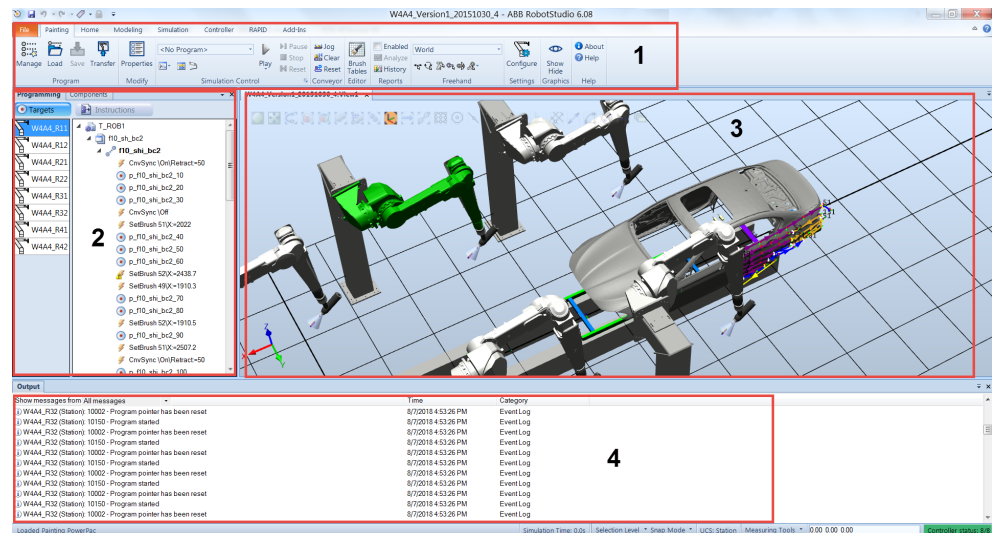
The following table lists the terminologies and concepts used in Painting PowerPac.

Concept	Description
Virtual controller	Virtual controllers can run both the systems for real robots and specific virtual systems for testing and evaluation purposes. A Virtual Controller uses the same software as the controller to execute the RAPID program, to calculate robot motions and to handle I/O signals.
Real Controller	IRC5 Paint Controller.
Workpiece	The CAD model on which the paint programs are created are referred to as Workpiece. In a RobotStudio station, there can be several CAD models, some represent the part being worked upon and others the environment.
Panel	Unique segments of a workpiece can be grouped together and identified as a Panel. For example, Door, Hood, and so on. Panels are used while generating the paint path.

1.3 Graphical user interface

Painting tab

Following is the graphical user interface of Painting PowerPac.



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Label	Component	Description
1	Painting ribbon	Contains the features required to modify and verify paint programs.
2	Programming window	Displays the components of the station in a tree structure.
3	Graphical window	3D display of the painting application. You can directly select from Graphics window and edit the station objects.
4	Output	Displays the log of the user actions while using Painting PowerPac.

Painting ribbon



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The Painting ribbon consists of the following groups and buttons:

Group	Button	Description
Program	Manage	Allows you manage the programs.
	Load	Loads modules and workpiece associated with a program into RobotStudio station.
	Save	Saves the changes to a program.
	Transfer	Distribute files to different controllers.
Modify	Properties	Allows you to edit instruction and target properties.

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1 Introduction

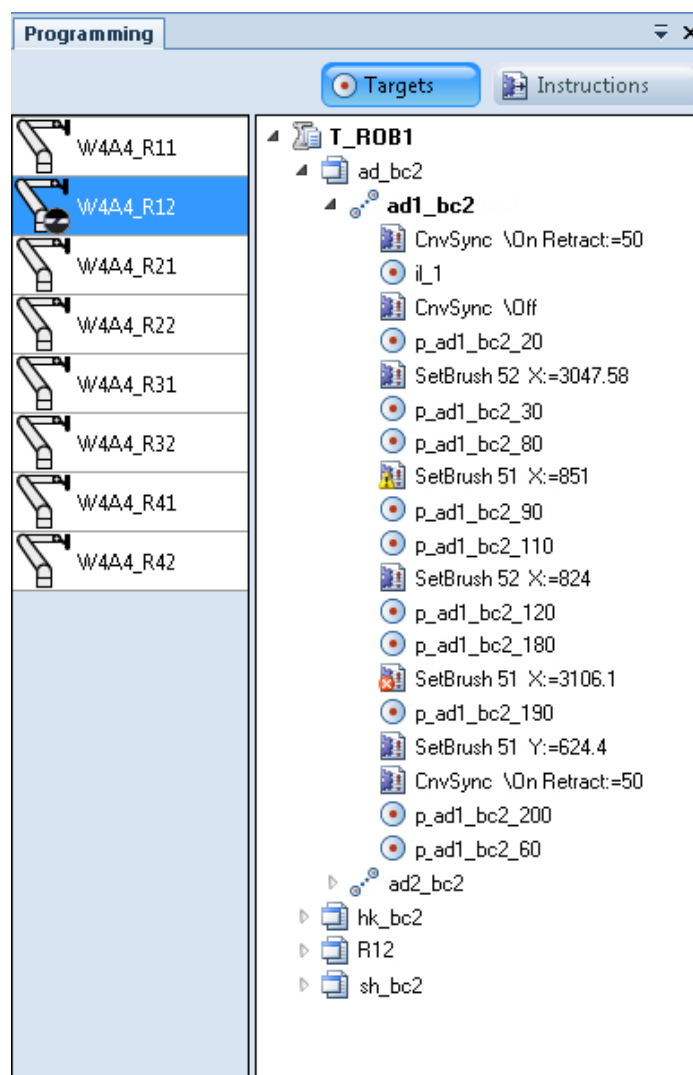
1.3 Graphical user interface

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Group	Button	Description
Simulation Control	Program list	Displays the available programs. Select a program from this list for the simulation.
	Job Queue	Allows you to specify the objects on the production line to be processed.
	Batch	Allows you to configure several initial states which are used in sequence during a simulation.
	Simulation Setup	Allows you to configure and stage a simulation.
	Simulation Control buttons	Allows you to manage the simulation of the selected program.
	I/O Simulator icon	Allows you to configure signal, group, and cross connections during program execution.
	TCP Trace icon	Allows you to visually detect the critical robot movements during simulation.
Conveyor	Jog	Allows you to jog the conveyor.
	Reset	Resets the conveyor to the start position.
	Clear	Detaches the workobjects, clears the placed objects, and resets the conveyor to the start position.
Editor	Brush Tables	Allows you to manage the brush parameters.
Reports	Enabled	Enables the report functionality.
	Analyze	Opens the latest available report from the history.
	History	Displays all the available reports.
Freehand	Free hand tools	Allows you to manage the movement of the robot using freehand tools, manage the view of the robot system, and select the coordinate system.
Settings	Path Parameters	Allows you to define the parameters used for generating paint path.
	Map to Online Controller	Allows you to configure the connection between virtual and online controller.
	Distribution Rule	Allows you to configure the distribution rules.
	Users and Groups	Allows you to configure the users and groups with its associated features.
Graphics	Show Hide	Allows you to display or hide graphical components in the graphical window.

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Programming window



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Component	Description
Robots	Lists the robots and displays their connection status to the mapped real robot.
Targets	Lists all the loaded program targets for the selected Controller. The short cut to toggle and the paths are displayed in the target mode.
Instructions	Lists all the instructions in the loaded programs for the selected Controller.

Graphical window

The graphical window displays the station contents. Following are some of the paint specific features of the graphical window:

- The path is shown in 3D.
- The SetBrush instructions are represented graphically.

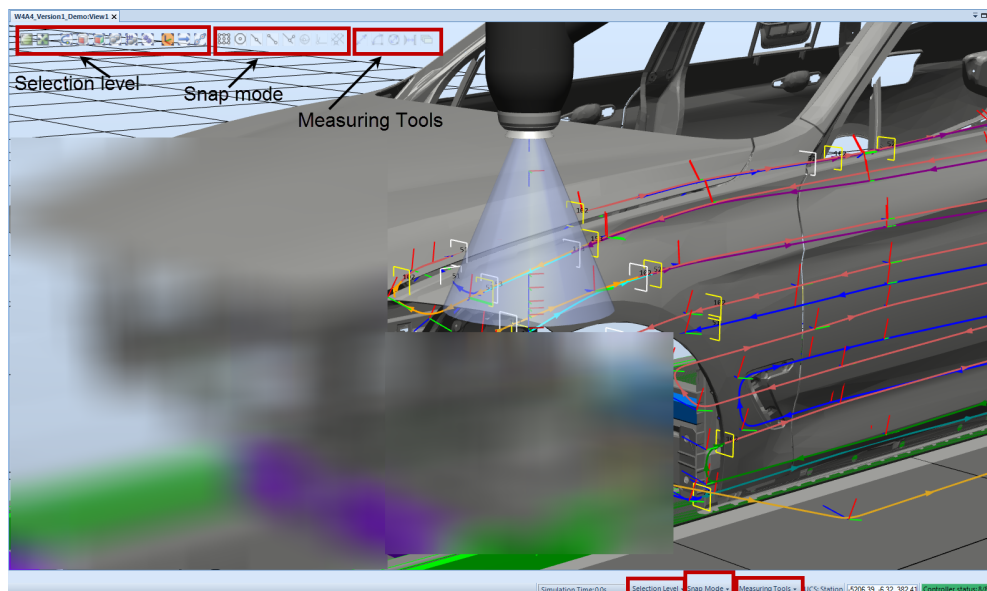
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1 Introduction

1.3 Graphical user interface

Continued

- The path segment is colored based on the SetBrush number. Depending on the position of SetBrush on the path segment its visualization is displayed in white, red, or yellow.
 - White indicates a proper positioning of the SetBrush.
 - Red indicates the trigger plane is outside subsequent path segments.
 - Yellow indicates the trig plane is inside the zone.



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Component	Description
Selection Level	Allows you to control which objects can be selected in the graphical window.
Snap Mode	Allows you to control how the selection point is snapped to geometric features.
Measuring Tools	Allows you to select the measuring tools.

2 Installation

2.1 System requirements

Overview

For details about the system requirements, see *Operating manual - RobotStudio*.

2 Installation

2.2 Installation

2.2 Installation

Installing Painting PowerPac

- 1 Double-click on the `Painting PowerPac.exe` installation file.
This is a self-extracting executable. When you double-click it extracts all the installation components to a specified folder.
- 2 Navigate to the extracted location.
- 3 Click `setup.exe`.
Follow the instructions in the installation wizard and finish the installation.

2.3 Licensing

Overview

The Painting PowerPac software licenses are designed to provide attractive and cost effective solutions to cater to the Engineering (Office) and Operations (shop floor) requirements.

The following licensing options are available:

Licenses for PC software

- RobotStudio
 - Basic
 - Premium
- Painting PowerPac
 - Basic
 - Premium

License on Robot controller


- ShopFloor PPP Enabler PaintWare option.

For details about RobotStudio licensing, see *Operating manual - RobotStudio*.

License type	Description
ShopFloor PPP Enabler	This is a PaintWare option which enables the transfer of files between real controller and Painting PowerPac. This option is available with PaintWare 5.15.14 and 6.05 onwards.
RobotStudio Basic	In Basic (or No license) version of RobotStudio, the functions relevant to visualizing and simulating path programs are available. The changes to the station cannot be saved.
RobotStudio Premium	Provides access to all RobotStudio features.
Painting PowerPac Basic	Similar to the RobotStudio Basic version, the Basic (or No license) version of PowerPac enables functions relevant to visualizing and simulating path programs.
Painting PowerPac Premium	Provides access to all the features of Painting PowerPac. This requires RobotStudio Premium license.

The licensing options can be selected (not restricted) based on the project requirements.

Engineering requirements

Requirements	License Type	Details
Typically software is executing on a office PC for creating stations, path programs, test various simulation scenarios, including commissioning tasks. You need full access to all the functions in RobotStudio and Painting PowerPac including connect, load, edit, and transfer files with the robot controller.	Requires <i>Premium licenses</i> of both the products (RobotStudio and Painting PowerPac).  Note The ShopFloor PPP Enabler option is not required on the Robot Controller if the PC software has Premium licenses.	License/ user (PC) Time bound license


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2 Installation

2.3 Licensing

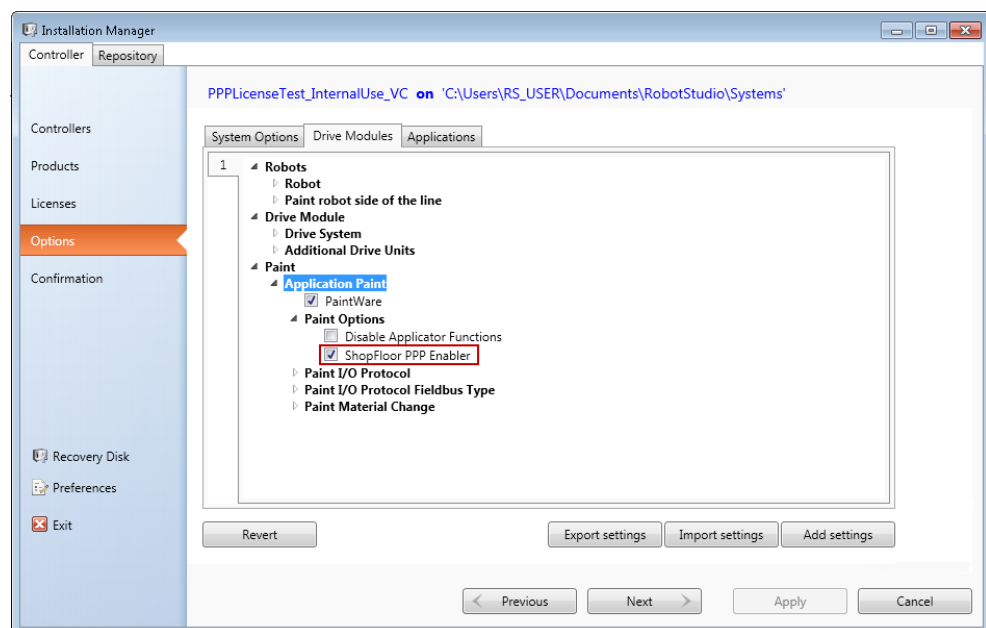
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Operations requirements

Requirements	License Type	Details
<p>Typically software is executing on a shop floor HMI/PC on the paint line.</p> <p>You need access to functions necessary to connect, load, edit, and transfer files with the paint controller.</p> <p>License should not expire for shop floor software.</p>	<p>Requires the ShopFloor PPP Enabler option on robot controller.</p> <p>License is not required for the PC software. The basic mode of RobotStudio and Painting PowerPac is sufficient for shopfloor operations.</p> <p> Note</p> <p>The License keys of the virtual and real controller must match to enable the file transfer between Painting PowerPac and Paint robot.</p>	<p>License/robot controller.</p> <p>License is perpetual as it is a robot controller licence</p> <p>Relevant shop floor functions are enabled in the basic mode with the PaintWare option.</p>

ShopFloor PPP enabler

If you have a valid license for the **ShopFloor PPP Enabler** option, the option to enable this feature is available to you when you create a system using Installation Manager as shown in the following figure.



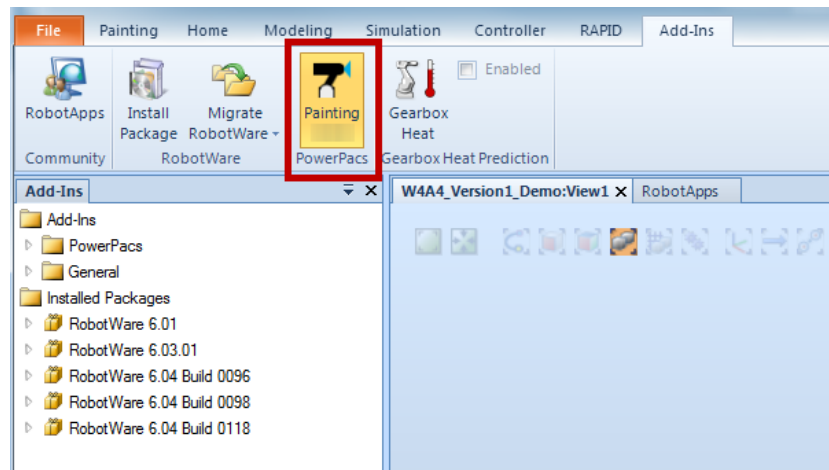
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2.4 Start Painting PowerPac

Starting Painting PowerPac

To start the Painting PowerPac:

- 1 Create a new paint station, or open an existing paint station by using RobotStudio.
- 2 Click the **Add-Ins** tab and click **Painting** in the **PowerPacs** group.



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The Painting PowerPac is started.

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3 Workflow

3.1 Overview

Workflow overview

Painting PowerPac is a programming tool used on the paint lines for optimizing existing programs or in the office for creating programs for new models. The following steps indicate the workflow to work with paint program using RobotStudio and Painting PowerPac:

- 1 Prepare RobotStudio Station.
- 2 Prepare Workpiece.
- 3 Prepare Programs.
- 4 Simulate the paint cell.
- 5 Reports and analysis.
- 6 Deploy stations to shop floor.
- 7 Edit paint programs on the shop floor.

3 Workflow

3.2 Prepare RobotStudio stations

3.2 Prepare RobotStudio stations

Preparing RobotStudio stations

A RobotStudio station consists of one or more robots, conveyors and peripheral equipment. The station must match the real paint cells closely.

Refer to RobotStudio manual for more information on preparing stations and configuring conveyors.

3.3 Prepare workpiece

Preparing workpiece

You can use the following steps to prepare the CAD model of the object that must be painted. The object CAD model is referred as *workpiece*.

- 1 Import the CAD model into a RobotStudio station.
- 2 Reduce the data in the CAD model, see [Manage Workpiece on page 55](#).
- 3 Prepare Panels for painting, see [Identify panels on page 58](#).
- 4 Position the workpiece in the paint cell to prepare for programming.
- 5 Create WorkObjects on the workpiece.
- 6 Identify Collision sets.
- 7 Save the workpiece as [`$Workpiece name`].rslib.



Note

To prepare the CAD model for interior painting, you need to identify the details of the links and joints in the workpiece and create mechanisms to simulate the joint behavior. For example, opening door, hood, trunk.

3.4 Prepare programs

Preparing programs

Use the following steps to create paint paths on the workpiece.

- 1 Create program structure, see [Manage programs on page 31](#).
 - a Create a new program from existing or blank program.
 - b Assign a *Program number* and *Name*.
 - c Create new modules or associate existing modules with the program.
 - d Associate Workpiece library and WorkObjects with the program.
- 2 Load program to RobotStudio, see [Load program on page 34](#).
- 3 Create paint paths and instructions, see [Edit paint programs on page 36](#).
 - Generate paths automatically, see [Semi automatic path generation on page 44](#).
- 4 Define Brush tables, see [Manage brush parameters on page 53](#).

3.5 Simulate the paint cell

Simulating the paint cell

Use simulation to confirm the execution of programs on the paint controller. Programs can be tuned for speed, efficiency and cycle time.

- 1 Simulate paint programs, see [Simulation on page 64](#).
- 2 Simulate various scenarios, see [Batch simulation on page 69](#).

3 Workflow

3.6 Reports and analysis

3.6 Reports and analysis



Reporting and analysis

The estimated paint consumption and simulation results are available after simulation, see [Reporting functions on page 80](#).

3.7 Deploy stations

Deploying stations to the shop floor

When the program is ready to be tested on the paint line, you can prepare your station for shop floor operations. The shop floor PC settings and their details are listed in the following table.

Settings	Details
General	<ul style="list-style-type: none"> Install RobotStudio and Painting PowerPac on the shop floor PC. Unpack the RobotStudio station on the shop floor PC. Activate the Painting Powerpac add-in. <div>  Note </div> <p>To automatically load the Painting PowerPac add-in while starting RobotStudio, you must enable the Activate on startup option. This option is available in the Add-Ins tab, under Add-Ins browser > PowerPacs > Painting > Activate on startup.</p>
Connections	Map Virtual and Real robots, see Manage connections on page 86 .
Programs	<ul style="list-style-type: none"> Ensure that Programs have corresponding WorkObjects mapped, see Manage programs on page 31. Check the option Update WorkObject under File > Options > Painting > Connections. <p>When connected to the real robot, the mapped workobject values are updated from the real robot into RobotStudio.</p>
UAS (optional)	<ul style="list-style-type: none"> Configure Users and Groups, see Login and access control on page 93. Enable User Authentication option. Ensure that the UAS.xml is copied to [\$:\ProgramData\ABB\Painting\UserAccess].
Station	<ul style="list-style-type: none"> Remove the paths and workpiece details from the station as this is loaded automatically on the shop floor . Save the station. Mark the [\$StationName].rsstn station as read-only to avoid editing of the paint cell on the shop floor.
Workpiece	<ul style="list-style-type: none"> The workpiece libraries must be placed in the location defined under the RobotStudio option File > Options > Painting > General. <div>  Note </div> <p>To associate workpiece with collision sets, see Associate collision sets with workpiece on page 60.</p> <p>To associate workpiece with path, see Associate procedure and work-piece on page 62.</p>

3 Workflow

3.8 Edit paint programs

3.8 Edit paint programs

Editing paint programs on the shop floor

When the station PC is prepared for operations the following steps are followed for shop floor editing.

Step	Action	Description
1	Start RobotStudio station.	
2	Login with the credentials defined under User authentication system. For more details, see Login and access control on page 93 .	
3	Connect to a real Paint robot.	
4	Load Program modules and workpiece into RobotStudio.	The modules are fetched from the real controller. The Workpiece is positioned in front of the robot.
5	Edit the path and save.	The modules can be automatically mirrored or copied to other robots in the station. For more details, see Distribution rules on page 89 .
6	Validate the changes by executing the simulation.	
7	Transfer files to the real robot.	Capture comments for the changes in a log file.
8	Disconnect.	
9	Close the station.	To prevent accidental editing do not save the station if prompted.

4 Painting PowerPac

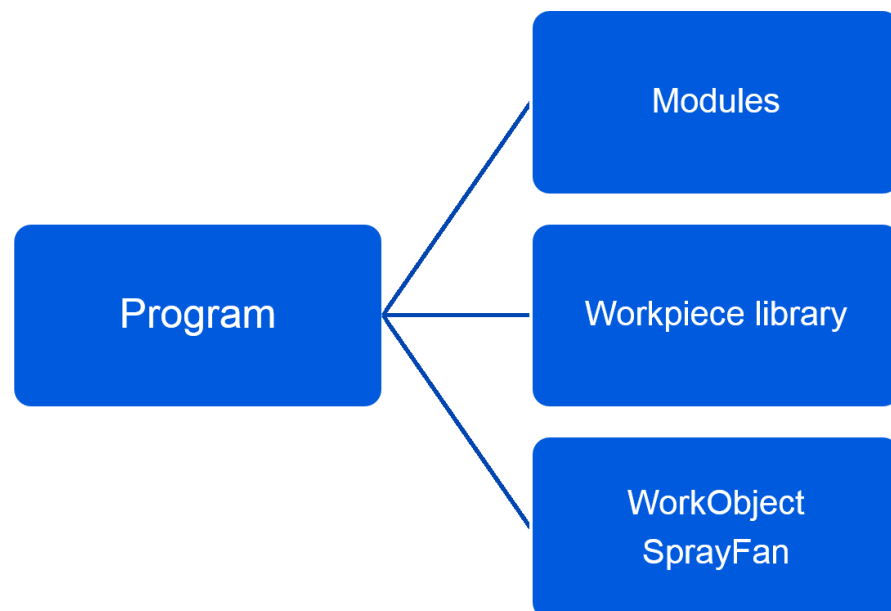
4.1 Manage programs

4.1.1 New program

Overview

A paint program is identified by a unique number which is called upon for execution by the robot controller or PLC. The `program.map` file stores the information about the program numbers.

Painting PowerPac allows you to create programs and make the necessary configurations for enabling shop floor operations in RobotStudio.



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The program refers to several RAPID modules which are loaded into the controller when the program is selected. The association with the modules is usually defined within the *Main* module.

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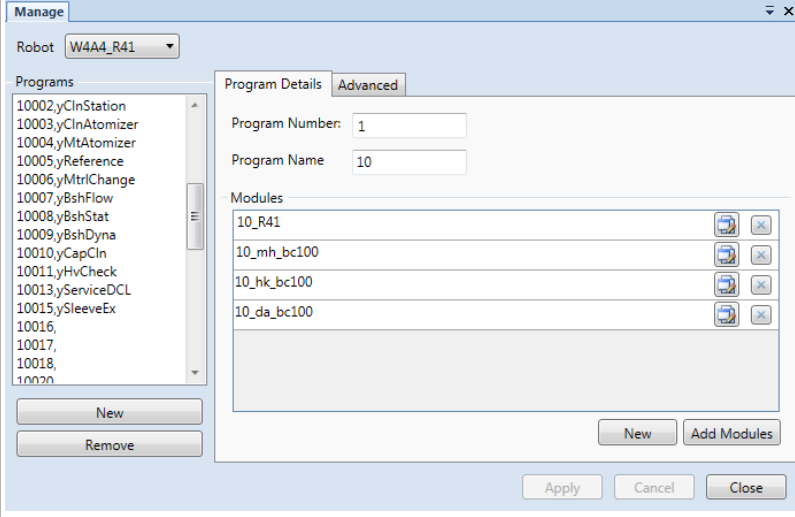
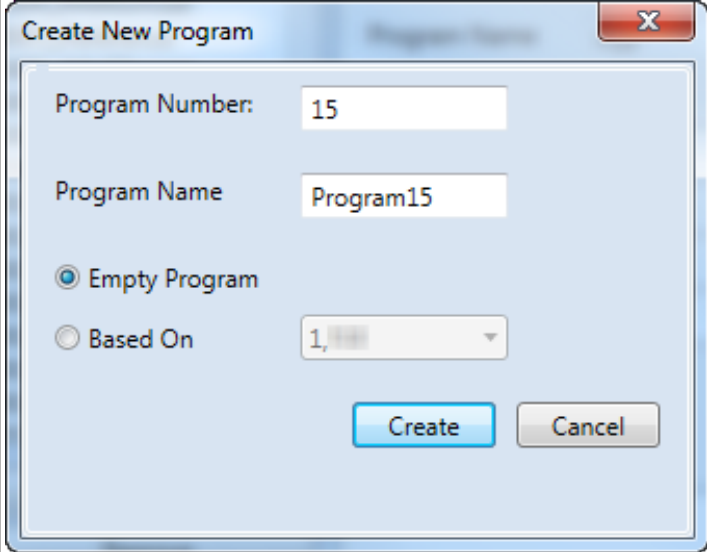
4 Painting PowerPac

4.1.1 New program

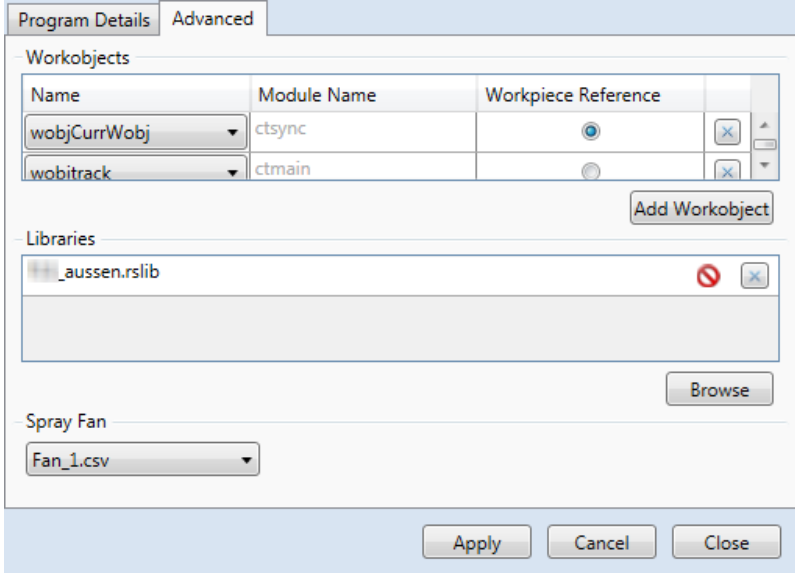



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Create a new program

The following steps describe the procedure for creating a new program using Painting Powerpac:

Step	Action
1	<p>In the Program group click Manage. The Manage window is displayed.</p>  <p>xx1600001476</p>
2	<p>Click New under Programs section. The Create New Program window is displayed.</p>  <p>xx1600001477</p>
3	<p>Validate or edit the program details. If you choose to create an empty program, the modules have to associated manually. If you choose create a new program based on an existing program, new RAPID modules are created based on the modules associated with the existing program.</p>
4	<p>Click Create. The Program Details window displays the details of the new program.</p>

Continues on next page

Step	Action
5	Click New to create a new module or click Add Modules to select and add existing modules to the program.
6	<p>In the Advanced tab, under Workobjects section, click Add Workobject. A blank row is added to the list.</p>  <p>xx1600001666</p>
7	<p>From the Workobject list in the Name column select a Workobject. The name of the module associated with the selected Workobject is updated in the Module Name column.</p> <p> Note</p> <p>If you want to make the selected Workobject as the reference for the workpiece, select the corresponding radio button in the Workpiece Reference column.</p>
8	<p>In the Libraries section click Browse and select a . rslib library file. The selected library file is added to the Libraries section.</p> <p> Note</p> <p>If the selected library file is not present in the workpieces folder X icon.</p>
9	Select a spray fan from the Spray Fan list.
10	<p>Click Apply.</p> <p>The <code>program.map</code> file is updated with the new program details. This file is located under <code>\$<systemname>/HOME/alias</code> folder.</p> <p> Note</p> <p>Modules are created or copied under <code>\$<systemname>/HOME/programs</code> folder.</p>

4 Painting PowerPac

4.1.2 Load program

4.1.2 Load program

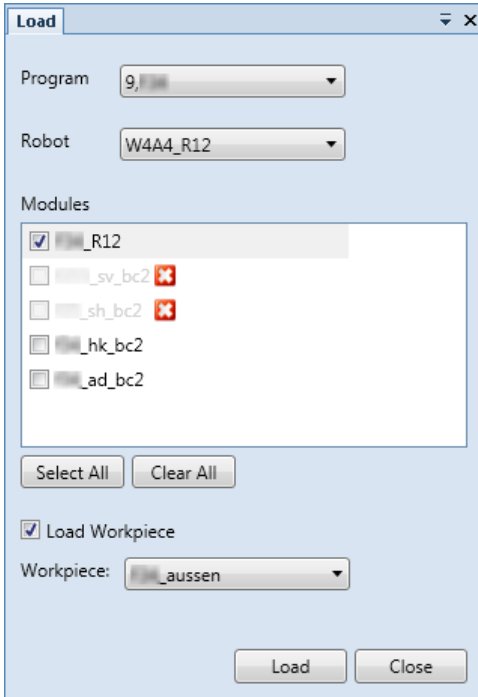
Overview

The **Load** feature loads selected modules and workpiece associated with a program into RobotStudio station. If connected to a real robot, the modules from the real robot are loaded into the station.

The modules and workpieces association with the program is configured under manage programs.

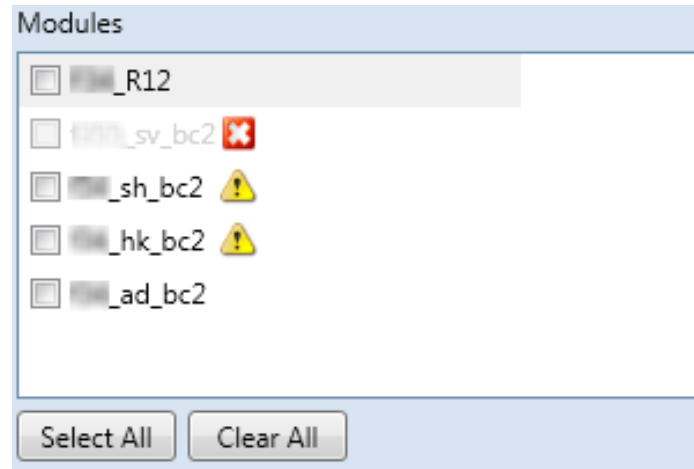
Loading a program

The following steps describe the procedure:

Step	Action	Description
1	Click Load from the Program group. The Load window is displayed.	 xx1500002112
2	Select the required program from the Program list.	
3	Select the required robot from the Robot list.	The modules associated with the selected program for the selected robot are displayed in the Modules section.
4	Select the modules.	To select all the available modules you can use the Select All button.
5	Select the Load Workpiece checkbox and select the required workpiece from the Workpiece list.	The workpiece associated with the selected program for the selected robot are displayed in the Workpiece list.
6	Click Load .	The selected modules and workpiece are loaded in RobotStudio. The workpiece is placed with reference to the workobject configured under manage programs.

Continues on next page

Following are some of the scenarios while loading a program.



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Scenario	Description
Scenario 1: The module is not found in the real controller or in the local	In this case the icon is displayed against the module. You will not be able to load this module.
Scenario 2: The module is not present in the Real Robot Controller, but present in the local.	The icon is displayed next to the module. In this case if you select this module and click the Load button the local version is loaded.
Scenario 3: If there is difference between the versions in local and robot.	<p>The icon is displayed next to the module. In this case when you select the module a drop-down list is displayed next to it.</p> <p>xx1500002114</p> <p>The Compare button displays the difference in the files. If you choose to load the version from the Real Robot Controller it overwrites the local version before loading into Robot-Studio station.</p>

4 Painting PowerPac

4.1.3 Edit paint programs

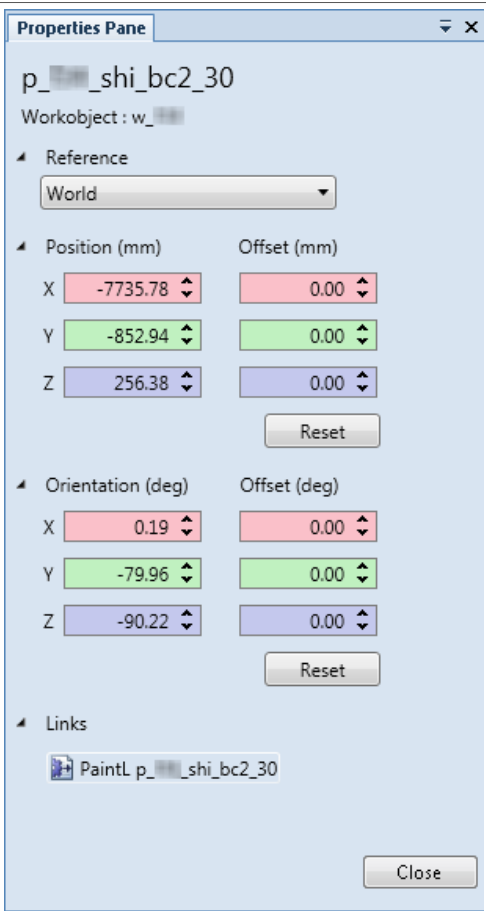
4.1.3 Edit paint programs

Overview

Painting PowerPac provides easy navigation to the instructions or targets either from the browser tree or the graphical window to edit or create paint paths using the functions described in the following sections.

Modify target

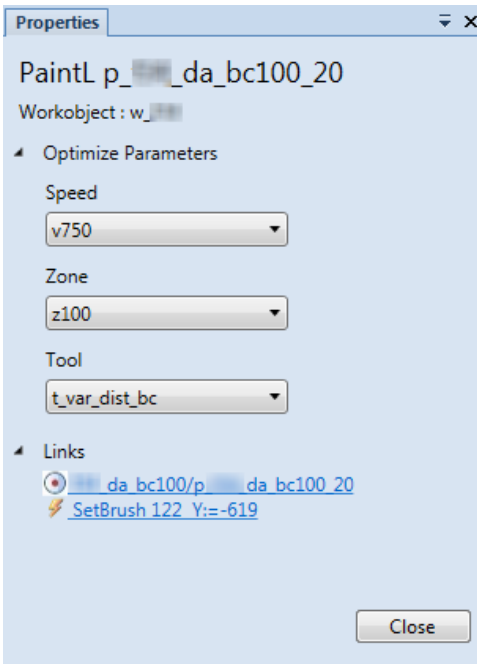
To modify the properties of a target:

Step	Action	Description
1	Select the target either directly from graphical window or from the browser tree.	
2	In the Modify group click Properties . The Properties window is displayed.	 xx1500002158
3	Edit the target position or orientation directly or with an offset. The changes are applied immediately for the selected target.	The Links section displays the links to the associated instructions. Click on an instruction link to edit its properties. For more details, see Modify instruction on page 37 .

Continues on next page

Modify instruction

To modify the properties of an instruction:

Step	Action	Description
1	Select the instruction either directly from graphical window or from Programming Instructions tree.	
2	In the Modify group click Properties . The Properties window is displayed.	 <p>xx1500002159</p>
3	Edit the instruction parameters according to your requirement. The changes are applied immediately for the selected instruction.	The Links section displays the links to the associated target and Setbrush. Click on a link to modify its properties. For more details, see Insert motion instructions on page 38 , Insert action instructions on page 39 , and Modify event on page 40 .

Modify JointTarget

To modify the JointTarget values of RobotAxes and the ExternalAxes, you can use the Properties pane.

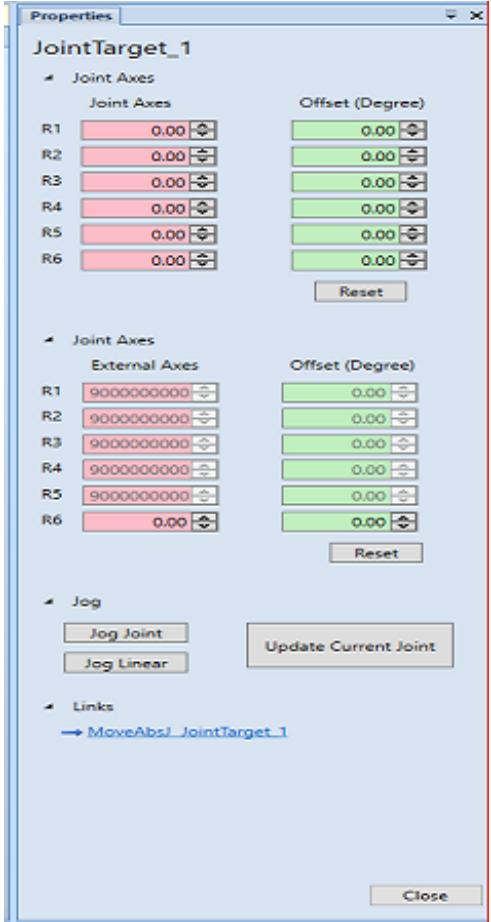
Step	Action	Description
1	Select the JointTarget either directly from the graphical window or from the browser tree.	

Continues on next page

4 Painting PowerPac

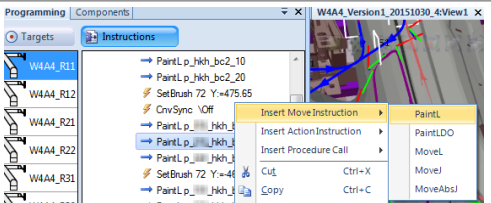
4.1.3 Edit paint programs

Continued

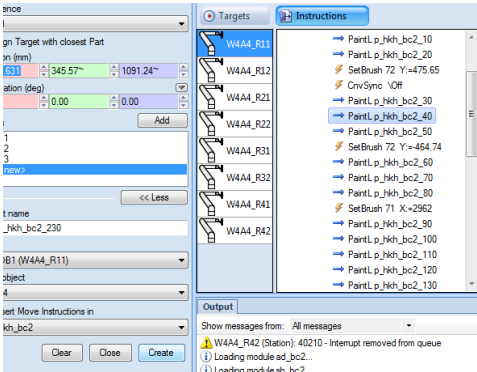
Step	Action	Description
2	In the Modify group click Properties . The Properties window is displayed.	 <p>xx1800000573</p>
3	Edit the JointTarget – Robot Axes or External Axes directly or with an Offset . The changes are applied immediately for the selected target.	The Links section displays the links to the associated JointTarget instructions. Click the link to modify its properties.

Insert motion instructions

Use the following procedure to insert motion instructions:

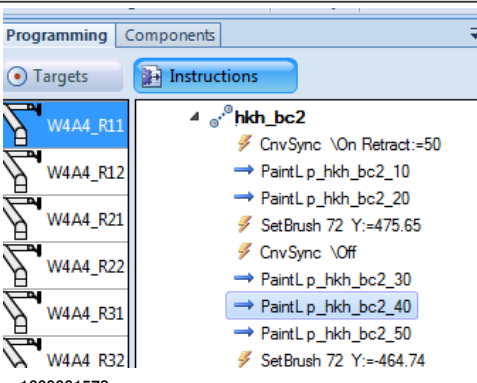
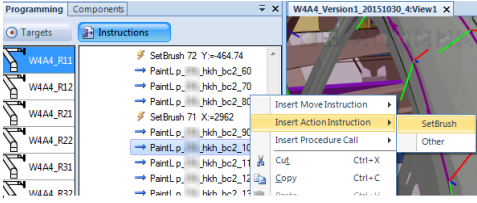
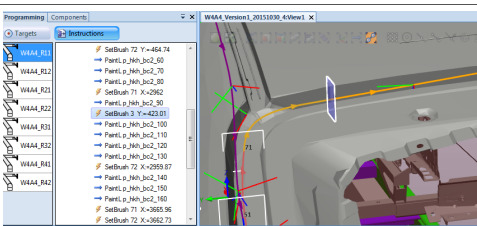
Step	Action	Description
1	Select an instruction listed under a procedure from Programming > Instructions tree.	
2	Right-click the Instruction and then click Insert Move Instruction > PaintL . The Create Move Instruction Pane opens with the selected instruction template.	 <p>xx1600001579</p>

Continues on next page

Step	Action	Description
3	In the Graphics window, select the required points where the new targets for adding instructions must be created. The selected points gets added and listed in the Points box.	
4	Click Create . The selected motion instructions are created with LOCAL targets.	 <p>xx1600001581</p>

Insert action instructions

Use the following procedure to insert action instructions:

Step	Action	Description
1	Select an instruction listed under a procedure from Programming > Instructions tree.	 <p>xx1600001578</p>
2	Right-click the Instruction and then click Insert Action Instruction > SetBrush .	 <p>xx1600001582</p>
3	SetBrush Instruction is added in the middle of the selected path which can further be edited either graphically or using the edit event function. For more details, see Modify event on page 40 .	 <p>xx1600001583</p>

Continues on next page

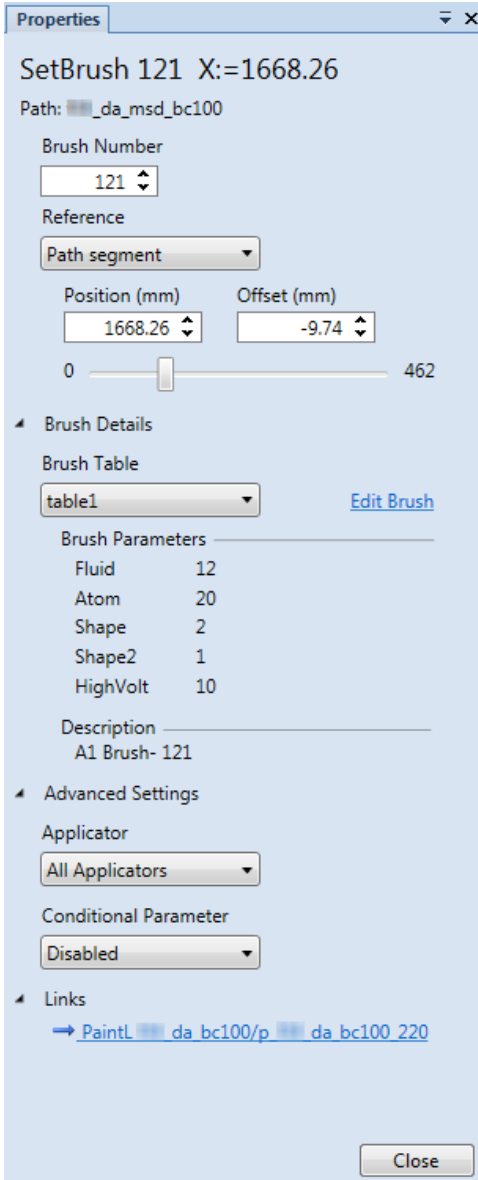
4 Painting PowerPac

4.1.3 Edit paint programs

Continued

Modify event

To modify the properties of an event.

Step	Action	Description
1	Select the Setbrush from browser tree.	
2	In the Modify click Properties . The Properties window is displayed. From this window you can change the brush number, trigger position, and other brush parameters.	 <p>xx1500002160</p> <p>The Brush Details section displays the brush parameters for the brush number for a selected brush table.</p> <p>Note</p> <p>The trigger event is validated based on the position on the path segment and the zone information of the next path segment. This is indicated graphically. For more details, see Graphical window on page 15.</p>

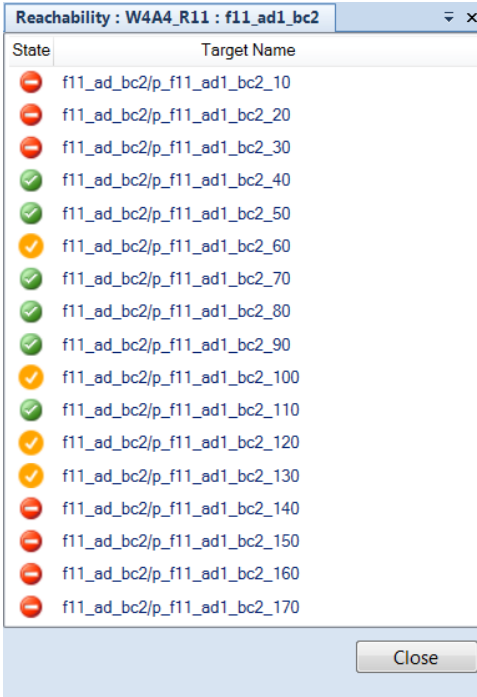



Continues on next page

Step	Action	Description
3	Edit the instruction parameters according to your requirement. The changes are applied immediately for the selected instruction.	The Links section displays the links to the associated instruction. Click on a link to modify its properties. For more details, see Modify instruction on page 37 .

Target reachability

The Reachability feature allows you to verify the reachability of all the targets.

To verify the reachability:

Step	Action	Description
1	Select a procedure or the targets listed under a procedure from the browser tree.	
2	Click Reachability from the context menu option of the path procedure. The Reachability window is displayed.	 <p>xx1500002164</p> <p>The reachability status for all the targets under a selected procedure are displayed. The  icon next to a target indicates that the target is not reachable. The  icon next to a target indicates that the target is reachable in the current position. The  icon next to a target indicates that the target is not reachable with the current configuration but may be reachable with other configurations.</p>
3	Double click on a target to navigate to its position in the graphical window.	

Continues on next page


4 Painting PowerPac

4.1.3 Edit paint programs

Continued

Validate trigger events

The Events feature allows you to verify the state of the SetBrush instructions.

Step	Action	Description																																																															
1	Select a procedure or setbrush listed under a procedure from the Programming Targets tree.																																																																
2	Right click on the selected procedure. The context menu is displayed.																																																																
3	Click Events . The Events window is displayed. The trigger event is validated based on the position on the path segment and the zone information of the next path segment. This is indicated graphically. For more details, see Graphical window on page 15 .	 <p>Events :W4A4_R11</p> <table><thead><tr><th>State</th><th>SetBrush Name</th><th>Procedure</th></tr></thead><tbody><tr><td>⚠</td><td>SetBrush 51 Y:=-720</td><td>ad1_bc2</td></tr><tr><td>⚠</td><td>SetBrush 52 X:=3080.5</td><td>ad1_bc2</td></tr><tr><td>✅</td><td>SetBrush 51 X:=986</td><td>ad1_bc2</td></tr><tr><td>✅</td><td>SetBrush 52 X:=903</td><td>ad1_bc2</td></tr><tr><td>⚠</td><td>SetBrush 51 X:=3106.1</td><td>ad1_bc2</td></tr><tr><td>✅</td><td>SetBrush 51 Y:=-624.4</td><td>ad1_bc2</td></tr><tr><td>✅</td><td>SetBrush 52 Y:=-741.76</td><td>ad2_bc2</td></tr><tr><td>⚠</td><td>SetBrush 51 X:=3441.4</td><td>ad2_bc2</td></tr><tr><td>✅</td><td>SetBrush 51 Z:=772</td><td>ad2_bc2</td></tr><tr><td>⚠</td><td>SetBrush 51 X:=1864.9</td><td>shi_bc2</td></tr><tr><td>✅</td><td>SetBrush 49 X:=1917.1</td><td>shi_bc2</td></tr><tr><td>❌</td><td>SetBrush 52 X:=2573.9</td><td>shi_bc2</td></tr><tr><td>✅</td><td>SetBrush 51 X:=2597.8</td><td>shi_bc2</td></tr><tr><td>✅</td><td>SetBrush 52 X:=1911.9</td><td>shi_bc2</td></tr><tr><td>✅</td><td>SetBrush 52 X:=3592.7</td><td>shi_bc2</td></tr><tr><td>⚠</td><td>SetBrush 52 X:=3307.5</td><td>shi_bc2</td></tr><tr><td>✅</td><td>SetBrush 51 X:=3157.5</td><td>shi_bc2</td></tr><tr><td>✅</td><td>SetBrush 52 X:=2719.1</td><td>shi_bc2</td></tr><tr><td>✅</td><td>SetBrush 49 X:=1918.9</td><td>shi_bc2</td></tr><tr><td>✅</td><td>SetBrush 52 X:=1906.8</td><td>shi_bc2</td></tr></tbody></table> <p>Lookup Brush <input type="text"/></p> <p>Close</p> <p>xx1500002165</p> <p>The state of the SetBrush instructions is displayed. Following are the possibilities:</p> <ul style="list-style-type: none">✅ - SetBrush Valid⚠ - SetBrush lies on path but within the zone. It depends on the subsequent path segment to determine whether it triggers or not.❌ - SetBrush lies outside the path segment. <p> Note</p> <p>You can type a brush number in the Lookup Brush field to display only those instructions referring the brush number.</p>	State	SetBrush Name	Procedure	⚠	SetBrush 51 Y:=-720	ad1_bc2	⚠	SetBrush 52 X:=3080.5	ad1_bc2	✅	SetBrush 51 X:=986	ad1_bc2	✅	SetBrush 52 X:=903	ad1_bc2	⚠	SetBrush 51 X:=3106.1	ad1_bc2	✅	SetBrush 51 Y:=-624.4	ad1_bc2	✅	SetBrush 52 Y:=-741.76	ad2_bc2	⚠	SetBrush 51 X:=3441.4	ad2_bc2	✅	SetBrush 51 Z:=772	ad2_bc2	⚠	SetBrush 51 X:=1864.9	shi_bc2	✅	SetBrush 49 X:=1917.1	shi_bc2	❌	SetBrush 52 X:=2573.9	shi_bc2	✅	SetBrush 51 X:=2597.8	shi_bc2	✅	SetBrush 52 X:=1911.9	shi_bc2	✅	SetBrush 52 X:=3592.7	shi_bc2	⚠	SetBrush 52 X:=3307.5	shi_bc2	✅	SetBrush 51 X:=3157.5	shi_bc2	✅	SetBrush 52 X:=2719.1	shi_bc2	✅	SetBrush 49 X:=1918.9	shi_bc2	✅	SetBrush 52 X:=1906.8	shi_bc2
State	SetBrush Name	Procedure																																																															
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4	Double click on a SetBrush instruction to examine it in the graphical window.																																																																

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Verify the robot motion

The **Move To** function enables you to verify the robot motion along a path and identify the reachability and configuration issues, if any.

Use the following procedure to verify the robot motion:

- 1 Click **File > Options > Painting > General > Move To Default Speed**.
- 2 Set the speed of simulation.
- 3 In the programming browser tree, right click on the path procedure/instructions.
- 4 Select **Move To**.

The program execution starts and the simulation progresses with the configured speed. The respective instruction is highlighted on the browser tree.

4 Painting PowerPac

4.1.4 Semi automatic path generation

4.1.4 Semi automatic path generation

Overview

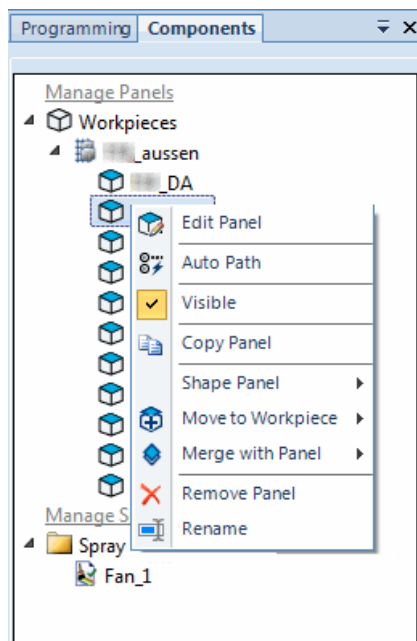
This function enables you to generate path on workpiece panels. The path pattern is based on the type of the paint equipment (spray gun or atomizer) attached to the robot, parameters such as pitch, offsets, path direction and so on which can be tuned.

Following are the pre-requisites for using **Auto Path**:

- A program is created and listed in the Painting PowerPac browser window
- The workpiece is imported and panels are identified on it.
- The parameters in the **Preferences** dialog are set.

Auto path

To access auto path, on the browser tree select the **Component** tab and right-click on a panel inside a workpiece as shown in the following figure.



xx1100000855

Continues on next page

From the context menu select **Auto Path**. The **Auto Path** window is displayed.

Auto Path

Part_3_Panel_1
Workpiece:Part_3

Select

Robot: Controller1
Module: m4

Instruction Parameter

Tool: ROBOBEL926_T_TD_300
Workobject: wobj0

Painting Type

☒ Spray gun ☐ Atomizers

Path Parameters

Path Direction: Along Long Edge
Starting Corner: 1
Path Offset (mm): 1
Pitch (mm): 150
Rotation (deg): 0

SetBrush

Start Brush Number: 2
End Brush Number: 1

Create Close

xx1100000856

The following table provides you the procedure for selecting the values in the **Auto Path** window.


Option	Description
Select	Robot: Displays the robots available in the station. Module: Displays the modules that are loaded into the station for the selected robot.
Instruction Parameter	Tool: Displays all the tool data associated with the selected robot. Workobject: Displays all the workobjects associated with the selected robot.
Painting Type	Allows you to choose a painting type. The available options are Spray Gun and Atomizer. For more details see, Path parameters on page 49 .

Continues on next page

4 Painting PowerPac

4.1.4 Semi automatic path generation

Continued

Option	Description
Path Parameters	<p>Path Direction Displays the possible path directions.</p> <p>xx1100000857</p> <p>Specify the path on the selected panel with Path Direction. You can choose the direction of the path as:</p> <ul style="list-style-type: none"> • Along Long Edge - When the program is created along the longest side of the Panel (here the length of the box) • Along Middle Edge - When the program is created along with less longer side of the Panel (here the breadth of the box) • Along Short Edge - When the program is created along the shortest side of the Panel (in this case the vertical side of the box) <p>Starting Corner Select the starting corner of the path as 1, 2, 3, or 4 as required. Then click Create to create the path. The other points can be located by moving in the counter-clockwise direction from the current starting corner point.</p> <p>xx1100000858</p> <p>Pitch Pitch describes the distance between two parallel paths. You can change the Pitch value from the window.</p> <p>Path Offset: Defines the distance from the starting corner edge and the path. This is usually half of the pitch value.</p> <p>Rotation: Rotates the path by the specified value.</p>
SetBrush	<p>Start Brush Number: Allows you to change the start brush number.</p> <p>End Brush Number: Allows you to change the end brush number.</p> <p> Note</p> <p>The set brush number is used while creating the path.</p>
Create	<p>Creates the path. Individual paint strokes are identified and appended to a procedure with the name associated with the panel. The name of the procedure is similar to the corresponding panel name.</p>

Continues on next page

Manual Paint Stroke

The Manual paint stroke option allows you to create the paint path by the selection made in the Part of the Graphics which creates the corresponding RobTargets and Instructions. Also, while completing the path, SetBrush gets created after the first RobTarget and before the last RobTarget.

To access Manual Paint Stroke, on the browser tree, right-click on an instruction or a procedure and select **Insert Paint Stroke** from the context menu.

The **Manual Path** window is displayed.

xx1800000531

The following table provides you the information about the fields in the **Manual Path** window.


Option	Description
Robot	Displays the robots available in the station.
Module	Displays the modules that are loaded into the station for the selected robot.
Instruction Parameter	Tool: Displays all the tool data associated with the selected robot. Workobject: Displays all the workobjects associated with the selected robot.

Continues on next page

4 Painting PowerPac

4.1.4 Semi automatic path generation

Continued

Option	Description
Painting Type	Allows you to choose a painting type. The available options are Spray Gun and Atomizer. For more details see, Path parameters on page 49 .
SetBrush	Start Brush Number: Allows you to change the start brush number. End Brush Number: Allows you to change the end brush number.  Note The set brush number is used while creating the path.
Clear	To delete all the created RobTargets/ Instructions.
Start/Finish	To start/finish creating the RobTargets.
Show Create Grid	Allows you to position the targets accurately while using manual paint strokes. For more details see, Creating grid on page 48 .
Close	To close the window.

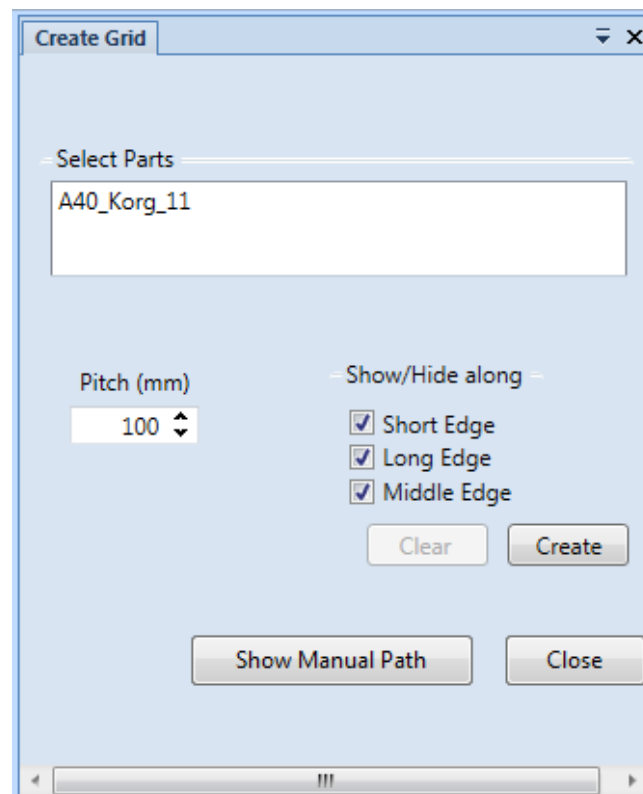
Creating grid

A grid is created to position the targets accurately while using manual paint strokes.

Use the following procedure to create a grid:

- 1 In the **Manual Path** window, click **Show Create Grid**

The **Create Grid** window is displayed.



xx1900001179

Continues on next page

- In the graphical window select the parts for which the grid needs to be created.



Note

Hold the SHIFT key and select the parts for multiple selection. The selected parts name is displayed in the **Select Parts** list.

- Configure the following settings:

- Pitch:** Specify the pitch value in mm. The pitch value defines the distance between grid lines.
- Show/Hide along:** Select the required check boxes to see the grid lines along a specific edge.



Note

Click **Clear** to clear all the grid lines.

- Click **Create**.

The grid is created for the selected parts. The grid of the model is created based on the world coordinates.

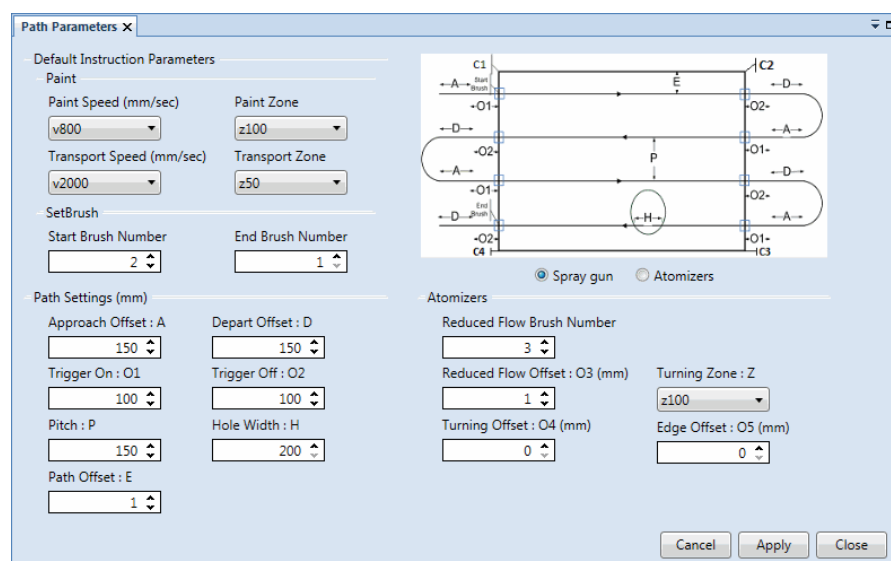


Note

When you select another set of parts and create a grid, the previous grid is deleted. When the **Manual PaintStroke** dialog is closed, all the grids are deleted.

Path parameters

You can use the **Path Parameters** window to adjust the parameters used to generate paint path. To access this in the **Settings** group, click **Configure > Path Parameters**.



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Continues on next page

4 Painting PowerPac

4.1.4 Semi automatic path generation

Continued

The following table describes the options available in the **Path Parameters** window.

Option	Description
Default Instruction Parameters - Paint	<p>This section defines the default PaintL and SetBrush instruction values for different scenarios.</p> <ul style="list-style-type: none">• Paint Speed: Defines the velocity of the TCP while painting.• Paint Zone: Defines the Zone value while painting.• Transport Speed: Defines the speed of the PaintL instruction when the robot is not painting, that is, when it is moving between the paint strokes.• Transport Zone: Defines the zone value to be used for the PaintL instruction when the robot is not painting, that is, when it is moving between the paint strokes.
Default Instruction Parameters - SetBrush	<p>Following are the SetBrush parameters:</p> <ul style="list-style-type: none">• Start Brush Number: Defines the brush number to be used for turning ON the paint flow.• End Brush Number: Defines the brush number to be used for turning OFF the paint flow.
Path Settings	<p>This section allows you to adjust the common parameters for the path pattern of spray gun and atomizer.</p> <ul style="list-style-type: none">• Approach Offset: A: Defines the value (mm) which specifies the distance the robot has to travel before turning ON the paint flow. This is the distance in which the robot needs to reach the programmed TCP speed.• Depart Offset: D: Defines the distance the robot has to travel after turning OFF the paint.• Trigger On : O1: Defines the distance the robot has to travel before turning ON the paint. A brush event is created at this point.• Trigger Off : O2: Defines the distance the robot has to travel before Turning OFF the Paint flow. A brush event is created at this point.• Pitch: P: Defines the distance between two parallel paint strokes.• Hole Width: H: Defines the minimum size of any hole that is identified during path generation. For the identified holes, targets are created at the starting and ending point after the path generation. <div> Note</div> <p>A hole can be any gap on the divided model. If there are holes in the panel and along the path, and the size of the hole is larger than the specified value in the template, then targets are created at the starting and ending point of the hole along the path. You can add events at these positions. Holes that are smaller than the specified size are ignored.</p> <ul style="list-style-type: none">• Path Offset: E: Defines the distance from the starting corner edge and the path. This is usually half of the pitch value.

Continues on next page

Option	Description
Atomizers	<p>Following are the stay on parameters:</p> <ul style="list-style-type: none"> • Reduced Flow Brush number: Defines the brush number used for reducing the paint flow when robot is making a turn. • Reduced Flow Offset: O3: Defines the offset distance (in mm) before which the reduced flow event must be inserted before starting the turning operation and the distance turning before which the normal brush event is inserted. • Turning Zone: Z: Defines the Zone information used for the PaintL instructions which are used to make a turn in Stay-On painting. • Turning Offset: O4: Defines the distance (in mm) the target is offset from the path direction when making a turn. • Edge Offset: O5: Defines the distance (in mm) of the target from the edge of the Panel.

Some scenarios

Scenario 1

RobTarget Z- axis is not pointing normal into the surface

In some CAD models the Z-axis may be pointing out of the surface. Here you can choose **Adjust Position and Orientation** option from the context menu of the PaintStroke to rotate the RobTargets by 180 degrees.

Scenario 2

Atomizer painting is creating paint strokes which are not similar to the template

In such cases the Pitch and Edge values are not proportional to the edge length. Modify the same to be proportional with the size of the edge along the path direction.

Scenario 3

Auto path process is time consuming.

Possible reasons for this are large number of parts in the panel, complex panel shape, multiple layers in the selected CAD model, and so on. The suggested solutions are:

- Simply the panel by expand/divide functions.
- Optimize the number of parts in the panel.
- Ensure that panel parts do not have duplicate layers.

Some CAD models may have multiple layers. You may have selected only the top surface of the workpiece while creating the Panel. However the path generated

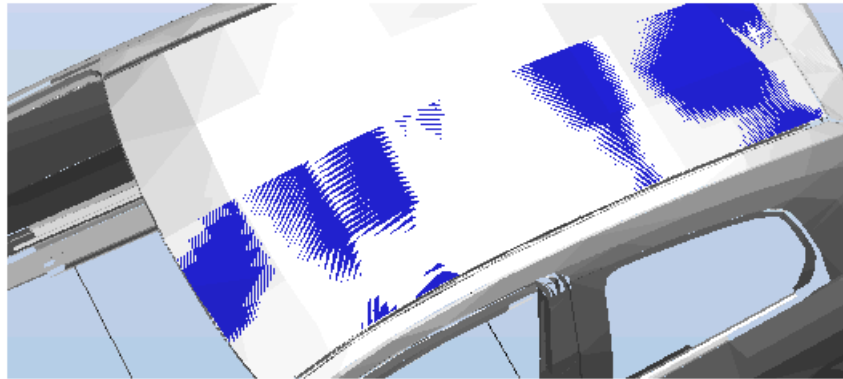
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4 Painting PowerPac

4.1.4 Semi automatic path generation

Continued

may not be as expected. An example of multiple layers is shown in the following figure.



xx1100000864

In a case, as shown in the figure, delete all duplicate layers and leave only one layer which defines the surface to be painted.

4.2 Manage brush parameters

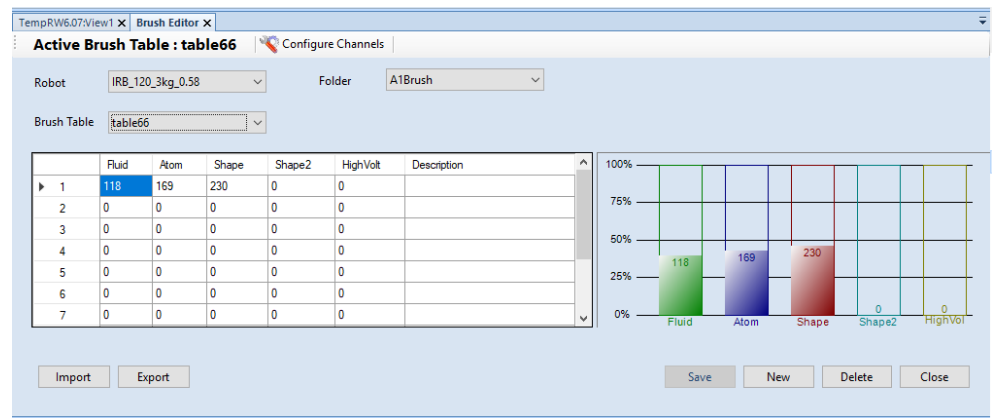
Overview

You can manage brush parameters using the Brush table editor. On the virtual controller the brush tables are stored under `$<Systemname>/IPS/A1Brush` folder. When connected with a real robot, the brush tables are fetched and updated to the above folder.



Note

For RobotWare 6.07 and onwards, the brush tables are stored in sub-folders under the A1Brush folder. The sub-folders are automatically created and stored based on the Brush Table number.



xx1500001907

Define brush table

To define a brush table:

Step	Action	Description
1	Click Brush Tables on the Editor group in the Painting ribbon Tab. The Brush Editor window is displayed.	
2	Select the robot from the Robot list for which you want to access the brush table. Select a folder from the available folder list for the selected robot. The available brush tables from the selected robot & the selected folder will be displayed in the Brush Table list.	Note The option for folder selection will be available for the systems with RobotWare 6.07 and above.
3	Click New . The Create New Brush Table window is displayed.	Click the Import button to import an existing brush table from another location.
4	Type value in the Brush Table number field.	

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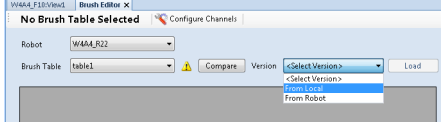
4 Painting PowerPac

4.2 Manage brush parameters

Continued

Step	Action	Description
5	Type value in the Number of brushes field.	
6	Click OK . A new brush table is created and the default values are loaded in various fields.	
7	Type the values in various fields or edit using the chart.	To edit using the chart the option must be enabled from File > Options > Painting > Tables .
8	Click Save . The new brush table is saved under the system folder.	Click the Export button to export the newly created brush table for reuse.

The following scenario can occur while editing brush tables on the real paint controller:

Scenario	Description
Scenario: If there is difference between the brush table values in local and real robot.	<p>If a different version of Brush Table exists on the controller, the ⚠ icon is displayed next to the Brush Table. Select the version of Brush Table to be loaded.</p> <p>The Compare button displays the difference between the files. In this case when you must choose the version. If you choose to load the version from the Real Robot Controller it overwrites the local version. However if you choose the local version the version on the real robot remains the same.</p>  <p>xx1600001667</p>

4.3 Manage Workpiece

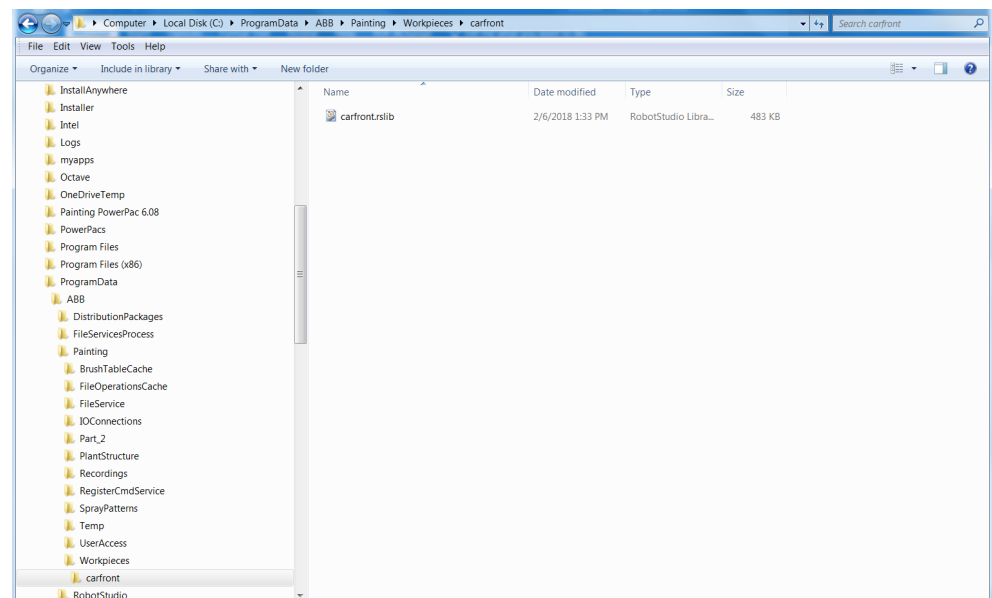
Preparing Workpiece

Prepare the workpieces associated with the paint programs according to the following guidelines:

- Identify Panels on the workpiece to enable show/hide path and graphics information in RobotStudio.
- Simplify the workpiece geometry to reduce the complexity and size.
- Save the workpiece as a RobotStudio library (*.rslib format) within a folder with the same name as the RobotStudio Library.

The information corresponding to workpieces are saved in

C:\ProgramData\ABB\Painting\Workpieces as shown in the following figure.



xx1500002602

Workpiece configuration file

The Workpiece configuration file defines the following additional configuration related to a workpiece library:

- Defines the collision sets in the workpiece.
- Defines the configuration smart component details related to simulating the opening and closing of the workpiece mechanisms (for interior painting).

When a workpiece is loaded into RobotStudio station, the collision sets are created in RobotStudio and the smart components are configured. This information is used during Program simulation. The configuration XML is placed in the same folder as the workpiece library and shares the same name with a Configuration extension.


Continues on next page

4 Painting PowerPac

4.3 Manage Workpiece

Continued

Workpiece configuration file is described in the following table:

Section	Description
<pre><?xml version="1.0" encoding="UTF-8"?> - <WorkpieceSetup Name="F06" xmlns:xsd= + <PaintCells> </WorkpieceSetup></pre> xx1500002643	The name of the workpiece is mentioned in the WorkpieceSetup Name node.
<pre><WorkpieceSetup Name="F06" xmlns:xsd="http://www.w3.org/2001/XMLSchema" - <PaintCells> + <PaintCellSetup Name="BMW_DGF_W4A3_BC_Innen_2015_11_09"> </PaintCells> </WorkpieceSetup></pre> xx1500002644	A workpiece can be imported into any RobotStudio station, however the collision sets and smart components are different for each station. The configuration file provides the option to specify the information of the RobotStudio station under the PaintCellSetup Name node.
<pre><PaintCellSetup Name="BMW_DGF_W4A3_BC_Innen_2015_11_09"> <StationSignal Name=""/> + <AdditionalLibraries> + <CollisionSetups> </PaintCellSetup></pre> xx1500002645	The collision sets and smart component details are configured for each station.  Note The StationSignal Name node is not used.
<pre><AdditionalLibraries> + <ParentSC Name="F06__Logic/F06_HK_Logic"> + <ParentSC Name="F06__Logic/F06_L_TH_Logic"> + <ParentSC Name="F06__Logic/F06_L_TV_Logic"> + <ParentSC Name="F06__Logic/F06_MH_Logic"> + <ParentSC Name="F06__Logic/F06_R_TH_Logic"> + <ParentSC Name="F06__Logic/F06_R_TV_Logic"> </AdditionalLibraries></pre> xx1500002646	The AdditionalLibraries node lists the smart components defined in the workpiece whose behavior is to be configured.
<pre><ParentSC Name="F06__Logic/F06_HK_Logic"> - <ChildSC Name="CollisionSensor"> <Links Type="SmartComponent" Value="Tuertools" Property </ChildSC> + <ChildSC Name="Highlighter_tool"> </ParentSC></pre> xx1500002649	The child smart components and their behavior is defined in these nodes.
<pre><PaintCellSetup Name="BMW_DGF_W4A3_BC_Innen_2015_11_09"> <StationSignal Name=""/> + <AdditionalLibraries> - <CollisionSetups> + <CollisionSetup Name="CollisionSetup_R11_F06"> + <CollisionSetup Name="CollisionSetup_R12_F06"> + <CollisionSetup Name="CollisionSetup_R21_F06"> + <CollisionSetup Name="CollisionSetup_R22_F06"> + <CollisionSetup Name="CollisionSetup_R31_F06"> + <CollisionSetup Name="CollisionSetup_R32_F06"> + <CollisionSetup Name="CollisionSetup_R41_F06"> + <CollisionSetup Name="CollisionSetup_R42_F06"> </CollisionSetups> </PaintCellSetup></pre> xx1500002647	The collision sets configured for the station in relation with the workpiece is defined in these nodes.
<pre><CollisionSetup Name="CollisionSetup_R11_F06"> <Properties ShowMarkup="true" Highlight="parts" Active="true" Invisible - <CollisionObjects Name="ObjectA"> <CObject Name="Slimcover_Platte_links_R11"/> <CObject Name="W4A3_R11"/> <CObject Name="W4A3_R11_ROBOBEL1000_WSC_500cc_02"/> </CollisionObjects></pre> xx1500002648	The subsequent child nodes define the collision set properties and objects.

CAD model simplification-Split part by

The Split Part by function provides options to process the model by creating panels and paint strokes on the workpiece. The following Split Part by options are available:

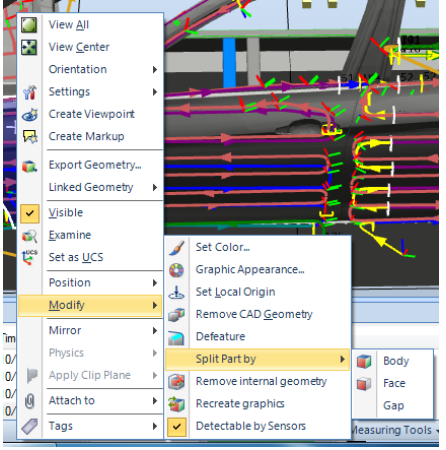
- **Body/Face:** For showing the internal structure of the selected part by identifying the bodies as sub-parts. This option exposes the internal structure

Continues on next page

of the workpiece as individual selectable parts. This helps to identify panels on the workpiece.

- **Gap:** This option meshes (sub-divides) the selected parts to triangular surfaces. This helps to identify the surface normals while creating paint strokes. New parts may be created based on the gaps in the CAD model.

To divide a workpiece:

Step	Action	Description
1	Select part selection icon from the Selection Level on the graphics window and select the required workpiece from the graphics window.	
2	Right click and select Modify > Split Part by > Body/Face/Gap .	 <p>xx1600001478</p>
3	The selected split part by process is done.	If you select the Gap option the parts that are already expanded are meshed into triangular bodies. The parts that are not expanded or can be further expanded are not meshed.



Note

Processing a workpiece to divide it into smaller parts depends on the format, size, complexity, and the level of the detailing in the work piece. If the work piece is highly detailed and large in size, then the process takes more time to complete.

Continues on next page

4 Painting PowerPac

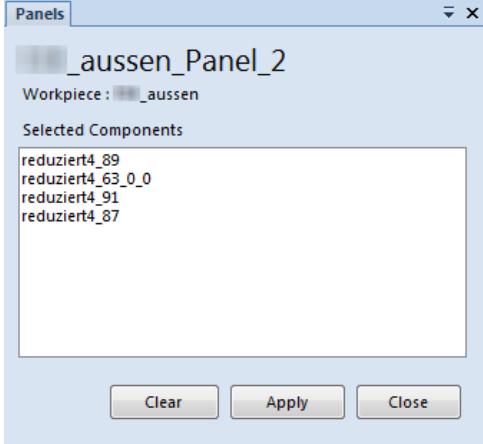
4.3 Manage Workpiece

Continued

Identify panels

The unique parts of a workpiece that can be grouped together is termed as a Panel. For example, Door, Hood, and so on.

To create a new panel use the following procedure:

Step	Action	Information
1	Right click on the work piece and select New Empty Panel . A new empty panel is added to the selected workpiece. The Panels window is displayed.	By default the the name of the panel is Workpiece name_Panel_1, Workpiece name_Panel_2, and so on. You can right click on the panel and rename it. For example, Hood, Door, and so on. 
2	Click on the surface of the work-piece and select the parts according to your requirement.	The selected parts are added to the Panels window.
3	Click Apply	The panel is created and listed in the Panel Browser window below the corresponding workpiece.
4	Right click on the panel and select Edit Panel .	To edit the panel.

For more details, see [Semi automatic path generation on page 44](#).

Shape panels

The shape panel functionality allows you to divide or extract a Panel along a number of cutting planes which intersect the parts along each axis. The cutting planes are placed such that the workpiece is divided equally into the number of planes along each axis. You can shape the panel by specifying the number of cutting planes along each of the X, Y and Z axes.

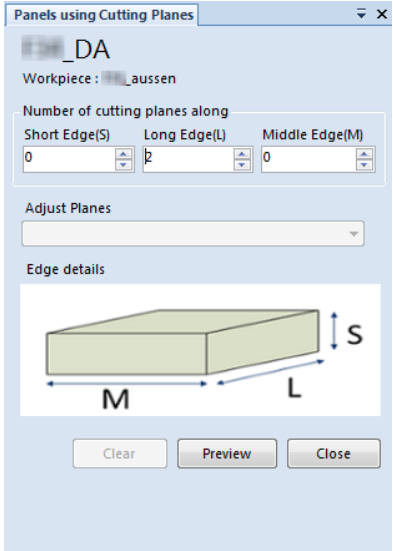
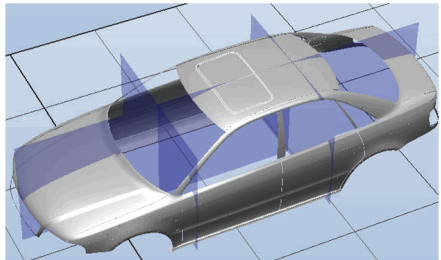
Shape Panel - Cutting planes

The shape panel cutting planes option allows you to divide a Panel along a number of cutting planes which intersect the parts along each axis.

To cut planes:

Step	Action	Information
1	Select the panel for which you want to cut the planes from the browser tree.	

Continues on next page

Step	Action	Information
2	Right click on the panel and select Shape Panel > Cutting Planes . The Panels using Cutting Planes window is displayed.	 <p>xx1600001464</p>
3	Type the number of cutting planes in Short Edge, Long Edge, and Middle Edge fields.	
4	Click Preview to view a preview of the cutting planes on the Panel.	 <p>xx1100000834</p>
5	Click Apply The parts in the panel are divided along the cutting planes and the parts within each plane are identified as a Panel.	<p>The new panels are listed in the Panel Browser tree below the corresponding workpiece.</p>

Dividing a workpiece during importing, breaks it into smaller parts along the natural gaps on the surface. Hence it may not always identify one half of the car body by selecting parts. In this scenario the functionality of being able to shape an existing panel helps in identifying different panels along different sections uniquely.

You can customize the cutting planes' position using RobotStudio options *Freehand Move* or *Rotate*.

4 Painting PowerPac

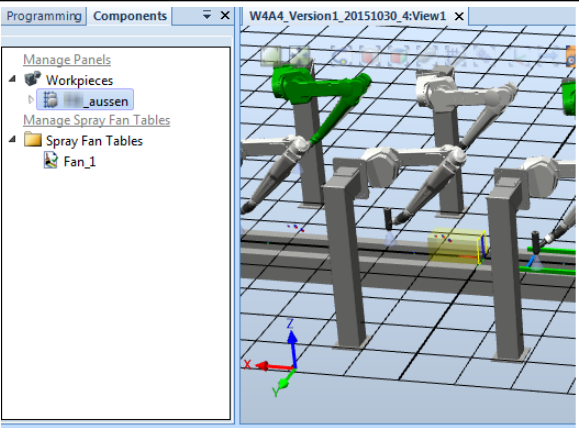
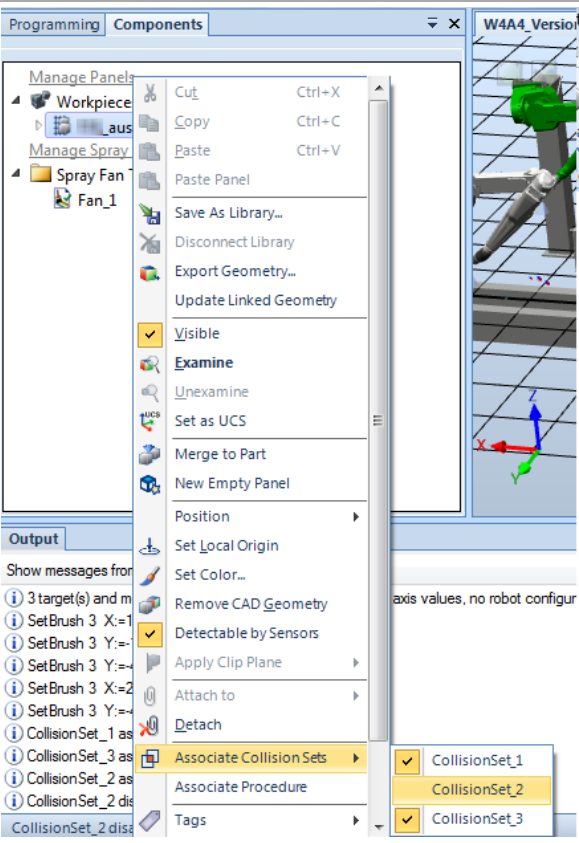
4.3 Manage Workpiece

Continued


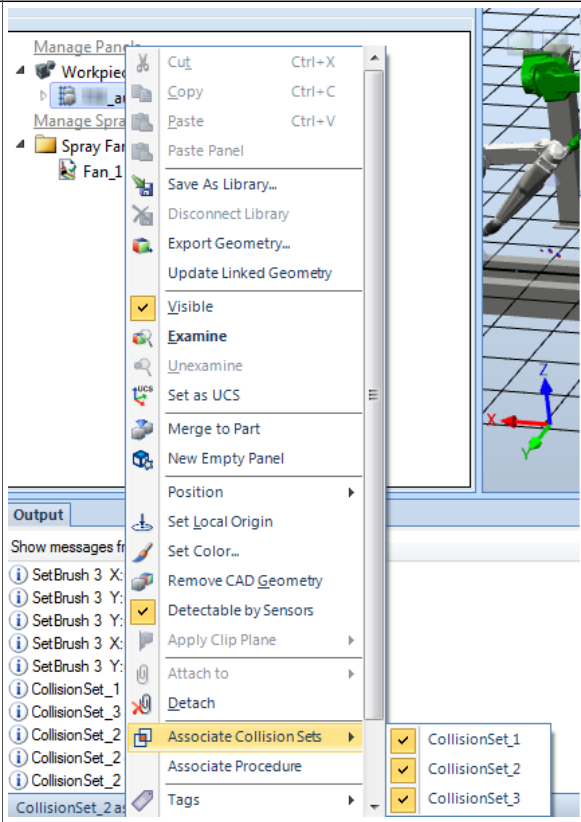
Associate collision sets with workpiece

Use the following procedure to associate collision sets with workpiece:

To associate collision sets with workpiece:

Step	Action	Description
1	Select the required workpiece for associating the collision set.	 <p>xx1600001586</p>
2	Right-click the selected workpiece, select Associate Collision Sets and then click the required CollisionSet.	 <p>xx1600001588</p>

Continues on next page

Step	Action	Description
3	<p>A check mark appears near the selected collision set and the collision set is associated with the workpiece.</p> <p> Note</p> <p>To separate the collision set from the workpiece click on the the selected collision set again.</p>	 <p>xx1600001587</p>

Continues on next page

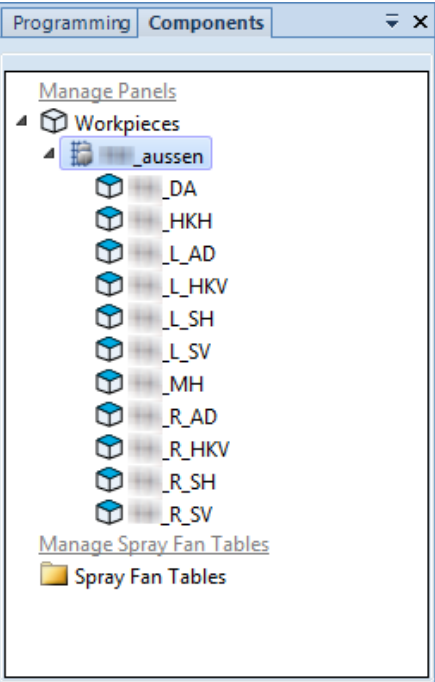
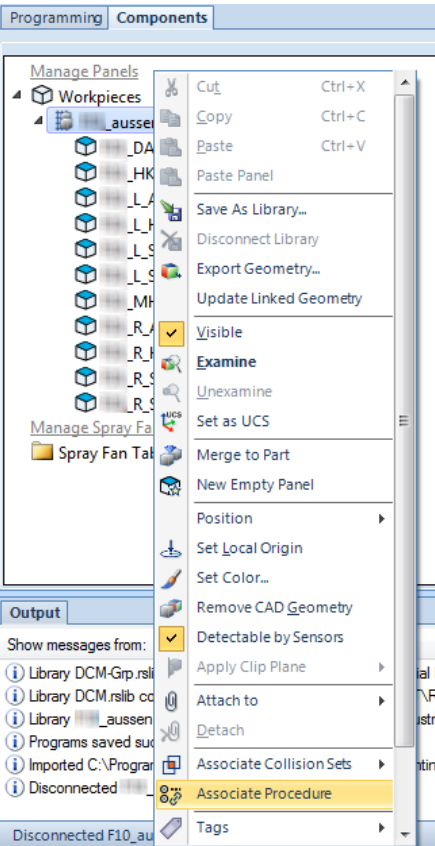
4 Painting PowerPac

4.3 Manage Workpiece

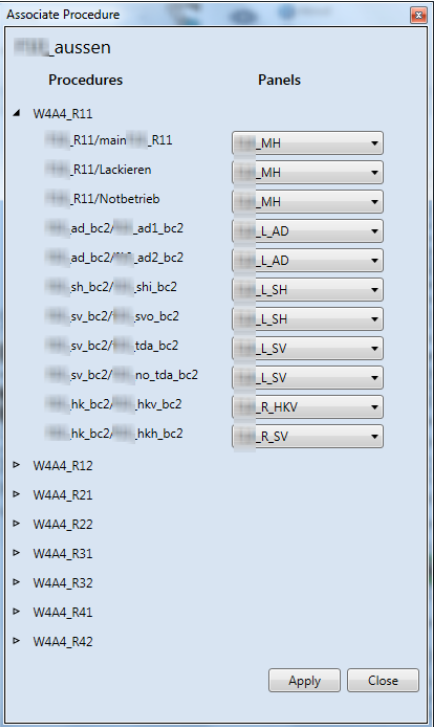
Continued

Associate procedure and workpiece

To associate procedure and workpiece:

Step	Action	Description
1	Select the required workpiece for associating the procedure.	 <p>xx1600001590</p>
2	Right-click the selected workpiece and then click Associate procedure . The Associate Procedure dialog opens.	 <p>xx1600001591</p>

Continues on next page

Step	Action	Description
3	From the listed procedures, select the panels to associate.	 <p>xx1600001592</p>
4	Click Apply . The workpiece is associated with the procedure. This association information is used in the <i>Show/Hide</i> function.	



Note

After associating procedures with the corresponding panels of the workpiece, save this information as a library file `[$WorkpieceName].rslib` for the further use on the shop floor.

4 Painting PowerPac

4.4.1 Overview

4.4 Simulation

4.4.1 Overview

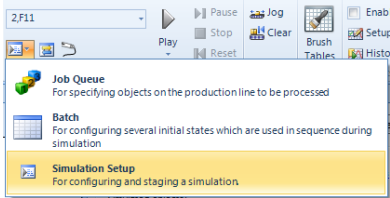
Simulation

Painting PowerPac offers a number of options to simulate and run a paint cell with multiple robots including conveyor tracking.

4.4.2 Executing a simulation

Procedure

Use the following procedure to execute a simulation:

Step	Action	Description
1	In the Simulation Control group select a program from the list.	The list displays the programs from all the paint controllers in the RobotStudio station.
2	Click Play . The program is appended to the controllers, conveyor is reset, and the simulation starts.	<p>The programs are executed similar to job queue. For more details, see Job Queue on page 66.</p> <p>The programs are appended to the controllers if the simulation entry point is MAIN. This is defined set under Simulation Setup in the Simulation Control group.</p>  <p>xx1600001668</p> <p>You can tune the behavior of the simulation using File > Options > Painting > Simulation.</p>

4 Painting PowerPac

4.4.3 Job Queue

4.4.3 Job Queue

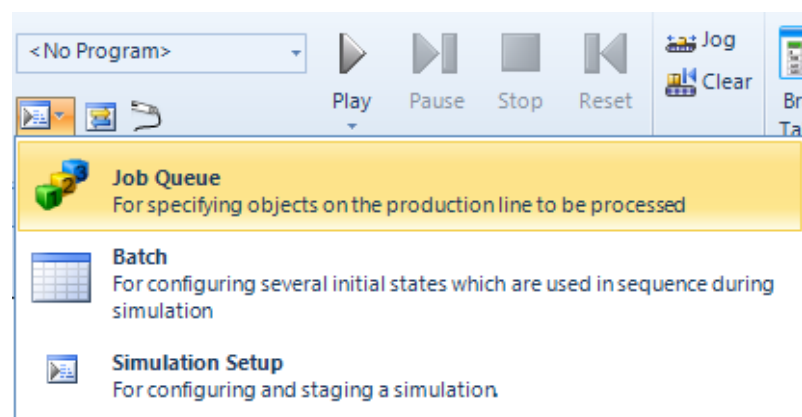
Overview

The Job Queue functionality allows to create a sequence of programs for execution.

The following are the pre-requisites for using the Job Queue:

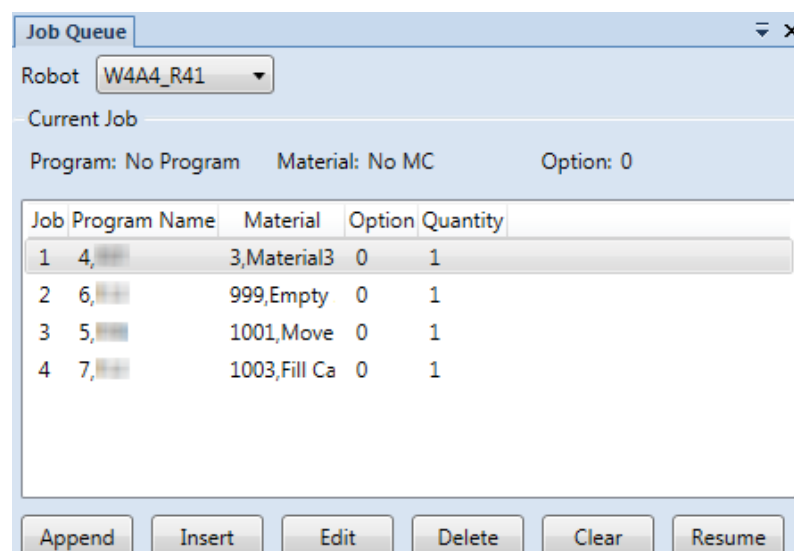
- Programs must be saved under $\$<\text{Systemname}>/\text{HOME}/\text{programs}$ folder.
- The mapping files, *program.map* and *material.map* files must be prepared. The files can be located under *System/HOME/alias* folder. For more details, see [Distribute programs on page 83](#).

Usage



xx1600001465

To access Job Queue, in the **Simulation Control** group, click **Configure > Job Queue**. The **Job Queue** window is displayed. This window displays the jobs in the Queue and the currently executing job.



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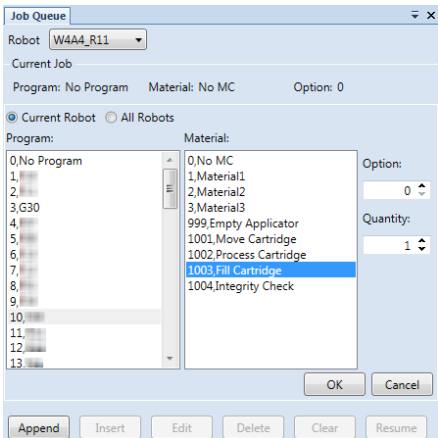

The following table describes the options in the **Job Queue** window.

Option	Description
Append	To append a job to the controller/controllers.
Insert	To Insert a job before the selected job.
Edit	To edit a selected job.
Delete	To delete a selected job.
Clear	To delete all the jobs in the selected controller.
Inhibit/Resume	When running the job in Production mode, you can Inhibit (pause) and Resume the production.

Appending a job

You can append a job to the job queue for the selected robot or for all the robots the station.

To append a job:

Step	Action	Description
1	Click Append . The Job Queue - Append window is displayed	 xx1600001479
2	Select Current Robot or All Robots as required.	
3	Select a program from the Program list, and material from the Material list.	 Note The Quantity option defines the number of times the program must be executed.
4	Click OK The selected job is added to the job queue.	
	Click Play . The simulation starts and programs are executed in sequence .	<p>To execute programs through job queue the simulation entry point is MAIN. This is defined set under Simulation Setup.</p> <p>You can tune the behavior of the simulation using File >.....</p>

Continues on next page

4 Painting PowerPac

4.4.3 Job Queue

Continued

Simulating the production

After appending jobs to the queue, you can view a simulation of the production by clicking the **Play** button from Graphics window or from the Simulation tab in RobotStudio. To start the production the Entry point must be in the `main` module.

If you open the Job Queue window when no simulation is running, then the entry point for each controller is set to their corresponding main procedures.

Inhibiting and resuming production

You can pause and resume the production at any point. To pause a production, click **Inhibit**. To resume the production, click **Resume**.

When a program is paused during execution, it completes the currently executing task and then pauses. However, the simulation status does not change to *Stop* and the controller remains in the *Start* state. When resumed, the production continues as normal.



Note

Clicking **Inhibit** or **Resume** does not affect the execution of high priority jobs such as *HomePos*.



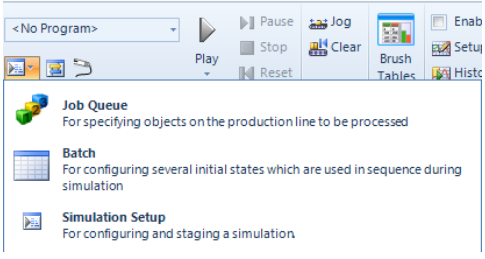
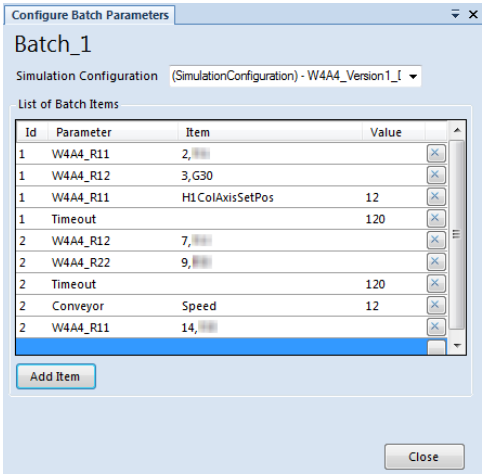
Tip

- Sometimes jobs might not be appended to the controller because controller might give Socket error, Try to Close and Re-open the Job Queue window and try again.
- If you are not able to append jobs to the controller because of any reason, restart the controller and then try again.

4.4.4 Batch simulation

Running a batch simulation

Batch simulation is used to run simulation repeatedly with different initial states or scenarios for each simulation instance. This saves time by automating the simulation scenarios.

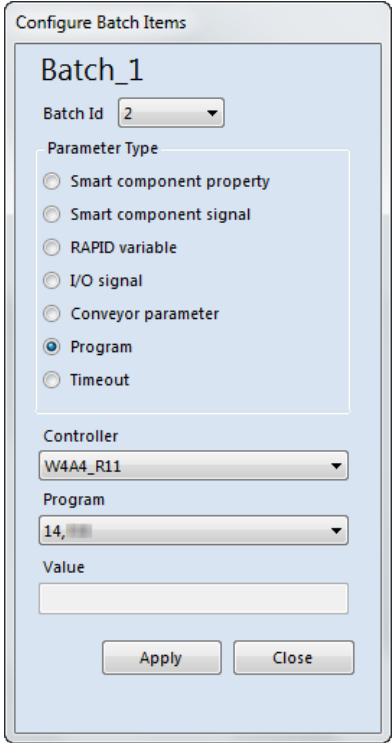
Step	Action	Image
1	In the Simulation Control group click on the Configure button. The context menu is displayed.	 xx1600001484
2	Click Batch . The Batch ribbon tab is displayed with the required options.	
3	In the Manage Batch group click New Batch button. A new batch is created under Manage Batches in the Batch window.	
4	Select the newly created batch.	
5	Right click and select Edit . The Configure Batch Parameters window is displayed.	 xx1600001485

Continues on next page

4 Painting PowerPac

4.4.4 Batch simulation

Continued

Step	Action	Image
6	Click the Add Item button. The Configure Batch Items window is displayed.	 <p>xx1600001485</p>
7	Select a parameter from the Parameter Type section. The corresponding options are displayed below it. Select the options according to your requirement.	
8	Once the required options are configured click Apply . The item is added to the List of Batch Items section.	
9	Continue adding more items for the selected Batch ID.	
10	Once you finish adding all items for a Batch click Close . The Configure Batch Items window is closed. The configured items for the selected batch ID is available in the List of Batch Items section. To add more items under a new Batch ID, click the Add Item button and repeat the previous steps.	
11	Once all the items are added click Close in the Configure Batch Parameters window.	
12	In the Batch ribbon, Batch group, select the required batch from the Select Batch list.	

Continues on next page

Step	Action	Image
13	Click the Execute button. The simulation is executed for each Batch ID sequentially.	

4.4.5 Spray fan

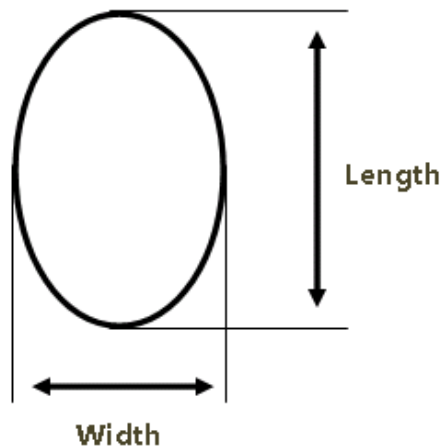
Overview

Spray Fan allows you to set the brush properties used by Painting PowerPac. These Brush properties are not used by the robot controller directly, instead it is used by Painting PowerPac to identify PaintStrokes.

Creating a Paint program requires a Spray Fan specification to be defined in the station. For each brush number, the Spray Fan specification has the following information:

- **Width** *in mm*
- **Length** *in mm*
- **Spray Distance** *in mm*
- **Color**

The **Width** and **Length** information is used while creating/identifying paint strokes. The **Color** information in a Brush number is shown on the path. The **Width** and **Length** represent the pattern of the spray for the corresponding Brush number. For example, a value of 0 for **Width** and **Length** indicates that the corresponding brush number is used to Turn-Off the paint. This information is used when loading the existing Paint programs. It is important to create the appropriate Spray Fan specification such that the PaintStrokes are identified correctly.

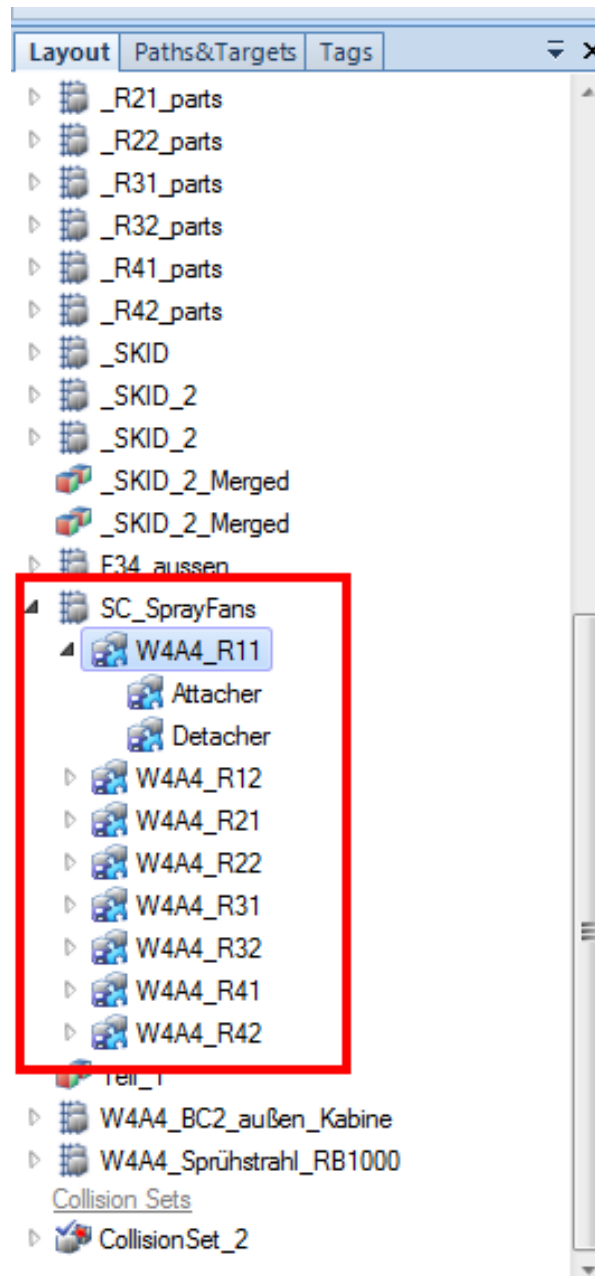


xx1100000842

When you open a painting station or when you open painting PowerPac the smart components of Spray Fans are automatically created. You can access these smart

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component of Spray fans from Home tab > Layout browser tree as shown in the following figure.



xx1600001473

Creating a Spray Fan table

You can create a new Spray Fan Table.

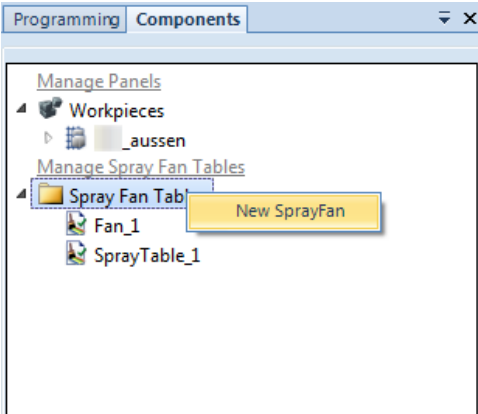
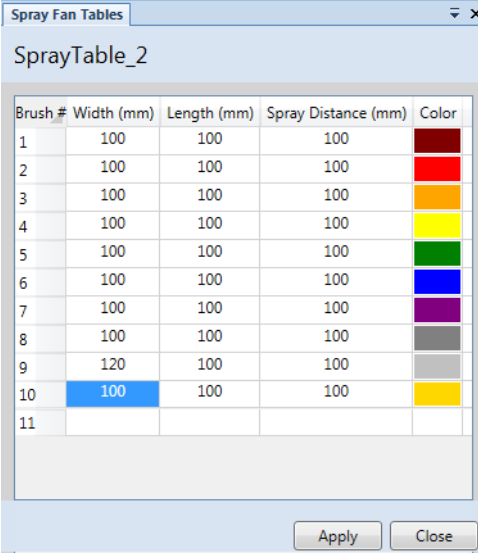
Continues on next page

4 Painting PowerPac

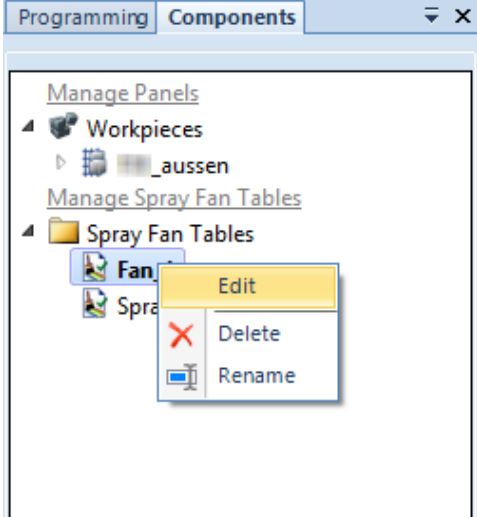
4.4.5 Spray fan

Continued

To create a Spray Fan table:

	Action	Information
1	<p>In the Components programming tree right click on the Spray Fan Table folder.</p> <p>The New Spray Fan option is displayed.</p>	 <p>xx1600001469</p>
2	<p>Select the New Spray Fan option.</p> <p>The new spray Fan is added to the Spray Fan Table folder with the default options and Spray Fan Tables window is displayed.</p>	<p>The new spray fan table is added as a station document. You can access this document from Home Tab > windows document window.</p>
3	<p>Edit the Width, Length, or Spray Distance parameters for a particular brush number according to your requirement.</p>	 <p>xx1600001471</p>
4	<p>Click Apply.</p> <p>The changes are saved.</p>	

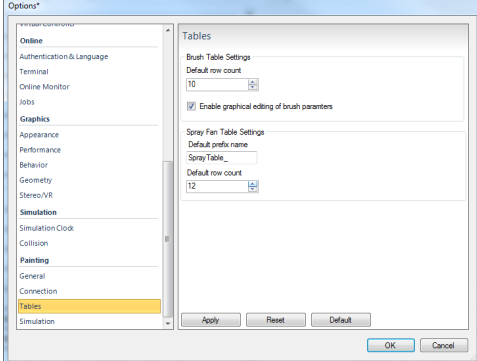
Continues on next page

	Action	Information
5	Right click on the Spray Fan Table folder and select the Edit option.	<p>To edit the spray fan table.</p>  <p>xx1600001470</p>

Configuring the default properties of Spray Fan Table

You can configure the default properties of Spray Fan table.

To configure the default properties of spray fan table:

Step	Action	Information
1	In the File tab click Options . The Options window is displayed.	
2	Navigate to the Painting section and select Tables . The Tables window is displayed.	 <p>xx1600001472</p>
3	Navigate go the Spray Fan Table Settings section and edit the Default prefix name and Default row count according to your requirement.	
4	Click Apply . The changes are saved.	
5	Click OK .	

Once the settings are saved, when you create a new Spray Fan Table the settings saved here are applied to the new table.

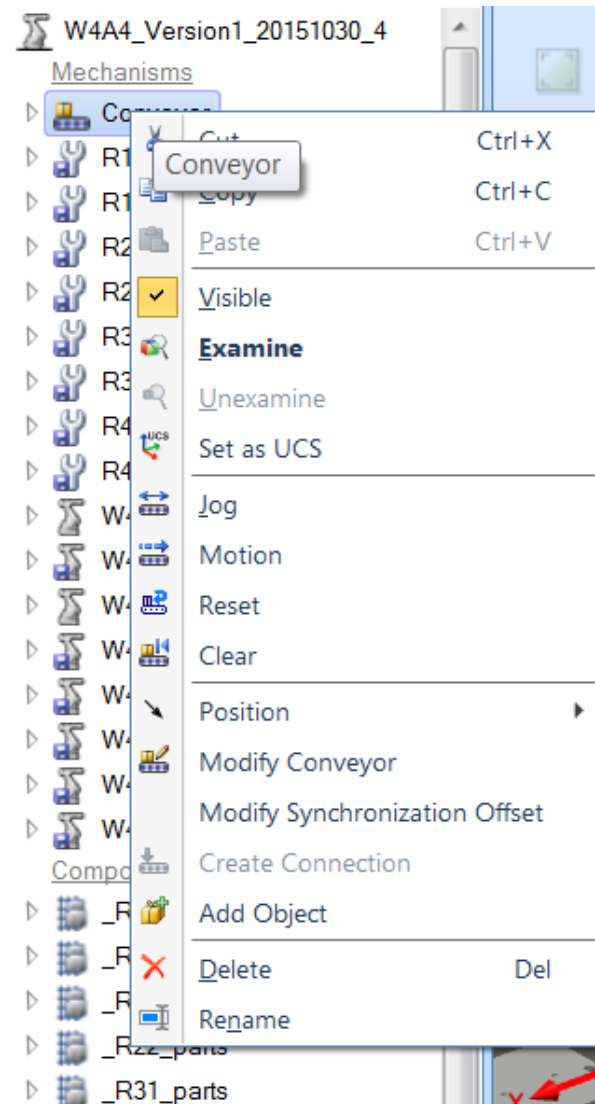
4.4.6 TCP trace

For information regarding TCP trace, refer *Operating manual - RobotStudio*.

4.4.7 Conveyor tracking

Synchronization Offset

Shopfloor simulation Painting PowerPac extends the conveyor tracking feature in RobotStudio by providing the **Modify Synchronization Offset** function. This feature brings the conveyor simulation more closer to the actual paint lines. The **Modify Synchronization Offset** function is accessible from the context menu of the Conveyor:



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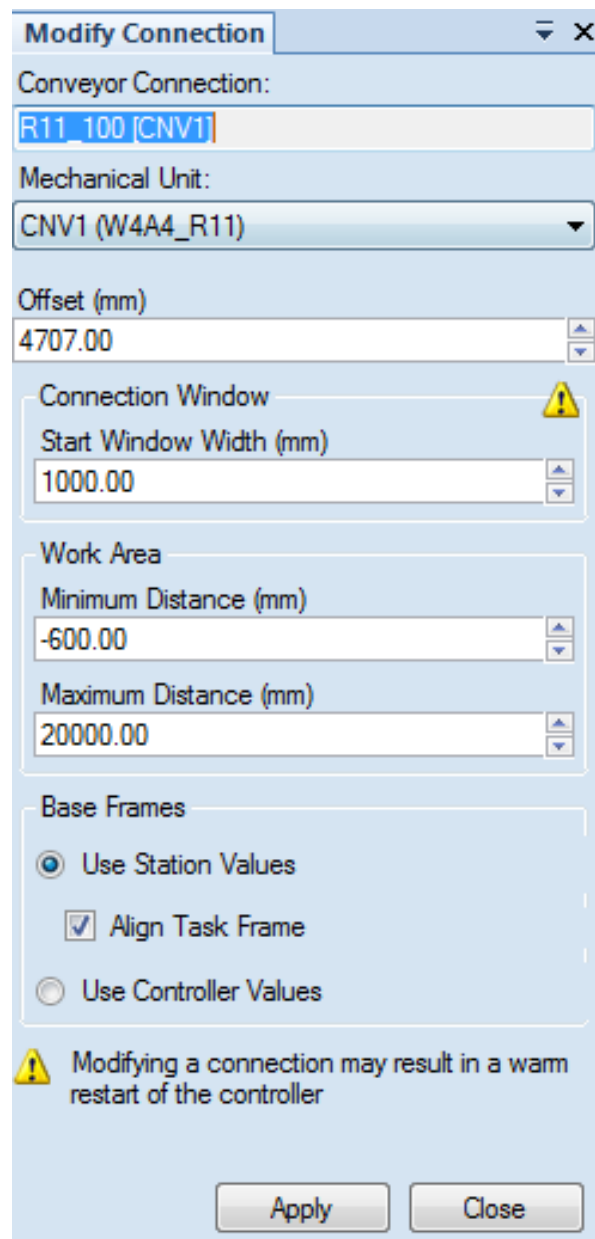
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4 Painting PowerPac

4.4.7 Conveyor tracking

Continued

Usually the sync-signal is set by the **Offset** parameter in the **Modify Connection** window. It gives the distance from the conveyor start to the robot's base frame:



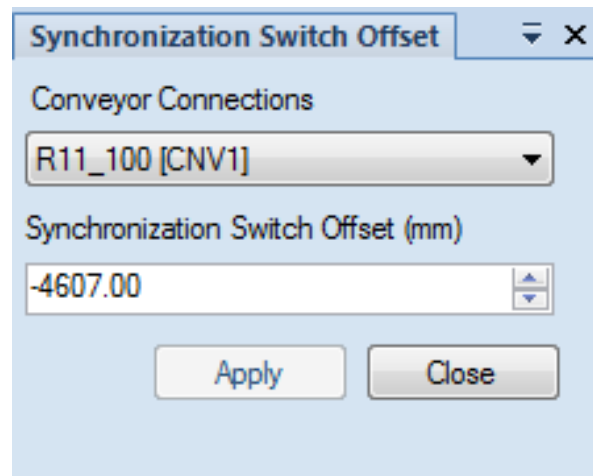
The screenshot shows the 'Modify Connection' dialog box with the following settings:

- Conveyor Connection:** R11_100 [CNV1]
- Mechanical Unit:** CNV1 (W4A4_R11)
- Offset (mm):** 4707.00
- Connection Window:** Start Window Width (mm) is 1000.00. A yellow warning icon is present.
- Work Area:** Minimum Distance (mm) is -600.00, Maximum Distance (mm) is 20000.00.
- Base Frames:** ☒ Use Station Values, ☒ Align Task Frame, ☐ Use Controller Values.
- A yellow warning icon and text: 'Modifying a connection may result in a warm restart of the controller'.
- Buttons: 'Apply' and 'Close'.

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If the sync-signal has to be set apart from the offset value, you can adjust the sync-signal separately from the **Synchronization Switch Offset** window.



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Note

The synchronization offset value should be according to the formula
 $\text{Offset} + \text{Sync-Signal Offset} > 0$.

4 Painting PowerPac

4.5.1 Overview

4.5 Reporting functions

4.5.1 Overview

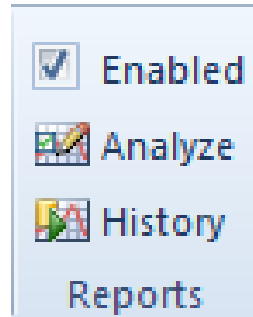
Reporting function

This function allows you to record information during simulation. The data can be analyzed to calculate the consumption details and analyze the error logs.

4.5.2 Generate report

Generating a report

The options available in the **Reports** group allows you to manage the reporting functions.



xx1600001468

Use the following procedure to generate a report:

Step	Action	Description
1	In the Reports group, select the Enabled option. The reporting functionality is enabled.	
2	In the Simulation Control group, click Play and run the simulation. The events are recorded with the simulation.	
3	In the Reports group, click Analyze . Opens the latest available report from the history.	
4	Click History . The History window is displayed. The History window displays the report of all the simulations that are run after you selected the Enabled option.	<p>The History window is displayed with a title bar 'History' and a close button. Below the title bar is a 'View by Today' dropdown. The main area contains a table with three columns: 'Name', 'Duration', and 'Size'. The table lists several simulation runs, including 'Batch_1_1_21-10-16 3:42:14 PM' and others with their respective durations and sizes.</p>

xx1600001671

4 Painting PowerPac

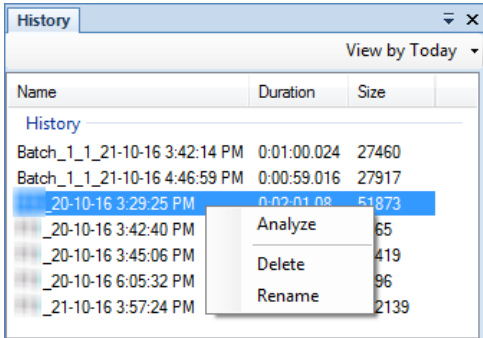
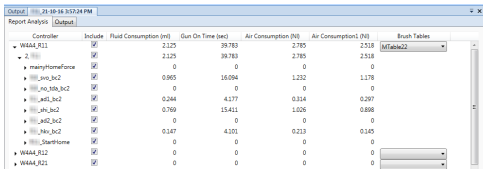
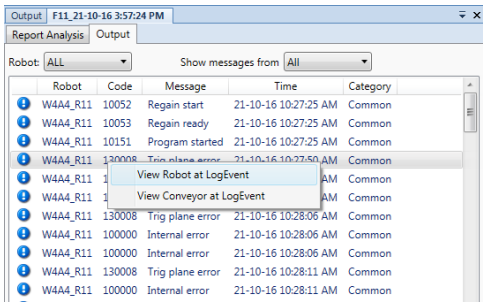
4.5.3 Analyze report

4.5.3 Analyze report

Analyzing a report

Information from each simulation is captured in the reports and is available for further investigation. The report analysis feature provides information about paint consumption, gun on time, and other parameters. It also captures the simulation event logs such as collision, warnings, and so on, with an option to view the robot or conveyor at the position where event occurred. This helps in better problem solving.

To analyze and view a report:

Step	Action	Description
1	Select a report from the History window and right-click. The context menu is displayed.	 xx1600001672
2	Select Analyze . The analysis of the selected report is done and the report is displayed at the bottom of the screen.	The report has two sections, paint consumption and output log.
3	Paint Consumption: This section displays the details of programs that are executed in the simulation instance. Select a brush table for robot and get an estimate for the consumption and the gun on time.	 xx1600001669
4	Output logs: This section lists the event logs for the simulation instance. Examples are Controller messages, collision messages, and so on. Right-click on an event log (for example, collision) and select an option to view the robot and conveyor at the log event position. This moves the robot and conveyor to the closest position when the log was reported. This helps to solve issues quickly.	 xx1600001670

4.6 Distribute programs

4.6.1 Overview

Distribute programs

Programs in Painting PowerPac (RAPID modules, Brush Tables, and so on) can be copied or mirrored to other robots in the RobotStudio station and transferred to the real robots on the paint line. The following sections describe the various options and settings for this activity.

4 Painting PowerPac

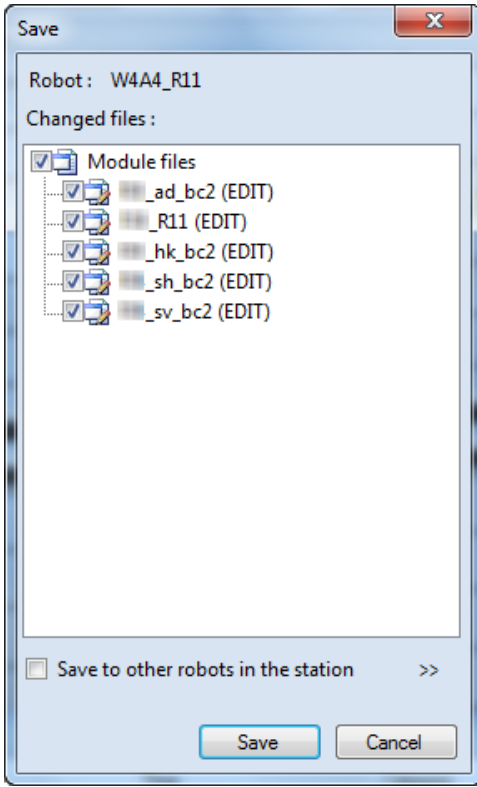


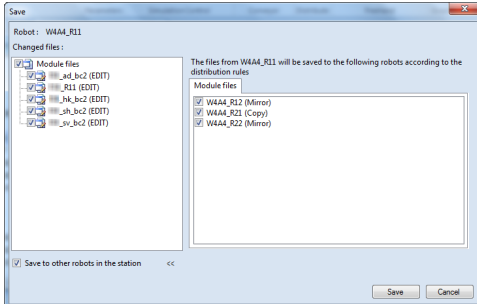
4.6.2 Save programs

4.6.2 Save programs

Saving a program

The save feature allows you to save changes in a program for a selected robot. The changes to the program are saved in the system folder (<systemname> // HOME / Programs). The Save button is enabled if a program has been edited in RobotStudio.

Use the following procedure to save the changes to a program:

Step	Action	Description
1	Click Save from the Program group on the Painting ribbon tab. The Save window is displayed. The changed files (modules, index, and mapping files) are listed.	 xx1500002161  Note The EDIT label next to a module denotes that the file is changed.
2	The changes for a particular robot can be copied or mirrored to other robots based on defined rules. For this select the Save to other robots in the station checkbox and click >>. The window is expanded as shown in the figure.  Note This step is optional. For more information about configuring distribution rules, see Distribution rules on page 89 .	 xx1500002162

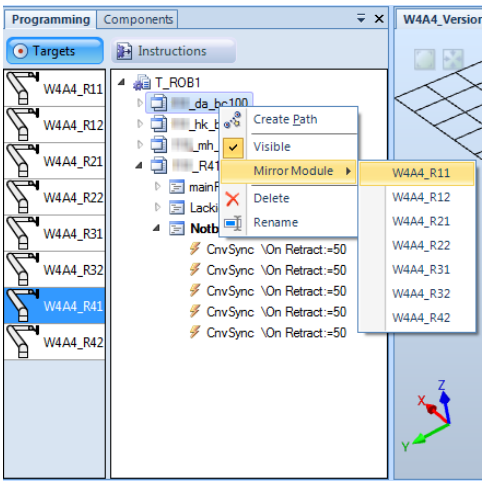
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Step	Action	Description
3	Click Save . The files are saved in the corresponding system folders for each robot.	

Mirror modules

You can mirror a module between two virtual robots from the Programming Browser tree.

To mirror a module:

Step	Action	Description
1	In the Programming browser tree select the module for which you need to create a mirror.	
2	Right click on the selected module. The context menu is displayed.	 <p>xx1600001483</p>
3	Select Mirror Module > <system name> . The mirror module is created in the system you selected.	

4 Painting PowerPac

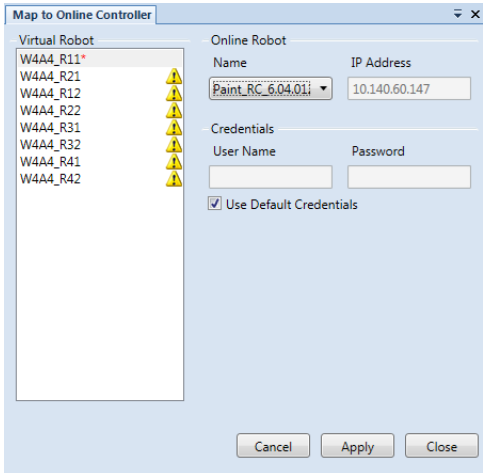


4.6.3 Manage connections

4.6.3 Manage connections

Map a virtual and real robot

To load paint programs from the robots on the shop floor into RobotStudio, there must be a mapping defined between the virtual robot in the RobotStudio station and the real robot on the shop floor.

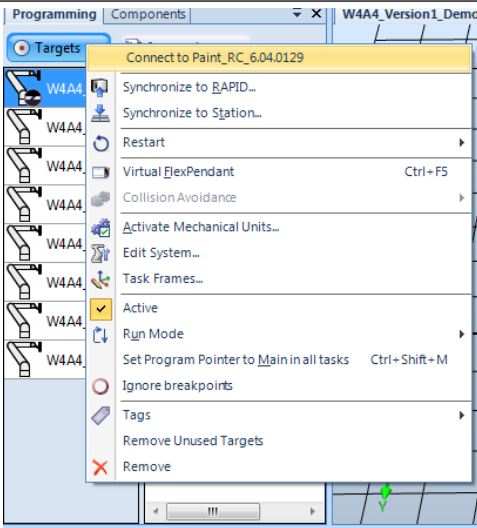
The following steps describe the mapping procedure:

Step	Action	Description/Image
1	In the Settings group, select Configure > Map to Online Controller . The Map to Online Controller window is displayed.	 xx1600001480  Note Ensure that the PC is on the same network as the robot controller and the PC-Interface option is selected on the robot controller.
2	Select the virtual robot.	
3	Select the real robot from the Name list. The IP Address of the selected real robot is automatically loaded in the IP Address field.	
4	You can specify the username and password configured in the real controller for connecting to the robot, else the default credential is used.  Note To configure the default credentials navigate to the File > Options > Painting > Connection > Default Credentials section.	
5	Click Apply . The selected virtual robot is mapped to the selected real robot.	

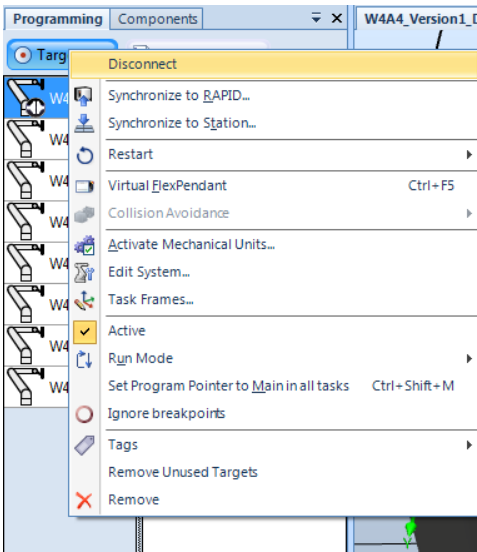
Continues on next page

Connect and disconnect

To make a connection between a virtual robot and real robot:

Step	Action	Description/Image
1	Right-click on the selected robot from the programming tree. The context menu is displayed.	 <p>xx1600001481</p>
2	Select the Connect to <real robot name> option. The mapped robot is connected to the real robot. Once connected the icon near the virtual robot is updated.	

To disconnect the connection between a virtual robot and real robot:

Step	Action	Description/Image
1	In the Programming browser tree select the virtual robot for which you need to disconnect .	
2	Right-click on the connected virtual robot. The context menu is displayed.	 <p>xx1600001482</p>

Continues on next page

4 Painting PowerPac

4.6.3 Manage connections

Continued

Step	Action	Description/Image
3	Select the Disconnect option. The virtual robot is disconnected from the real robot.	

4.6.4 Distribution rules

Distribution rules

Overview

A painting booth usually contains several robots. Because of the axis-symmetrical design of the workpiece, identical or mirrored (with movement programs) programs normally exist on several robots. The changes can be either copied or mirrored depending on the robot and the file type. Program modules, Brush Tables, and Alias file types are supported. This is configured as `distributionrules.xml` using which it is possible to make changes in a robot and automatically distribute the changes to other robots.

Rules configuration

The following are the two types of rules defined in the `distributionrules.xml` file:

- Copy
- Mirror

The rules can be configured for Program files, Brush Tables, and Alias files. For program files, both copy and mirror can be configured and for brush file and alias file only copy can be configured.

A sample configuration is shown below:

```
<?xml version="1.0"?>
<DistributionRules>
  <Rule Name="Cell1_BrushFiles">
    <Scope>BrushFiles</Scope>
    <CopyAction>
      <PartOf>{22c6a77e-2bec-4735-be36-823ad687d1f7}</PartOf>
      <PartOf>{7437588d-f68e-4064-b46f-301c4e914832}</PartOf>
    </CopyAction>
  </Rule>
  <Rule Name="Cell1_ProgramFiles">
    <Scope>ProgramFiles</Scope>
    <MirrorAction>
      <PartOf>{22c6a77e-2bec-4735-be36-823ad687d1f7}</PartOf>
      <PartOf>{73cd28c7-0aee-45b8-ba72-f057fb662a61}</PartOf>
    </MirrorAction>
  </Rule>
  <Rule Name="Cell1_AliasFiles">
    <Scope>AliasFiles</Scope>
    <CopyAction>
      <PartOf>{22c6a77e-2bec-4735-be36-823ad687d1f7}</PartOf>
      <PartOf>{7437588d-f68e-4064-b46f-301c4e914832}</PartOf>
    </CopyAction>
  </Rule>
  <Rule Name="Cell1_IndexFiles">
    <Scope>IndexFiles</Scope>
    <CopyAction>
      <PartOf>{22c6a77e-2bec-4735-be36-823ad687d1f7}</PartOf>
```

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4 Painting PowerPac

4.6.4 Distribution rules

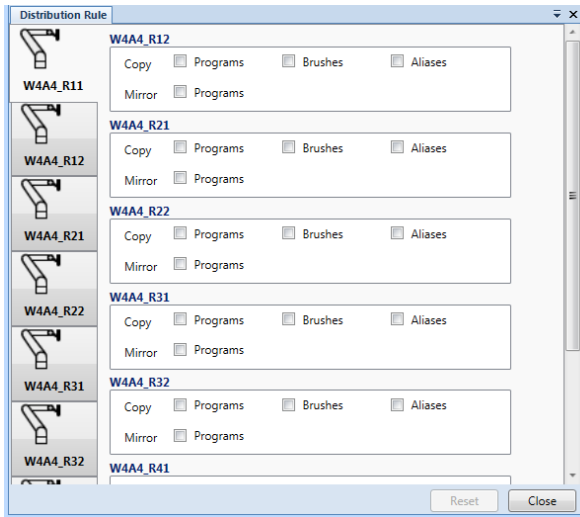
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```
<PartOf>{7437588d-f68e-4064-b46f-301c4e914832}</PartOf>
</CopyAction>
</Rule>
</DistributionRules>
```


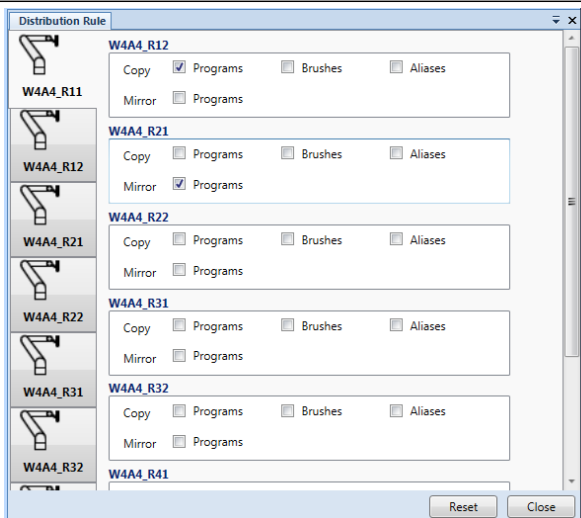
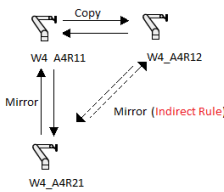
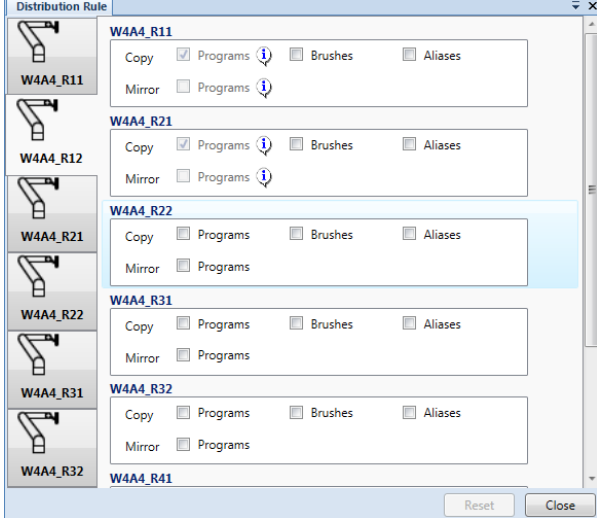


The following table provides a description of the elements available in the distribution rules file.

Element	Description
Rule Name	Defines the name of the rule.
Scope	Defines the rules for each type of file (brush tables, modules, mapping files, index files).
Action	Defines the type of action. Action can be copy or mirror.
PartOf	Defines the copy and mirror relation between two virtual robots. These robots are identified by their unique IDs.

Use the following procedure to configure the distribution rules.

Step	Action	Description
1	Click Distribution Rule from the Settings group on the Painting ribbon tab. The Distribution Rule window is displayed.	 xx1700001819 Each tab display the controller present in the station except itself. The distribution rule options for each controller is displayed inside each tab.
2	Click on a tab to select a controller for which the rules need to be configured.	

Continues on next page

Step	Action	Description
3	<p>Choose the destination controllers and select the rules to be configured.</p> <p>The rules are instantaneously configured on the selected controllers.</p> <p> Note</p> <p>Click Reset to change the rules to the previous state.</p>	 <p>xx1700001820</p> <p>Following are the rules configured in this example:</p> <ul style="list-style-type: none"> • W4A4_R11 -> W4A4_R12(Copy) • W4A4_R11 -> W4A4_R21(Mirror)
4	<p>The rules are propagated to other controllers as illustrated in the following image.</p>  <p>xx1700001909</p>	 <p>xx1700001908</p> <p> Note</p> <p>The  icon near a rule indicates that rules are applied indirectly.</p>

4 Painting PowerPac

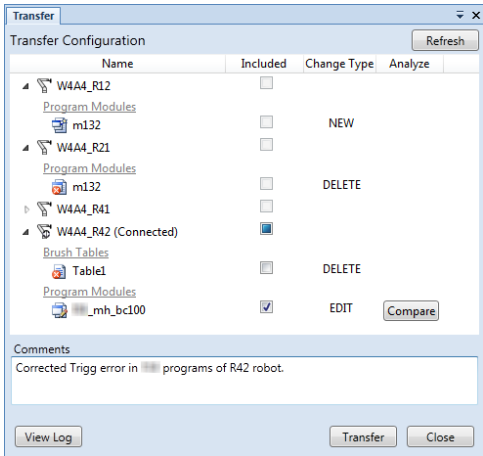
4.6.5 Transfer programs

4.6.5 Transfer programs

Transfer

The transfer feature allows you to transfer the files from the virtual robot to the connected real robot.

To transfer the files:

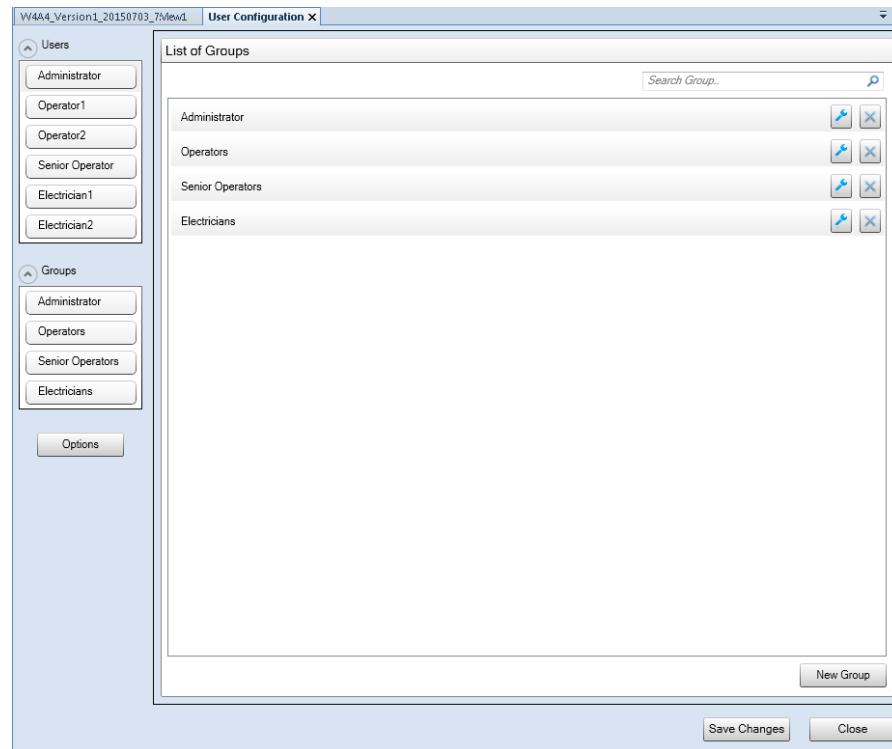
Step	Action	Description
1	Click Transfer in the Program group. The Transfer window is displayed. The changed module files, brush table, index files, and alias files for all the robots are listed in this window for transfer.	 xx1500002163 The Change Type column displays the type of file change. DELETE denotes a deleted file, EDIT denotes a changed file, and NEW denotes a new file. The Compare button allows you to compare the changes in a file.
2	Select the files to be transferred.	
3	Write a brief description regarding the transfer in the Comments section.	Change logs Painting PowerPac allows you to type in comments in a log file for the files that are transferred from a PC to the robots on the paint shop floor. Information like, file name, user name and timestamp are recorded by default. These information can be used for further reference.
4	Click the Transfer button. The selected files are transferred. The files are transferred to the connected real robot.	

4.7 Login and access control

4.7.1 Overview

User authentication system

The **User Configuration** feature is used to manage the users and groups. To access User Configuration, in the **Settings** group, click **Configure** and then click **Users and Groups**. The **User Configuration** window is displayed.



xx1500002468

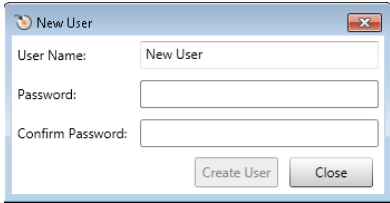
4 Painting PowerPac

4.7.2 Create user

4.7.2 Create user

Creating a user

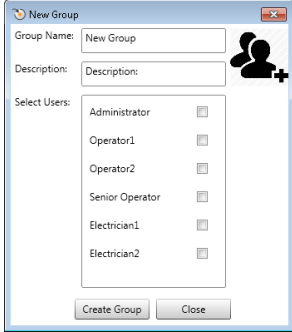

To create a user:

Step	Action	Description
1	Click Users drop down The List of Users window is displayed. It displays all the current users.	
2	Click New User . The New User window is displayed.	 xx1500002467
3	Type a name for the user in the User Name field.	
4	Type a password in the Password field.	
5	Retype the password in the Confirm Password field.	
6	Click Create User . The new user is created.	

4.7.3 Create group

Creating a group

To create a group:

Step	Action	Description
1	Click Groups drop down. The List of Groups window is displayed. It displays all the current groups.	
2	Click New Group . The New Group window is displayed.	 xx1500002466
3	Type a name for the group in the Group Name field.	
4	Type a description for the group in the Description field.	
5	The Select Users section displays all the available users. Select the users that need to be assigned to the new group from this list.	 Note You can add or remove users from a group using the Edit Users feature. For more details, see .
6	Click Create Group . The new group is created.	

4.7.4 Assign rights

Assigning rights to a user group

To assign rights to a group:

Group Details Administration

Group: **User Authentication X** Search Function

Rules

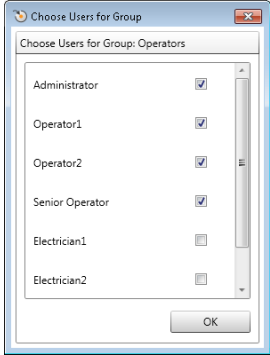
Rules: **Rule1** **Rule2** **Rule3** **Rule4** **Rule5** **Rule6** **Rule7** **Rule8** **Rule9** **Rule10** **Rule11** **Rule12** **Rule13** **Rule14** **Rule15** **Rule16** **Rule17** **Rule18** **Rule19** **Rule20** **Rule21** **Rule22** **Rule23** **Rule24** **Rule25** **Rule26** **Rule27** **Rule28** **Rule29** **Rule30** **Rule31** **Rule32** **Rule33** **Rule34** **Rule35** **Rule36** **Rule37** **Rule38** **Rule39** **Rule40** **Rule41** **Rule42** **Rule43** **Rule44** **Rule45** **Rule46** **Rule47** **Rule48** **Rule49** **Rule50** **Rule51** **Rule52** **Rule53** **Rule54** **Rule55** **Rule56** **Rule57** **Rule58** **Rule59** **Rule60** **Rule61** **Rule62** **Rule63** **Rule64** **Rule65** **Rule66** **Rule67** **Rule68** **Rule69** **Rule70** **Rule71** **Rule72** **Rule73** **Rule74** **Rule75** **Rule76** **Rule77** **Rule78** **Rule79** **Rule80** **Rule81** **Rule82** **Rule83** **Rule84** **Rule85** **Rule86** **Rule87** **Rule88** **Rule89** **Rule90** **Rule91** **Rule92** **Rule93** **Rule94** **Rule95** **Rule96** **Rule97** **Rule98** **Rule99** **Rule100** **Rule101** **Rule102** **Rule103** **Rule104** **Rule105** **Rule106** **Rule107** **Rule108** **Rule109** **Rule110** **Rule111** **Rule112** **Rule113** **Rule114** **Rule115** **Rule116** **Rule117** **Rule118** **Rule119** **Rule120** **Rule121** **Rule122** **Rule123** **Rule124** **Rule125** **Rule126** **Rule127** **Rule128** **Rule129** **Rule130** **Rule131** **Rule132** **Rule133** **Rule134** **Rule135** **Rule136** **Rule137** **Rule138** **Rule139** **Rule140** **Rule141** **Rule142** **Rule143** **Rule144** **Rule145** **Rule146** **Rule147** **Rule148** **Rule149** **Rule150** **Rule151** **Rule152** **Rule153** **Rule154** **Rule155** **Rule156** **Rule157** **Rule158** **Rule159** **Rule160** **Rule161** **Rule162** **Rule163** **Rule164** **Rule165** **Rule166** **Rule167** **Rule168** **Rule169** **Rule170** **Rule171** **Rule172** **Rule173** **Rule174** **Rule175** **Rule176** **Rule177** **Rule178** **Rule179** **Rule180** **Rule181** **Rule182** **Rule183** **Rule184** **Rule185** **Rule186** **Rule187** **Rule188** **Rule189** **Rule190** **Rule191** **Rule192** **Rule193** **Rule194** **Rule195** **Rule196** **Rule197** **Rule198** **Rule199** **Rule200** **Rule201** **Rule202** **Rule203** **Rule204** **Rule205** **Rule206** **Rule207** **Rule208** **Rule209** **Rule210** **Rule211** **Rule212** **Rule213** **Rule214** **Rule215** **Rule216** **Rule217** **Rule218** **Rule219** **Rule220** **Rule221** **Rule222** **Rule223** **Rule224** **Rule225** **Rule226** **Rule227** **Rule228** **Rule229** **Rule230** **Rule231** **Rule232** **Rule233** **Rule234** **Rule235** **Rule236** **Rule237** **Rule238** **Rule239** **Rule240** **Rule241** **Rule242** **Rule243** **Rule244** **Rule245** **Rule246** **Rule247** **Rule248** **Rule249** **Rule250** **Rule251** **Rule252** **Rule253** **Rule254** **Rule255** **Rule256** **Rule257** **Rule258** **Rule259** **Rule260** **Rule261** **Rule262** **Rule263** **Rule264** **Rule265** **Rule266** **Rule267** **Rule268** **Rule269** **Rule270** **Rule271** **Rule272** **Rule273** **Rule274** **Rule275** **Rule276** **Rule277** **Rule278** **Rule279** **Rule280** **Rule281** **Rule282** **Rule283** **Rule284** **Rule285** **Rule286** **Rule287** **Rule288** **Rule289** **Rule290** **Rule291** **Rule292** **Rule293** **Rule294** **Rule295** **Rule296** **Rule297** **Rule298** **Rule299** **Rule300** **Rule301** **Rule302** **Rule303** **Rule304** **Rule305** **Rule306** **Rule307** **Rule308** **Rule309** **Rule310** **Rule311** **Rule312** **Rule313** **Rule314** **Rule315** **Rule316** **Rule317** **Rule318** **Rule319** **Rule320** **Rule321** **Rule322** **Rule323** **Rule324** **Rule325** **Rule326** **Rule327** **Rule328** **Rule329** **Rule330** **Rule331** **Rule332** **Rule333** **Rule334** **Rule335** **Rule336** **Rule337** **Rule338** **Rule339** **Rule340** **Rule341** **Rule342** **Rule343** **Rule344** **Rule345** **Rule346** **Rule347** **Rule348** **Rule349** **Rule350** **Rule351** **Rule352** **Rule353** **Rule354** **Rule355** **Rule356** **Rule357** **Rule358** **Rule359** **Rule360** **Rule361** **Rule362** **Rule363** **Rule364** **Rule365** **Rule366** **Rule367** **Rule368** **Rule369** **Rule370** **Rule371** **Rule372** **Rule373** **Rule374** **Rule375** **Rule376** **Rule377** **Rule378** **Rule379** **Rule380** **Rule381** **Rule382** **Rule383** **Rule384** **Rule385** **Rule386** **Rule387** **Rule388** **Rule389** **Rule390** **Rule391**

4.7.5 Manage users

Managing users

You can add or remove users in a group:

To manage users in a group:

Step	Action	Description
1	Click Groups drop down and click on the group that you want to edit. The Group details for the selected group is displayed.	
2	Click Edit Users . The Choose Users for Group window is displayed.	 xx1500002465
3	Add or remove users according to your requirement.	
4	Click OK .	
5	Click Save Changes . The changes to the selected group are saved.	

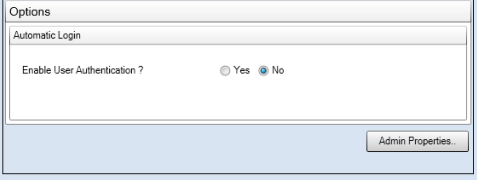
4 Painting PowerPac

4.7.6 Enable user authentication

4.7.6 Enable user authentication

Enabling user authentication

To enable user authentication:

Step	Action	Description
1	Click Options . The options window is displayed.	 xx1500002469
2	Select Yes in the Enable User Authentication field.	
3	Click Save Changes . The user authentication is enabled.	

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