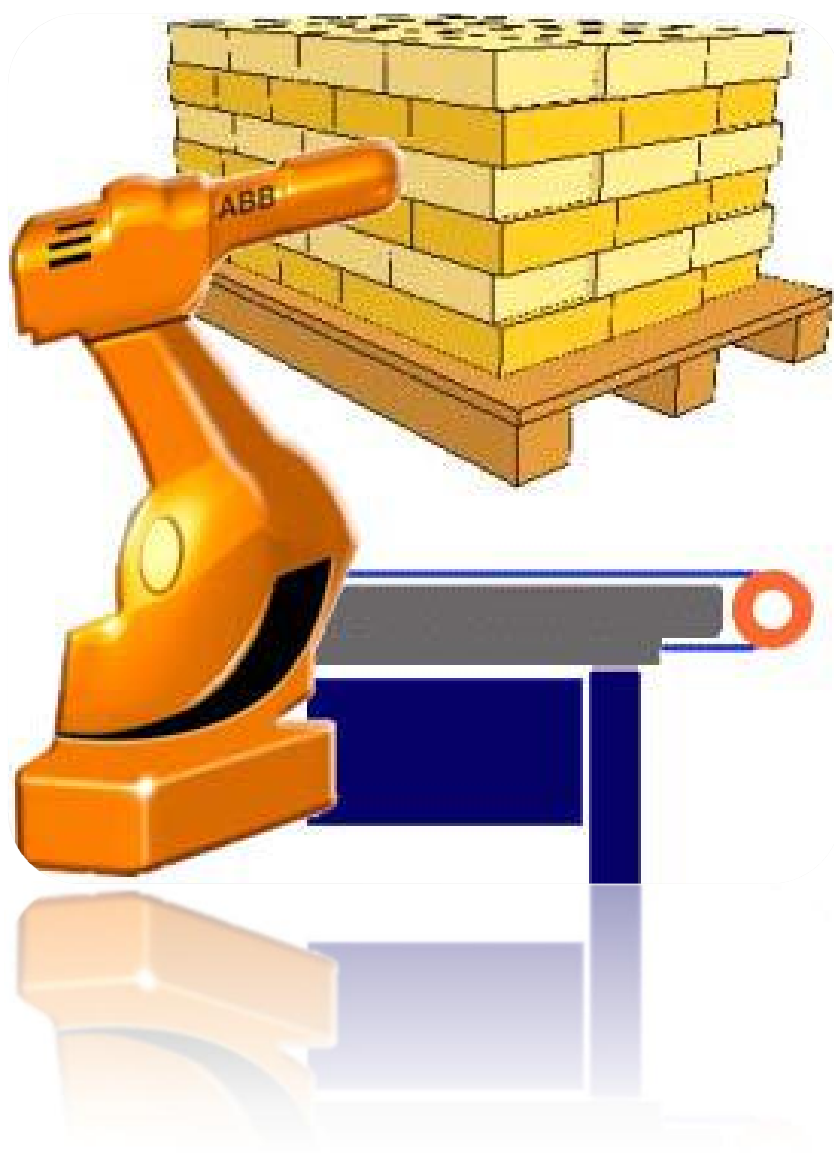# Operating manual
PalletWare

Power and productivity
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ABB

Operating Manual

PalletWare

3AEJ04PalletWare, Revision: 1.0

Overview

About this manual

This manual contains instructions for installing, configuring and running PalletWare application in an IRC5 controller.

Usage

This manual should be used during installation, commissioning, configuration of a PalletWare application. It describes PalletWare and includes step-by-step instructions on how to perform the tasks from here:

Who should read this manual?

This manual is intended for:

- System integrators
- ABB Service engineers
- Users of PalletWare

Prerequisites

The reader should be familiar with:

- industrial robots and their terminology
- the RAPID programming
- palletizing applications

Organization of chapters

The manual is organized in the following chapters:

Chapter	Contents
1. Welcome to PalletWare	Introduction to PalletWare. Description of the capabilities and limitations of PalletWare. A terminology list, including definitions of specific terms for this manual.
2. Getting started	A step-by-step procedure describing the work flow, from installing the hardware and software to setting up the robot for production.
3. Palletizing applications	Examples of how to use PalletWare for palletizing applications. A palletizing process description.
4. Navigate and handle PalletWare	How to navigate in PalletWare. Screens and other parts of the user interface are described in respect of their content and how they are accessed.
5. Operation and Run-time	How to operate PalletWare during production. Step-by-step procedures describing: ● How to create new jobs. ● How to execute production changeover

References

Reference	Document ID
Operator's Manual – RobotStudio Online	3HAC 18236-1
Operator's Manual – IRC5 with Flexpendant	3HAC 16590-1
Product Manual – IRC5	3HAC021785-1
Application Manual - Motion functions and events	3HAC 18152-1

Revisions

Revision	Description
1.0	First issue.

1 Welcome to PalletWare

1.1 What is PalletWare?

Overview

PalletWare is robot software running on the IRC5 controller for palletizing applications.

It is designed to minimizing learning and setup time. The modular program structure - program wizard and the graphical production window - together decrease the time for training. As a result it is easy & efficient to use during installation, production set-up and optimizing the robot cycle.

PalletWare functionality

PalletWare contains a WIZARD to:

- Create and adjust jobs.
- Train robot movements.
- Create and adjust pallet patterns.

PalletWare contains a CellHMI to:

- Control palletizing cell devices.
- Control and supervise cell safeties and faults.
- Request robot commands.
- Handle production changeover.

PalletWare contains a RAPID program to:

- Pick up items from infeeders and place items on outfeeder according to a pallet pattern.
- Pick up pallets form a pallet stack station and place them on outfeeders.
- Pick up slip sheet from a slip sheet stack station and place them on a pallet stack according to a pallet pattern.

PalletWare limitations

PalletWare is limited to:

- 999 jobs for every flow.
- Handle 2 flows.
- Handle 2 infeeders
- Handle 2 outfeeders.
- Handle 1 slip sheet stack station.
- Handle 1 pallet stack station.
- Single pick and single drop.
- 3 ways of picking items on infeeders for every job.
- 30 items for each layer
- 15 layer on a pallet stack

2 Getting started

2.1 Introduction

Structure of this chapter

This chapter describes how to get started with the PalletWare and includes:

- Hardware and software overview

- Step-by-step working procedure, which includes steps from how to get started with the installation of the PalletWare software until how to operate and run PalletWare.

2.2 Requirements

Overview

This section gives an overview of the necessary hardware and software to run PalletWare.

PalletWare software

The PalletWare software is delivered on a CD, which contains all the software needed to install PalletWare as also the necessary documentation.

RobotWare Software

PalletWare only supports the IRC5 robot controller. The RobotWare software is preinstalled on the robot controller and is also supplied on a CD with the controller.

RobotWare Options

The following RobotWare options are required:

- FlexPendant Interface
- Profibus Fieldbus Adapter or ProfiNet Fieldbus Adapter

3 Palletizing applications

3.1 Introduction

Structure of this chapter

This chapter gives a process description of the palletizing application and focuses on how to pack products and speed up the process, also describes some key concepts used on PalletWare.

3.2 The palletizing process

Overview

A palletizing application aims at picking larger size objects from a fixed position and stacking them tightly together in a second fixed position. An important parameter for the palletizing process is the speed of the process - that is, the throughput of products in time and the efficiency in stacking the products in a stable configuration without taking up too much space.

After the palletizing process the stacks are loaded into containers or trucks, and the less space the products require, the less transportation costs are involved.

The palletizing cell

The figure illustrates an example of a palletizing cell:
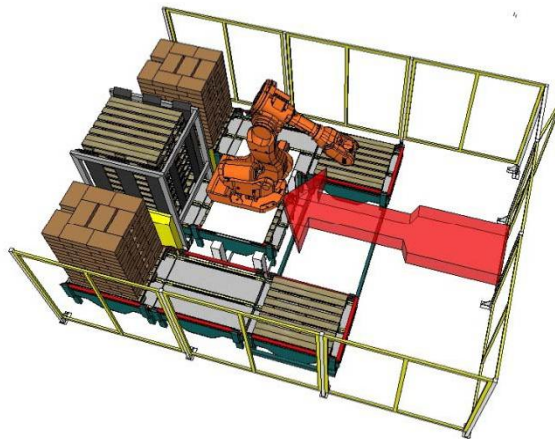
In a palletizing cell, the robot is used for the following tasks:

- Picking and placing one or more products.
- Picking and placing slip sheets from a slip sheet stack station to pallet stations. This task is optional.
- Picking and placing pallets from a pallet stack station to pallet stations. This task is optional.

When working with the optional tasks described above, the robot should be able to pick the objects off a varying and initially unknown stack size. This is solved by automatically searching the height of the stack, usually with a sensing device in the robot gripper for the first approach and then keeping track of the stack height

When the robot is not handling the pallets, they are moved into position by a feeder working in two directions, by AGVs or manually by forklifts.

The palletizing cell

All goods produced in the factory pass through the palletizing cells before shipping it to customers. This means that there are a large number of different products, which have to be guided to the right destination for accumulation. The most common shapes of products are a variety of carton boxes followed by bag types, but increasing numbers of open recycling crates are shaped for tight stacking.

How to pack the products

The way the products are packed is solved by using optimal layer layouts, and a variety of layouts to build stability in the complete stack. The various layouts can be achieved by using different layouts every second layer or by simply rotating or mirroring the same layout for every second layer.

Further common practice to stabilize the stack and protect the products is to use slip sheets between the layers. The slip sheets are thin cardboard sheets and they may be placed anywhere between the layers, but mostly they are evenly distributed. Slip sheets may also be placed both at the bottom and on the top.

How to speed up the process

For the palletizing process to be fast, the robot itself has to be as fast as possible and it has to be able to take more than one product at a time. The simplest way is to take as many boxes as possible in one group and to place them in the same configuration in one drop. However, this reduces the universal flexibility of the robot. It is usually used for half and full layer palletizing, where the layouts are simple and very high throughput is required, often also in retrofits of older hard automated palletizers.

To plan each layout

A more flexible and efficient way is to plan each layout to be processed as efficiently as possible, which usually means as few operations as possible with a limited number of boxes at a time. Therefore it can be interesting to use different "picking formats".

With picking formats it is possible to define up to 3 ways of picking items on infeeder and so 3 different ways of placing items on pallet stack. It is only possible to make a single pick and a single drop.

Infeeders, outfeeders and logical devices

In order to handle many products and pallet loads simultaneously, the installations use multiple infeeders and outfeeders gathered around the robot and logical devices to order the correct products to the robots. Different products have different production cycle durations and any order can be stopped and switched to another at any time, while other orders continue to operate without being affected.

How robot may move between different stacks

During the palletizing process the robot has to be informed about the next flow to run and the next format to pick up. When an operation is completed, another station may request the robot. In this way the robot has to move constantly and dynamically between the 2 possible combinations of stacks.

4 Navigate and handle PalletWare

4.1 Introduction

Overview

This chapter describes how to navigate in PalletWare. Screens and other parts of the user interface are described in respect of their content and how they are accessed.

The configuration parameters

Because of the different layouts configuration of palletizing cells, PalletWare contains some parameters that allow user to adapt the GUI to the requirements. In this section user will find references to those parameters.

Related information

4.2 Wizard

Overview

The wizard contains all necessary tools to prepare robot for production. When the Wizard is completed the program will be ready to run. It is also possible to save the program before the program is completed and continue later by use of modifying a selected job.

4.2.1 Main view

Description of the view

The Main view is the entry point for the PalletWare Wizard.

Click on...	When you want to...
Edit	Edit any of the parameters of the current job including robot path and pallet pattern.
Common Moves	To edit positions of home, access, Out of line and EPS can be edited.
Job Library	To open the library of jobs.

Related information

Palletizing applications on page 11

Job Editor on page 17
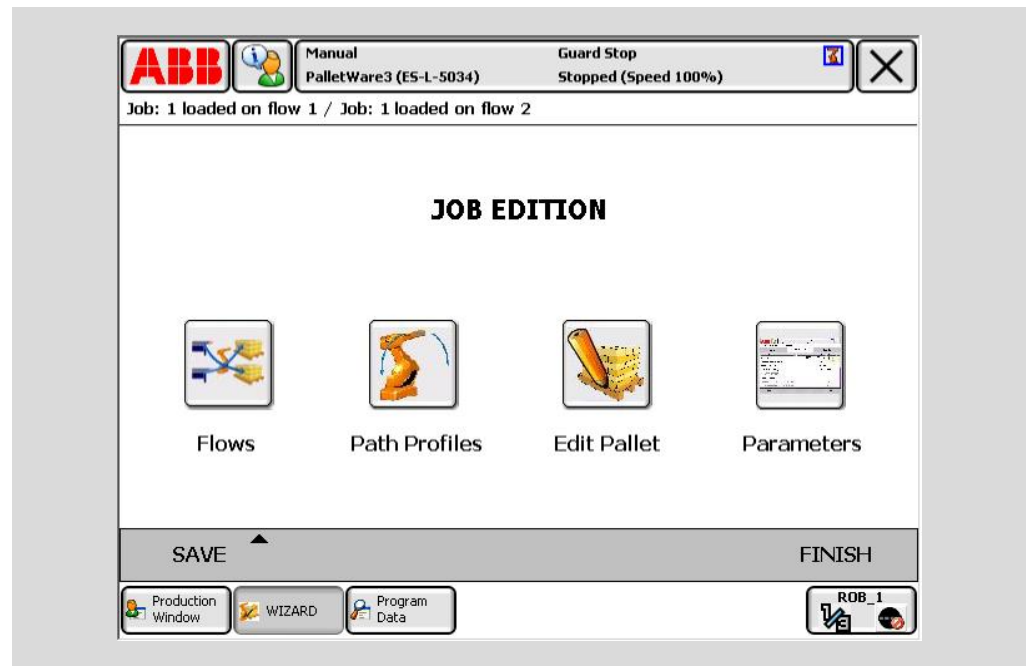
Common Moves on page 20

Job Library on page 18

Creating a new job on page 57

4.2.2 Job Editor

Description of the view

The Edit Job allows user to edit loaded jobs.

Click on...	When you want to...
Flows	To edit flows configuration.
Path Profiles	To edit robot movements.
Edit Pallet	To edit pallets parameters and pallet patterns.
Parameters	To edit parameters.
SAVE	To save jobs on robot mass memory.
FINISH	To go to previous view.

Related information

4.2.3 Job Library

Description of the view

The Job library view shows the list of job stored on the robot for every flow.

NOTE!

The Flow 2 view will only be enabled to edit if a second outfeeder is enabled on robot configuration.

Click on...	When you want to...
FLOW	To select flow 1 or flow 2.
DELETE	To delete the selected job.
LOAD	To load the selected job on robot.
FINISH	To go to previous view.

| Element	It shows...
#	Job number.
Name	Job name.
Last Save	Last date and time job was saved
Status	If job is finished (F) and therefore ready for production or instead, job is not finished (U) and then user should be warn before job enters on production.

Related information

4.2.4 Common Moves

Description of the view

The Common Moves view allows user editing common positions and movement parameters of every position.
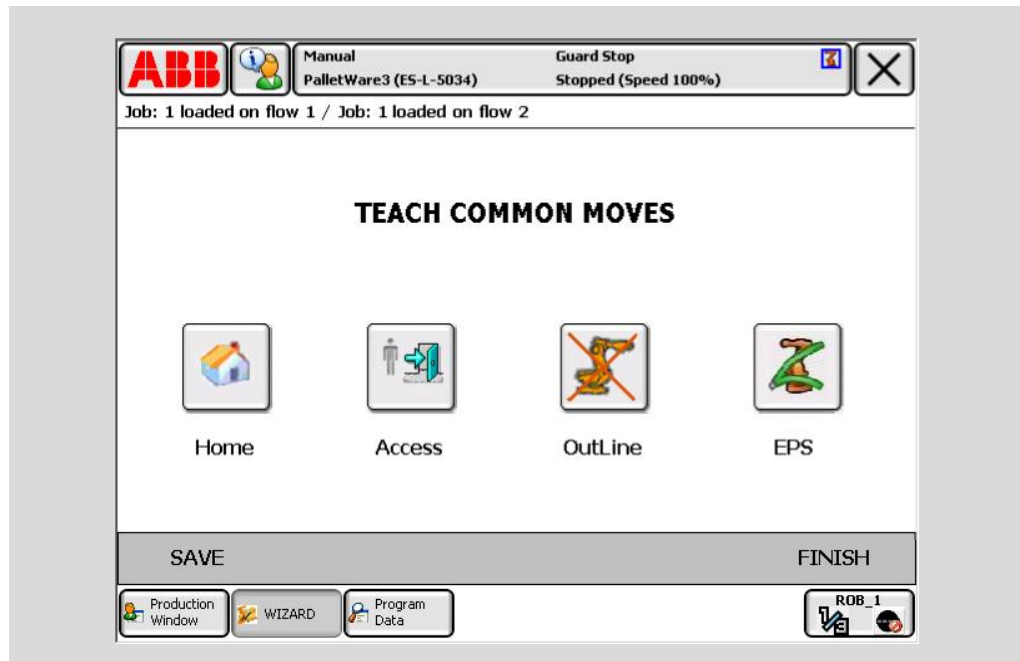
Click on...	When you want to...
Home	To edit Home position and movement parameters.
Access	To edit Access position and movement parameters.
Out Line	To edit Out Line position and movement parameters.
EPS	To edit EPS(Electronic Position Switches) position and movement parameters.
SAVE	To save positions and movement parameters on robot mass memory.
FINISH	To go to previous view.

Related information
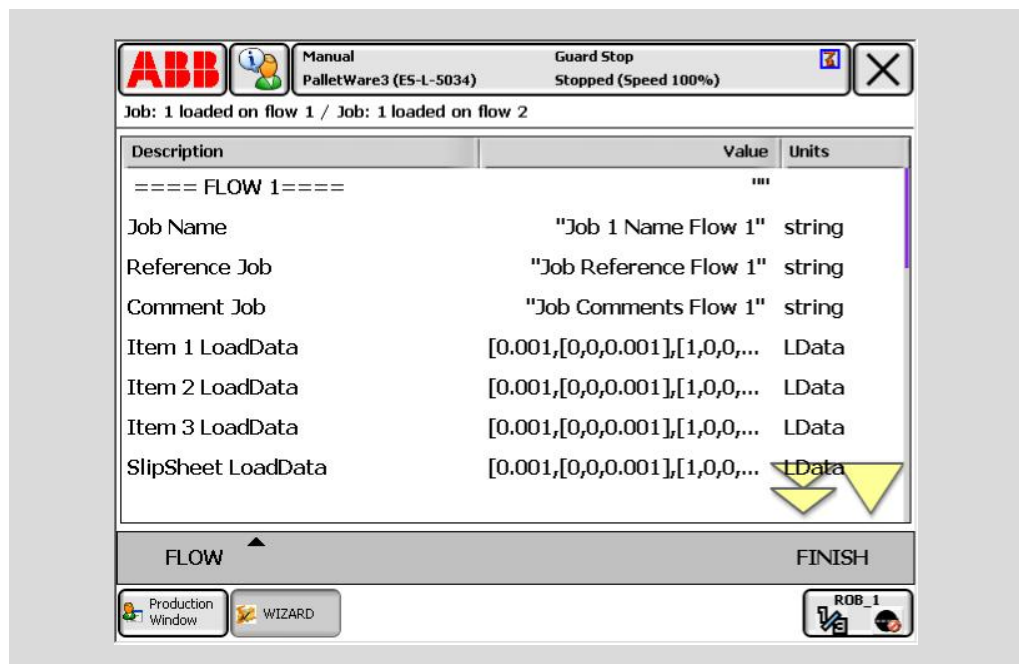
4.2.5 Parameters

Description of the view

The Parameters view allows user changing job parameters for both flows.

NOTE!

The Flow 2 view will only be enabled to edit if a second outfeeder is enabled on robot configuration.

Field	Description
Description	Shows the description of the parameter.
Value	Shows the value of the parameter.
Units	Shows the units of the parameter.
FLOW	Allows user to select the flow to edit.
FINISH	To go to previous view.

Related information

Creating a new job on page 57
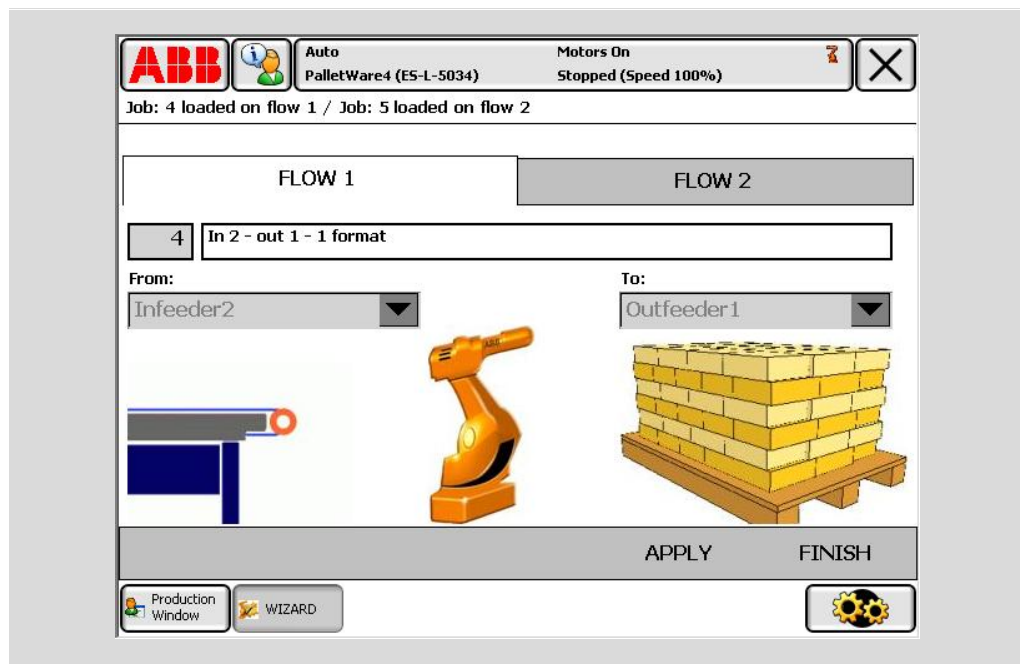
4.2.6 Flow Editor

Description of the view

The Flows Editor allows user defining the flows.

NOTE!

The Flow 2 fields will only be enabled to edit if a second outfeeder is enabled on robot configuration.

Field	Description
Job Number	Shows the number of the job.
Job Name	Type the name of the current job.
From	Select the infeeder that will be used on this particular job.
To	Select the outfeeder that will be used on this particular job.
APPLY	When clicked values are applied to robot.
FINISH	To go to previous view.

Related information

Palletizing applications on page 11

Creating a new job on page 57

4.2.7 Path Profiles

Description of the view

The Path Profiles view allows the user to select each of the positions the robot follows during the job.


NOTE!

The menu items Flow 1 and Flow 2 will appear only if a second outfeeder is enabled on robot configuration. In case a second outfeeder is not enabled flow buttons will not appear and user will be only able to edit Flow 1 values.

Product Tab

When selecting this tab user will be able to edit the robot path for picking items from the infeeder and placing them to the outfeeder as per the flow configuration.
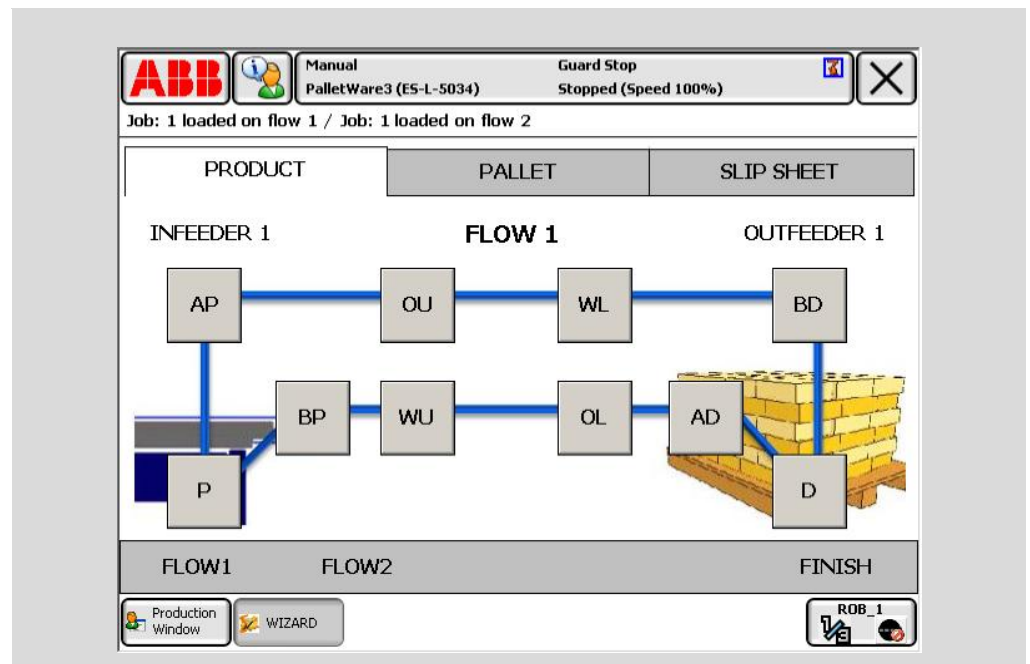
Click on...	When you want to...
BP	To edit Before Pick Position
P	To edit Pick position.
AP	To edit After Pick position.
WU	To edit Wait Unload Position
OU	To edit Out Unload position.
OL	To edit Out Load Position.

Click on...	When you want to...
WL	To edit Wait Load position.
BD	To edit Before Drop position.
D	To edit Drop Position.
AD	To edit After Drop Position.
FLOW 1	When clicked values for flow 1 will be edited.
FLOW 2	When clicked values for flow 1 will be edited.
APPLY	When clicked values are applied to robot.
FINISH	To go to previous view.

Picking Formats

The "picking formats" refer to different ways of picking items on infeeder.
When more than 1 picking format is enabled a drop-down-list will appear to allow the user in selecting the picking format to edit.

Indexed Points on Pallet

Indexed positions are referred to those positions that are automatically calculated according to the pallet pattern.
When clicking on points inside the pallet stack user will have to select the layer number and item.
All the indexed position use the same movement data's of the first point on the pallet stack, point related to item 1 on layer 1. It is by means of the work object how the robot moves through all items in the pallet stack.
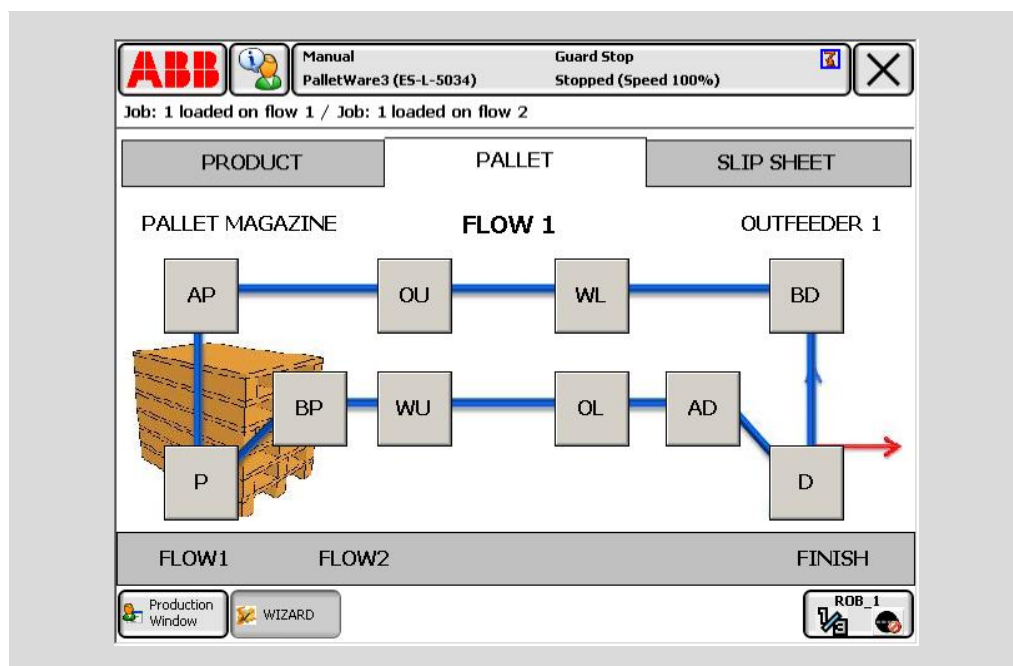
Pallet Tab

When selecting this tab user will be able to edit the robot path for picking pallets from the pallet stack station and placing them to the outfeeder station as per the flow configuration.

NOTE!

The Pallet tab will appear only if Pallet Stack station is enabled on robot configuration.

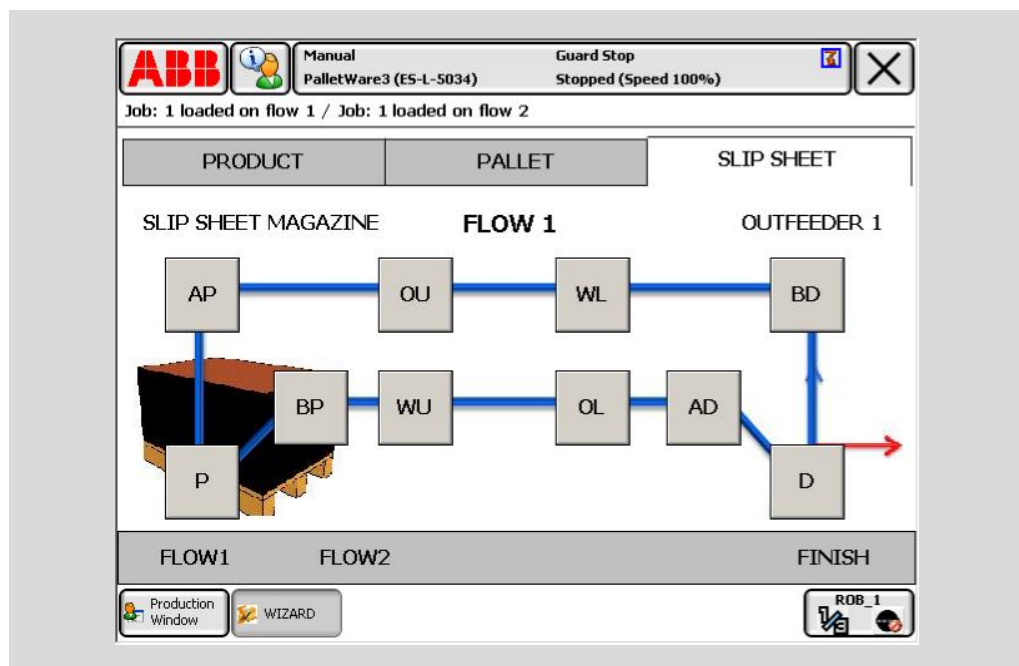| Click on...	When you want to...
BP	To edit Before Pick Position.
P	To edit Pick position.
AP	To edit After Pick position.
WU	To edit Wait Unload Position.
OU	To edit Out Unload position.
OL	To edit Out Load Position.
WL	To edit Wait Load position.
BD	To edit Before Drop position.
D	To edit Drop Position.
AD	To edit After Drop Position.

Slip Sheet Tab

When selecting this tab user will be able to edit the robot path for picking slip sheets from the slip sheet stack station and placing them to the pallet as per the flow configuration and the pallet pattern of the current job.

NOTE!

The Slip Sheet tab will appear only if Slip Sheet Stack station is enabled on robot configuration.

Click on...	When you want to...
BP	To edit Before Pick Position.
P	To edit Pick position.
AP	To edit After Pick position.
WU	To edit Wait Unload Position.
OU	To edit Out Unload position.
OL	To edit Out Load Position.
WL	To edit Wait Load position.
BD	To edit Before Drop position.
D	To edit Drop Position.
AD	To edit After Drop Position.

Related information

4.2.8 Point Editor

Description of the view

The Point Editor allows user defining the parameters of the selected position.

Field	Description
Movement	It defines how the robot will move to reach this point.
Zone	It defines the zonedata applied to the movement.
Speed	It is used to specify the speed of the robot movement. - Tcp. It specifies the speed of the tcp in mm/s. - Orient. The reorientation velocity of the TCP in mm/s.
Acceleration	It is used to slower acceleration and deceleration of the robot movement. - Acc. It specifies acceleration and deceleration in percentage - Ramp. The rate at which acceleration and deceleration increases as a percentage of the normal values.
Wait Digital Input	It is used to select which signal robot will wait for when position is reach. Robot will not continue until signal is high. **NOTE!** To make the signal appear on the list the signal has to appear on the "Most Common I/O list
Wait (sec)	It defines the time robot will wait at this position.
X,Y,Z	The position (x,y,z) of the tool center point expressed in mm.
Tab Auxiliary point	When clicking will enable the auxiliary position.
Work Objects	It shows the work object robot uses for the movement.

Field	Description
Trigg	It opens the Trigg Editor.
Align	It aligns robot to the specified item orientation. **NOTE!** This function is only available for positions inside pallet and first item is selected.
ModPos	It reads the robot current position.
GoTo	It sends the robot to selected position.
APPLY	When clicked values are applied to robot
FINISH	To go to previous view.

Indexed positions and Special robot configurations

For the indexed positions inside the pallet there are some cases that might be necessary to apply a certain robot configuration. This is necessary normally when error "Position not compatible" appears in the robot.

The following table shows how to apply a "special robot configuration":

	Action
1	Select an indexed position inside the pallet (BF,D,AD)
2	Jog the robot to the required position.
3	Click on ModPos to apply the current robot configuration to the item position **NOTE!** - Only the value of robot configuration will be applied - The robot configuration will be only applied to this particular item

Related information

4.2.9 Trigg Editor

Description of the view

The Point Editor allows user defining the parameters of the selected position.

ABB	Manual PalletWare3 (ES-L-5034)	Guard Stop Stopped (Speed 100%)	✕

☐ Trigg Enabled

	Name	Action	Time (sec)
O1	none ▼	none ▼	0
O2	none ▼	none ▼	0
O3	none ▼	none ▼	0

Custom Procedure: [   ]

OK   CANCEL

Production Window | WIZARD | ROB_1

Field	Description
Trigg Enabled	It enables the trigg.
Name	It defines the output signal to trigg. **NOTE!** To make the signal appear on the list the signal has to appear on the "Most Common I/O list".

Action	It defines the action of the trigg:
	  - Set. It will set the signal.
	  - Reset. It will reset the signal.
	  - Pulse. It will pulse the signal.

Time	Depending on the action will do:
	  - Set/Reset. It defines the time to trigg signal before reaching position.
	  - Pulse. It defines the length of the pulse.

Custom Procedure	It defines the name of the procedure to call when trigg occurs.

Related information

4.2.10 Edit Pallet

Description of the view

The Edit Pallet view allows user to edit the pallet data of the job for both flows.

Field	Description
Dimensions	It defines the dimensions of the pallet in millimeters according to the outfeeder work object orientation. **TIP!** When defining the pallet dimension it is very important that the dimensions are related to work object orientation. It is a good practice to make a mark on the outfeeder or floor showing the work object frame.
Number of layers on pallet	It defines the number of layers of the pallet pattern. **NOTE!** Slip sheets count as a layer on the pallet pattern.
Layer Height	It defines the height of the layer. **NOTE!** Layer height will be the same for all the layers except for the slip sheet layers.
Pallet Displacement	It defines the pallet displacement in millimeters according to the outfeeder work object orientation.

Field	Description
Layer Height	It allows user selecting the pallet to edit. **NOTE!** Pallet 2 will only enabled to edit if a second outfeeder is enabled on robot configuration.
PICKING FORMATS	Click to edit the picking formats.
PATTERN	Click to edit pallet pattern.
APPLY	When clicked values are applied to robot.
FINISH	To go to previous view.

Related information

4.2.11 Picking Formats

Description of the view

The Picking Formats view allows user to edit the parameters of different ways of picking items on the infeeder.

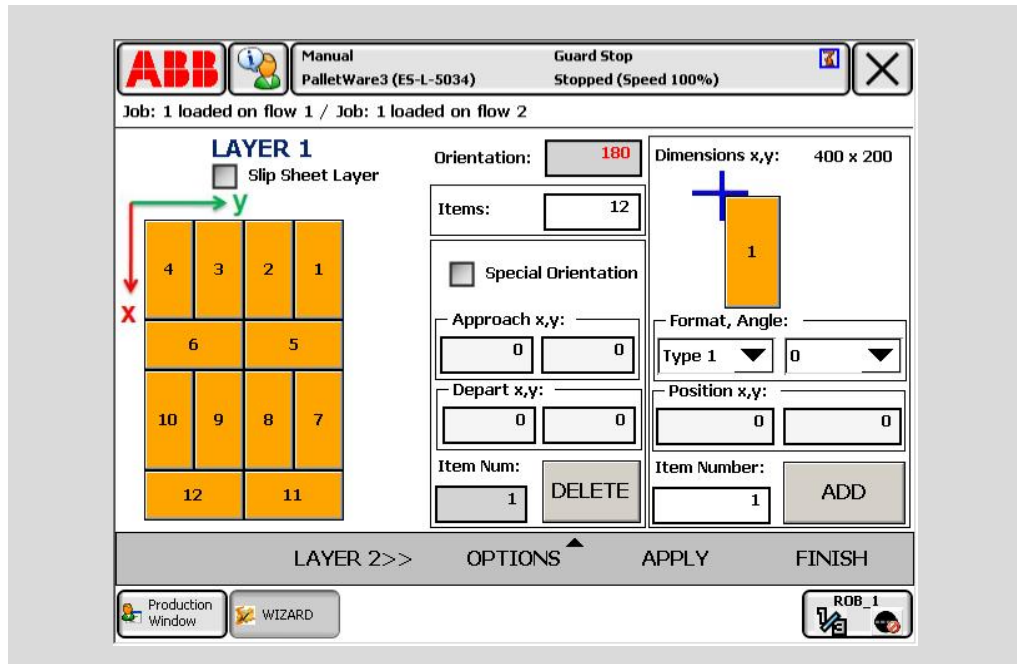| Field	Description
Enable	When clicked it enables the picking format.
Number of items	It defines the number of items that will be picked in a single pick.
Item dimensions	It defines the dimensions of the item to pick according to tool coordinated system. **NOTE!** When more than one item is picked in a single pick, it is necessary to define the dimensions of the group of items.
Gripper Displacement	It defines the displacement of the TCP in millimeters. **TIP!** Gripper displacement is used to correct the rotation of items on the pallet. If these values are 0 the rotation center of the items will be the tool TCP.
APPLY	When clicked values are applied to robot.
FINISH	To go to previous view.

Related information

4.2.12 Pallet Pattern Editor

Description of the view

The Pallet Pattern Editor view allows user to edit the layout of every layer on the pallet.

Field	Description
Dimensions x,y	It shows the dimensions of the item.
Format Type	It defines the type of picking format to be added.
Angle	It defines the orientation of the item to be added.
Position x,y	It defines the position of the item to be added.
Item Number	It defines the order in which the items will be placed.
Slip Sheet Layer	When checked it defines the layer will contain a slip sheet and no items.
Orientation	It shows the current orientation of the robot gripper with respect to pallet work object. **NOTE!** When the orientation field is red means actual robot 6th axis position does not match with the defined item orientation.

Field	Description
Special Orientation	When it is checked it will enable applying a particular orientation to the item. **NOTE!** For the indexed positions inside the pallet there are some cases that might be necessary to apply a certain robot configuration. This is necessary normally when error "Position not compatible" appears in the robot. **TIP!** Enable "special orientation" to help avoiding "Position not compatible" errors.
Approach	It defines the offset x,y for the point "Before Drop" applied for the selected item. **NOTE!** Approach offset is expressed in the same direction of the work object frame.
Depart	It defines the offset x,y for the point "After Drop" applied for the selected item. **NOTE!** Approach offset is expressed in the same direction of the work object frame.
ADD	When clicked will add the item to layer.
DELETE	When clicked will detele the item from layer.
CLEAR LAYER	When clicked values are deleted.
COPY LAYER	When clicked values layer is copied.
PASTE LAYER	When clicked values of a copied layer will be pasted on the current layer.
APPLY	When clicked values are applied to robot.
FINISH	To go to previous view.

Warnings on layer layout

In order to prevent user from making mistakes when creating a layout, the Pallet Editor view contains an engine for detecting those errors and warns the user about them. The following table describes how this engine works.
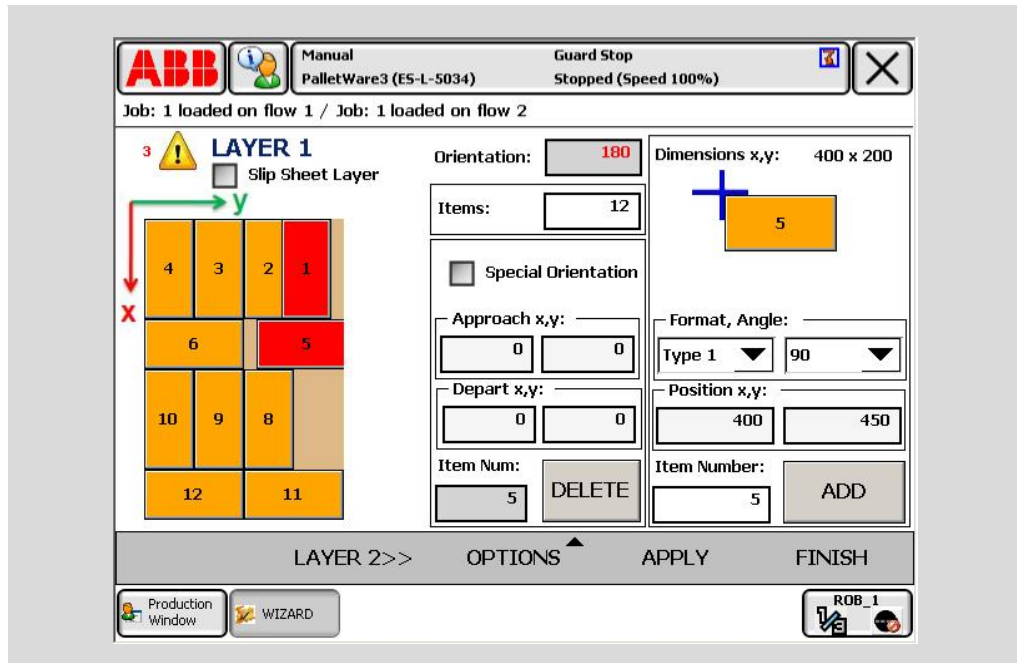
Warning	Description
⚠️	When clicked it opens a view with all the active warnings on pallet pattern **NOTE!** It appears only when a warning is active.
Missing item	It will be active when one item is missing on layer layout. **NOTE!** Item 7 does not exists on layer.
Occupied area	It will be active when two items occupied same area. **NOTE!** Item 1 and 2 share the same area.
Item out of pallet area	It will be active when one item is out of pallet area. **NOTE!** Item 5 is out of pallet area.

Related information

4.2.13 Warnings on pallet pattern

Description of the view

The Warnings on Pallet view show user a list of warnings detected on the pallet pattern.
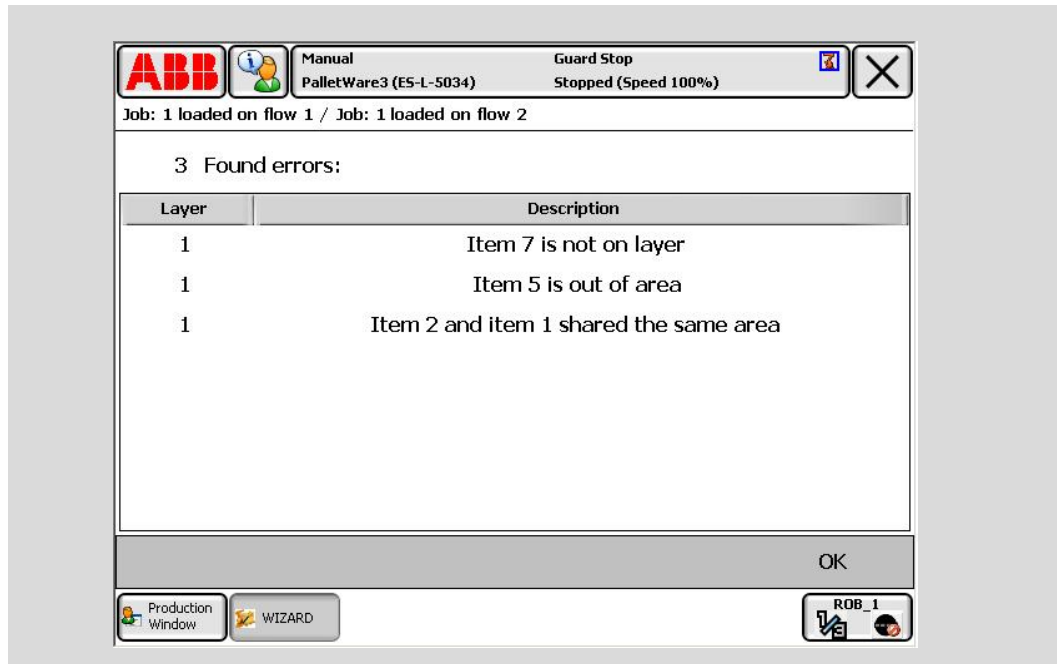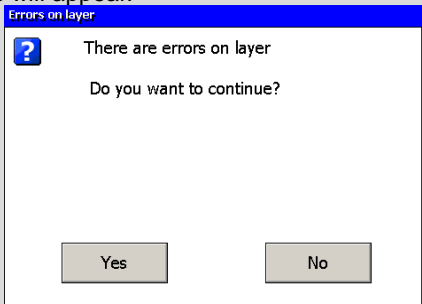
Field	Description
Layer	Shows the incorrect layer number.
Description	Shows a brief description of the warning.

NOTE!

In order to acknowledge the layer layout as correct do the following:-

	Action
1	On Pallet Editor view, click APPLY
2	A message box as follows will appear:
3	Click on "Yes" and errors will be acknowledge and it will be possible to run the pallet pattern.

Related information

4.3 CellHMI

Overview

CellHMI is been design to manipulate and control an end of line palletizing cell. It communicates through robot IO with PLC sending commands and showing the status of the cell.

Layout of the CellHMI
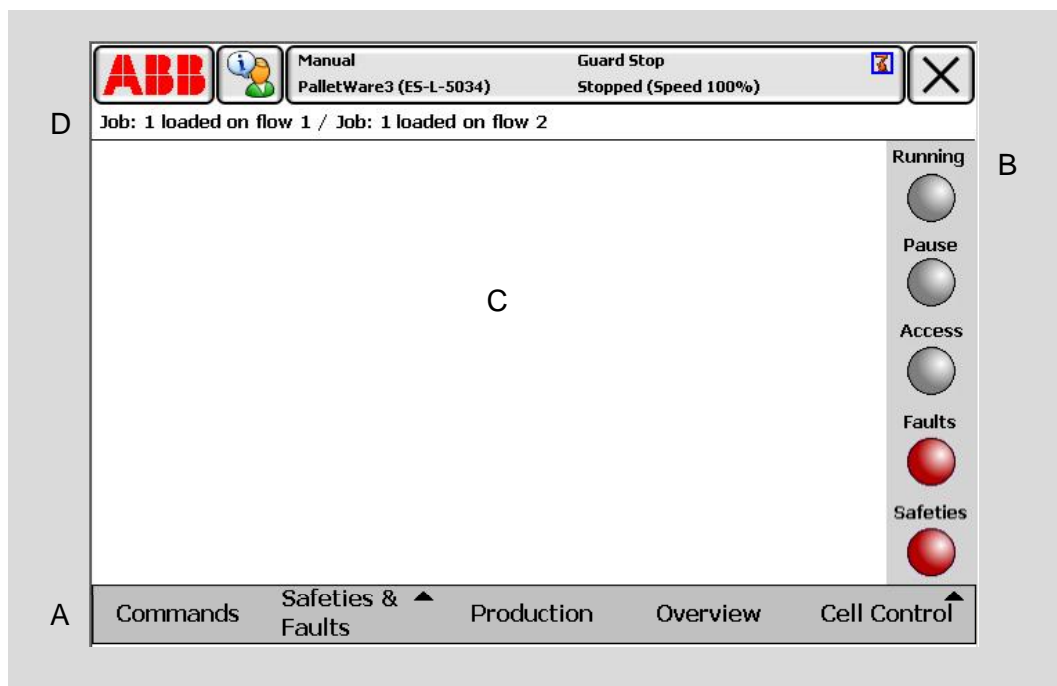
Element	Name
A	Menu bar.
B	Status bar.
C	Screen.
D	Loaded jobs.

Menu bar

In the menu bar it is possible to find several buttons and pull-up menus where the user will be able to navigate among several screens.

Loaded jobs

It shows the loaded jobs on robot.

Status bar

In this area the user will be able to see what the status of the line is at any moment.

The following table shows the information each LED represents:

LED	This led will be...
Running	Green if robot is in auto mode, production started and program is running. Whenever the conditions are not true, the led will be grey.
Pause	Yellow if the line is in pause mode. Whenever the conditions are not true, the led will be grey.
Access	Yellow whenever an access request has been granted and the line has conditions to access. Its normal status is grey.
Faults	Red whenever there is a fault in the cell. If no faults are active it will remain grey.
Safeties	Red whenever there the safeties are not ok. If no faults are active it will remain grey.

The configuration parameters

Because of the different layouts configuration of palletizing cells, PalletWare contains some parameters that allow user to adapt the CellHMI to the requirements. Therefore user might notice the views on this manual differ from the views on robot FlexPendant.

4.3.1 Production Overview

Description of the view

This view shows an overview of the current production status.
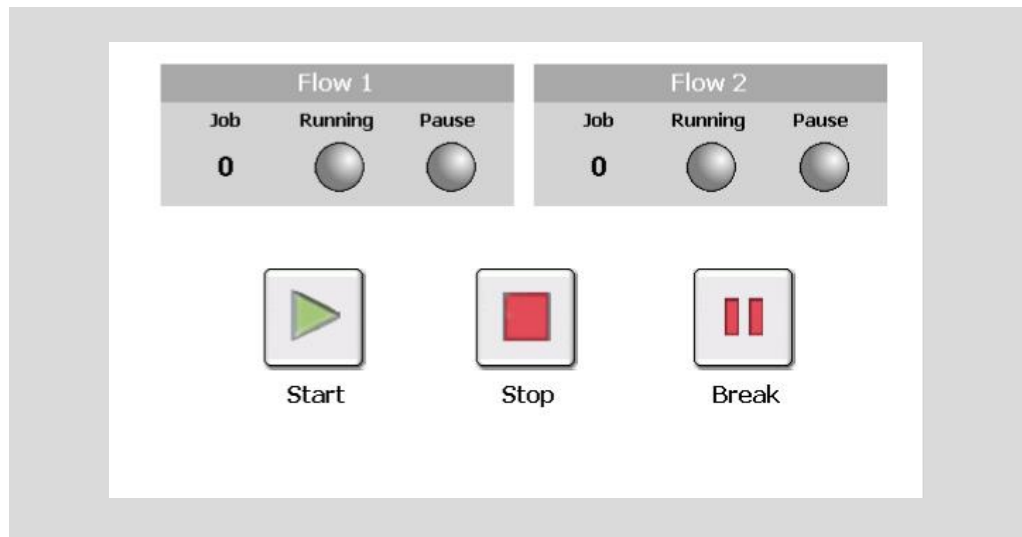
Click on...	When you want to...
Start	To request motors on and start execution.
Stop	To stop program execution.
Break	To break cycle and activate Pause.
Element	**Description**
Job Number	The number of loaded job on robot.
LED Running	The LED is green when flow is running.
LED Pause	The LED is yellow when pause is active on flow.

Related information

4.3.2 Commands

Description of the view

This view enables user to send commands to cell.
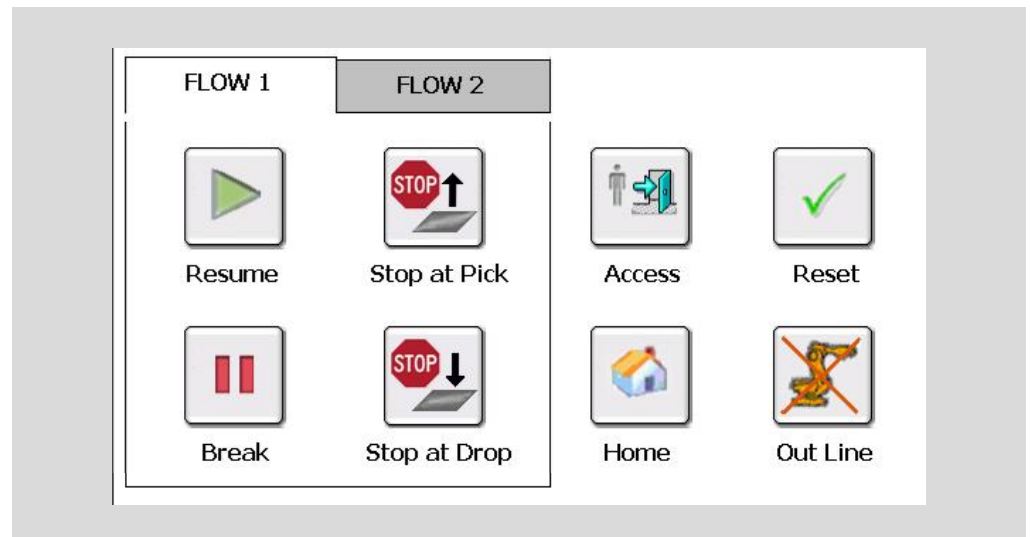
Click on...	When you want to...
FLOW 1	To select flow 1 commands
FLOW 2	To select flow 2 commands
Resume	Resume the line from an stop or break
Break	To break production and activate Pause mode
Stop at Pick	To order robot to stop at pick position
Stop at Drop	To order robot to stop at drop position
Access	To order robot go to access position and request access to cell
Home	To order robot to go home position
Reset	To reset faults
Out Line	To order robot to go Out of line position

Break flow options

When clicking on "Break" the following pop up will appear:

Select Stop Option

◯ After Place Item

◯ At End of Layer

◯ At End of Pallet

OK   CANCEL

Select...	When you want to...
After place item	To break the flow after robot places the next item on pallet.
At End of Layer	To break the flow when robot finishes stacking the current layer.
At End of Pallet	To break the flow when robot finishes stacking the current pallet.

Related information

Palletizing applications on page 11

4.3.3 Faults

Description of the view

In this view user is able to see Cell faults through a set of LEDs.

NOTE!

The picture shown in this manual may differ from the real one in the application. This is because this screen is prepared to be adjusted according to cell layout and process requirements.

TIP!

It is possible to adjust the screen according to cell and customer requirements.

LED	It will be...
Any	Red whenever the fault is active, otherwise it will be grey.

4.3.4 Safeties

Description of the view

In this view user is able to see Cell safeties through a set of LEDs.

NOTE!

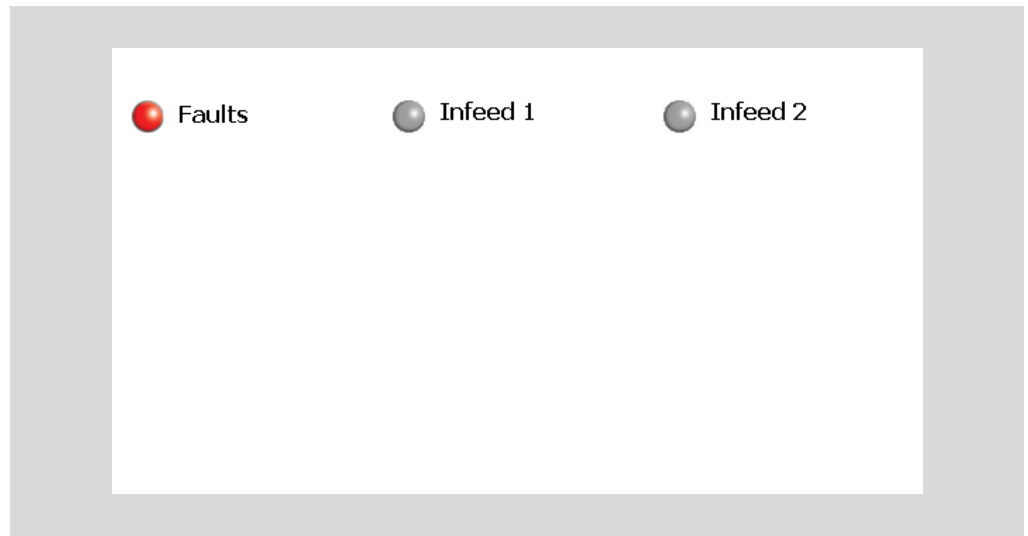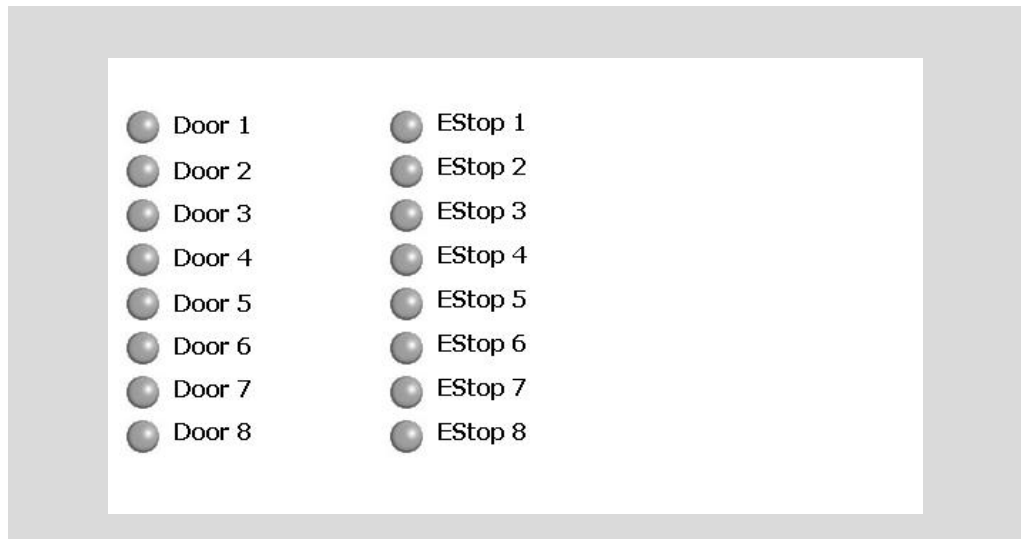The picture shown in this manual may differ from the real one in the application. This is because this screen is prepared to be adjusted according to cell layout and process requirements.

TIP!

It is possible to adjust the screen according to cell and customer requirements.

LED	It will be...
Any	Red whenever the fault is active, otherwise it will be grey.

4.3.5 Production

Description of the view

In this view user is able to see information about the production statistics for every flow and also request production changeover.

NOTE!
The Flow 2 fields will only appear if a second outfeeder is enabled on robot configuration.

FLOW 1	FLOW 2	Production Info Flow 1	
		Job Number:	1
Job: 0	...	Cycle Time:	0
		Placed Items:	0
▷		Filled Pallets:	0
Load Job		Production Info Flow 2	
		Job Number:	1
■		Cycle Time:	0
		Placed Items:	0
End Job		Filled Pallets:	0

Click on...	When you want to...
FLOW 1	To select flow 1
FLOW 2	To select flow 2
...	To open job library
Load job	To request load selected job **NOTE!** When clicking on "Load job" it will be requested to load the job which has been previously selected on job library.
End job	To request finish production of loaded job **NOTE!** When clicking on "End job" it will be requested to finish the current production for selected flow.

Fields	Description
Job Number	It shows the job number on production.
Cycle Time	It shows the last cycle time in seconds.
Placed Items	It shows the number of items placed during the production of this job.
Filled Pallets	It shows the number of filled pallets during the production of this job.

Job library

When clicking on "job selection" the following a library containing all the jobs for that flow will appear and the user will be able to select the job to run.

#	Name	LastSave	Status
0	Empty Flow 1	16/03/2011 13:57	U
1	Job 1 Name Flow 1	26/08/2011 8:25	F
2	Job 2 Name Flow 1	26/08/2011 8:25	F

Element	It shows...
#	Job number.
Name	Job name.
Last Save	Last date and time job was saved
Status	If job is finished (F) and therefore ready for production or instead, job is not finished and then user should be warn before job enters on production.

End job options

When clicking on "end job" the following pop up will appear:
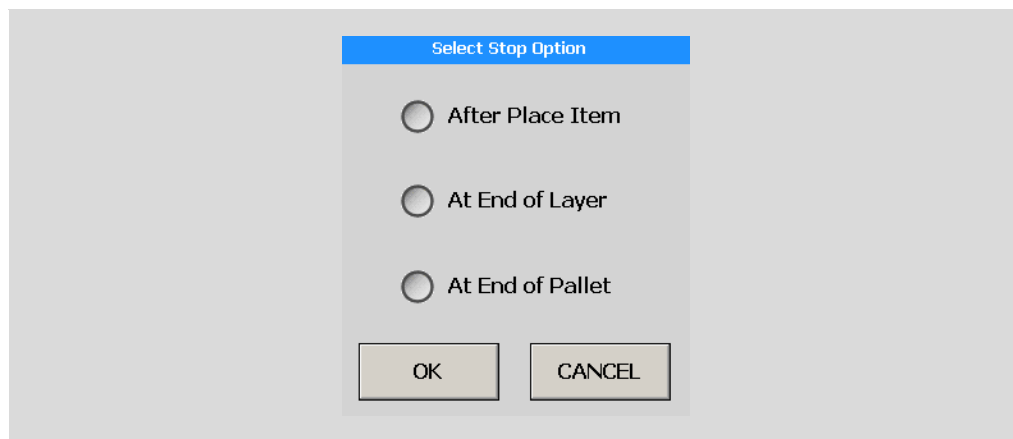
Select...	When you want to...
After place item	To stop production of this flow after robot places the next item on pallet.
At End of Layer	To stop production of this flow when robot finishes stacking the current layer.
At End of Pallet	To stop production of this flow when robot finishes stacking the current pallet.

Related information

4.3.6 Flow view

Description of the view

This view shows an overview of elements involved on flow.
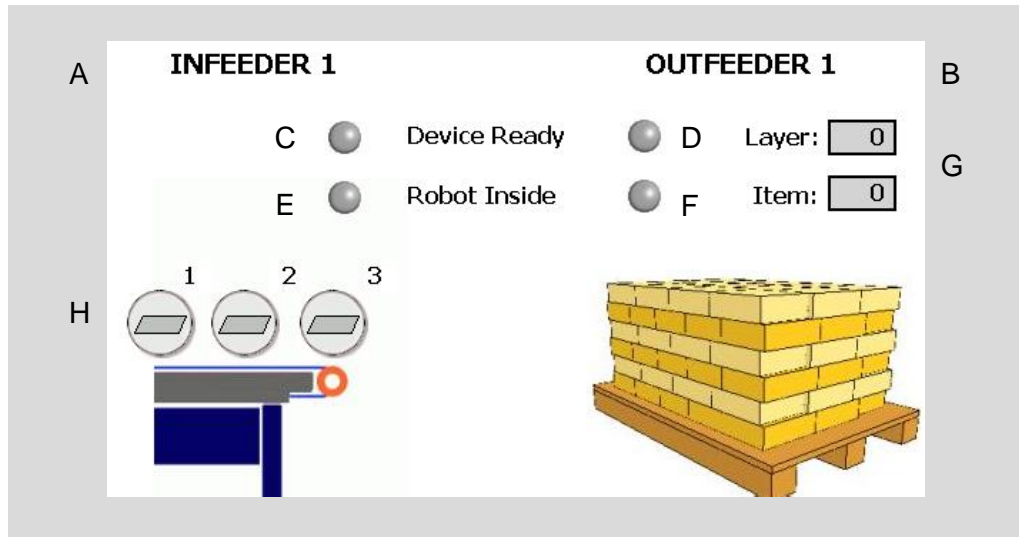
	Name	Description
A	Infeeder number.	It shows the infeeder number involved on this flow.
B	Outfeeder number	It shows the outfeeder number involved on this flow.
C	Infeeder status	This LED will be green when infeeder is ready for production. Otherwise, it will remain grey.
D	Outfeeder status	This LED will be green when outfeeder is ready for production. Otherwise, it will remain grey.
E	Robot inside infeeder	This LED will be red when robot is inside infeeder. Otherwise, it will remain grey. **NOTE!** Due to safety restrictions some functionality on infeeder may be disabled when robot is occupying infeeder.
F	Robot inside outfeeder	This LED will be red when robot is inside outfeeder. Otherwise, it will remain grey. **NOTE!** Due to safety restrictions some functionality on outfeeder may be disabled when robot is occupying outfeeder.

	Name	Description
G	Current Item	These fields show the position on the pallet where robot is placing item.
H	Format Status	These buttons have 2 functions: - To show if the "picking format" is ready to be unloaded. - To allow user modifying status of the "picking format" on infeeder. This might be necessary after an unloading error. **NOTE!** Depending on the job configuration only those "picking formats" enabled on job will appear.

Related information

Palletizing applications on page 11

Wizard on page 15

4.3.7 Outfeeders

Description of the view

This view shows an overview of the status of the outfeeders and it allows user to disable/enable outfeeders.

NOTE!

The view of the outfeeder 2 view will only appear if a second outfeeder is enabled on robot configuration.
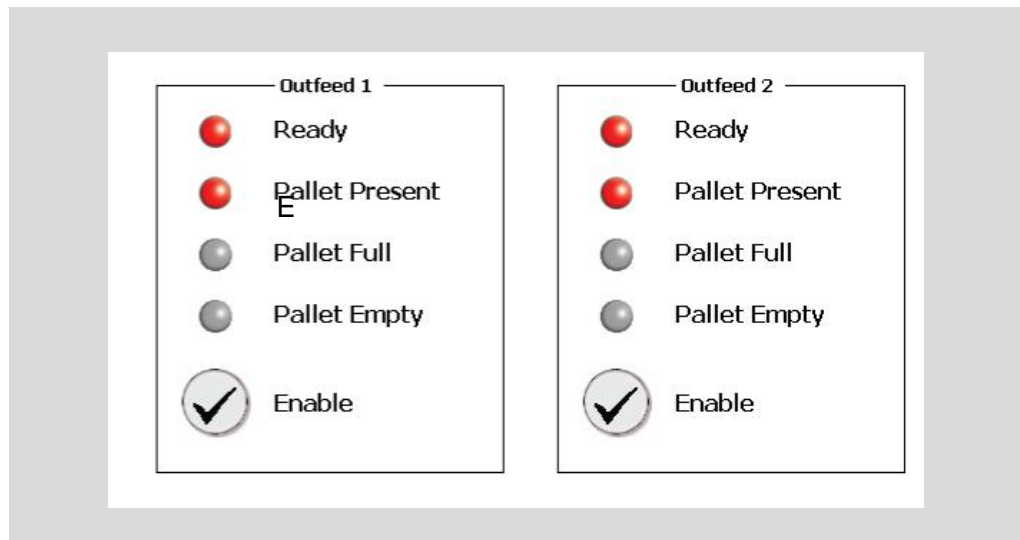
Element	Description
Ready	This LED is green when the outfeeder is ready for production, otherwise it will be red.
Pallet Present	This LED is green when a pallet is detected on the outfeeder, otherwise it will be red.
Pallet Full	This LED is yellow when a pallet is full, otherwise it will be grey.
Pallet Empty	This LED is yellow when a pallet is empty, otherwise it will be grey.
Enable	These buttons have 2 functions: - To show if the outfeeder is enabled for production. - To request enable/disable outfeeder for production whenever button is pushed.

Related information

4.3.8 Magazines

Description of the view

This view shows an overview of the status of the pallet stack station and the slip sheet stack station and it allows user to disable/enable stations.

NOTE!

- The view of the slip sheet stack station will only appear if this is enabled on robot configuration.
- The view of the pallet stack station will only appear if this is enabled on robot configuration.

Element	Description
Ready	This LED is green when the device is ready for production, otherwise it will be red.
Present	This LED is green when stack is detected, otherwise it will be red.
Enable	These buttons have 2 functions: - To show if the stack is enabled for production. - To request enable/disable stack for production whenever button is pushed.

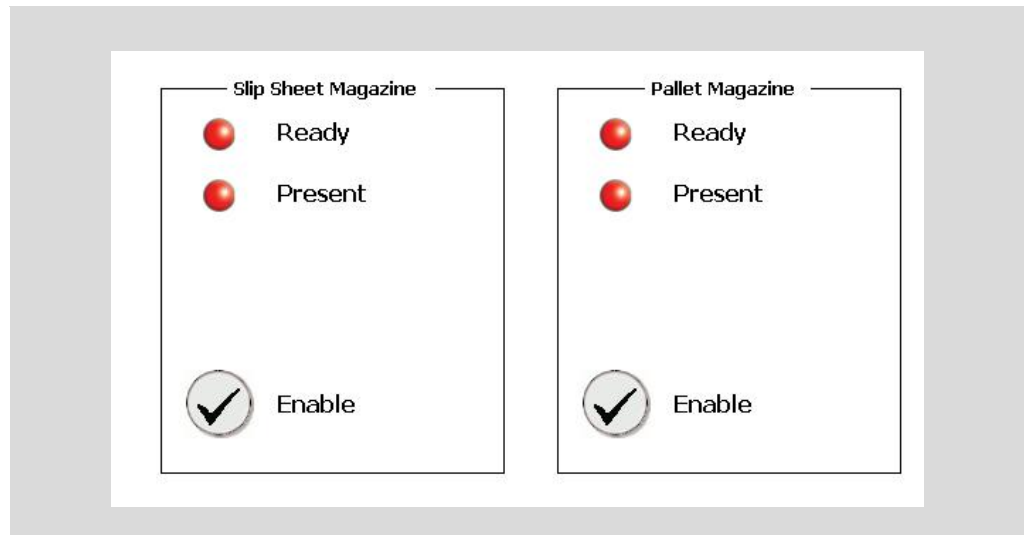**Related information**

Palletizing applications on page 11

5 Operation and Run-time

5.1 Introduction

Structure of this chapter

This chapter describes how to operate PalletWare during production and also includes:

- Step-by-step working procedure, which includes steps to create new jobs.

- Description of job parameters

- Step-by-step working procedure, which includes steps to execute production changeover.

- Information regarding unloading errors and how to recover robot execution

5.2 Creating a new job

Overview

This is an overview of how to create a new job.

Working procedure

The table below shows the steps to create a job.

NOTE!

The controller needs to be on Manual mode to create a new job.

	Action
1.	Open Wizard GUI.
2.	Click on "Job Library"
3.	Select the job 0 (Empty flow) to start from an empty job or an existing job to use it as base.
4.	Click on "LOAD" button to load the job on robot.
5.	On "Main" view, click on "EDIT".
6.	On "Job Editor", click on "SAVE" and enter job number.
7.	Select the flow in which you want to add the new job.
8.	Configure the "Flows".
9.	Edit pallet data
10.	Enter on Picking formats to edit the ways items are to be picked from infeeder.
11.	On pallet pattern, edit the way items are stacked on pallet.
12.	Enter on "Path Profile" and edit robot path.
13.	Save job

Configuring the flows

1.	Click on "Flows".
2.	On "Flow Editor", select infeeder to pick items from and outfeeder to place items to.
3.	On job name field, enter a brief description for the job or code to help identification.
4.	Click on Apply.

Editing the pallet data

1.	Click on "Edit Pallet".
2.	Select pallet you want to edit.
3.	Enter pallet dimensions according to work object orientation.
4.	Enter the number of layer that will contain the pallet. **NOTE!** Slip sheets count as a layer on the pallet pattern.
5.	Enter the height of the layer. **NOTE!** Layer height will be the same for all the layers except for the slip sheet layers.

Editing picking formats

	Action
1.	Click on "PICKING FORMATS"
2.	Enable the "picking formats" you will use on that job.
3.	For every enabled "picking format" enter the number items that will be picked on a single pick.
4.	Enter the dimensions of the item to pick according to tool coordinated system. **NOTE!** When more than one item is picked in a single pick, it is necessary to define the dimensions of the group of items.
5.	It defines the displacement of the TCP in millimeters. **TIP!** Gripper displacement is used to correct the rotation of items on the pallet. If these values are 0 the rotation center of the items will be the tool TCP.
6.	Click on "APPLY" and then "FINISH"

Editing Pattern

	Action
1.	Click on "PATTERN".
2.	Enter the number of items for the current layer.

Slip Sheet Layers

	Action
1.	Check on "Slip Sheet Layer" box

NOTE!

Enabling slip sheet will disable adding items on the current layer.

Adding an item on layer

	Action
1.	Select the type of item you want to add.
2.	Select the orientation for this item.
3.	Enter the position x and y.
4.	Enter the item number. **NOTE!** The item number defines the order in which the items will be placed.
5.	Click on "ADD" to add item on layer.

Editing approach and depart values

	Action
1.	Click on the item you want to edit
2.	Enter the approach values x and y.
3.	Enter the depart values x and y.

Special orientation

For the indexed positions inside the pallet there are some cases that might be necessary to apply a certain robot configuration. This is necessary normally when error "Position not compatible" appears in the robot.

The following table shows how to apply a "special robot configuration":

	Action
1.	Click on the item you want to edit
2.	Check on "Special Orientation" to enable or disable

NOTE!

It will be necessary to edit the item orientation on "Point editor".

Modifying item values

	Action
1.	Click on the item you want to edit
2.	Enter the data you want to modify. Format, angle or position.
3.	Click on "ADD".

Deleting an item

	Action
1.	Click on the item you want to delete.
2.	Click on "DELETE".

Copying and pasting layers

	Action
1.	Navigate to layer you want to copy.
2.	Click on "OPTIONS" and select "COPY LAYER" to copy layer data.
3.	Navigate to layer you want to paste data on.
4.	Click on "OPTIONS" and select "PASTE LAYER" to paste values.

Editing the path

1.	Click on "Path Profiles",
2.	Select the flow you want to edit.
3.	Select "PRODUCT" tab to edit robot path for picking and placing items on pallet.
4.	Select "PALLET" tab to edit robot path for picking and placing pallets on outfeeder. **NOTE!** The Pallet tab will appear only if Pallet Stack station is enabled on robot configuration
5.	Select "SLIP SHEET" tab to edit robot path for picking and placing slip sheets on outfeeder. **NOTE!** The Slip Sheet tab will appear only if Slip Sheet Stack station is enabled on robot configuration
6.	Click on "FINISH" to return to previous view.

Adjusting robot path for picking and placing items

	Action
1.	Click on "WU".
2.	Jog robot to wait unload position, enter point data and apply robot position to target.
3.	Click on "BP".
4.	Jog robot to before pick position, enter point data and apply robot position to target.
5.	Click on "P" to edit picking position
6.	Jog robot to pick position, enter point data and apply robot position to target.
7.	Activate robot gripper to grip item.
8.	Click on "AP" to edit after pick position.
9.	Jog robot to after pick position, enter point data and apply robot position to target. **NOTE!** "After pick position" is usually a Z offset of pick position.
10.	Click on "OU".
11.	Jog robot to out unload position, enter point data and apply robot position to target.
12.	Click on "WL".
13.	Jog robot to wait load position, enter point data and apply robot position to target.
14.	Click on "BD" and select item 1 from layer 1.
15.	Jog robot to before drop position, enter point data and apply robot position to target. **NOTE!** "Before drop position" is usually a Z offset of drop position. Edit approach values on "Pallet Pattern Editor" to adjust item fly in.

	Action
16.	Click on "D" and select item 1 from layer 1.
17.	Jog robot to drop position, enter point data and apply robot position to target.
18.	Activate robot gripper to drop item on pallet.
19.	Click on "AD" and select item 1 from layer 1.
20.	Jog robot to after drop position, enter point data and apply robot position to target. **NOTE!** "After drop position" is usually a Z offset of drop position. Edit depart values on "Pallet Pattern Editor" to adjust item fly out.
21.	Click on "OL".
22.	Jog robot to out of load position, enter point data and apply robot position to target.

Adjusting robot path for picking and placing pallets

	Action
1.	Click on "WU".
2.	Jog robot to wait unload position, enter point data and apply robot position to target.
3.	Click on "BP".
4.	Jog robot to before pick position, enter point data and apply robot position to target. **NOTE!** "Before pick position" is usually a Z offset of pick position and the position where robot starts searching for stack height the first time.
5.	Click on "P" to edit picking position
6.	Jog robot to pick position, enter point data and apply robot position to target.
7.	Activate robot gripper to grip pallet.
8.	Click on "AP" to edit after pick position.
9.	Jog robot to after pick position, enter point data and apply robot position to target. **NOTE!** "After pick position" is usually a Z offset of pick position at top of stack.
10.	Click on "OU".
11.	Jog robot to out unload position, enter point data and apply robot position to target.
12.	Click on "WL".
13.	Jog robot to wait load position, enter point data and apply robot position to target.
14.	Click on "BD"
15.	Jog robot to before drop position, enter point data and apply robot position to target. **NOTE!** "Before drop position" is usually a Z offset of drop position.

	Action
16.	Click on "D".
17.	Jog robot to drop position, enter point data and apply robot position to target.
18.	Activate robot gripper to drop pallet.
19.	Click on "AD".
20.	Jog robot to after drop position, enter point data and apply robot position to target. **NOTE!** "After drop position" is usually a Z offset of drop position.
21.	Click on "OL".
22.	Jog robot to out of load position, enter point data and apply robot position to target.

Adjusting robot path for picking and placing slip sheets

	Action
1.	Click on "WU".
2.	Jog robot to wait unload position, enter point data and apply robot position to target.
3.	Click on "BP".
4.	Jog robot to before pick position, enter point data and apply robot position to target. **NOTE!** "Before pick position" is usually a Z offset of pick position and the position where robot starts searching for stack height the first time.
5.	Click on "P" to edit picking position
6.	Jog robot to pick position, enter point data and apply robot position to target.
7.	Activate robot gripper to grip slip sheet.
8.	Click on "AP" to edit after pick position.
9.	Jog robot to after pick position, enter point data and apply robot position to target. **NOTE!** "After pick position" is usually a Z offset of pick position.
10.	Click on "OU".
11.	Jog robot to out unload position, enter point data and apply robot position to target.
12.	Click on "WL".
13.	Jog robot to wait load position, enter point data and apply robot position to target.
14.	Click on "BD"
15.	Jog robot to before drop position, enter point data and apply robot position to target. **NOTE!** "Before drop position" is usually a Z offset of drop position at top of pallet stack.

	Action
16.	Click on "D".
17.	Jog robot to drop position, enter point data and apply robot position to target. **NOTE!** "Slip sheet drop position" should be the lowest position on the pallet stack. The drop position height is calculated automatically depending on the pallet pattern.
18.	Activate robot gripper to drop slip sheet.
19.	Click on "AD".
20.	Jog robot to after drop position, enter point data and apply robot position to target. **NOTE!** "After drop position" is usually a Z offset of drop position at top of pallet stack.
21.	Click on "OL".
22.	Jog robot to out of load position, enter point data and apply robot position to target.

Related information

5.3 Job parameters

Overview

This chapter explain the job parameters.

List of parameters

Parameter name...	This parameter...
Job Name	Holds the name of the job.
Reference	Is used to add a reference to identify job.
Comment Job	Can be used to add some more information to help identifying the job.
Item 1 LoadData	Is used to add load parameters such as mass, center of gravity and inertias… of item 1.
Item 2 LoadData	Is used to add load parameters such as mass, center of gravity and inertias… of item 2.
Item 3 LoadData	Is used to add load parameters such as mass, center of gravity and inertias… of item 3.
Slip Sheet LoadData	Is used to add load parameters such as mass, center of gravity and inertias… of slip sheet.
Pallet LoadData	Is used to add load parameters such as mass, center of gravity and inertias… of pallet.
Acceleration value	It is used to adjust acceleration
Format 1 load anticipation	Will advance the request to load a new item or set of items on infeeder for item 1 as also the call to custom action "AfterPickInfeedX". *X=Infeeder number*
Format 2 load anticipation	Will advance the request to load a new item or set of items on infeeder for item 2 as also the call to custom action "AfterPickInfeedX". *X=Infeeder number*
Format 3 load anticipation	Will advance the request to load a new item or set of items on infeeder for item 3 as also the call to custom action "AfterPickInfeedX". *X=Infeeder number*

Parameter name...	This parameter...
Item drop anticipation	Will advance the drop of item or set of items on outfeeder and therefore the call to custom action "DropItemXOutfeedY". *X=Item number, Y=Outfeeder number.*
Item after drop anticipation	Will advance the call to custom action "AfterDropOutfeedX". *X=Infeed number.*
Joint conf. control	Will enable/disable robot configuration control on joint movements.
Linear conf. control	Will enable/disable robot configuration control on linear movements.
Concurrent option enabled	Will enable/disable option on movements. Subsequent instructions are executed while the robot is moving. The argument is usually not used but can be used to avoid unwanted stops caused by overloaded CPU when using fly-by points. This is useful when the programmed points are very close together at high speeds. The argument is also useful when, for example, communicating with external equipment and synchronization between the external equipment and robot movement is not required.
Drop slip sheet on Pallet	Will advance the drop of slip sheets on pallet stack and therefore the call to custom action "DropSlipSheet".
Drop Pallet on outfeed	Will advance the drop of a pallet on outfeeder and therefore the call to custom action "DropPallet".

Related information

5.4 Production Changeover

Overview

This is an overview of how to execute production changeover.

Working procedure

The table below shows the steps to execute production changeover.

	Action
1.	Open CellHMI GUI.
2.	Click on "Production".
3.	Select the flow it should be changeover.
4.	Click on "Select Job" button [...] to select next job to produce.
5.	Select the job you want to load and click OK.
6.	Click on End Job to request stop production.
7.	Click on Load Job to request loading the new job. **NOTE!** The loading of the new job won't take place until robot has finished executing the current job.

Related information

5.5 Unloading error

Overview

This section contains information regarding unloading errors and how to recover robot execution after an unloading error.

Unloading error

Unloading error rises when robot fails picking an item from the infeeder.

In the cases robot fails picking the item, robot will stop on wait load position (WL) of the flow in progress and a pop up message will appear. There the user will be able to select how to proceed with the error.

Description of the view

This view allows user recovering execution after an unloading error.
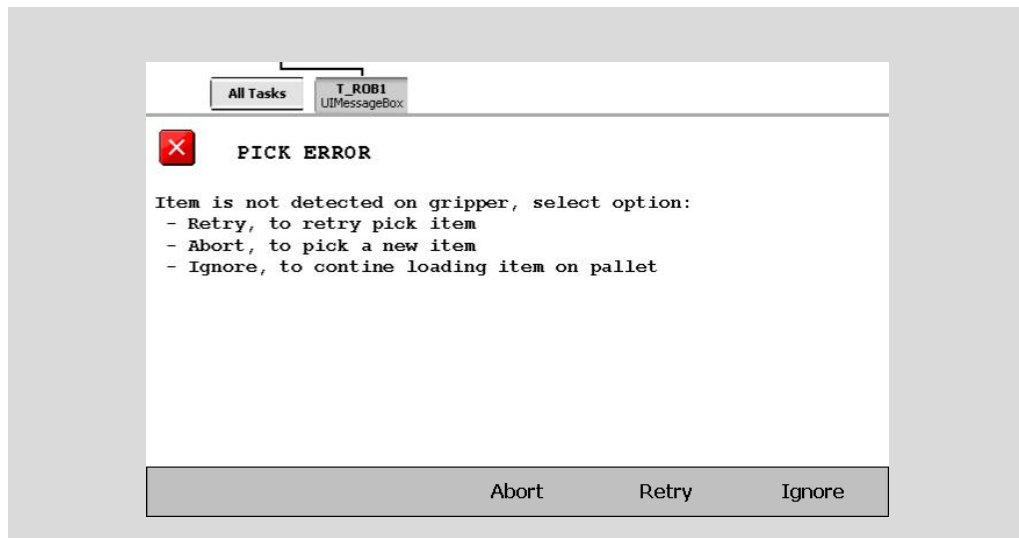
Click on...	When you want to...
Abort	Skip robot cycle and request to pick a new item from the infeeder. This option it is normally chosen when item has fallen on floor.
Retry	Retry picking the same item from the infeeder. This option it is normally chosen when robot has left the item behind and it remains ready to be picked again.
Ignore	Ignore error and continue loading item on pallet stack. This option is normally selected when item is on robot and robot can continue loading.

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