ABB ROBOTICS

Application Manual
PalletWare

Application Manual

PalletWare

3AEJ04PalletWare, Revision: 2.0

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ABB

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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. PalletWare application	Definition and explanation of PalletWare concepts and description of the user interface and the RAPID program.
5. 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.
6. Installation and Commissioning	How to install PalletWare and a description of all configuration settings required.
7. 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.
2.0	Added localization

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

1.2 Terminology

About these terms

Some words have a specific meaning when used in this manual. It is important to understand what is meant by these words. This manual's definitions of these words are listed below.

Some of the terms are put in their context when describing a palletizing process.

Words that have italic font style in the definition column are included in the term list and have their own definitions

Term list

Term	Definition
Activator	An I/O controlled part of a robot tool, normally a vacuum cup.
Approach	Defines the robot path to follow between the robot positions "Before Drop" and "Drop" item on an outfeeder.
Device	A piece of equipment that can be unloaded/loaded by a robot. Ex: press, table, conveyor, shuttle, robot, etc.
Cell HMI	Graphical User Interface running on robot FlexPendant that enables users to operate the cell.
Custom Action	Set of RAPID instructions available for the user to be edited. These custom actions are executed when robot is on robot positions: pick, after pick, out of infeeder, drop, after drop, out of outfeeder.
Custom Trigg	Description of an action on the robot path, for example setting an output signal or calling a procedure.
Depart	Defines the robot path to follow between the robot positions "Drop" and "After Drop".
Displacement Frame	The location of the outfeeder/pallet frame relative to the outfeeder/pallet work object.
Flow	Defines the infeeder and the outfeeder where formats are picked and placed.
Flow Library	A collection of jobs available to be produced.
GUI	Graphical User Interface.
Infeeder	Device that supplies items to be picked/placed by robot. Usually a belt conveyor.
Item	The generic term for a specific object to be picked or placed.
Job	A job contains all the information necessary for a palletizing robot to perform the actions of picking items from a certain infeeder and placing them on a certain outfeeder according to the parameters of the flow, path and pallet pattern configured by the user.
Layout	Defines the arranged two dimensional pattern of a shape in a layer.
Outfeeder	Device that enables robot to place items. Usually a pallet.
Pallet	The actual wooden or plastic structure that the products are placed on.
Pallet Pattern	The pallet pattern describes how the products should be stacked on the pallet, and consists of a number of layers which all have a layout.

Term	Definition
PalletBase	RAPID application code specific for End of Line Palletizing solutions.
PalletPack	A Pre-Engineered package of standard products that are brought together, connected and tested in such a way that they deliver a plug and produce solution for End of Line palletizing solutions without the need to resort on RAPID programming.
Pallet stack Station	A stack of pallets which are picked/placed one by one by a robot gripper in one operation.
Path	The way or track a robot follows to reach a certain position.
Picking Format	Defines one item or a group of items that can be picked/placed by a robot tool in one operation.
Product	Description of the product to be palletized.
Production	Current job or jobs being executed in a palletizing robot.
Shape	2D geometric description of an item.
Slip Sheet	A thin sheet that is placed on a pallet before palletizing of products and between two layers to increase stability in the stack.
Slip Sheet stack Station	A stack of slip sheet which are picked/placed one by one by a robot gripper in one operation.
ScreenMaker	ScreenMaker is an add-in component of Robot Studio that allows non-IT professional users to create simple operator interfaces on the FlexPendant.
Stack	An arranged pile of items consisting of a number of layers.
Step	Every one of the operations into which a palletizing robot program can be divided. Examples: Unload Infeeder 1, Load Outfeeder 2 …
TCP	Tool Center point
Wizard	Graphical User Interface running on robot FlexPendant that enables users to set up all the parameters and data necessary to define a job or jobs.

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

2.3 Working procedure

Step-by-step overview

This section gives an overview of the necessary steps to install and run PalletWare on your robot.

	Action	See
1.	Install the PalletWare software	*Installing PalletWare on page 71.*
2.	Define gripper	*Gripper on page 72.*
3.	Train workobjects	*WorkObjects on page 74.*
4.	Teach common positions	*Common Positions on page 76.*
5.	Configure cell	*Configuration on page 77.*
6.	Create new job	*Creating a new job on page 107.*
7.	Adjust job parameters	*Job parameters on page 117.*

Related information

Palletizing applications on page 15
PalletWare Concepts on page 19
Installing PalletWare on page 71
Gripper on page 72
WorkObjects on page 74
Common Positions on page 76
Configuration on page 77
Creating a new job on page 107
Job parameters on page 117

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

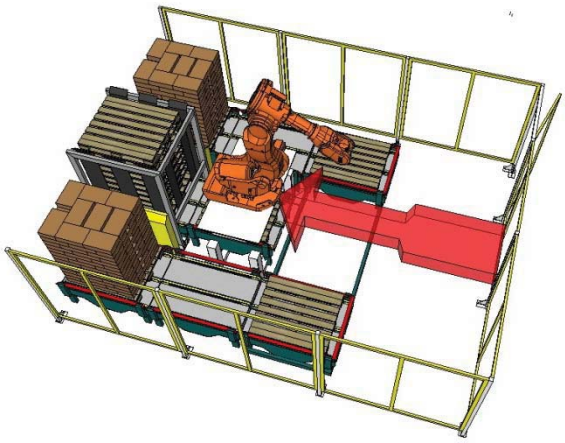
Overview

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 PalletWare application

4.1 Introduction

Overview

PalletWare is robot software running on the IRC5 controller deployed as an additional option of RobotWare for palletizing applications.

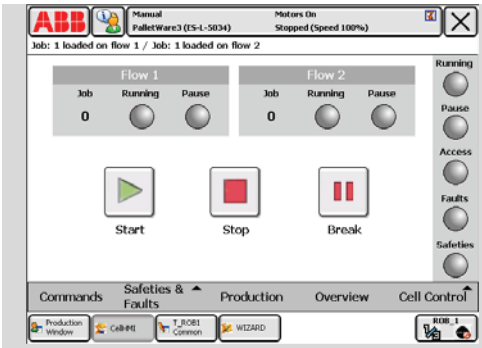
It is designed to minimizing learning and setup time. The modular program structure - program wizard and the graphical production window - together decrease the time for training. As a result it is easy & efficient to use during installation, production set-up and optimizing the robot cycle.

PalletWare contains 4 software components:

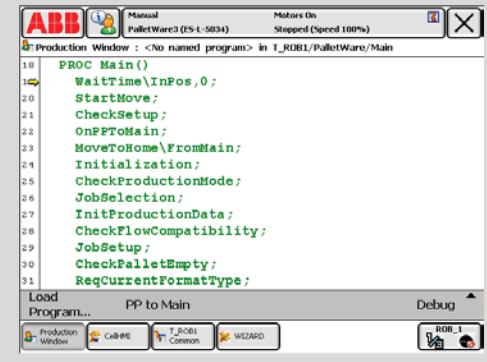
- A WIZARD to create and adjust jobs, pallet patterns and train robot movements.
- A CellHMI to control, operate and monitor a palletizing cell.
- A RAPID program to build a pallet stack according to a pallet pattern.
- An installation package to install PalletWare on IRC5 controller.

PalletWare Components

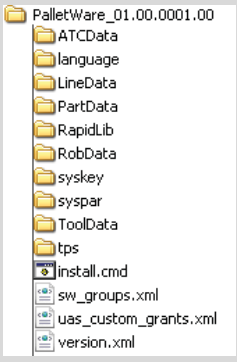
WIZARD



CellHMI



RAPID program



Installation package and robot configuration

4.2 PalletWare Concepts

The device concept

In PalletWare every area which might be occupied for robots or machines is identified as device, so signals, variables and any data are always referred to as devices.
The below table shows the different devices:

Device	Related to...
Device 1	Infeeder 1
Device 2	Infeeder 2
Device 3	Outfeeder 1
Device 4	Outfeeder 2
Device 5	Slip sheet stack station
Device 6	Pallet stack station

The step concept

The operation performed by a robot on a device (device) is known as “step”.
There are several “steps”, one for every possible operation considered in PalletWare. The bellow table shows the different “steps”.

Step Name	This step does...
FlowXUnloadInfeedYItemZ	Unload item Z from infeeder Y for flow X. X=Flow number, 1 or 2. Y=Infeeder number, 1 or 2. Z=Picking format, 1, 2 or 3.
FlowXLoadOutfeedY	Load item on outfeed Y for flow X. X=Flow number, 1 or 2. Y=Outfeeder number, 1 or 2.
FlowXUnloadPalletOutfeedY	Unloads a pallet from pallet stack to be loaded on outfeed Y for flow X. X=Flow number, 1 or 2. Y=Outfeeder number, 1 or 2.
FlowXLoadPalletOutfeedY	Loads a pallet on outfeed Y for flow X. X=Flow number, 1 or 2. Y=Outfeeder number, 1 or 2.
FlowXUnloadSlipSheetOutfeedY	Unloads a slip sheet from slip sheet stack to be loaded on outfeed Y for flow X. X=Flow number, 1 or 2. Y=Outfeeder number, 1 or 2.
FlowXLoadSlipSheetOutfeedY	Loads a slip sheet on outfeed Y for flow X. X=Flow number, 1 or 2. Y=Outfeeder number, 1 or 2.

The flow concept

The Flow concept defines the infeeder and the outfeeder where formats are picked and placed.

PalletWare is limited to a maximum of 2 flows.

One outfeeder can only be used on 1 flow.

The picking formats

The “picking formats” refer to different ways of picking items from the infeeder for a single job.
When defining a “picking format” it is necessary to define:

- Dimensions of the item or set of items
- Number of items to pick on a single pick
- Gripper displacement.

Common Positions

The “Common positions” are points (robtargets) used for all jobs or programs of PalletWare. This means, it will be necessary to make these positions reachable from any job.

Name	Description
Home	The position where robot will always start movements.
Access	The position where robot will stay when user request to access to cell.
Out Line	The position also known as “Parking”. Where robot stays when it is not on production.
EPS	The Calibration position for the EPS (Electronic Position Switches)

The movement engine

PalletWare contains an engine to handle robot movements.
This engine allows user to edit robot movements through the WIZARD the motion characteristics as:

- Position data.
- Speed data.
- Zone data.
- Acceleration.
- Waiting time before starting next movement.
- Waiting signal to allow starting next movement.
- Trigg.

The engine also allows user to add auxiliary movements to be executed before a main movement.

Main point and auxiliary points

Every movement on PalletWare is divided into 4 segments. In this manual they are referred as main point and auxiliary points.
The main point is the last segment or the last position on the movement.
The auxiliary points are the first 3segments or points before the main point. Those are known as auxiliary point 1, auxiliary point 2 and auxiliary point 3.

Indexed Position

Indexed positions are referred to those positions that are automatically calculated according to the pallet pattern and the first position on the pallet.
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.

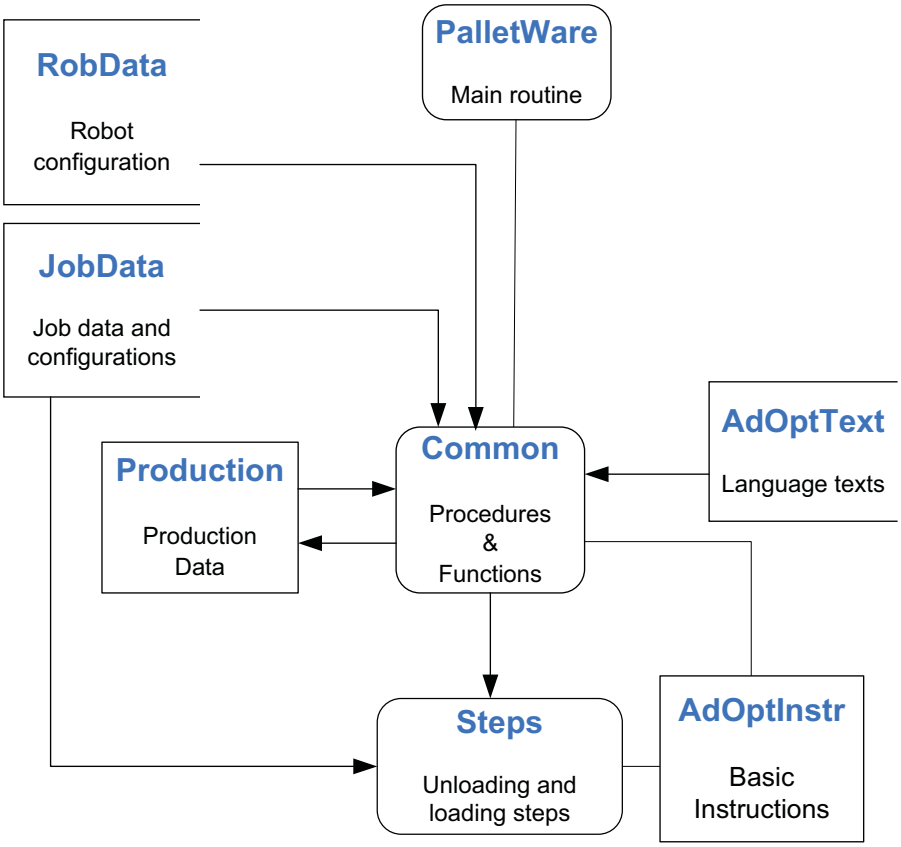
4.3 RAPID Program

Overview

The RAPID program in PalletWare is the performer of the application.
All positions, data's and configurations given by the WIZARD are used by the RAPID program to perform the process of palletizing.

Program structure

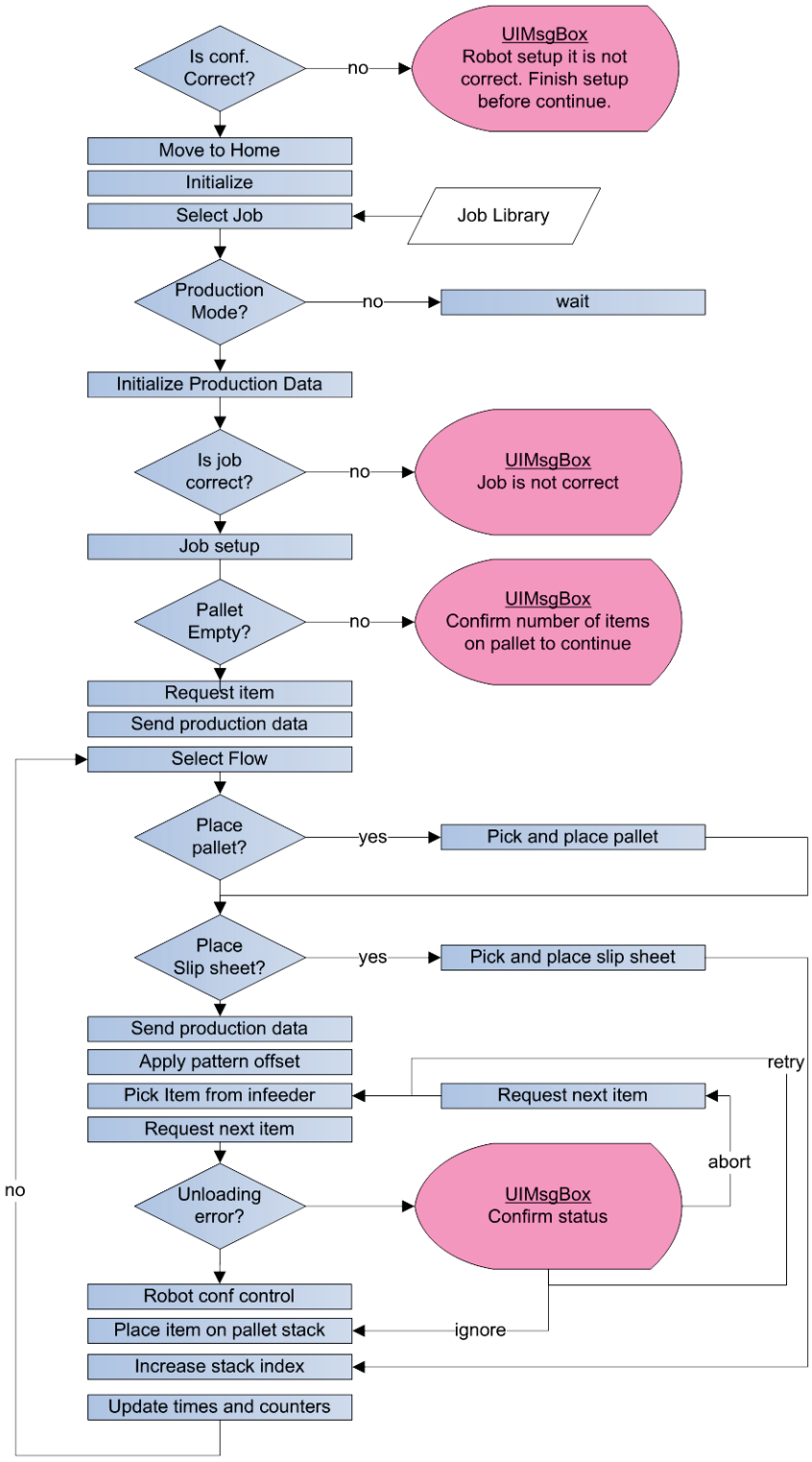
The bellow diagram shows the structure of the program and the RAPID modules.



RAPID modules

Name	Type	Description
PalletWare	Program	This module contains the main routine.
JobDataFX	Program	It holds the loaded job data. X=Flow number.
Production	System	The module contains the current production data and engines to retrieve job data.
Common	System	This module is the core of the RAPID program. It holds a library procedures and function used by the rest of modules.
Steps	System	It contains all the steps for every possible operation.
AdOptInstr	System	In this module the movement engine and the “record” types are implemented.

Program flow



Related information

Palletizing applications on page 15
PalletWare Concepts on page 19
The User Interface on page 25

4.4 The User Interface

Overview

The user interface resides on FlexPendant. It is a customized graphical user interface designed to setup, monitor and control the palletizing process.

The user interface covers the following topics:

- Define jobs and pallet patterns.
- Define and adjust robot movements.
- Hot tuning of robot movements and pallet patterns.
- Monitor and control production.
- Monitor and control cell devices.
- Monitor cell safeties and faults.
- Request robot commands.
- Production changeover.

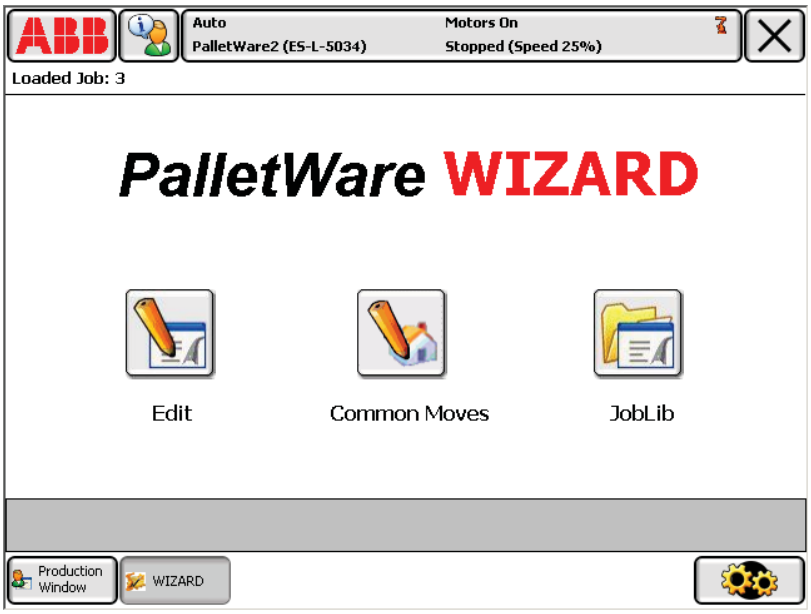
The user interface consists of 2 applications:

- WIZARD
- CellHMI

WIZARD

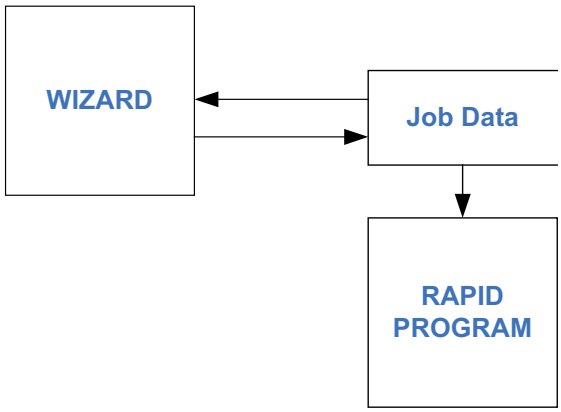
The wizard contains all necessary tools to prepare robot for production. When the job is completed the program will be ready to run.

Illustration



Interface with RAPID program

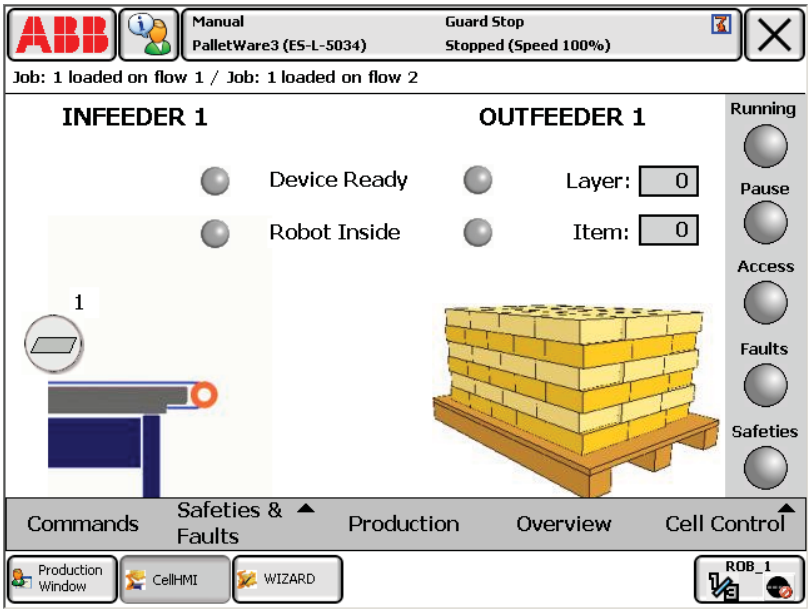
The WIZARD and the RAPID program share information through RAPID modules which hold all the necessary data to defined jobs.



CellHMI

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.

Illustration



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.

Related information

Palletizing applications on page 15

PalletWare Concepts on page 19

RAPID Program on page 21

Wizard on page 29

CellHMI on page 56

Configuration on page 77

5 Navigate and handle PalletWare

5.1 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

Palletizing applications on page 15

PalletWare Concepts on page 19

The User Interface on page 25

Wizard on page 29

CellHMI on page 56

Configuration on page 77

5.2 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.

5.2.1 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 15

RAPID Program on page 21

The User Interface on page 25

Job Editor on page 31

Common Moves on page 34

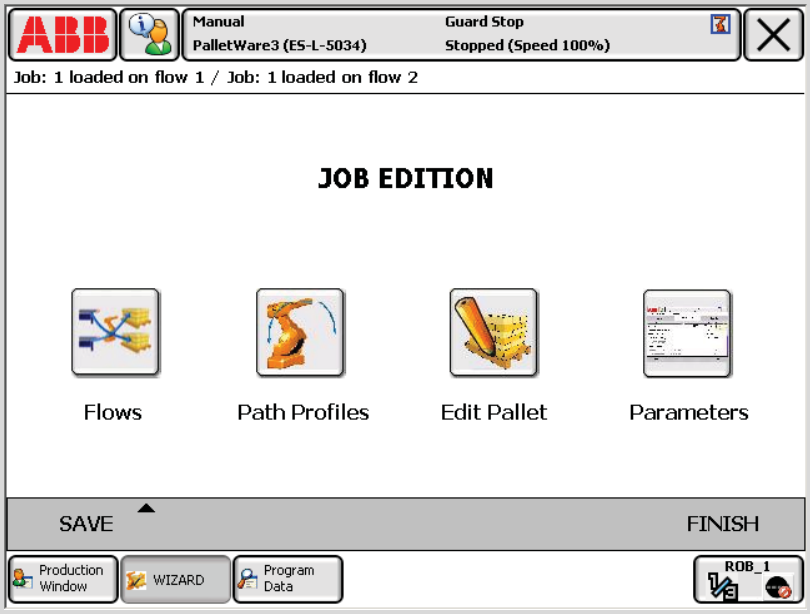
Job Library on page 32

Creating a new job on page 107

5.2.2 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

Palletizing applications on page 15

PalletWare Concepts on page 19

RAPID Program on page 21

The User Interface on page 25

Parameters on page 35

Flow Editor on page 36

Path Profiles on page 37

Edit Pallet on page 46

Configuration on page 77

Creating a new job on page 107

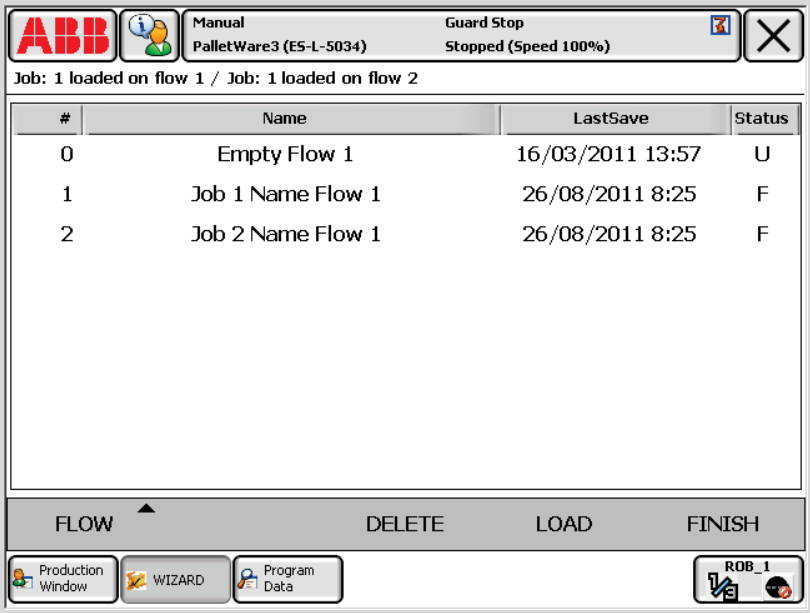
5.2.3 Job Library

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

Palletizing applications on page 15
PalletWare Concepts on page 19
RAPID Program on page 21
The User Interface on page 25
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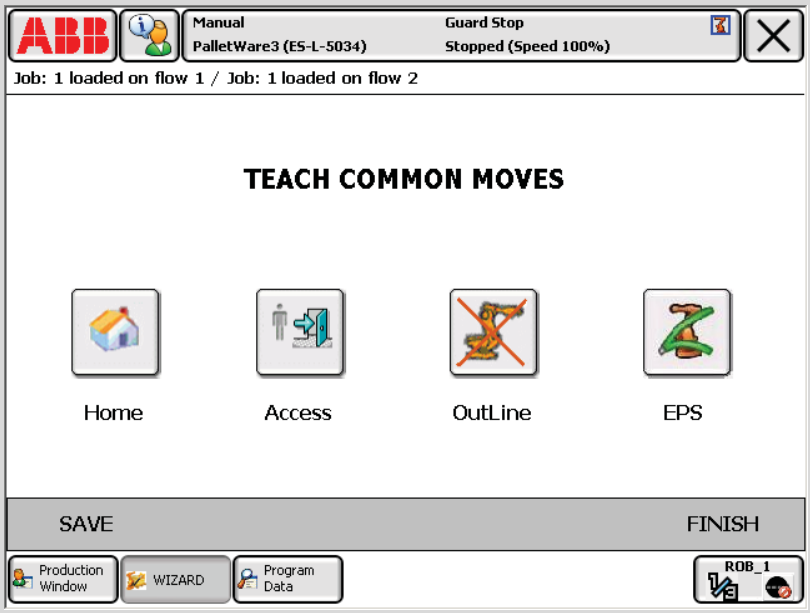
Creating a new job on page 107

5.2.4 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

Palletizing applications on page 15

PalletWare Concepts on page 19

RAPID Program on page 21

The User Interface on page 25

Common Positions on page 76

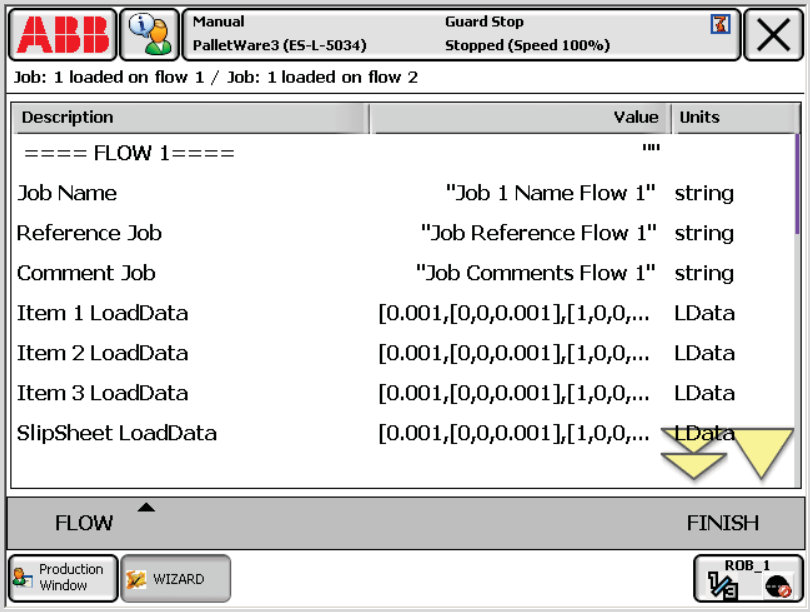
5.2.5 Parameters

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

RAPID Program on page 21

The User Interface on page 25

Configuration on page 77

Creating a new job on page 107

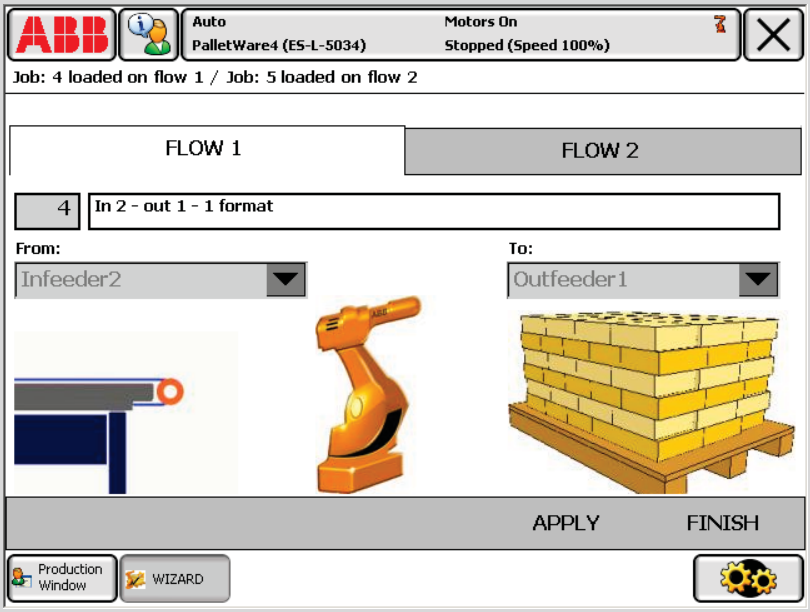
5.2.6 Flow Editor

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 15

PalletWare Concepts on page 19

RAPID Program on page 21

The User Interface on page 25

Configuration on page 77

Creating a new job on page 107

5.2.7 Path Profiles

Description of the view

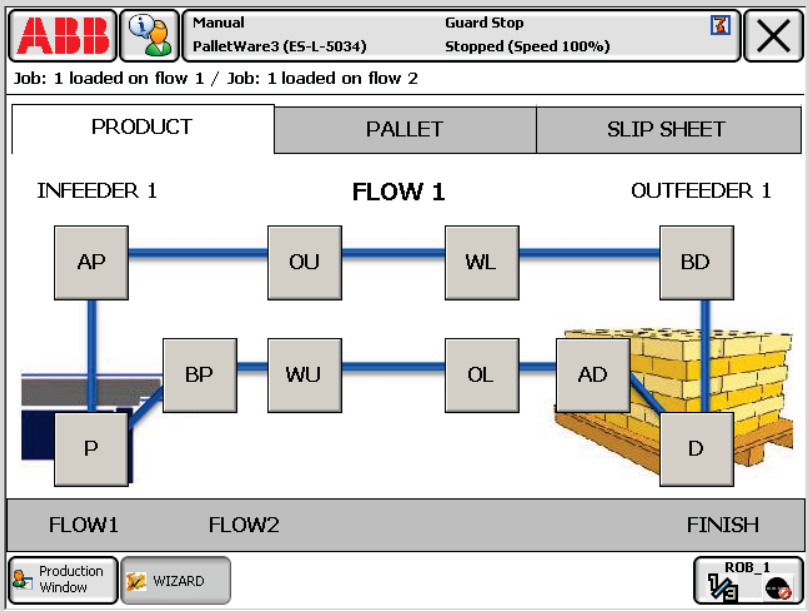
The Path Profiles view allows the user to select each of the positions the robot follows during the job.

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

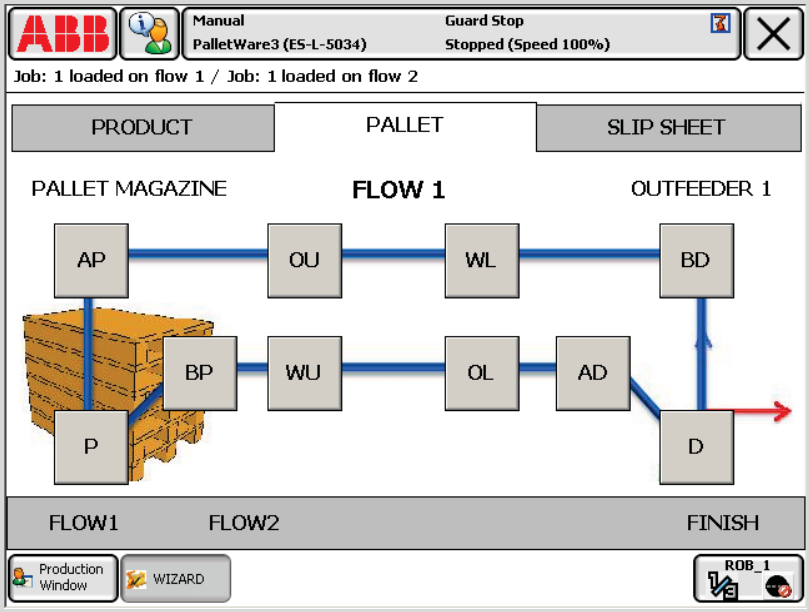
Indexed positions are referred to those positions that are automatically calculated according to the pallet pattern.
When clicking on points inside the pallet stack user will have to select the layer number and item.
All the indexed position use the same movement data’s of the first point on the pallet 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.



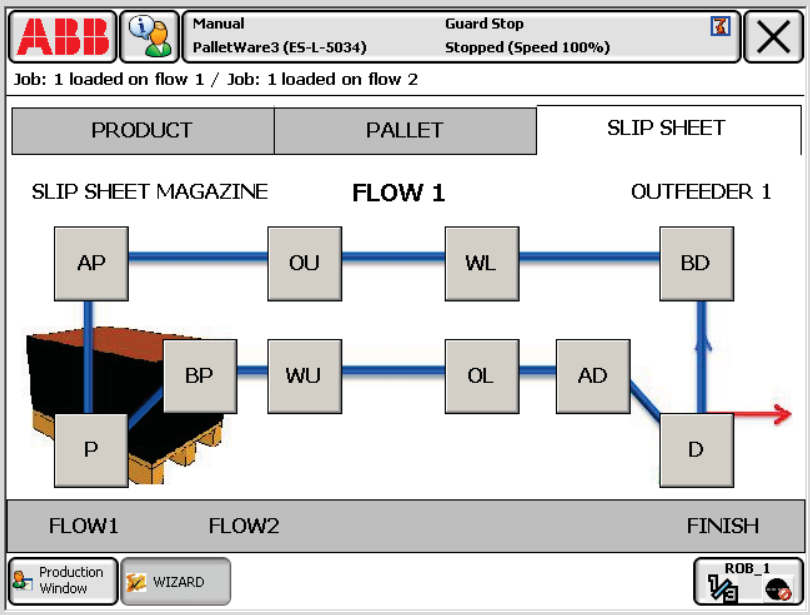
Click on...	When you want to...
BP	To edit Before Pick Position.
P	To edit Pick position.
AP	To edit After Pick position.
WU	To edit Wait Unload Position.
OU	To edit Out Unload position.
OL	To edit Out Load Position.
WL	To edit Wait Load position.
BD	To edit Before Drop position.
D	To edit Drop Position.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

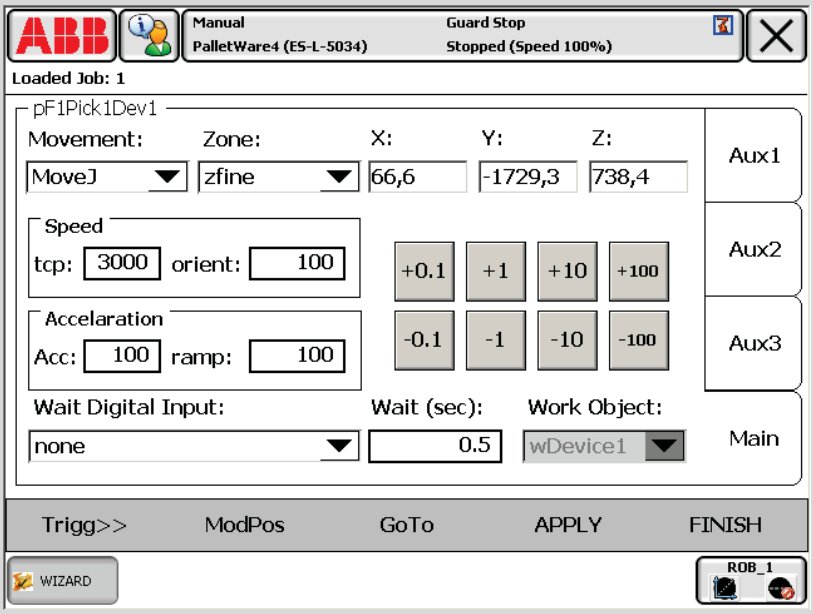
Related information

Palletizing applications on page 15
PalletWare Concepts on page 19
RAPID Program on page 21
The User Interface on page 25
Pallet Pattern Editor on page 50
Configuration on page 77
Creating a new job on page 107

5.2.8 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

Palletizing applications on page 15

PalletWare Concepts on page 19

RAPID Program on page 21

The User Interface on page 25

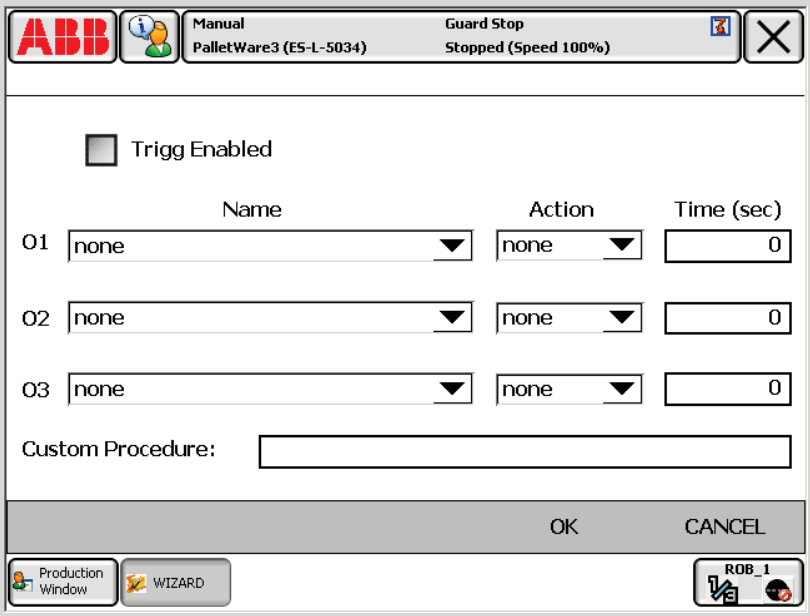
Trigg Editor on page 44

Creating a new job on page 107

5.2.9 Trigg Editor

Description of the view

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



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.

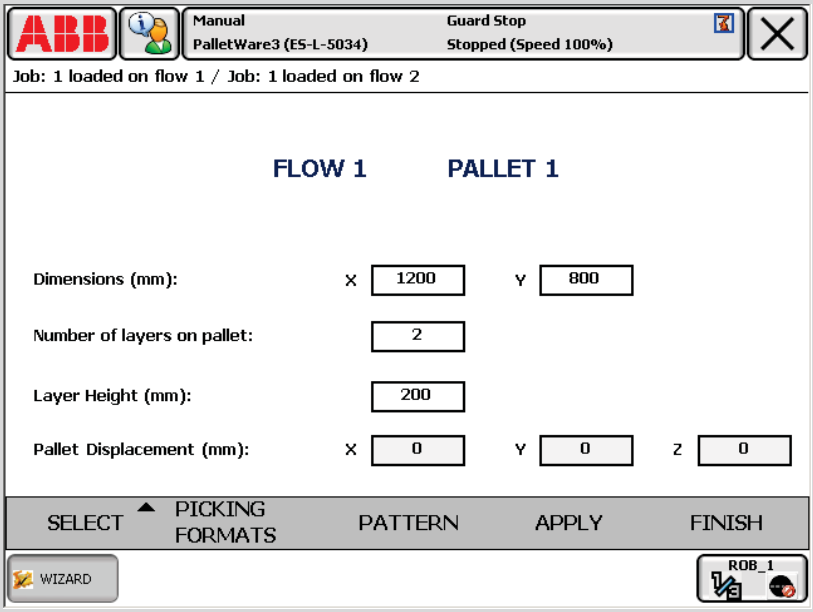
Related information

Palletizing applications on page 15
PalletWare Concepts on page 19
RAPID Program on page 21
The User Interface on page 25
Point Editor on page 42
PalletWare IO on page 85
Creating a new job on page 107

5.2.10 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

Palletizing applications on page 15

PalletWare Concepts on page 19

RAPID Program on page 21

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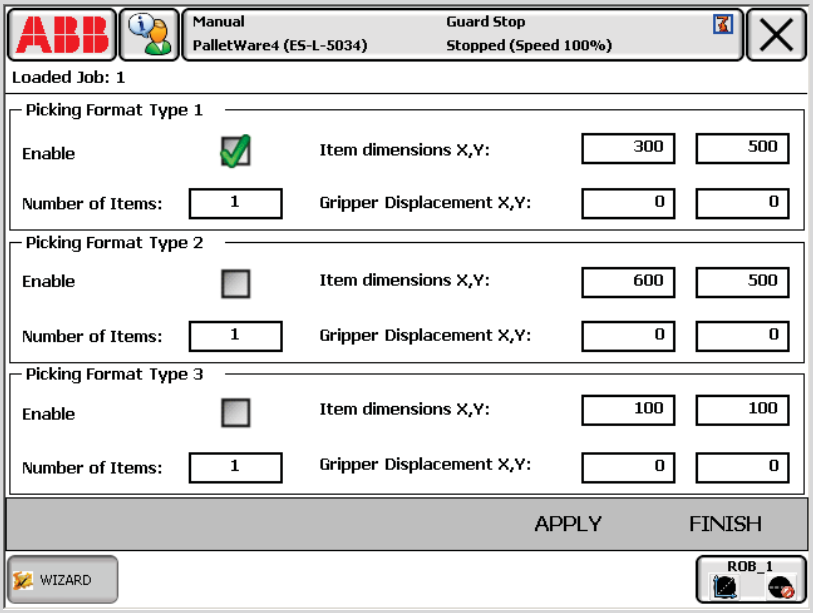
Configuration on page 77

Creating a new job on page 107

5.2.11 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

Palletizing applications on page 15
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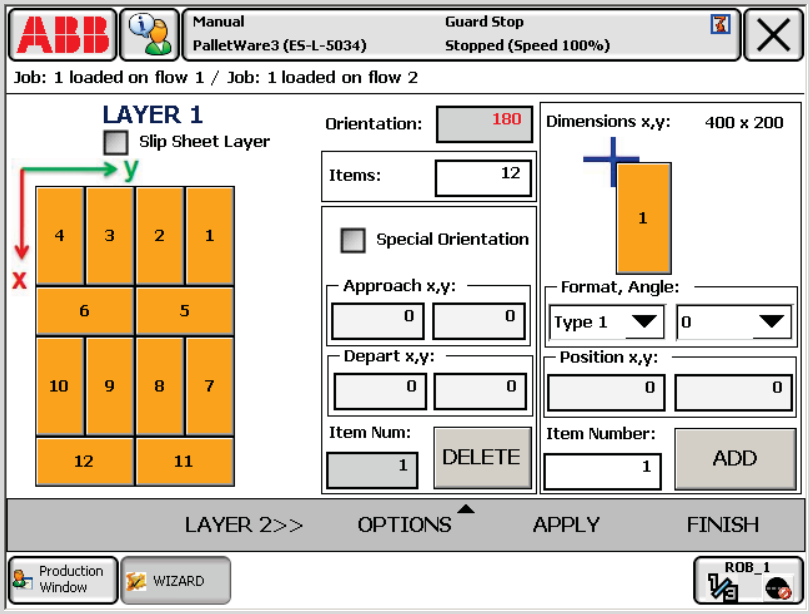
The User Interface on page 25
Creating a new job on page 107

5.2.12 Pallet Pattern Editor

Description of the view

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

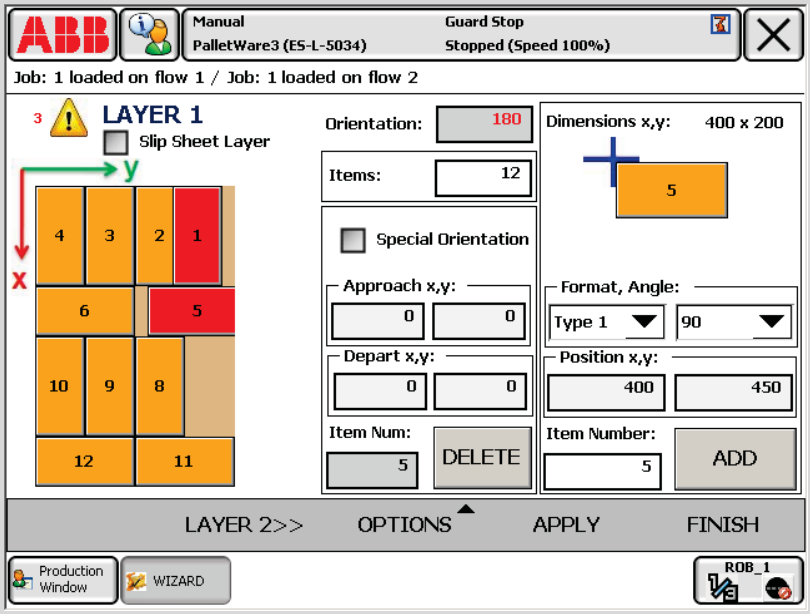


Field	Description
Dimensions x,y	It shows the dimensions of the item.
Format Type	It defines the type of picking format to be added.
Angle	It defines the orientation of the item to be added.
Position x,y	It defines the position of the item to be added.
Item Number	It defines the order in which the items 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 layer 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.

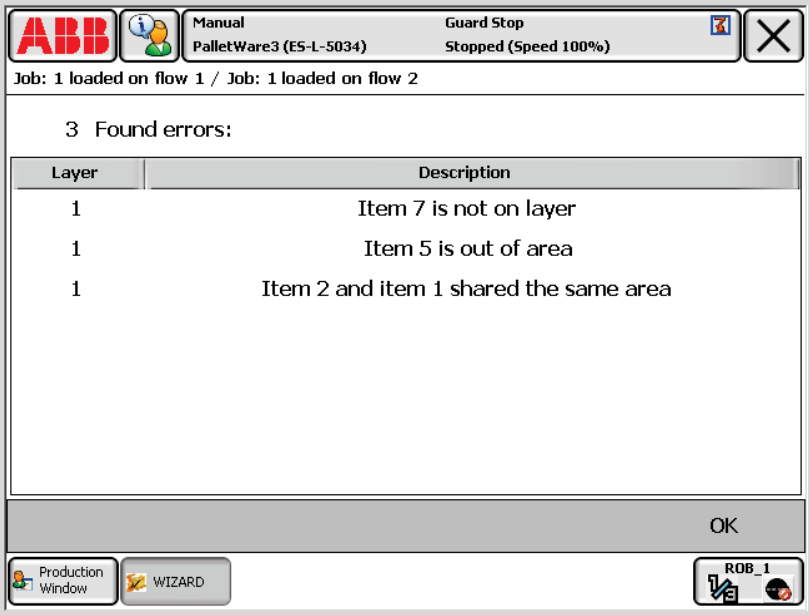
Related information

Palletizing applications on page 15
PalletWare Concepts on page 19
RAPID Program on page 21
The User Interface on page 25
Point Editor on page 42
Warnings on pallet pattern on page 54
Creating a new job on page 107

5.2.13 Warnings on pallet pattern

Description of the view

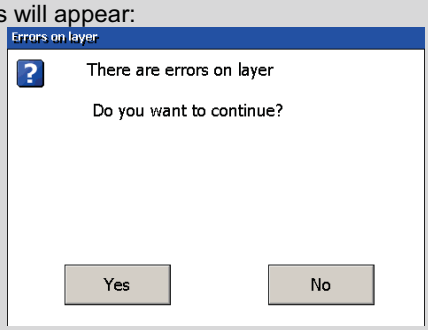
The Warnings on Pallet view show user a list of warnings detected on the pallet pattern.



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

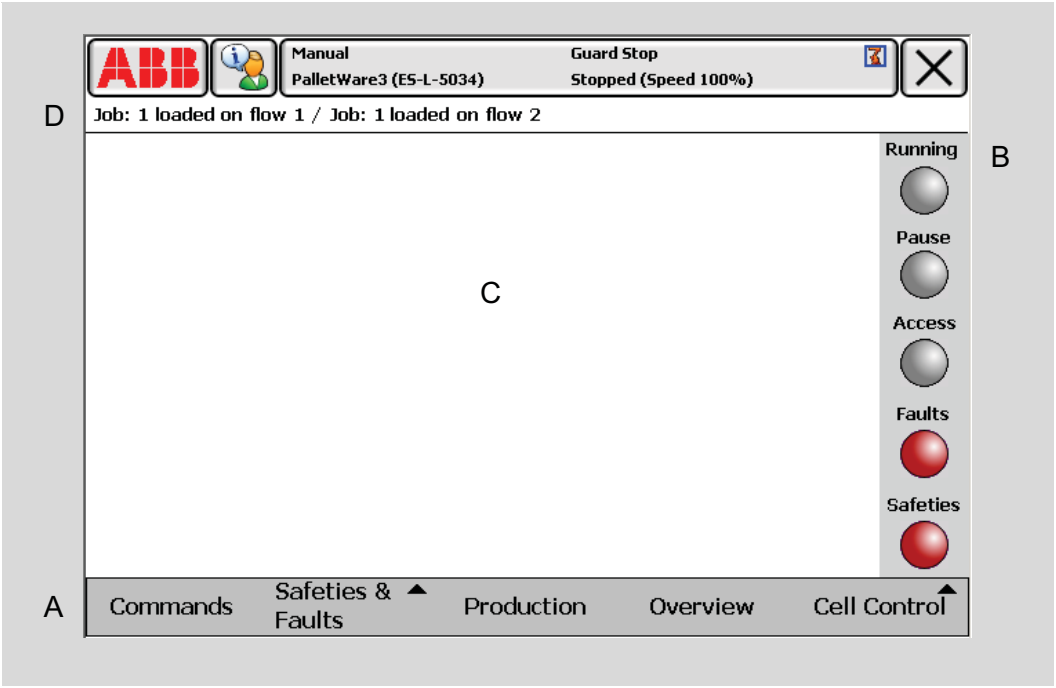
Palletizing applications on page 15
PalletWare Concepts on page 19
RAPID Program on page 21
The User Interface on page 25
Pallet Pattern Editor on page 50
Creating a new job on page 107

5.3 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.

Related information

The User Interface on page 25

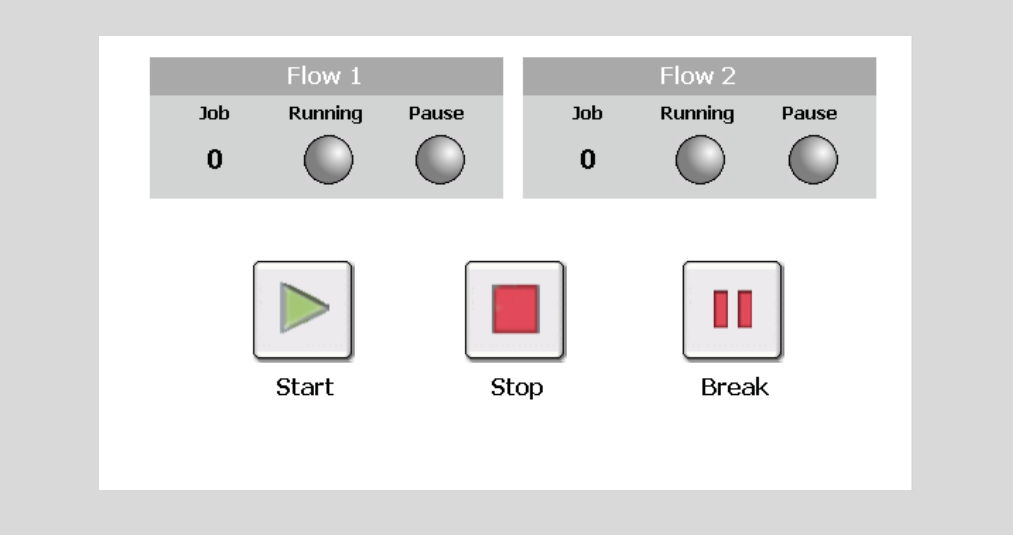
Configuration on page 77

PalletWare IO on page 85

5.3.1 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.

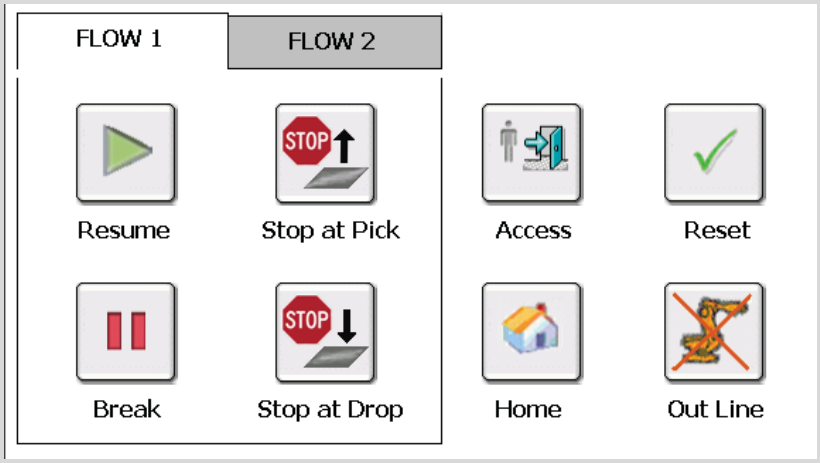
Related information

Palletizing applications on page 15
PalletWare Concepts on page 19
RAPID Program on page 21
The User Interface on page 25
Configuration on page 77
PalletWare IO on page 85

5.3.2 Commands

Description of the view

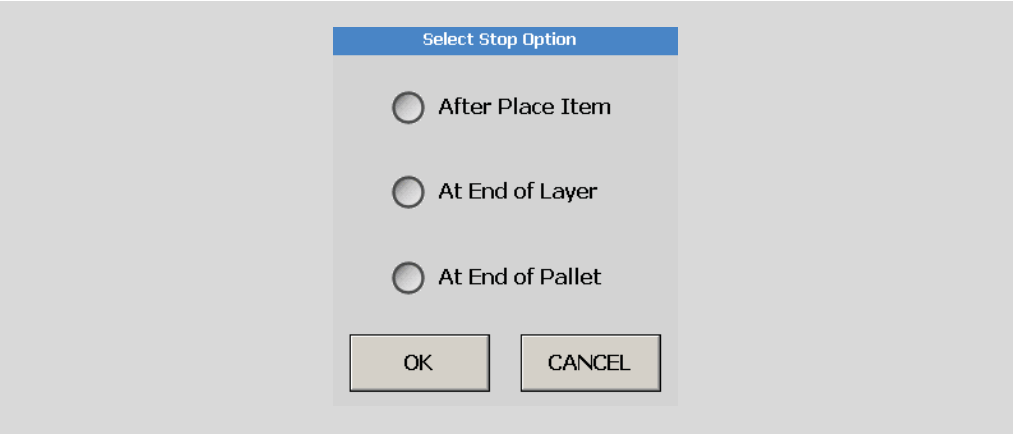
This view enables user to send commands to cell.



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...	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 15
PalletWare Concepts on page 19
RAPID Program on page 21
The User Interface on page 25
Common Positions on page 76
Configuration on page 77
PalletWare IO on page 85

5.3.3 Faults

Description of the view

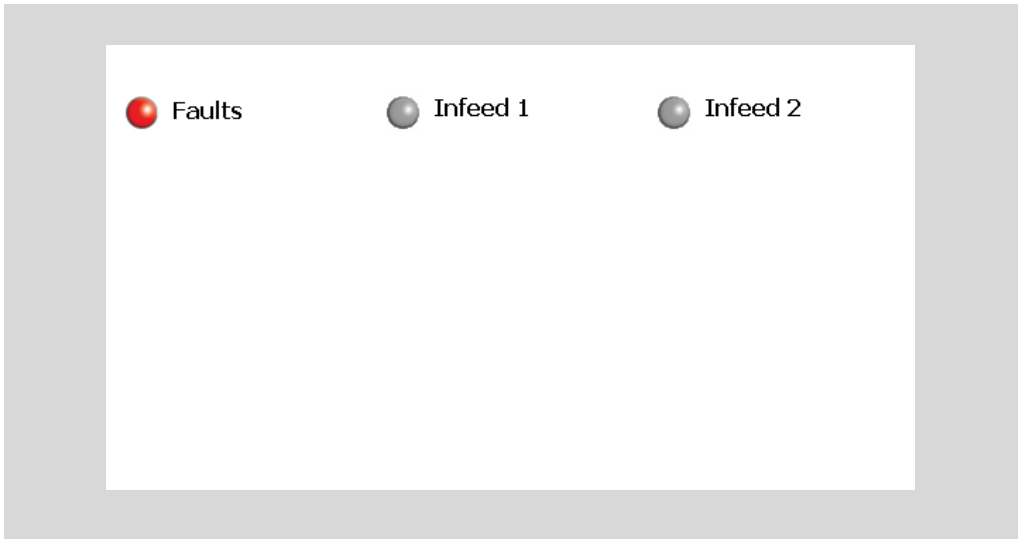
In this view user is able to see Cell faults through a set of LEDs.

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.

Related information

The User Interface on page 25

Configuration on page 77

PalletWare IO on page 85

5.3.4 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.

Related information

The User Interface on page 25

Configuration on page 77

PalletWare IO on page 85

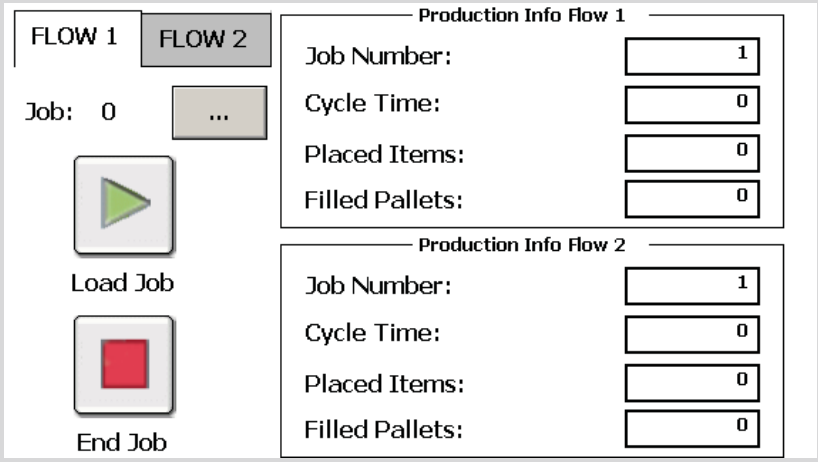
5.3.5 Production

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!

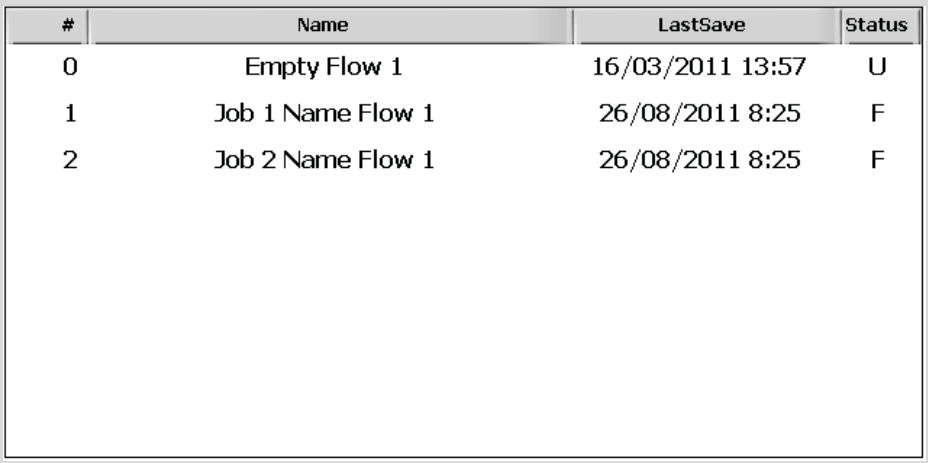
The Flow 2 fields will only appear if a second outfeeder is enabled on robot configuration.



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.



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

Palletizing applications on page 15

PalletWare Concepts on page 19

RAPID Program on page 21

The User Interface on page 25

Wizard on page 29

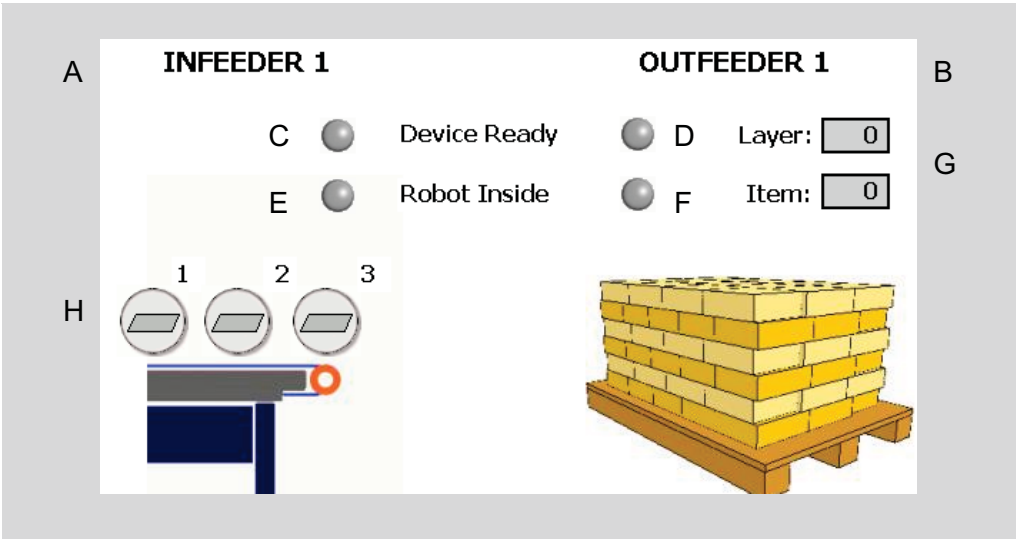
Configuration on page 77

PalletWare IO on page 85

5.3.6 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 15

PalletWare Concepts on page 19

RAPID Program on page 21

The User Interface on page 25

Wizard on page 29

Configuration on page 77

PalletWare IO on page 85

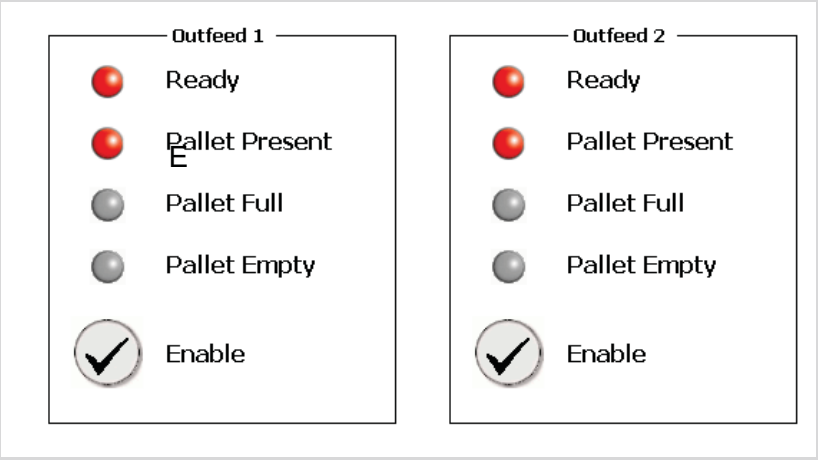
5.3.7 Outfeeders

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

Palletizing applications on page 15

The User Interface on page 25

Configuration on page 77

PalletWare IO on page 85

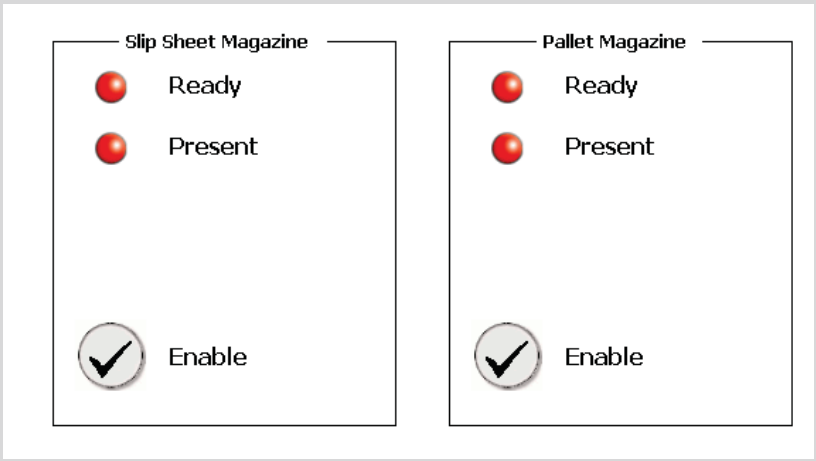
5.3.8 Magazines

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 15

The User Interface on page 25

Configuration on page 77

PalletWare IO on page 85

6 Installation and Commissioning

6.1 Introduction

Overview

PalletWare is deployed as an additional option of RobotWare therefore, to create a PalletWare system, it is necessary to use RobotStudio.

Once a system with PalletWare has been built and downloaded to the robot controller, some setup is required in order to leave the Robot ready for production.

Structure of this chapter

This chapter describes how to install PalletWare and a description of all configuration settings required.

6.2 Installing PalletWare

General

PalletWare is deployed as an additional option of RobotWare therefore, to create a PalletWare system, it is necessary to use RobotStudio.

First of all, it is necessary to install PalletWare Additional Option on your computer, and then use RobotStudio to create a system with PalletWare to finally download it to your robot.

Prerequisites

It is necessary to have a version of PalletWare software and a valid license key.

Install PalletWare

	Action
1.	Copy the contents of PalletWare_XX.XX.XXXX.XX provided with your system onto the MediaPool folder of the computer.  **NOTE!** Mediapool folder is usually on the path: *"C:\Program Files\ABB Industrial IT\Robotics IT\MediaPool"*
2.	On RobotStudio open the System Builder Wizard.
3.	Click on "Create New" or "Create from Backup" depending on your needs.
4.	Enter System Name and path where your system will be saved.
5.	Select Controller key and valid RobotWare version.
6.	Enter Drive Key.
7.	Add PalletWare additional option by entering PalletWare key.
8.	Configure RobotWare options and PalletWare options according to your needs.
9.	Click on Finish.
10.	Click on "Download to Controller" to download system to robot.
11.	Select controller and click on Load.
12.	Wait until the system has been loaded and controller started.
	Now PalletWare is ready on your robot!

6.3 Gripper

General

It is important to always define the actual tool load and when used, the payload of the robot too. Incorrect definitions of load data can result in overloading of the robot mechanical structure. When incorrect load data is specified, it can often lead to the following consequences:

If the value in the specified load data is greater than the true load:

- The robot will not be used to its maximum capacity
- Impaired path accuracy including a risk of overshooting
- Risk of overloading the mechanical structure

If value in the specified load data is smaller than the true load:

- Risk of overloading the mechanical structure
- Impaired path accuracy including a risk of overshooting

It is necessary to execute Load Identification.

Refer to Robot Product manual for further information about how to execute Load Identification.

The created tool is not useful until you have defined the tool data (TCP coordinates, orientation, weight etc.).

RAPID Variable name

The name of the RAPID variable that describes your gripper on PalletWare is “tGripper”.

Adding Gripper Signals

A basic step is to setup the inputs and outputs on robot system parameters to be able to handle the gripper from robot program.

User needs to setup all the required I/O boards and I/Os according to gripper design Defining Gripper signals

In order to control your gripper status on PalletWare it is necessary to cross-connect your gripper inputs with PalletWare pre-defined inputs. The bellow table contains all the signals necessary to cross-connect.

Name	Cross-connect with...
vdiItem1OnGripper	The signal that informs if gripper holds the item 1.
vdiItem2OnGripper	The signal that informs if gripper holds the item 2.
vdiItem3OnGripper	The signal that informs if gripper holds the item 3.
vdiSearchStopPallet	The signal that informs if pallet stack has been detected.
vdiSearchStopSlipSheet	The signal that informs if slip sheet stack has been detected.
vdiPalletOnGripper	The signal that informs if gripper holds a pallet.
vdiSlipSheetOnGripper	The signal that informs if gripper holds a slip sheet.

Handling gripper through PalletWare – Custom Actions

In order handle gripper signals PalletWare contains a set of RAPID procedures which are called by RAPID events. All the required RAPID instructions can be added on those procedures.

Related information

PalletWare Concepts on page 19

RAPID Program on page 21

Custom Actions on page 83

PalletWare IO on page 85

6.4 WorkObjects

General

A work object is a coordinate system with specific properties attached to it.

The work object coordinate system must be defined in two frames, the user frame (related to the world frame) and the object frame (related to the user frame).

On PalletWare every device is connected to a work object. Though it is only required to define outfeeders work objects, it is suggested to define the rest of devices.

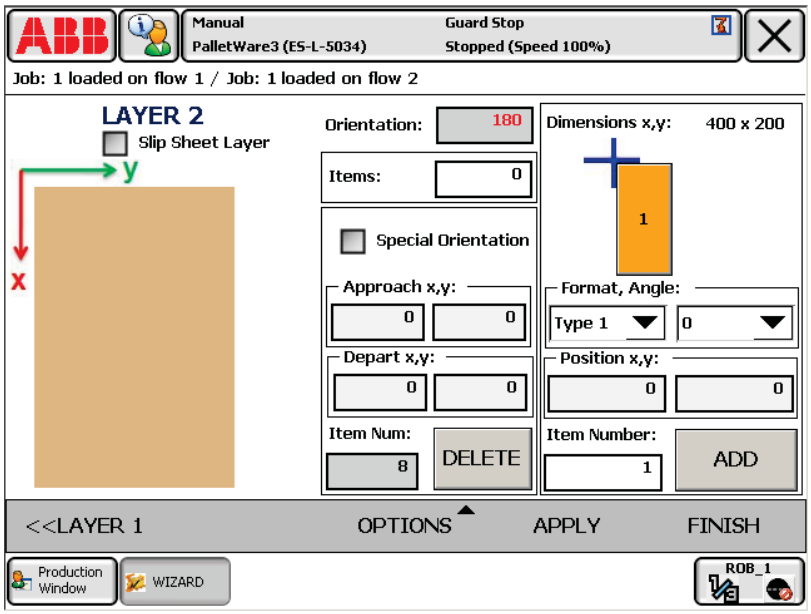
RAPID variable names

The following table shows the relation between devices and work objects:

Work Object	Device
wDevice1	Infeeder 1
wDevice2	Infeeder 2
wDevice3	Outfeeder 1
wDevice4	Outfeeder 2
wDevice5	Slip sheet stack station
wDevice6	Pallet stack station

TIP!

When defining the work objects it is important to consider wizard pallet editor view to make easier the process of creating new pallet patterns. The following illustration shows the pallet pattern view:



NOTE!

The X and Y arrows represents the work object frame.

Related information

PalletWare Concepts on page 19
RAPID Program on page 21
The User Interface on page 25
Wizard on page 29

6.5 Common Positions

General

On PalletWare the “common positions” are points (robtargets) used for all the jobs. This means, it will be necessary make this positions reachable for any job.

Positions

The following table shows the description of every “common position”:

Name	Description
Home	Robot will always start movements from this position.
Access	Position where robot goes when an access is requested.
Out Line	Position where robot stays when it is not in production or also known as parking position
EPS	Calibration position for Electronic Position Switches

Related information

PalletWare Concepts on page 19

RAPID Program on page 21

Wizard on page 29

6.6 Configuration

Overview

Because of the different layouts configuration of palletizing cells, PalletWare contains some parameters that allow user to adapt the GUI to the requirements.

Structure of this chapter

This chapter contains a description of all configuration parameters.

6.6.1 General parameters

Overview

On PalletWare there are some configuration parameters common for the robot program and for the GUI which will allow user to adapt PalletWare to the requirements.

Parameters

Name	Description
nMaxNumOfLayers	It defines the maximum number of layers.
nMaxNumOfItemsOnLayer	It defines the maximum number of items for each layer.
bInfeed2Enabled	When TRUE it will enable the infeeder 2.
bOutfeed2Enabled	When TRUE it will enable the outfeeder 2.
bLayerSheetMagEnabled	When TRUE it will enable the slip sheet stack station.
bPalletMagEnabled	When TRUE it will enable the pallet stack station.
vSearch	It defines the speed when searching for magazine height.
nMinSearchHeight	It defines the minimum height robot is allowed to reach when searching for magazine height.
nSlipSheetHeight	It defines slip sheet height.

Related information

PalletWare Concepts on page 19

RAPID Program on page 21

The User Interface on page 25

Wizard on page 29

CellHMI on page 56

6.6.2 Job parameters view

Overview

It is possible for the user to change the aspect of the Wizard Parameters view by means of modifying the value of some RAPID variables.

ParamDef Type

The type of variable the Wizard is using to show RAPID data to users it is named ParamDef. The aspect is as follows:

```
RECORD ParamDef
  string sVarName;
  string sDescription;
  string sUnit;
  bool bEditableInAuto;
  bool bRequiresUpdate;
  string sMin;
  string sMax;
  num nDeviceType;
ENDRECORD
```

Parameters

Array variables of ParamDef are created on RobData RAPID module. These variables define the list of parameters to be shown on the WIZARD.

Name	Description
pdF1Param	It contains a list of RAPID variables to be shown on job parameters view for flow 1.
pdF2Param	It contains a list of RAPID variables to be shown on job parameters view for flow 2.

Record components

Name	Type	Description
sVarName	String	It contains the name of the RAPID variable to show.
sDescription	String	It contains the description to show.
sUnit	String	It defines the unit type for visualization.
bEditableInAuto	Bool	It defines whether the parameter can be modified in AUTO
bRequiresUpdate	Bool	When TRUE Wizard request to update trigs and events on robot program.
sMin	String	It represents the minimum value.
sMax	String	It represents the maximum value.
sDeviceType	Num	It represents the device type. Default value=0

Related information

RAPID Program on page 21
The User Interface on page 25
Wizard on page 29

6.6.3 Safeties and Faults view

Overview

It is possible for the user to change the aspect of the CellHMI Faults and Safeties views by means of modifying the value of some RAPID variables.

ParamDef Type

The type of variable the CellHMI is using to show signals on CellHMI to users it is named *SignalDef*. The aspect is as follows:

```
RECORD SignalDef
  bool bEnabled;
  string stSignalName;
  string stSignalDesc;
ENDRECORD
```

Record components

Name	Type	Description
bEnabled	Bool	When TRUE enables to LED on screen
stSignalName	String	It contains the name of the signal to show on screen
stSignalDesc	String	It contains the description to show on screen

Parameters

Name	Description
Safeties	It contains the Safeties view configuration
Faults	It contains the Faults view configuration

Related information

RAPID Program on page 21

The User Interface on page 25

CellHMI on page 56

PalletWare IO on page 85

6.6.4 Zonedata

Overview

In PalletWare it is possible to edit the zonedata drop-down list used on the Point Editor view as also edit the values of those zonedata.

Add or remove Zonedata

By adding or deleting zonedata constants on the RAPID module named RobData.sys the drop-down list on Point Editor will automatically adapt to the changes.

The only requirement is to add the zonedata as shown below:

CONST zonedata zone_%NAME% := [“zonedata values”];

Example of zonedata z0:

CONST zonedata zone_z0 := [FALSE, 0.3, 0.3, 0.3, 0.03, 0.3, 0.03];

Adjust zonedata values

In order to adjust a particular zonedata it is only necessary to modify the variable declaration on RobData.sys module.

NOTE!

- The fact of modifying a zonedata declaration will not modify the values of created jobs; instead user should edit those jobs.
- After adjusting zonedata declaration user might find a blank selection on zonedata drop-down list; this is because the zonedata values applied to that point do not match with any of those declared on RobData.sys. When this occurs it is only necessary to select a new element on the zonedata drop-down list and apply.

Related information

RAPID Program on page 21

The User Interface on page 25

Wizard on page 29

6.7 Custom Actions

Overview

PalletWare contains a set of RAPID procedures which are called by RAPID events on which RAPID instructions can be added to adapt the robot program to the process requirements.

Procedures

User can find the procedures on table bellow on CustomActions.mod.

Procedure name...	The procedure is called when...
OnPPToMain	Program starts from main.
PickItem1Infeed1	Robot is on pick item 1 on infeed 1 position.
PickItem2Infeed1	Robot is on pick item 2 on infeed 1 position.
PickItem3Infeed1	Robot is on pick item 3 on infeed 1 position.
AfterPickInfeed1	Robot is on after pick item on infeed 1 position.
OutOfInfeed1	Robot is out of infeed 1 position.
PickItem1Infeed2	Robot is on pick item 1 on infeed 2 position.
PickItem2Infeed2	Robot is on pick item 2 on infeed 2 position.
PickItem3Infeed2	Robot is on pick item 3 on infeed 2 position.
AfterPickInfeed2	Robot is on after pick item on infeed 2 position.
OutOfInfeed2	Robot is on out of infeed 2 position.
DropItem1Outfeed1	Robot is on drop item 1 on outfeed 1 position.
DropItem2Outfeed1	Robot is on drop item 2 on outfeed 1 position.
DropItem3Outfeed1	Robot is on drop item 3 on outfeed 1 position.
AfterDropOutfeed1	Robot is on after drop item on outfeed 1 position.
OutOfOutfeed1	Robot is on out of outfeed 1 position.
DropItem1Outfeed2	Robot is on drop item 1 on outfeed 1 position.
DropItem2Outfeed2	Robot is on drop item 2 on outfeed 1 position.
DropItem3Outfeed2	Robot is on drop item 3 on outfeed 1 position.
AfterDropOutfeed2	Robot is on after drop item on outfeed 1 position.
OutOfOutfeed2	Robot is on out of outfeed 1 position.
StartSearchPallet	Robot starts searching for pallet on pallet stack station.
EndSearchPallet	Robot ends searching for pallet on pallet stack station.
PickPallet	Robot is on pick pallet position.
OutOfPalletMagazine	Robot is on out of pallet stack station position.
DropPallet	Robot is on drop pallet position.

Procedure name...	The procedure is called when...
AfterDropPallet	Robot is on After drop pallet position.
PickSlipSheet	Robot is on pick slip sheet position.
StartSearchSlipSheet	Robot starts searching for slip sheet on slip stack station.
EndSearchSlipSheet	Robot ends searching for slip sheet on slip sheet stack station.
DropSlipSheet	Robot is on Drop slip sheet position.
AfterDropSlipSheet	Robot is on After drop slip sheet position.
OutOfSlipSheetMagazine	Robot is on Out of slip sheet stack station position.
OnUnloadingFault	Robot is on unloading fault and waiting for user to select an option.
OnUnloadingFault_Abort	Robot is on unloading fault and user selects “abort”.
OnUnloadingFault_Retry	Robot is on unloading fault and user selects “retry”.
OnUnloadingFault_Ignore	Robot is on unloading fault and user selects “ignore”.

Related information

PalletWare Concepts on page 19

RAPID Program on page 21

6.8 PalletWare IO

Structure of this chapter

This chapter contains a description of all the signals uses on PalletWare.

6.8.1 Inputs

List of inputs

Name	Type	Description
rdiMotOnStart	DI	It orders motors on and start.
rdiMotorOn	DI	It orders motors on.
rdiStartMain	DI	It orders start at main.
rdiResetEstop	DI	It resets Emergency Stop.
rdiPLCLifeBit	DI	It can be used to monitor PLC communication
rdiQuickStop	DI	It orders a quick stop.
rdiStopInstr	DI	It orders a stop at end of instruction.
rdiProductionMode	DI	High to select production mode.
rgiOrderRequest	GI	Order number. Length: 8 bits.
rgiF1JobNumber	GI	Job number to run on flow 1. Length: 16 bits.
rgiF2JobNumber	GI	Job number to run on flow 2. Length: 16 bits.
rdiOutOfInfeeder1	DI	It is connected to LED out of infeeder 1 of CellHMI.
rdiOutOfInfeeder2	DI	It is connected to LED out of infeeder 2 of CellHMI.
rdiOutOfOutfeeder1	DI	It is connected to LED out of oufeeder 1 of CellHMI.
rdiOutOfOutfeeder2	DI	It is connected to LED out of oufeeder 2 of CellHMI.
rdiOutOfSlipSheetMag	DI	It is connected to LED out of slip sheet magazine of CellHMI.
rdiOutOfPalletMag	DI	It is connected to LED out of pallet magazine of CellHMI.
rdiPickPlaceItemFlow1	DI	It orders to pick and place item on flow 1.
rdiPickPlaceItemFlow2	DI	It orders to pick and place item on flow 2.
rdiFlow1Ready	DI	It shows status of flow 1.
rdiFlow2Ready	DI	It shows status of flow 2.

Name	Type	Description
rdiFlow1BreakAfterItem	DI	It orders flow 1 to break after robot place next item.
rdiFlow1BreakAfterLayer	DI	It orders flow 1 to break when robot finishes stacking the current layer.
rdiFlow1BreakAfterPallet	DI	It orders flow 1 to break when robot finishes stacking the current pallet.
rdiFlow2BreakAfterItem	DI	It orders flow 2 to break after robot place next item.
rdiFlow2BreakAfterLayer	DI	It orders flow 2 to break when robot finishes stacking the current layer.
rdiFlow2BreakAfterPallet	DI	It orders flow 2 to break when robot finishes stacking the current pallet.
rdiFlow1StopAfterItem	DI	It orders flow 1 to stop job after robot place next item.
rdiFlow1StopAfterLayer	DI	It orders flow 1 to stop job when robot finishes stacking the current layer.
rdiFlow1StopAfterPallet	DI	It orders flow 1 to stop job when robot finishes stacking the current pallet.
rdiFlow2StopAfterItem	DI	It orders flow 2 to stop job after robot place next item.
rdiFlow2StopAfterLayer	DI	It orders flow 2 to stop job when robot finishes stacking the current layer.
rdiFlow2StopAfterPallet	DI	It orders flow 2 to stop job when robot finishes stacking the current pallet.
rdiAllowLoadPalletOutfeed1Inf	DI	It allows robot to load pallet on outfeed 1.
rdiAllowLoadPalletOutfeed2Inf	DI	It allows robot to load pallet on outfeed 2.
rdiCellRunningInf	DI	It is connected to LED Cell running of CellHMI.
rdiCellAccessInf	DI	It is connected to LED Cell Access running of CellHMI.
rdiCellSafetiesInf	DI	It is connected to LED Cell Safeties of CellHMI.
rdiCellFaultsInf	DI	It is connected to LED Cell Faults of CellHMI.
rdiCellPause	DI	It is connected to LED Cell Pause of CellHMI.
rdiCellEStop%NUMBER%Inf	DI	It is connected to LED Cell Emergency Stop %EMERGENCY_STOP_NUMBER% of CellHMI.

Name	Type	Description
rdiInfeeder1ReadyInf	DI	It is connected to LED Infeeder 1 ready of CellHMI.
rdiInfeeder1ASInf	DI	To inform about status of infeeder 1 fencing.
rdiInfeeder1ESInf	DI	To inform about status of infeeder 1 emergency stop.
rdiInfeeder1FaultedInf	DI	To inform about status of infeeder 1 fault.
rdiInfeeder1ItemSensor1Inf	DI	It is connected to LED status of format 1 on infeeder 1 of CellHMI.
rdiInfeeder1ItemSensor2Inf	DI	It is connected to LED status of format 2 on infeeder 1 of CellHMI.
rdiInfeeder1ItemSensor3Inf	DI	It is connected to LED status of format 3 on infeeder 1 of CellHMI.
rdiInfeeder2ReadyInf	DI	It is connected to LED Infeeder 2 ready of CellHMI.
rdiInfeeder2ASInf	DI	To inform about status of infeeder 2 fencing.
rdiInfeeder2ESInf	DI	To inform about status of infeeder 2 emergency stop.
rdiInfeeder2FaultedInf	DI	To inform about status of infeeder 2 fault.
rdiInfeeder2ItemSensor1Inf	DI	It is connected to LED status of format 2 on infeeder 2 of CellHMI.
rdiInfeeder2ItemSensor2Inf	DI	It is connected to LED status of format 2 on infeeder 2 of CellHMI.
rdiInfeeder2ItemSensor3Inf	DI	It is connected to LED status of format 3 on infeeder 2 of CellHMI.
rdiOutfeeder1ReadyInf	DI	It is connected to LED Outfeeder 1 ready of CellHMI.
rdiOutfeeder1EmptyInf	DI	It is connected to LED Outfeeder 1 empty of CellHMI.
rdiOutfeeder1FullInf	DI	It is connected to LED Outfeeder 1 full of CellHMI.
rdiOutfeeder1PresentInf	DI	It is connected to LED Outfeeder 1 present of CellHMI.
rdiOutfeeder1EnabledInf	DI	It is connected to LED Outfeeder 1 enabled of CellHMI.
rdiOutfeeder2ReadyInf	DI	It is connected to LED Outfeeder 2 ready of CellHMI.
rdiOutfeeder2EmptydInf	DI	It is connected to LED Outfeeder 2 empty of CellHMI.
rdiOutfeeder2FullInf	DI	It is connected to LED Outfeeder 2 full of CellHMI.
rdiOutfeeder2PresentInf	DI	It is connected to LED Outfeeder 2 present of CellHMI.
rdiOutfeeder2Enabled	DI	It is connected to LED Outfeeder 1 enabled of CellHMI.

Name	Type	Description
rdiSlipSheetMagReadyInf	DI	It is connected to LED slip sheet magazine ready of CellHMI.
rdiSlipSheetMagPresentInf	DI	It is connected to LED slip sheet magazine present of CellHMI.
rdiSlipSheetMagEnabledInf	DI	It is connected to LED slip sheet magazine enabled of CellHMI.
rdiPalletMagReadyInf	DI	It is connected to LED pallet magazine ready of CellHMI.
rdiPalletMagPresentInf	DI	It is connected to LED pallet magazine present of CellHMI.
rdiPalletMagEnabledInf	DI	It is connected to LED pallet magazine enabled of CellHMI.
rdiFlow1RunningInf	DI	It is connected to LED flow 1 running of CellHMI.
rdiFlow1PauseInf	DI	It is connected to LED flow 1 on pause of CellHMI.
rdiFlow2RunningInf	DI	It is connected to LED flow 2 running of CellHMI.
rdiFlow2PauseInf	DI	It is connected to LED flow 2 on pause of CellHMI.
rdiRstHeightPalletMag	DI	It orders to reset memory of pallet magazine height and start searching from top of the stack.
rdiRstHeightSlipSheetMag	DI	It orders to reset memory of slip sheet magazine height and start searching from top of the stack.

Related information

PalletWare Concepts on page 19
RAPID Program on page 21
The User Interface on page 25
Wizard on page 29
CellHMI on page 56

6.8.2 Outputs

List of outputs

Name	Type	Description
rdoError	DO	It informs about a production execution error on robot. *System output.*
rdoEmStop	DO	High when robot is on emergency stop state. *System output.*
rdoRunchOk	DO	High when robot is on emergency stop state. *System output.*
rdoMotOnState	DO	High when robot is on motors on state. *System output.*
rdoMotOffState	DO	High when robot is on motors off state. *System output.*
rdoTaskExecuting	DO	High when main task is executing. *System output.*
rdoAutoOn	DO	High when robot is on automatic mode. *System output.*
rdoSpare7	DO	Spare
rgoOrderAck	GO	Order acknowledgement. 8 bits.
rgoFlow1JobNumber	GO	Feedback of loaded job on flow 1. 16 bits.
rgoFlow2JobNumber	GO	Feedback of loaded job on flow 2. 16 bits.
rgoPosNum	GO	Feedback job position. 8 bits.
rdoUnloadingFault	DO	It gets high when an unloading error occurs.
rdoItemOnGripper	DO	It gets high when an item is on gripper.
rdoMonitorGripper	DO	It request to monitor item on gripper.
rdoLoadAuthInfeeder1	DO	It informs robot is going out of infeeder 1. Pulse. Length=1sec.
rdoLoadAuthInfeeder2	DO	It informs robot is going out of infeeder 2. Pulse. Length=1sec.
rdoLoadConfOutfeeder1	DO	It informs robot has placed a new pallet on outfeeder 1. Pulse. Length=1sec.
rdoLoadConfOutfeeder2	DO	It informs robot has placed a new pallet on outfeeder 2. Pulse. Length=1sec.
rdoFlowChanged	DO	It confirms robot has changed of flow. Pulse. Length=1sec.

Name	Type	Description
rdoOutOfInfeeder1	DO	It gets low when robot enters on infeeder 1 area. Only when robot is executing program.
rdoOutOfInfeeder2	DO	It gets low when robot enters on infeeder 2 area. Only when robot is executing program.
rdoOutOfOutfeeder1	DO	It gets low when robot enters on outfeeder 1 area. Only when robot is executing program.
rdoOutOfOutfeeder2	DO	It gets low when robot enters on outfeeder 2 area. Only when robot is executing program.
rdoOutOfSlipSheetMag	DO	It gets low when robot enters on slip sheet stack station area. Only when robot is executing program.
rdoOutOfPalletMag	DO	It gets low when robot enters on pallet stack station area. Only when robot is executing program.
rdoOnFlow1	DO	It informs robot is executing flow 1.
rdoOnFlow2	DO	It informs robot is executing flow 2.
rdoFlow1Infeeder1Selected	DO	It informs infeeder 1 is selected on flow 1.
rdoFlow1Infeeder2Selected	DO	It informs infeeder 2 is selected on flow 1.
rdoFlow1Outfeeder1Selected	DO	It informs oufeeder 1 is selected on flow 1.
rdoFlow1Outfeeder2Selected	DO	It informs oufeeder 2 is selected on flow 1.
rdoFlow2Infeeder1Selected	DO	It informs infeeder 1 is selected on flow 2.
rdoFlow2Infeeder2Selected	DO	It informs infeeder 2 is selected on flow 2.
rdoFlow2Outfeeder1Selected	DO	It informs oufeeder 1 is selected on flow 2.
rdoFlow2Outfeeder2Selected	DO	It informs oufeeder 2 is selected on flow 2.
rdoRbtAtHome	DO	It gets high when robot is at Home position.
rdoRbtAtOutOfLine	DO	It gets high when robot is at Out of line position.
rdoRbtAtAccess	DO	It gets high when robot is at Access position.
rdoHeightPalletMagRst	DO	It confirms the memory of pallet magazine height has been reset and robot will search from top of the stack. Pulse. Length=1sec.
rdoHeightSlipSheetMagRst	DO	It confirms the memory of slip sheet magazine height has been reset and robot will search from top of the stack. Pulse. Length=1sec.

Name	Type	Description
rdoUserConfEmptyPallet1	DO	It informs user has confirmed the pallet 1 is empty. Pulse. Length=1sec.
rdoUserConfEmptyPallet2	DO	It informs user has confirmed the pallet 2 is empty. Pulse. Length=1sec.
rdoCommandRequest	DO	It informs a command has been sent. Pulse. Length=1sec.
rgoTpCommand	GO	Command Request. 8 bits.
rgoTpCommandData	GO	Command Data. 16 bits.
rgoFlow1Onlayer	GO	It informs layer number robot is stacking on flow 1. 8 bits.
rgoFlow1OnItem	GO	It informs item number robot is stacking on flow 1. 8 bits.
rgoFlow1Format1QtyItems	GO	It informs about the quantity of items to prepare for format 1 on flow 1. 8 bits.
rgoFlow1Format2QtyItems	GO	It informs about the quantity of items to prepare for format 2 on flow 1. 8 bits.
rgoFlow1Format3QtyItems	GO	It informs about the quantity of items to prepare for format 3 on flow 1. 8 bits.
rgoFlow2Format1QtyItems	GO	It informs about the quantity of items to prepare for format 1 on flow 2. 8 bits.
rgoFlow2Format2QtyItems	GO	It informs about the quantity of items to prepare for format 2 on flow 2. 8 bits.
rgoFlow2Format3QtyItems	GO	It informs about the quantity of items to prepare for format 3 on flow 2. 8 bits.
rgoFlow1NextFormat	GO	It informs about the format type to prepare on infeeder used on flow 1.
rgoFlow2NextFormat	GO	It informs about the format type to prepare on infeeder used on flow 2.

Name	Type	Description
rdoFlow1ConfEndItem	DO	It informs robot has placed an item when running flow 1. Pulse. Length=1sec.
rdoFlow1ConfEndLayer	DO	It informs robot has finished stacking a layer when running flow 1. Pulse. Length=1sec.
rdoFlow1ConfEndPallet	DO	It informs robot has finished stacking a pallet when running flow 1. Pulse. Length=1sec.
rdoFlow2ConfEndItem	DO	It informs robot has placed an item when running flow 2. Pulse. Length=1sec.
rdoFlow2ConfEndLayer	DO	It informs robot has finished stacking a layer when running flow 2. Pulse. Length=1sec.
rdoFlow2ConfEndPallet	DO	It informs robot has finished stacking a pallet when running flow 2. Pulse. Length=1sec.
rdoFlow1NextItemReq	DO	It request to prepare next format on flow 1. Pulse. Length=1sec.
rdoFlow2NextItemReq	DO	It request to prepare next format on flow 2. Pulse. Length=1sec.
rdoEndBatchConfFlow1	DO	It confirms batch has finished on flow 1. Pulse. Length=1sec.
rdoEndBatchConfFlow2	DO	It confirms batch has finished on flow 2. Pulse. Length=1sec.

Related information

PalletWare Concepts on page 19

RAPID Program on page 21

The User Interface on page 25

Wizard on page 29

CellHMI on page 56

6.8.3 Group Values

rgiOrderRequest

When value is...	It requests robot...
3	To stop.
4	To go home position and stop.
5	To go access position and stop.
6	To go out of line position and stop.
7	To stop at pick position when running flow 1.
8	To stop at pick position when running flow 2.
11	To stop at drop position when running flow 1.
12	To stop at drop position when running flow 2.
19	To end cycle. All flows.
20	To end cycle flow 1.
21	To end cycle flow 2.
22	To attend custom order 1.
23	To attend custom order 2.
24	To attend custom order 3.
25	To attend custom order 4.

rgiF1JobNumber

When value is...	Means run...
Any	Job number on flow 1.

rgiF2JobNumber

When value is...	Means run...
Any	Job number on flow 2.

rgoOrderAck

When value is...	It acknowledges order...
3	Robot stop.
4	Go home position and stop.
5	Go access position and stop.
6	Go out of line position and stop.
7	Stop at pick position when running flow 1.
8	Stop at pick position when running flow 2.
11	Stop at drop position when running flow 1.
12	Stop at drop position when running flow 2.
19	End cycle. All flows.
20	End cycle flow 1.
21	End cycle flow 2.
22	Custom order 1.
23	Custom order 2.
24	Custom order 3.
25	Custom order 4.

rgoF1JobNumber

When value is...	Means...
Any	The number of job loaded on Flow 1.

rgoF2JobNumber

When value is...	Means...
Any	The number of job loaded on Flow 2.

rgoPosNum

When value is...	It means robot is at...
3	Stop.
4	Home position.
5	Access position.
6	Out of line position.
7	Stop at pick for flow 1.
8	Stop at pick for flow 2.
11	Stop at drop for flow 1.
12	Stop at drop for flow 2.
17	Waiting for flow selection.
18	Waiting for job selection.
22	Custom order 1.
23	Custom order 2.
24	Custom order 3.
25	Custom order 4.

rgoTpCommand

When value is...	On CellHMI user has pushed button...
1	Start button.
2	Reset.
3	Stop.
4	Robot to Home.
5	Access request.
6	Robot to Out of line.
7	Stop at pick for flow 1.
8	Stop at pick for flow 2.
11	Stop at drop for flow 1.
12	Stop at drop for flow 2.
22	Custom order 1.
23	Custom order 2.
24	Custom order 3.
25	Custom order 4.
27	Break cycle after robot placed an item. All flows.
28	Break cycle after robot finishes stacking current layer. All flows.
29	Break cycle after robot finishes stacking pallet. All flows.
30	Start batch on flow 1.
31	Resume flow 1.
32	Stop batch on flow 1 after item is placed.
33	Stop batch on flow 1 after robot finishes stacking current layer.
34	Stop batch on flow 1 after robot finishes stacking current pallet.
35	Break cycle after robot placed an item. Flow 1.
36	Break cycle after robot finishes stacking current layer. Flow 1.
37	Break cycle after robot finishes stacking pallet. Flow 1.
38	Start batch on flow 2.
39	Resume flow 2.
40	Stop batch on flow 2 after item is placed.
41	Stop batch on flow 2 after robot finishes stacking current layer.
42	Stop batch on flow 2 after robot finishes stacking current pallet.
43	Break cycle after robot placed an item. Flow 2.
44	Break cycle after robot finishes stacking current layer. Flow 2.
45	Break cycle after robot finishes stacking pallet. Flow 2.

When value is...	On CellHMI user has pushed button...
46	Enable outfeeder 1.
47	Enable outfeeder 2.
48	Enable pallet magazine.
49	Enable slip sheet magazine.
50	Format 1 ready on flow 1.
51	Format 2 ready on flow 1.
52	Format 3 ready on flow 1.
53	Format 1 ready on flow 2.
54	Format 2 ready on flow 2.
55	Format 3 ready on flow 2.

Related information

PalletWare Concepts on page 19

RAPID Program on page 21

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6.9 Dry Cycle

Overview

This section describes how to run the program in dry cycle instead of production.

The dry cycle may be set up to go through all positions in a pallet pattern in dry cycles. A dry cycle will go to every position in a pallet pattern without picking anything in between, thus nothing will actually be placed. This is a way of verifying that the robot will actually be able to go to (reach) every position in a pallet pattern.

What is dry cycle?

Dry cycle enables the user to run the complete process with real robot motion without actually picking or placing any items. It may be useful to verify the positions of a pallet pattern as well as tuning robot motion and verifying logical functionality in the application.

How to enable dry cycle?

In order to enable dry cycle it is necessary to “simulate” some signals on robot.

Pick – place items

Name	Value	Simulate to...
vdiItem1OnGripper	High	Avoid unloading error of “picking format” 1.
vdiItem2OnGripper	High	Avoid unloading error of “picking format” 2.
vdiItem3OnGripper	High	Avoid unloading error of “picking format” 3.

Pick – place pallets

Name	Type	Simulate to...
vdiSearchStopPallet	High/Low	Finish searching for pallet. When robot starts searching this signal needs to be low.
vdiPalletOnGripper	High	Avoid unloading error when picking and placing pallets.

Pick – place slip sheets

Name	Type	Simulate to...
vdiSearchStopSlipSheet	High/Low	Finish searching for slip sheet. When robot starts searching this signal needs to be low.
VdiSlipSheetOnGripper	High	Avoid unloading error when picking and placing slip sheets.

Related information

PalletWare Concepts on page 19

RAPID Program on page 21

PalletWare IO on page 85

6.10 Localization

Overview

Localization in PalletWare allows user to use the application in multiple languages. The language of PalletWare is selected based on the active language of Flexpendant

Structure of this chapter

This chapter contains a description of prerequisites for localization

6.10.1 Localizing Wizard

Overview

This section describes how to customize the wizard application to support multiple languages

Multi-Lingual Support

XML configuration files are used to achieve multi-lingual support in wizard application.

There are two types of elements that change with Multilanguage selection

- **Labels (**E.g. Text Labels, Button Texts,.etc**)**
- **Screen Alerts (**Alert Messages, Prompt Messages on FlexPendant Screen**)**

Labels

All the Text Labels on the Wizard Application are updated from an XML configuration file named **wizardtexts.xml.**

Each language contains a **wizardtexts.xml** which contains the string equivalent of all the labels in the corresponding language.

Example: wizardtexts.xml corresponding to Spanish language

```
<control text="FINISH">ACABADO</control>
<control text="APPLY">APLICABLE</control>
<control text="PATTERN">PATRÓN</control>
<control text="SELECT">SELECCIONAR</control>
```

Screen alerts

All the Screen Alerts on the Wizard Application are updated from an XML configuration file named **wizardMessages.xml.**

Each language contains a **wizardMessages.xml** which contains the string equivalent of all the Alert Messages in the corresponding language.

Example: **wizardMessages.xml** corresponding to Spanish language

```
<Text Name="CANT_GET_RAPID_DATA">
<Value> No se pudo obtener RapidData</Value>
<Comment>Couldn't get RapidData</Comment>
</Text>
<Text Name="WAIT_LIST_POPULATED">
<Value>Por favor, espera mientras que la lista se</Value>
<Comment>Please wait while the list is being </Comment>
```

XML Files Location

User has to place the corresponding language XML files in a folder named by Language specific code (for e.g “es” for Spanish) on the Language folder of the PalletWare application.

Example: PalletWare_01.01.0095.00\language\es\wizardtexts.xml

Working procedure

The table below shows the steps to change the language in wizard application.

	Action
1.	Start FlexPendant
2.	Click on Wizard Application
3.	Wizard application is loaded with English labels if the default language of FlexPendant is English.
4.	Go to Control Panel of FlexPendant
5.	Change on Language
6.	Select the required Language
7	Restart the FlexPendant
8	Click on the Wizard Application
8	Check the Wizard Application is loaded with new language of FlexPendant **NOTE!** The loading of new language does not happen until the application is restarted

6.10.2 Localizing CellHMI

Overview

This section describes how to customize the CellHMI application to support multiple languages

Multi-Lingual Support

XML configuration files are used to achieve multi-lingual support in wizard application.

There are two types of elements that change with Multilanguage selection

- **Labels (**E.g. Text Labels, Button Texts,.etc**)**
- **Screen Alerts (**Alert Messages, Prompt Messages on FlexPendant Screen**)**

Labels

All the Text Labels on the Wizard Application are updated from an XML configuration file named **cellHmitexts.xml.**

Each language contains a **cellHmitexts.xml** which contains the string equivalent of all the labels in the corresponding language.

Example cellHmitexts.xml corresponding to Spanish language

```
<control text="FINISH">ACABADO</control>
<control text="APPLY">APLICABLE</control>
<control text="PATTERN">PATRÓN</control>
<control text="SELECT">SELECCIONAR</control>
```

Screen alerts

All the Screen Alerts on the CellHmi Application are updated from an XML configuration file named **cellHMIMessages.xml.**

Each language contains a **cellHMIMessages.xml** which contains the string equivalent of all the Alert Messages in the corresponding language.

Example: **cellHMIMessages.xml** corresponding to Spanish language

```
<Text Name="CANT_GET_RAPID_DATA">
<Value> No se pudo obtener RapidData</Value>
<Comment>Couldn't get RapidData</Comment>
</Text>
<Text Name="WAIT_LIST_POPULATED">
<Value>Por favor, espera mientras que la lista se</Value>
<Comment>Please wait while the list is being </Comment>
```

XML files location

User has to place the corresponding language XML files in a folder named by Language specific code (for e.g "es" for Spanish) on the Language folder of the PalletWare application.

Example: PalletWare_01.01.0095.00\language\es\ cellHMITexts.xml

Working procedure

The table below shows the steps to change the language in wizard application.

	Action
1.	Start FlexPendant
2.	Click on CellHMI Application
3.	CellHMI application is loaded with English labels if the default language of FlexPendant is English.
4.	Go to Control Panel of FlexPendant
5.	Change on Language
6.	Select the required Language
7	Restart the FlexPendant
8	Click on the CellHMI Application
8	Check the CellHMI Application is loaded with new language of FlexPendant **NOTE!** The loading of new language does not happen until the application is restarted

6.10.3 Localizing RAPID messages

Overview

This section describes how to customize the Messages, Alerts and Prompts displayed on the FlexPendant Screen during the execution of RAPID Programs

Multi-Lingual Support

XML configuration files are used to achieve multi-lingual support in displaying the RAPID Messages on FlexPendant Screen. Each language contains a corresponding XML file called **AdOptText.xml** which contains the string equivalent of all the RAPID messages in the corresponding language

Example: **AdOptText.xml** corresponding to English language

```
<Text Name="2">
<Value>Running job num =</Value>
<Comment>Running job num =</Comment>
</Text>
<Text Name="3">
<Value>Waiting for signal:</Value>
<Comment>Waiting for signal:</Comment>
</Text>
```

XML files location

User has to place the corresponding language XML files in a folder named by Language specific code (for e.g "es" for Spanish) on the Language folder of the PalletWare application.

Example: PalletWare_01.01.0095.00\language\es\ AdOptText.xml

Working procedure

The table below shows the steps to change the language in wizard application.

	Action
1.	Start FlexPendant
2.	Go to Control Panel of FlexPendant
3.	Click on Language
4.	Select the required Language
5.	Restart the FlexPendant
7	Run a RAPID Program
8	Check the RAPID messages are displayed in corresponding language of FlexPendant  **NOTE!** The loading of new language does not happen until the application is restarted

7 Operation and Run-time

7.1 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

7.2 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

PalletWare Concepts on page 19

RAPID Program on page 21

The User Interface on page 25

Wizard on page 29

7.3 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

PalletWare Concepts on page 19
RAPID Program on page 21
The User Interface on page 25
Wizard on page 29

7.4 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

PalletWare Concepts on page 19

RAPID Program on page 21

The User Interface on page 25

CellHMI on page 56

7.5 Unloading error

Overview

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

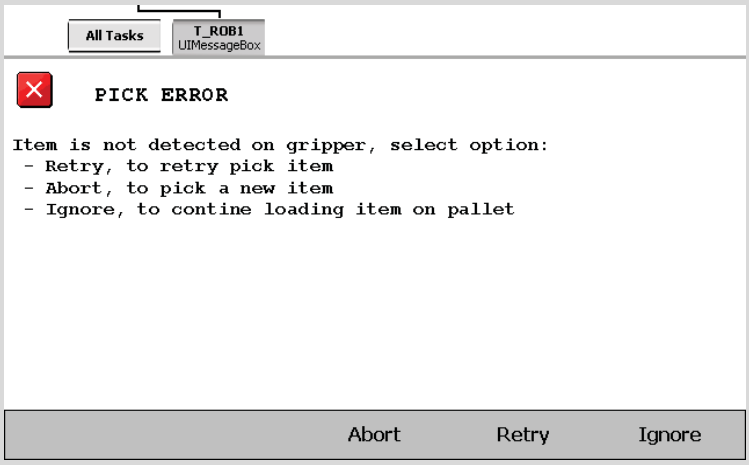
Unloading error

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.

Related information

PalletWare Concepts on page 19

RAPID Program on page 21

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