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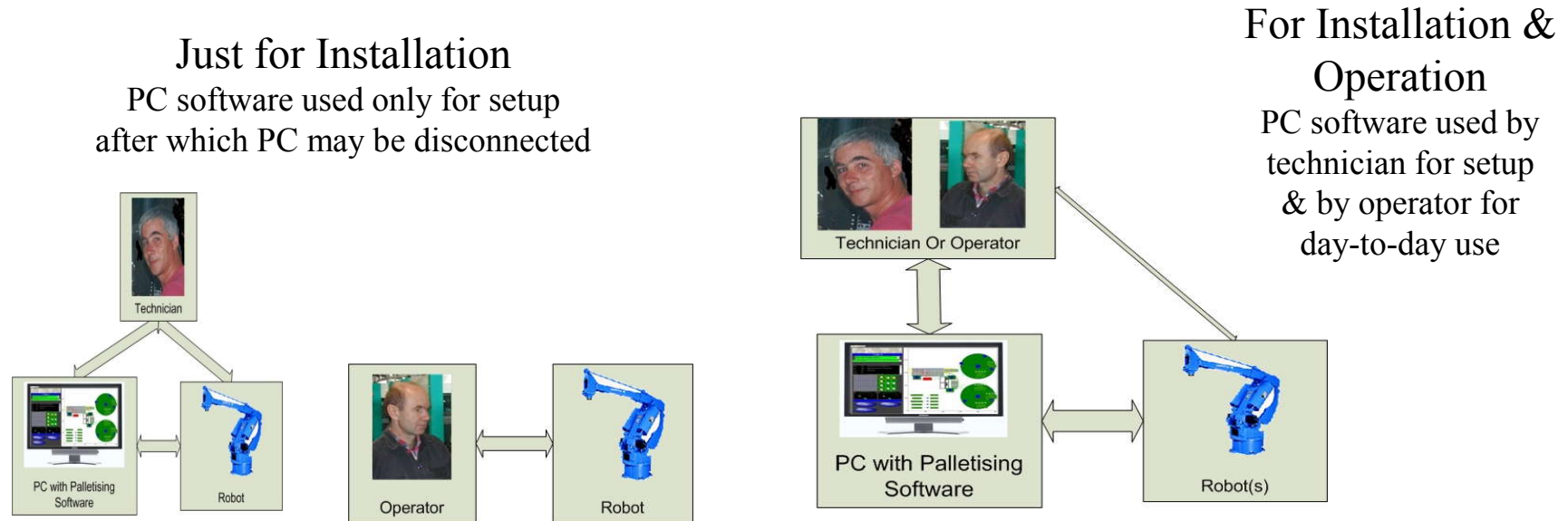
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Palletising Software

Main Features:

- User-friendly graphical run-time user interface.
- Easy graphical pallet patterns for creation and editing.
- Complete palletising application setup for single or multiple lines.
- System integrator uses tools with PC and/or edits robot programs for specific applications providing tailored performance and maximum flexibility.
- Maximizes palletising performance from robot.
- Integrated alarms handling.
- Option to collect and display data.
- Optional control of multiple robots from one PC.

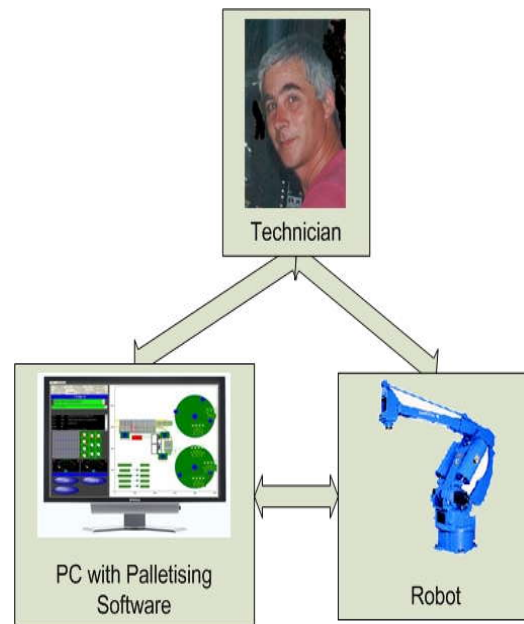
A choice of configurations is available to suit varying levels of operational complexity.



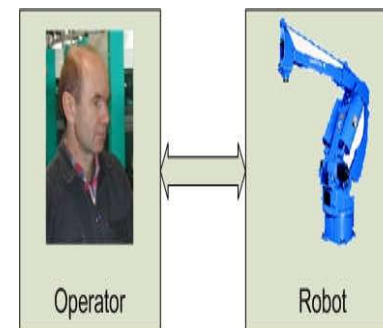
In either case the system may include a PLC to control conveyors.

Usage of Palletising Software for Installation Only

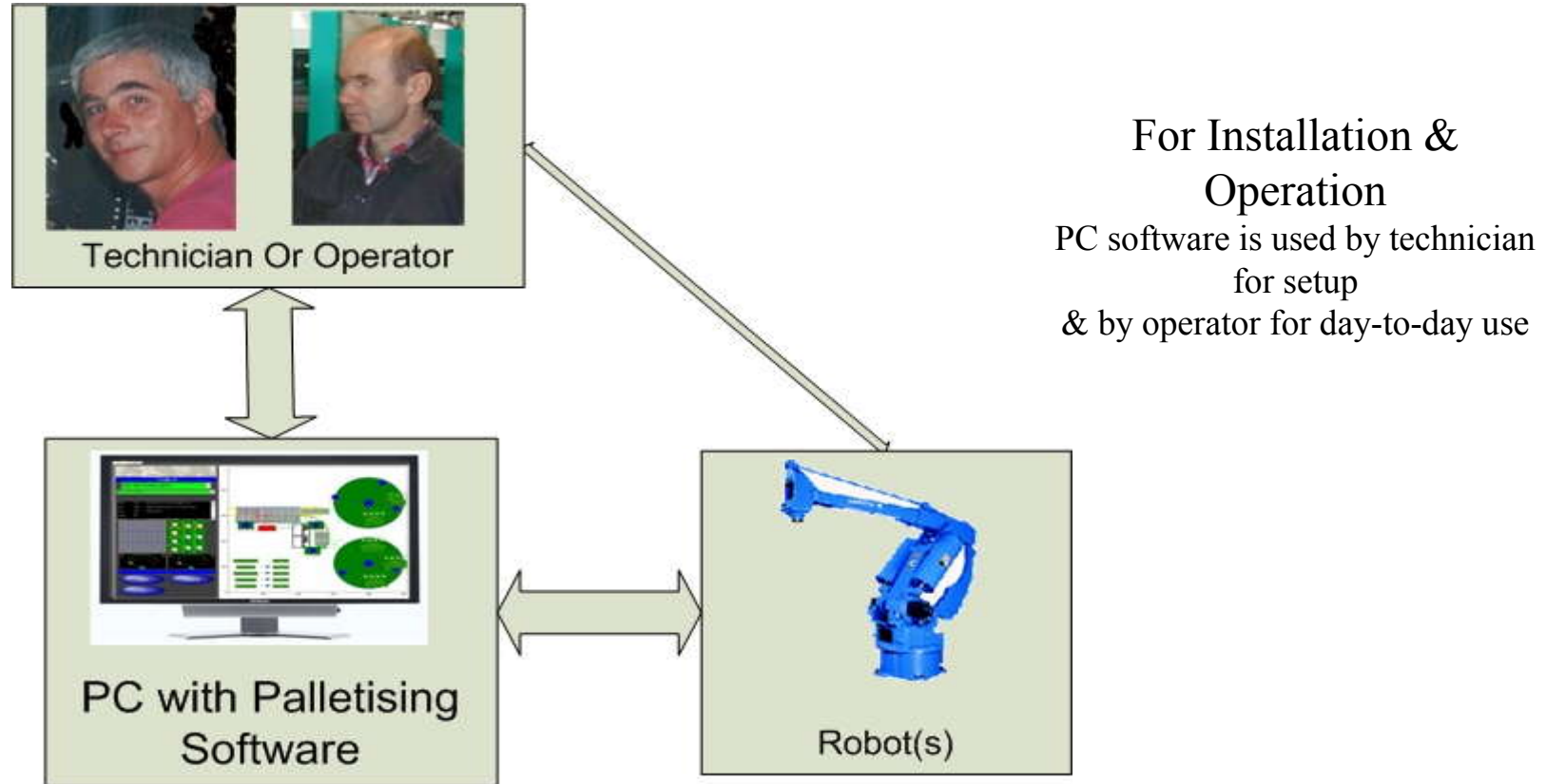
PC software used only for setup,
after which PC may be disconnected



Robot will carry on
palletising



Usage of Palletising Software For Installation and for Day-to-Day Operation



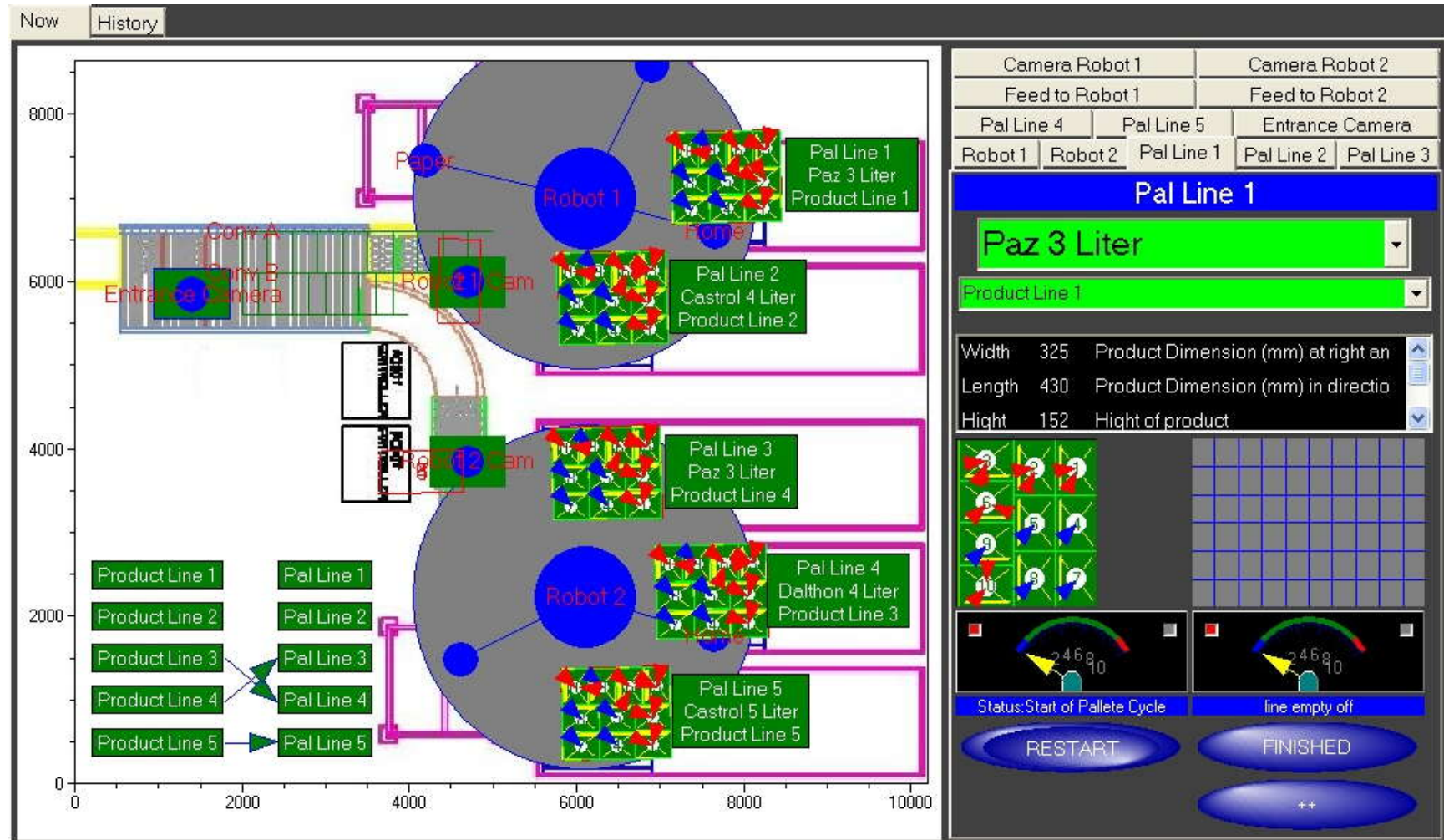
The system may:

- 1) Control single or multiple lines.
- 2) Include a PLC to control conveyors.

Main Screen – Example 1 3 Palletising Lines:

The screenshot displays the main interface of the Galim Palletising Software. On the left, a 3D perspective view shows a central blue robot with a circular path. Three production lines are arranged vertically: Line 1 (Circular 2.5 Liter) at the top, Line 3 (Oval 5 Liter) in the middle, and Line 2 (2-Round 5 Liter) at the bottom. A 'Paper' icon is at the top and a 'Home' icon is at the bottom of the robot's path. The right side of the screen features a control panel for 'Line 1' with a dropdown menu set to 'Circular 2.5 Liter'. Below this, product dimensions are listed: Width 215 and Length 205. A grid shows the pallet layout with numbered points 1-5. Two gauges show 'Products Per Minute' and 'Theoretical Productivity'. At the bottom of the panel are large buttons for 'STOP', 'LEFTOVERS', and 'FINISHED'. A 'statistics' label points to the gauge area, and a 'Product details' label points to the dimension fields. A 'Multiple Production Lines' label points to the top of the panel, and a 'Start / Stop buttons for each line' label points to the bottom buttons.

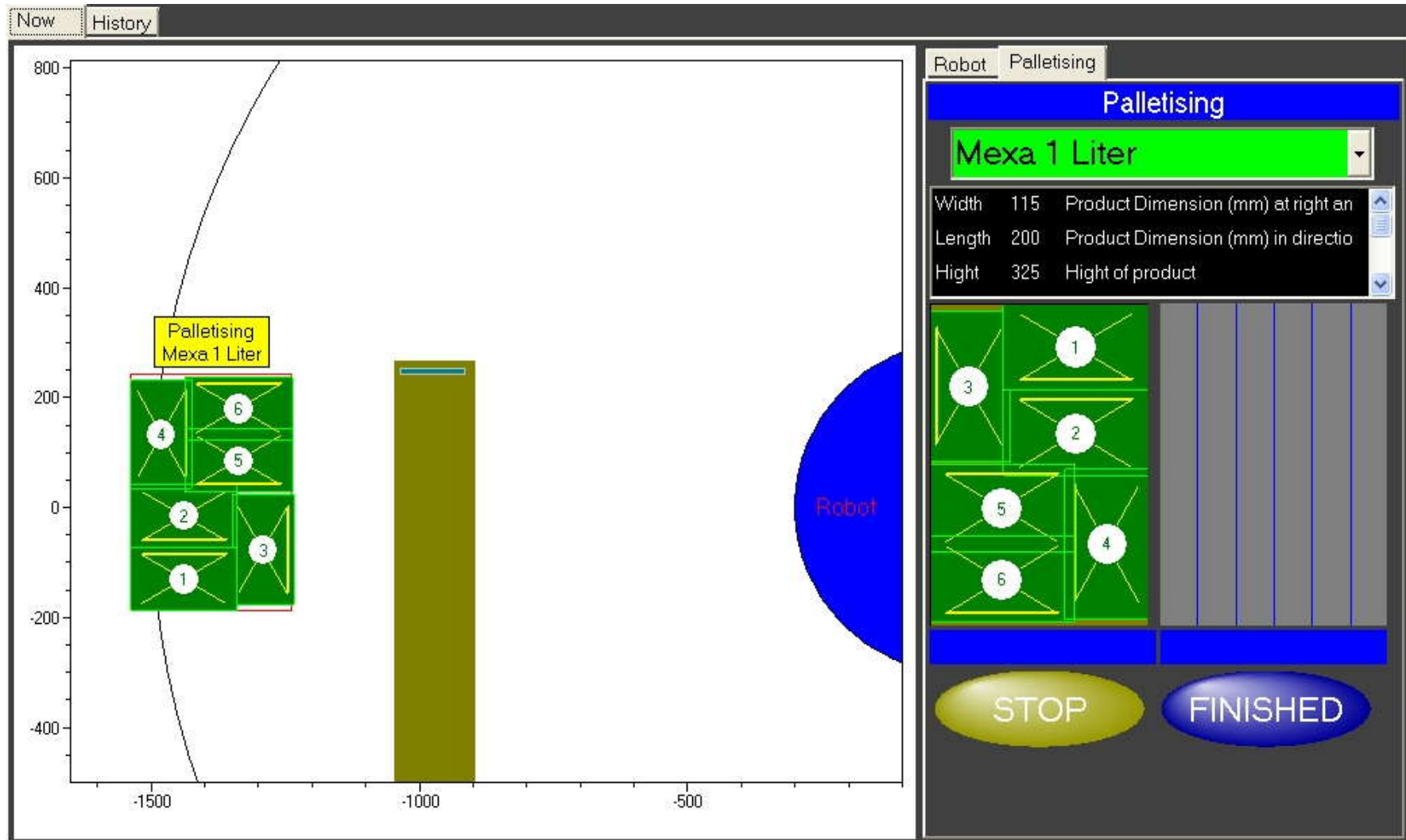
Main Screen – Example 2 5 Palletising Lines – 2 Robots:



The screenshot displays the main interface of the Galim Palletising Software. On the left, a 2D layout shows two robots, Robot 1 and Robot 2, positioned around five palletising lines (Pal Line 1 to Pal Line 5). Each line is associated with a specific product: Pal Line 1 (Paz 3 Liter Product Line 1), Pal Line 2 (Castrol 4 Liter Product Line 2), Pal Line 3 (Paz 3 Liter Product Line 4), Pal Line 4 (Dalthon 4 Liter Product Line 3), and Pal Line 5 (Castrol 5 Liter Product Line 5). The layout also includes an entrance camera, conveyor belts (Conv A, Conv B), and various sensors like 'Paper' and 'Robot 1 Cam'. A coordinate system is visible at the bottom of the layout, ranging from 0 to 10000 on the x-axis and 0 to 8000 on the y-axis.

On the right side, a control panel for 'Pal Line 1' is shown. It features a dropdown menu set to 'Paz 3 Liter' and another dropdown for 'Product Line 1'. Below these are input fields for product dimensions: Width (325), Length (430), and Height (152). The panel also includes a 3D visualization of a pallet with 10 products, two gauges showing a value of 246g, and status indicators for 'Status: Start of Pallet Cycle' and 'line empty off'. At the bottom of the control panel are buttons for 'RESTART', 'FINISHED', and a double plus sign '++'.

Main Screen – Example 3 1 Palletising Line



The screenshot displays the main interface of the Galim Palletising Software. It is divided into two main sections: a 2D coordinate system on the left and a control panel on the right.

2D Coordinate System: The left side features a 2D plot with a vertical axis ranging from -400 to 800 and a horizontal axis ranging from -1500 to -500. A green rectangular area represents the pallet layout, containing six numbered circles (1-6) indicating the positions of the products. A yellow callout box labeled "Palletising Mexa 1 Liter" points to this area. To the right of the pallet is a blue semi-circle labeled "Robot". A brown vertical bar is positioned at approximately x = -1000.

Control Panel: The right side contains a control panel with the following elements:

- Robot Palletising:** A blue header bar.
- Product Selection:** A dropdown menu currently showing "Mexa 1 Liter".
- Product Dimensions:** A table showing the dimensions for the selected product:

| | | |
|--------|-----|------------------------------------|
| Width | 115 | Product Dimension (mm) at right an |
| Length | 200 | Product Dimension (mm) in directio |
| Hight | 325 | Hight of product |
- Pallet Layout Preview:** A smaller version of the pallet layout shown in the 2D plot, with numbered circles 1-6.
- Control Buttons:** Two large buttons at the bottom: a yellow "STOP" button and a blue "FINISHED" button.

Easy Product Selection:



Straightforward Pallet Setup

- Set up all details of Pallet Layout via Setup Screens.
- Place units of product one after another as required.
- Support for pick and place of varying quantities of product.
- Software can automatically suggest layout based on product parameters.
- User-specified robot path for each placement.

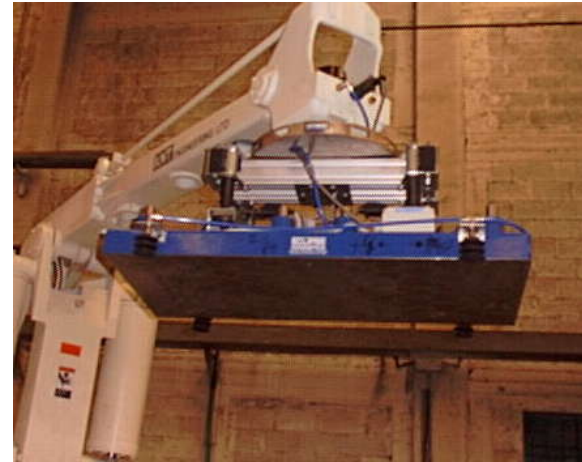
The screenshot displays the software interface for pallet layout configuration. On the left, there are input fields for robot parameters and checkboxes for layout options. The central area shows a 2D grid representing a pallet layer with numbered placement points (1-6) and their sub-positions (A-D). The right side shows a detailed view of the pallet layout with a grid and coordinate axes (+X, +Y).

| Positions | Cycle Type | Y Align | X Boxes | Y Boxes | Rotated | Relative To | Connection F | Plus X (mm) | Plus Y (mm) | Plus Z (mm) |
|-----------|------------|---------|---------|---------|---------|-------------|--------------|-------------|-------------|-------------|
| 1 | 3 | | 2 | 3 | 270 | PAL-0 | 1-B | 15 | 27 | |
| 2 | 3 | | 2 | 2 | 270 Deg | 1-D | 2-B | 110 | | |
| 3 | 3 | | 2 | 3 | 0 | 2-C | 3-B | 0 | 0 | |
| 4 | 3 | | 2 | 3 | 0 | 3-A | 4-B | | | |
| 5 | 3 | | 2 | 3 | 0 | 4-A | 5-B | | | |

Grippers

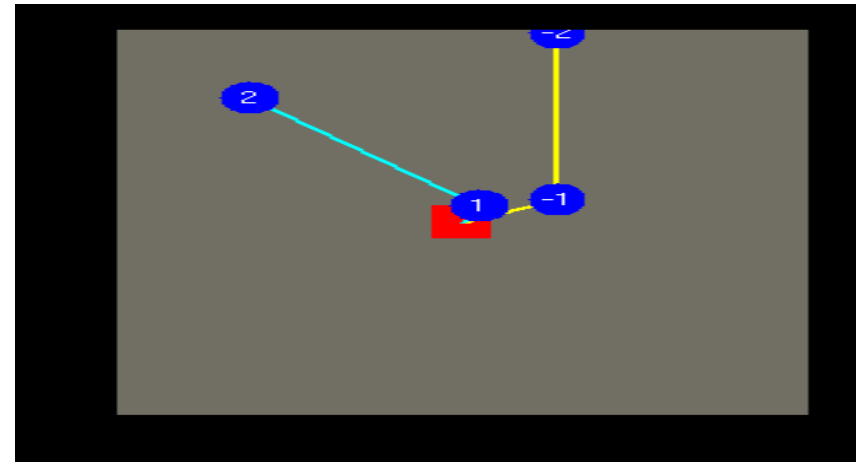
Can be adapted for use with a variety of gripper types including:

- Vacuum gripper
- Magnetic gripper
- Mechanical gripper
- Fork-type gripper



Setup Of Paths

- User sets up path to pick and place positions.
- Setup can be easily adjusted at any time.



Path

#1
Steps Before: 2
Steps After: 2

| # | Relative To | X | Y | Z | RX | RY | RZ | Speed | Precision | Type | Movement |
|----|-------------|---|-----|-----|-----|----|----|-------|-----------|--------|----------|
| -2 | 0 | 0 | 140 | 500 | 100 | 6 | 0 | 0 | 0 | Linear | |
| -1 | 0 | 0 | 140 | 60 | 50 | 4 | 0 | 0 | 0 | Linear | |
| 0 | | | | | | | | | | | |
| 1 | 0 | 0 | 50 | 10 | 30 | 2 | 0 | 0 | 0 | Linear | |
| 2 | 0 | 0 | 50 | 450 | 60 | 4 | 0 | 0 | 0 | Linear | |

Apply OK Cancel

Robot Locations

- Most locations are stored on PC along with setup user data and time of setup.
- Setting up multiple pallet patterns requires no further location instruction.

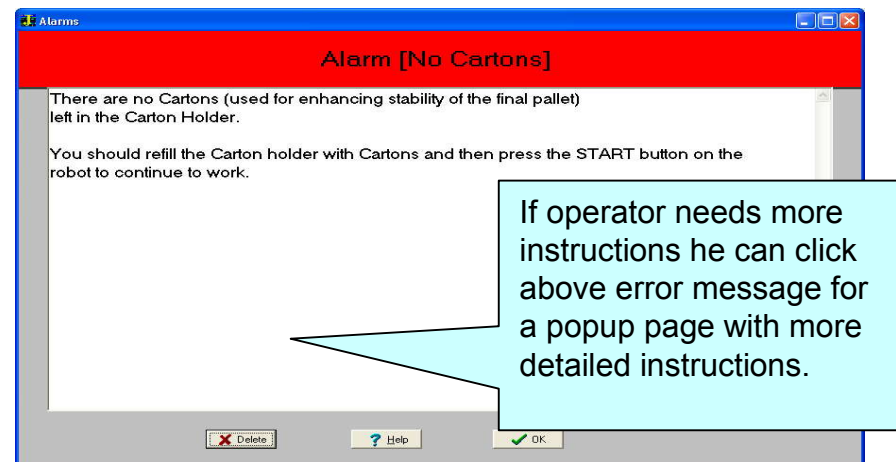
| RX | RY | RZ | X,Y,Z | R,P,Y | Euler Z,Y,Z |
|--------|--------|--------|-----------|---------|-------------|
| 1.000 | 0.000 | 0.000 | 2583.089 | 180.000 | 0.000 |
| 0.000 | -1.000 | -0.000 | 216.711 | 0.000 | 180.000 |
| -0.000 | 0.000 | -1.000 | -1394.916 | 0.000 | 180.000 |
| 0.000 | 0.000 | 0.000 | 1.000 | 0.000 | 0.000 |

Click here. The robot moves safely to the desired location and pauses.

Adjust location and click "Read" to record.

Alarms

- Alarm events trigger popup on-screen messages.
- Alarm list can be modified by installer or system manager.
- Users may customize alarm events messages on-site.
- Alarm log stored according to preset times.
- Alarm log available for display at any time.



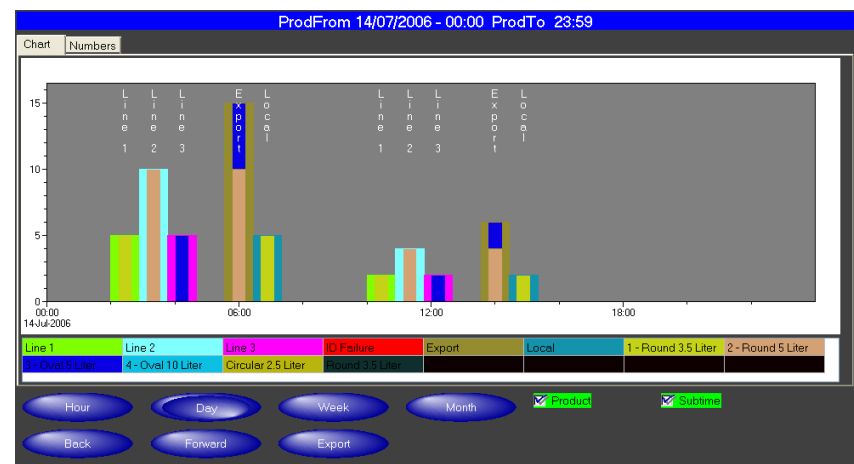
Data Collection And Reports

- Option to collect data on palletised quantities from various lines.
- Reports for various time periods.
- Data display in numeric or graphic format.
- Possibility of data export to readable Excel format.

ProdFrom 13/07/2006 - 23:03 ProdTo 14/07/2006 - 00:03

| Tree Band | Number Band | |
|---|-------------|-------|
| Tree | Total | Rate |
| ProdFrom 13/07/2006 - 23:03 ProdTo 23:23 | | |
| ProdFrom 13/07/2006 - 23:23 ProdTo 23:43 | | |
| Line 1 | | |
| 1 - Round 3.5 Liter | 2 | 46.30 |
| Line 2 | | |
| 2 - Round 5 Liter | 4 | 92.59 |
| Line 3 | | |
| 3 - Oval 5 Liter | 2 | 46.30 |
| ProdFrom 13/07/2006 - 23:43 ProdTo 14/07/2006 - 00:03 | | |
| Line 1 | | |
| 1 - Round 3.5 Liter | 7 | 0.44 |
| Line 2 | | |
| 2 - Round 5 Liter | 14 | 0.88 |
| Line 3 | | |
| 3 - Oval 5 Liter | 7 | 0.44 |
| Export | 21 | 1.32 |
| Local | 7 | 0.44 |

Hour Day Week Month Product Subtime
Back Forward Export



Software Design - Summary:

The Pallet Cell Controller Software is designed to more easily facilitate the setup and running of a robotic palletising application.

Setup

- The many details of the palletising application setup are contained in a user-friendly interface: number and locations of palletising lines, tools, frames, conveyors and pattern arrangements of products on the pallet base.
- The user may begin with data from a previous installation, amending details as needed.

PC Requirements:

PC with:

RS232 Com port

Motoman Plug for Motocom32 software

Options:

- Advantech Digital IO board or USB module (necessary only in the event of statistics collection or for alarms display on PC).

Example Application Motoman SP-100 At NirLat Company

- 3 incoming/outgoing lines, palletising buckets of paint.
- 20 different pallet patterns.



Example Application Motoman 20 kg Robot At Paz Company

- 1 line arranging bottles of liquid product in cartons.
- 7 different pallet patterns.



Example Application Motoman SP-100 At Sano Company

- 3 incoming/outgoing lines, palletising boxes containing bottles of household cleaning liquids.
- 30 different pallet patterns.

