Robot Substrate Handling System

POP1 (¾ Auto) (Robot + Laytable V2)

Why choose a Robot Substrate Handling System?

- **Range of Load & Unload Options**
  - **Load** - manual load 1, 2, 3, or 4 up with left or right-hand lay onto the laytable; substrate transferred to the vacuum table using the unload robot.
  - **Unload** - from the vacuum table to a single or dual stack using the unload robot. Optional features include unloading to inspection tables, cutting tables or to stacks on a conveyor belt.

- **Reduced Handling Time & Faster Changeover**
  - Robot Substrate Handling Systems reduce the overall cycle time of Onset X printers, offering users improved productivity.
  - Pallets can be changed quickly, with printed sheets released to post-print finishing with minimal delay.

- **Supports a Range of POP Substrates & Gauges**
  - Head effectors designed and manufactured by Inca feature a number of suction cups that can be arranged in a variety of configurations, catering to a wide range of substrate sizes and gauges.
  - Distorted (bowed) substrate can be handled and comprehensive control of table vacuum level and zoning always ensures a flat surface for maximum print quality.

- **Reliability & Accuracy of Substrate Placement**
  - ABB robots have outstanding position repeatability and excellent path accuracy, permitting accurate and repeatable sheet loading on the vacuum table. This means images can be consistently printed in the same position on the substrate, making post-print finishing easier and more efficient.

- **Multiple Standard Layout Configurations with the Option to Customise**
  - Standard layout configurations offer a reduced footprint over traditional automation systems. If required, robot positioning and safety systems can be customised (subject to extra cost, delivery and installation time) to further maximise space utilisation.

- **Ease of Use**
  - Robot Substrate Handling Systems are fully integrated within the Inca GUI, making operation simple with minimal training requirements.

- **Supported by all Onset X Printers**
  - Robot Substrate Handling Systems are supported from the entry level Onset X1 through to the ultra-high productivity Onset X3.

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1. Subject to limitations.
Technical Specification

While every reasonable effort has been made to ensure the accuracy and appropriateness of the content of this document, Inca Digital Printers Limited cannot be held responsible for any errors, omissions or consequential loss/damage however caused. The information supplied is subject to change without notice due to on-going design improvement and a unit may differ in detail from that described.

Unload Robot

<table>
<thead>
<tr>
<th>Manufacturer</th>
<th>ABB Asea Brown Boveri Ltd.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model / # Axis</td>
<td>IRB 660 / 4 Axis</td>
</tr>
<tr>
<td>Max. Height</td>
<td>2.957 m (116.4 in)</td>
</tr>
<tr>
<td>Supply</td>
<td>400-480V; 3-phase and Protective Earth/Ground; 25A per phase</td>
</tr>
<tr>
<td>Energy Consumption</td>
<td>ISO-Cube: 2.7 kW; Normal movements: 3.2kW</td>
</tr>
</tbody>
</table>

1 Refer to manufacturer’s instructions for full specification including but not limited to dimensions, weight, service requirements (electrical, compressed air, etc.), environmental effects and safety systems.
2 Maximum operational height when installed to recommended specification using 500mm plinth or base.

Inca Digital Printers Ltd. Head Effectors

<table>
<thead>
<tr>
<th>Quantity</th>
<th>1 x Unload</th>
</tr>
</thead>
<tbody>
<tr>
<td>Suction Cups</td>
<td>48 (16 adjustable); vacuum activation individually controlled</td>
</tr>
<tr>
<td>Vacuum Bars</td>
<td>4 (2 adjustable)</td>
</tr>
<tr>
<td>Ultrasonic Sensors</td>
<td>2</td>
</tr>
<tr>
<td>Compressed Air</td>
<td>Pressure 6 bar (88 psi); Volume (at 6 bar) 1.65 m³/minute</td>
</tr>
<tr>
<td></td>
<td>Supply 20 mm diameter push fitting</td>
</tr>
</tbody>
</table>

Media & Handling - ¾ Automatic Operation

Supported Media Types

- Foam PVC, PVC sheets, foamboard, corrugated cardboard, display board/cardstock, compressed cardboard, polystyrene, paper, synthetic paper, banner material, corrugated polystyrene, polycarbonate

Number of Sheets

- Up to 4 sheets load and unload with optional collation

Maximum Sheet Size

- Length (X): 3,220mm (126.8 in); Width (Y): 1,600mm (63 in)

Minimum Sheet Size

- Length (X): 805mm (31.7 in); Width (Y): 800mm (31.5 in)

Gauge (Thickness)

- Minimum: Media-dependent; Maximum 18mm (0.71 in)

Maximum Weight

- 10kg (22 lb)

Maximum Stack Capacity (Height)

- Unload: 1,300 mm (51.2 in)
- High Stack: 1,300 mm (51.2 in)
- Low Stack: 900 mm (35.4 in)

Table Loading Accuracy

- Accurate to ±1 mm (0.039 in)

1 Check media specification and test performance before printing.
2 Maximum number of sheets and collation ability dependent on installation layout, head effectors fitted and range of robotic movement available.
3 50 mm (2 in) maximum thickness when operating in manual mode; reduced to 48mm (1.88 in) with printed shim & table skin fitted; reduced to 46mm (1.81 in) with printed shim, standard & adjustable table skin fitted.
4 Maximum total of all sheets distributed evenly over table; 20kg (44 lb) maximum weight when operating in Manual mode at maximum print speed; 80kg (176 lb) maximum weight when operating in Manual mode at reduced print speed using maximum table vacuum (speed dependent on substrate).
5 Over maximum sheet size on pallet.
6 From floor; pallet + media; height installation specific and may vary due to robot base height and effector depth. Solid pallet required to ensure accurate ultrasonic sensing.

1 Figures for High Stack system; Low Stack system also available with reduced footprint at expense of stack height.
2 Machine + Robot + Laytable + Hard Guarding; customisation may affect footprint; access space required.
3 Provides necessary clearance for unimpeded robotic operation.

Configurations

<table>
<thead>
<tr>
<th>Footprint</th>
<th>13.84 m x 7.82 m (544.8 in x 307.8 in)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Min. Ceiling Height</td>
<td>3.2 m (126 in)</td>
</tr>
</tbody>
</table>

Safety System

- Components and specification are installation specific

Unload Area Light

- Curtain

Programmable Laser Scanning System

- Configured with multiple exclusion (or safety) zones and controlled by multiple safety scanners to monitor equipment area for presence of (unprogrammed) obstacles and motion

Protective Hard Guarding

- Protective hard guarding prevents incursion into the unload area

1 Active in Automatic and Semi-Automatic modes only.
2 Incursions will stop printer when operating (robot non-operational in Manual mode).

Ultrasonic Sensors

The POP head effector features ultrasonic sensors configured to report effector height above the substrate, permitting fine adjustment during the final moments prior to substrate placement.

Vacuum Bars

Four vacuum bars (two of which are adjustable to provide greater support for multiple substrate sizes) are fitted on the underside of the head effector.

Suction Cups

Forty eight suction cups (fitted in pairs) are distributed equally over four vacuum bars on the underside of the head effector and enable substrate to be handled reliably. Suction is created by vacuum generators operating on the Venturi effect. Vacuum activation is individually controlled per cup. If a loss of vacuum is detected on the effector, the sheet is dropped instantly. To provide greater support for multiple substrate sizes, the position of sixteen cups can be moved along the X axis.