Conveyor tracking module

Product Management, ABB Robotics

September 2018
Conveyor tracking today

4 x IRB 360 Picking Cell Topology
Conveyor tracking today

4 x IRB 360 Picking Cell Topology
Conveyor tracking – coming soon

4 x IRB 360 Picking Cell Future Topology
# Dynamic conveyor tracking

Enter the “Performance Optimizers - Uptimers”

<table>
<thead>
<tr>
<th>Customer Needs</th>
<th>Common Functionality</th>
<th>Expanded Functionality</th>
<th>Functions</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Customer Needs&lt;br&gt;  • PickMaster User&lt;br&gt;  • Wants trouble free integration&lt;br&gt;  • Wants to source from few suppliers&lt;br&gt;  • Needs simplified architecture&lt;br&gt;  • Requires easy fault finding&lt;br&gt;  • Needs to reduce TCO&lt;br&gt;  • Fast deployment and commissioning</td>
<td>- Few interfaces defined and implemented by customer&lt;br&gt;  • Two robot application&lt;br&gt;  • 2 conveyors&lt;br&gt;  • 1 Camera signal&lt;br&gt;  • 1 sensor signal</td>
<td>- Few interfaces defined and implemented by customer&lt;br&gt;  • 16 conveyors (4xCTM)&lt;br&gt;  • 4 Robots (scalable to 40)&lt;br&gt;  • Up to 16 Cameras&lt;br&gt;  • Up to 16 Sensor signals</td>
<td>A. Connectors for up to 8 Cameras/Sensors&lt;br&gt; B. Connector for Robot Network&lt;br&gt; C. Fan to handle heat from CPU&lt;br&gt; D. Connectors for Up to 4</td>
</tr>
</tbody>
</table>

![Diagram](image)
## Specification

<table>
<thead>
<tr>
<th>Feature</th>
<th>Details</th>
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<tbody>
<tr>
<td>Network interface</td>
<td>3 x RJ45 (WAN + 2 x LAN)</td>
</tr>
<tr>
<td>Encoder interface</td>
<td>4 x (2-phase encoder inputs, power)</td>
</tr>
<tr>
<td>Sensor interface</td>
<td>8 x (sync input, trigger output, power)</td>
</tr>
<tr>
<td>Other features</td>
<td>Console port, reset button, discovery led</td>
</tr>
<tr>
<td>Power Supply</td>
<td>24V/0.6A</td>
</tr>
<tr>
<td>CPU</td>
<td>NXP/Freescale P1010</td>
</tr>
<tr>
<td>FPGA</td>
<td>Altera Cyclone</td>
</tr>
<tr>
<td>RAM</td>
<td>2 x 128MB DDR3</td>
</tr>
<tr>
<td>Flash</td>
<td>128MB</td>
</tr>
<tr>
<td>Encapsulation</td>
<td>IP20</td>
</tr>
</tbody>
</table>
CTM

Software overview

A. CTM application
B. Linux OS

- Cyber security ready
- Supported interfaces: RobICl, SSH and PTP2
- Clients: RobotWare, Robot Studio
Dynamic conveyor tracking

New DSQ2000 CTM board

Simplification: 16 to 1 part number reduction, Field wiring reduced by 60%
Dynamic conveyor tracking
New Tracking Features

**High Speed**
- Highest Market Speed
  - 1.7 meters per second
  - 100 meters per minute

**Variable Speed**
- Indexing/Variable speed flow
  - From variable to constant speed.
  - From constant to variable speed.

**Circular**
- Tracking in Radians
  - From circular flow to inline flow.
  - From inline flow to circular flow.

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All Available in RobotWare 6.07
Dynamic conveyor tracking
Expanding your Application Capability – beating the Competition
Dynamic conveyor tracking
Expanding your Application Capability – beating the Competition
Dynamic conveyor tracking
Expanding your Application Capability – beating the Competition
Dynamic conveyor tracking
Use reachable targets – new feature

Use Reachable Targets - new in Rw6.07
– Removes the need for tuning enter/exit limits of conveyor work areas.
– Instead, a "usage time" is estimated, i.e. how long time it will take to handle a target. Actual usage times can be measured from successful picks.
– Activates a floating target release zone that adapts to changes in conveyor speed.

Advantages
– More robust, eliminates sporadic reach errors.
– Enables picking at higher and more variable conveyor speeds.
– Bigger release zone, more targets available, higher pick rate.

Example
UseReachableTargets
ItmSrcData[PlaceWorkArea[1]].ItemSource, TRUE, 0.7 ReleaseTime:=0.1;

Object flow direction

<table>
<thead>
<tr>
<th>Speed (mm/s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>580</td>
</tr>
<tr>
<td>960</td>
</tr>
<tr>
<td>1290</td>
</tr>
<tr>
<td>1770</td>
</tr>
</tbody>
</table>
Dynamic conveyor tracking

User case 1

High speed tracking

- Products exit a flow-wrapr at 750 ppm
- Products are 100 mm long, 75 mm wide, inside each product is a stack of cookies 3 high (25 mm high total)
- There is a 35 mm gap between products, the infeed conveyor runs at 102 meters per minute 1.7 m/sec
- Each FlexPicker picks 3 products at one time and places the group of 3 products in a tray on the outfeed conveyor. 84 ppm per robot
- The tray is 400 mm long, 250 mm wide. 3 layers of 9 products are created in each tray, 27 products per tray
- 28 Trays per minute on the outfeed conveyor, outfeed runs at 11 meters per minute, 0.185 meters per second.
**Dynamic conveyor tracking**

**User case 2**

**Circular conveyor tracking**

- 1600 mm wide infeed belt, 4 meters per minute speed
- 50 mm dia cookies, 20 across the infeed belt, in rows. 50 rows per minute, 1,000 cookies per minute
- 2,000 mm dia ring conveyor mounted over the infeed, rotating clockwise. 85 placement positions evenly distributed around the ring with side walls as in the picture. 74 mm spacing
- 6 FlexPicker distributed evenly picking from the infeed and placing into the pockets on the ring conveyor. Target 100 ppm
- Stacks of 4 cookies are created on the ring conveyor in the pockets.
- The ring conveyor has a single point of outfeed with a pusher.
Dynamic conveyor tracking
User case 3

Tracking variable speed – thermoforming machines

- Products exit a slicing machine in stacks, 200 stacks per minute
- Product stacks are 100mm long, 75 mm wide, 25 mm high total
- There is a 35 mm gap between products, the infeed conveyor runs at 22 meters per minute 0.366 m/sec
- Each FlexPicker picks 1 stack of products at one time and places the stack into a pocket on the web of a thermo-former. There are nine pockets per section on the Thermo-former. 22 sections per minute.
- Each section on the web is 400 long, 250 mm wide
- Thermo-formers have a dwell cycle where they are static, during the section thermo-forming process for 2 seconds, then accelerating 400 mm in 0.5 s
- FlexPickers must track the outfeed and be able to place during the dwell cycle and during the acceleration cycle
Conveyor tracking markets
All ABB robots

- **Food and Beverage**
- **Pharmaceutical**
- **Consumer Packaged Goods**

- **Automotive Parts Handling**
- **3C - Assembly**
- **Medical Devices**
Picking, Packing, Palletizing

Target Applications
## Dynamic conveyor tracking

Unique selling points - your competitive advantage

<table>
<thead>
<tr>
<th>1. Speed</th>
<th>2. Flexibility</th>
<th>3. Simplified</th>
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<tbody>
<tr>
<td>The fastest tracking speed</td>
<td>Variable and circular tracking</td>
<td>Reduced number of tracking cards easy installation</td>
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<tr>
<td>Reduced total integration cost</td>
<td>Patented features and design</td>
<td>Broadens your application offer</td>
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</table>