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**Travail de fin d'études et stage[BR]- Travail de fin d'études : Conception du système de mesure de la bande analytique de la ligne de tri "PickIt"[BR]- Stage d'insertion professionnelle : Laboratoire Gemme (ArGenCo)**

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**Faculté :** Faculté des Sciences appliquées

**Diplôme :** Master en ingénieur civil mécanicien, à finalité spécialisée en technologies durables en automobile

**Année académique :** 2023-2024

**URI/URL :** <http://hdl.handle.net/2268.2/19593>

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ABB ROBOTICS

# Conveyor tracking module

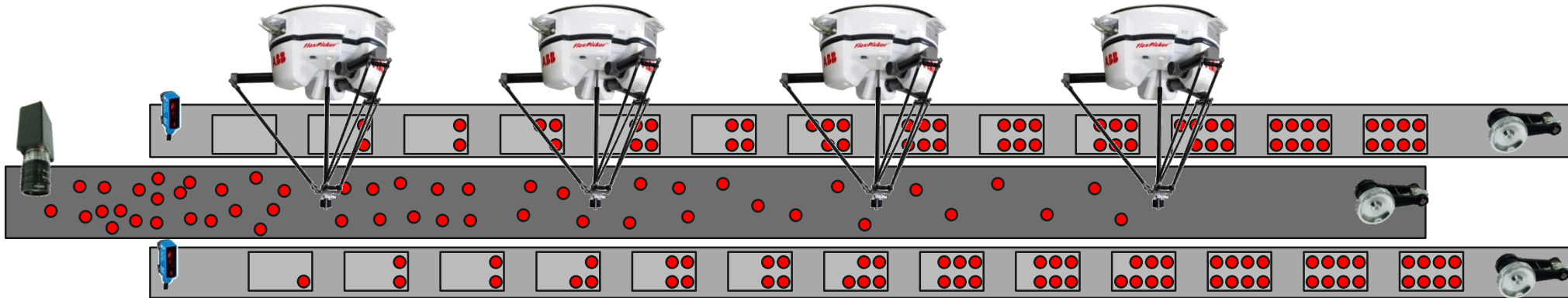
Product Management, ABB Robotics

September 2018



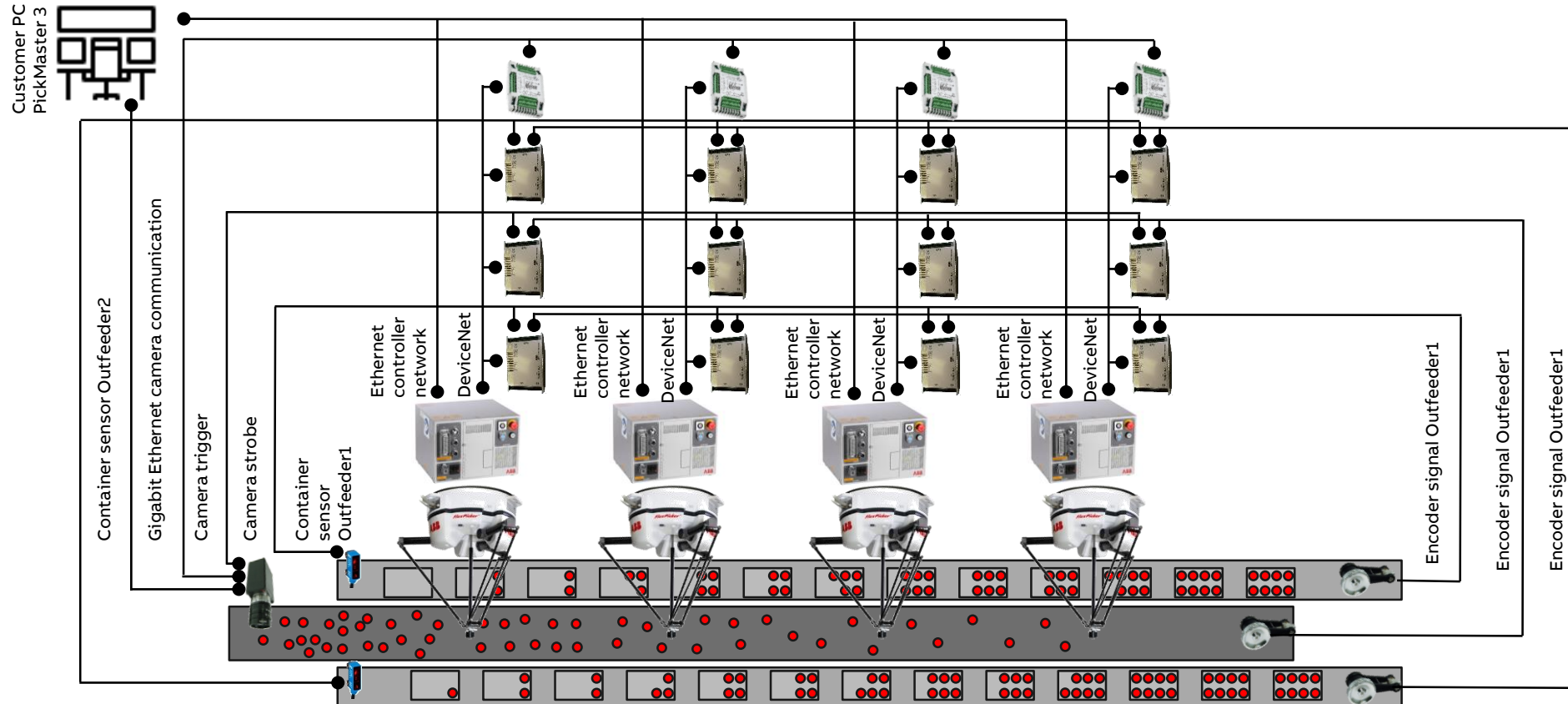
# Conveyor tracking today

4 x IRB 360 Picking Cell Topology



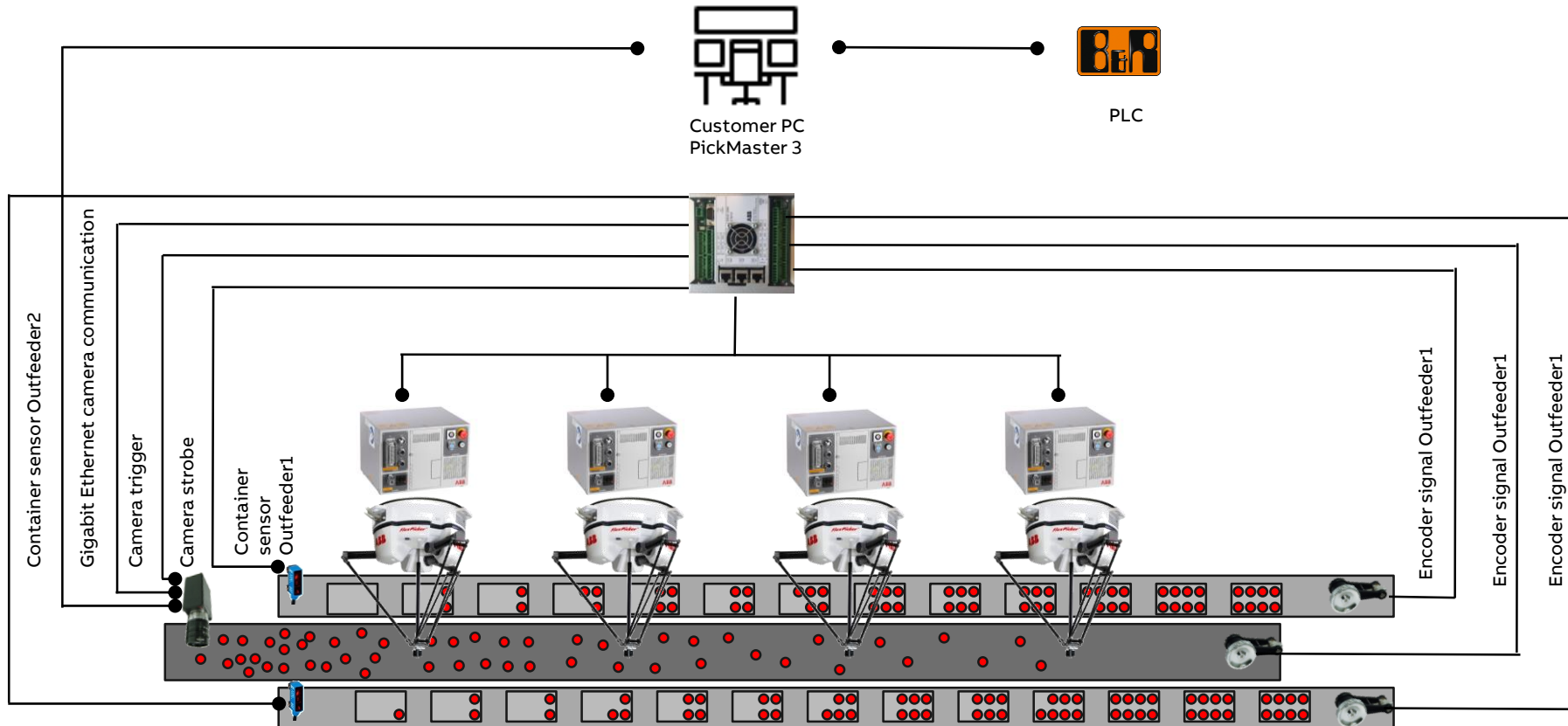
# Conveyor tracking today

## 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”

## Customer Needs

- Customer Needs
  - PickMaster User
  - Wants trouble free integration
  - Wants to source from few suppliers
  - Needs simplified architecture
  - Requires easy fault finding
  - Needs to reduce TCO
  - Fast deployment and commissioning

## Common Functionality

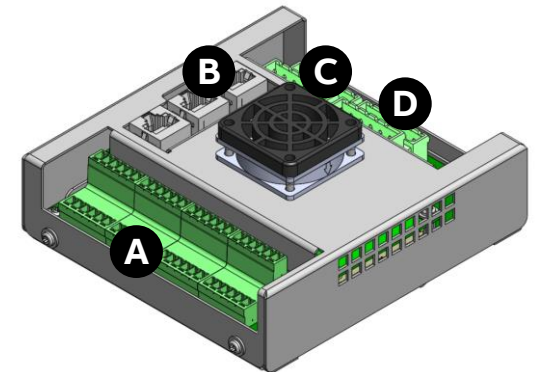
- Few interfaces defined and implemented by customer
  - Two robot application
  - 2 conveyors
  - 1 Camera signal
  - 1 sensor signal

## Expanded Functionality

- Few interfaces defined and implemented by customer
  - 16 conveyors (4xCTM)
  - 4 Robots (scalable to 40)
  - Up to 16 Cameras
  - Up to 16 Sensor signals

## Functions

- A. Connectors for up to 8 Cameras/Sensors
- B. Connector for Robot Network
- C. Fan to handle heat from CPU
- D. Connectors for Up to 4



# CTM

## Hardware specification

### Specification

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



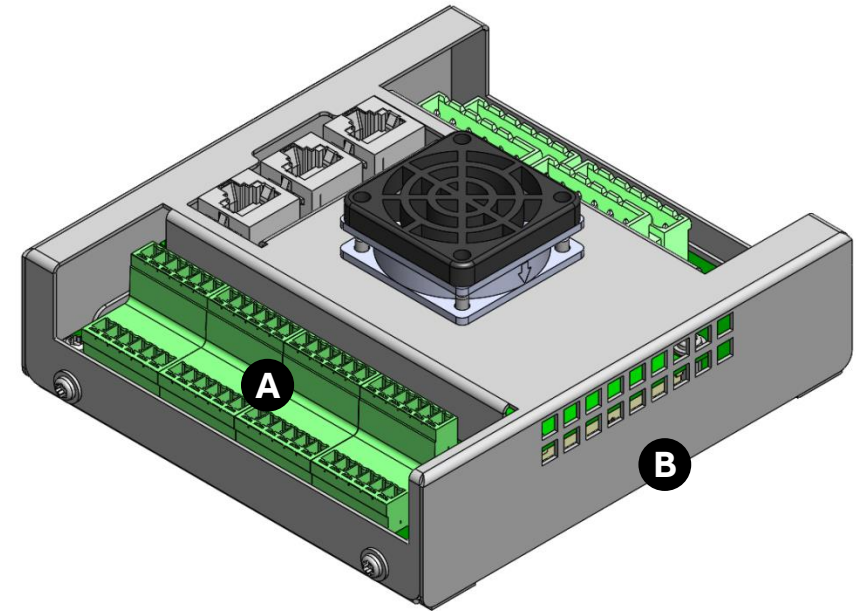
# CTM

## Software overview

A. CTM application

B. Linux OS

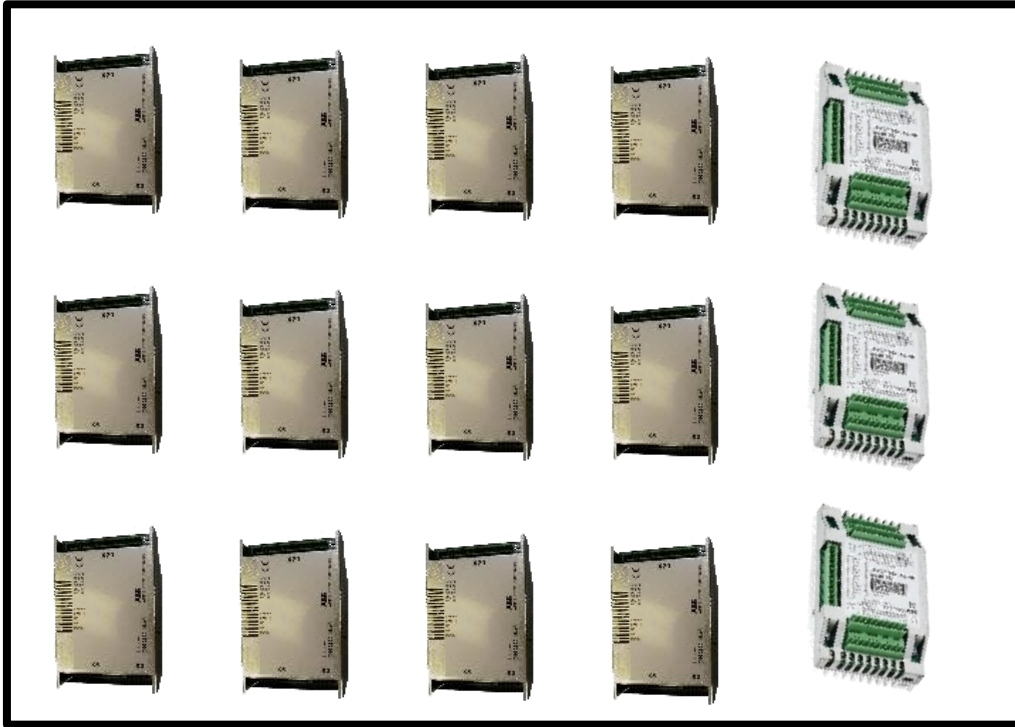
- Cyber security ready
- Supported interfaces: RobICI, SSH and PTP2
- Clients: RobotWare, Robot Studio





# Dynamic conveyor tracking

New DSQ2000 CTM board



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Simplification: 16 to 1 part number reduction, Field wiring reduced by 60%

# Dynamic conveyor tracking

## New Tracking Features

### High Speed

Highest Market Speed

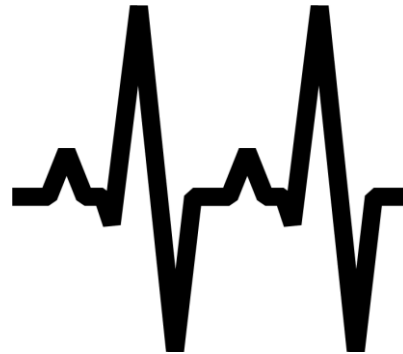
- 1.7 meters per second
- 100 meters per minute



### Variable Speed

Indexing/Variable speed flow

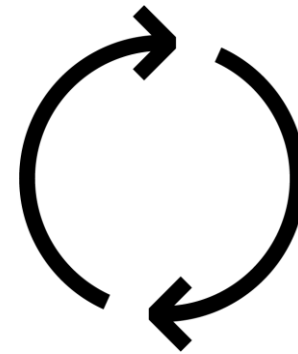
From variable to constant speed.  
From constant to variable speed.



### Circular

Tracking in Radians

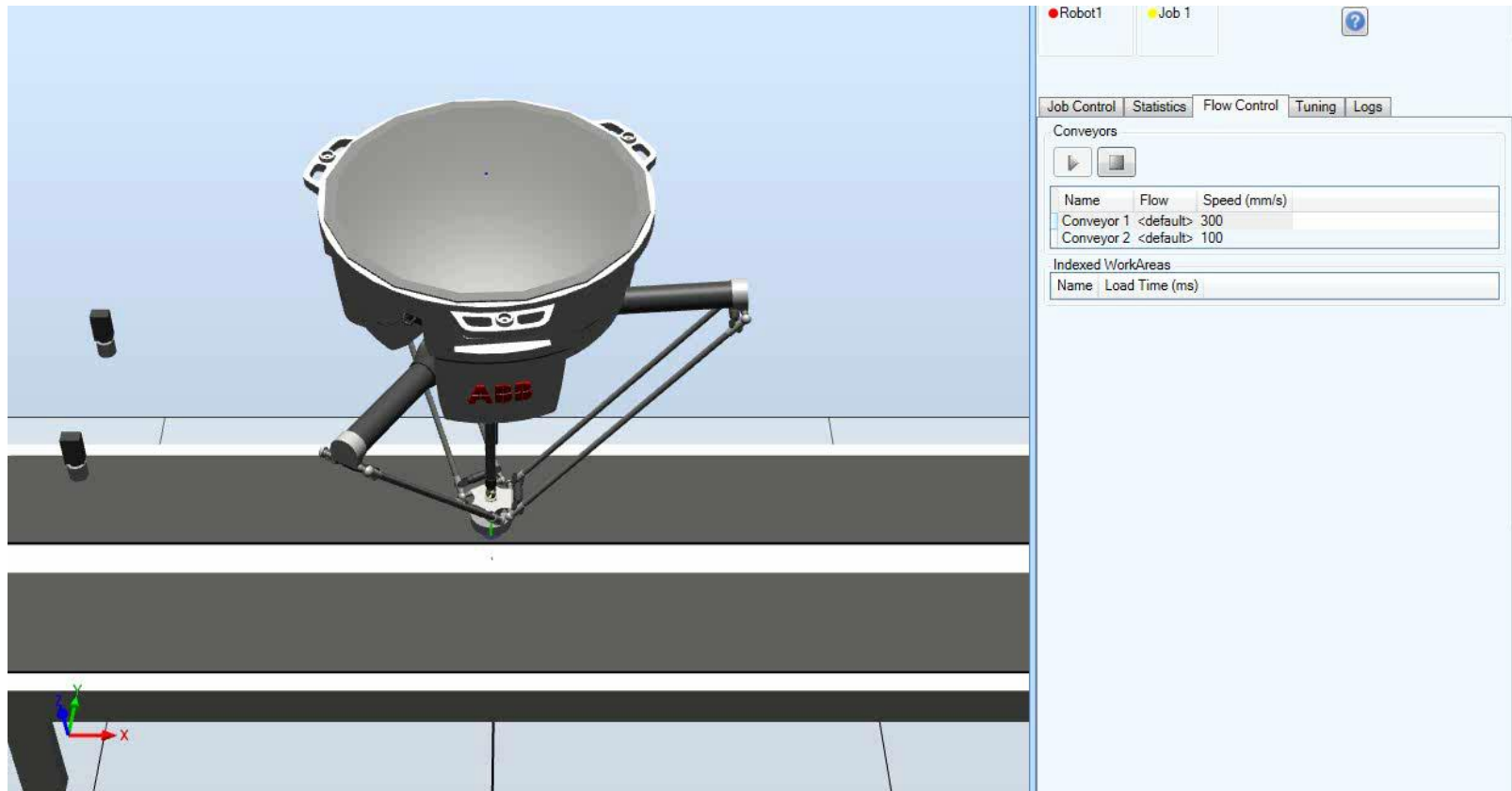
From circular flow to inline flow.  
From inline flow to circular flow.



All Available in RobotWare 6.07

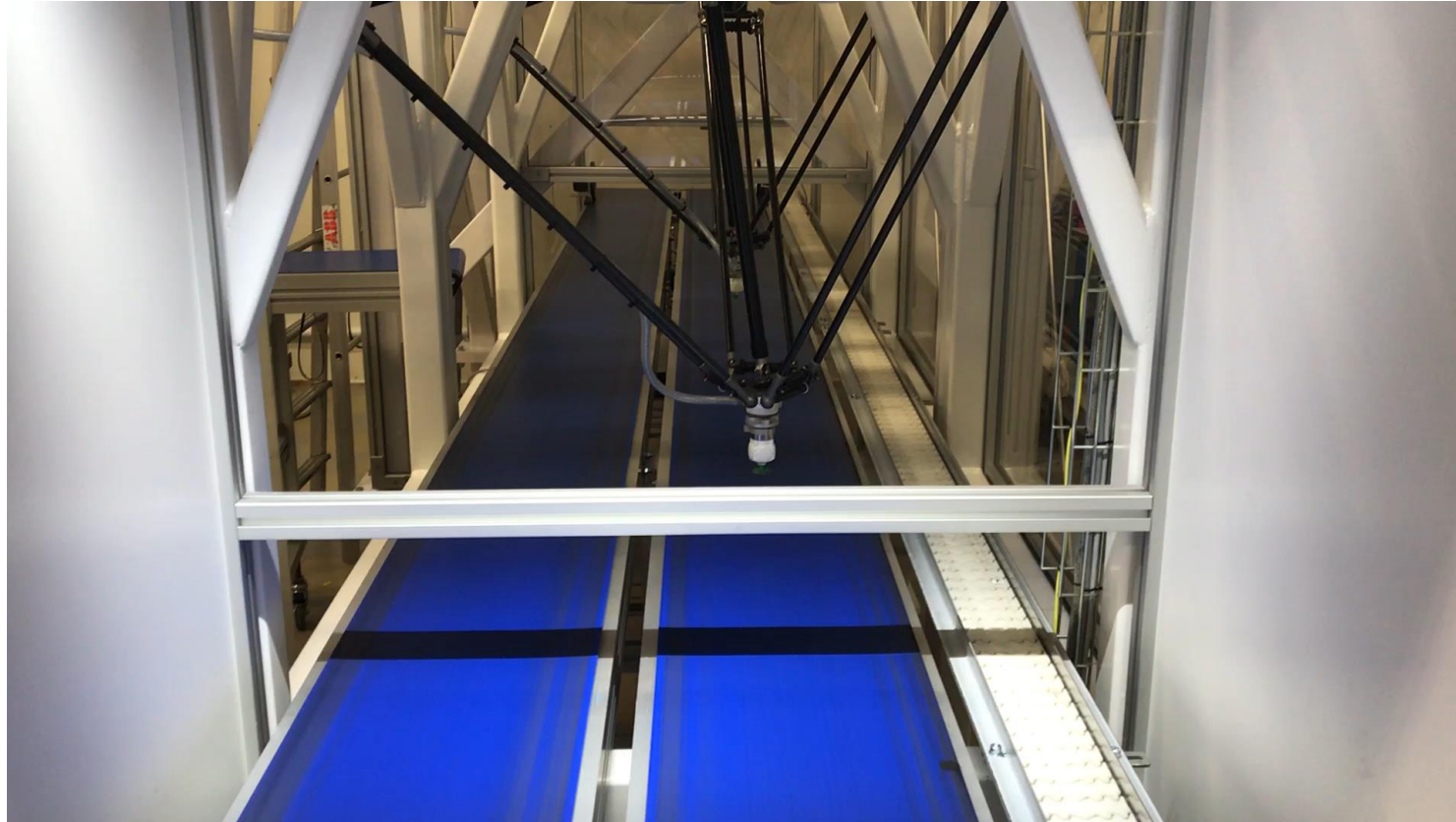
# Dynamic conveyor tracking

Expanding your Application Capability – beating the Competition



# Dynamic conveyor tracking

Expanding your Application Capability – beating the Competition



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# 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

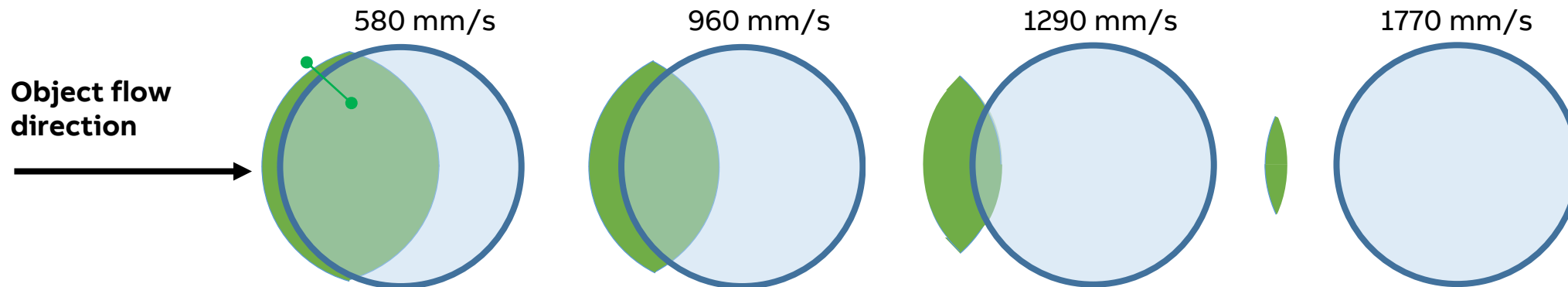
- Removes the need for tuning enter/exit limits of conveyor work areas.
- Instead, a "usage time" is estimated, i.e. how long time it will take to handle a target. Actual usage times can be measured from successful picks.
- Activates a floating target release zone that adapts to changes in conveyor speed.

### 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;
```





# Dynamic conveyor tracking

## User case 1

### High speed tracking

- Products exit a flow-wrapper 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.

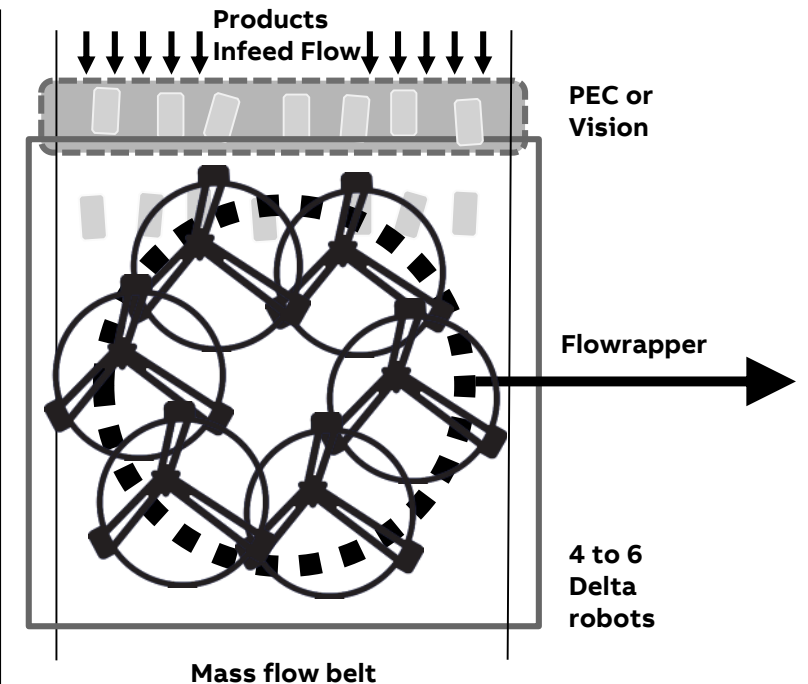


# Dynamic conveyor tracking

## 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.



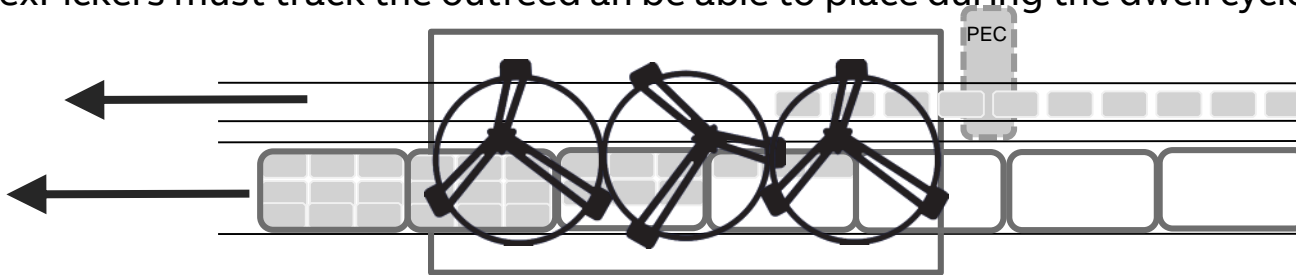


# Dynamic conveyor tracking

## 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



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# Conveyor tracking markets

All ABB robots

## Food and Beverage

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## Pharmaceutical

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## Consumer Packaged Goods

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## Automotive Parts Handling

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## 3C - Assembly

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## Medical Devices

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# Picking, Packing, Palletizing

## Target Applications



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# Dynamic conveyor tracking

Unique selling points - your competitive advantage

## 1. Speed

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The fastest tracking speed

## 2. Flexibility

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Variable and circular tracking

## 3. Simplified

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Reduced number of tracking cards  
easy installation

## 4. Cost

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Reduced total integration cost

## 5. Unique

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Patented features and design

## 6. Domain

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Broadens your application offer

**ABB**