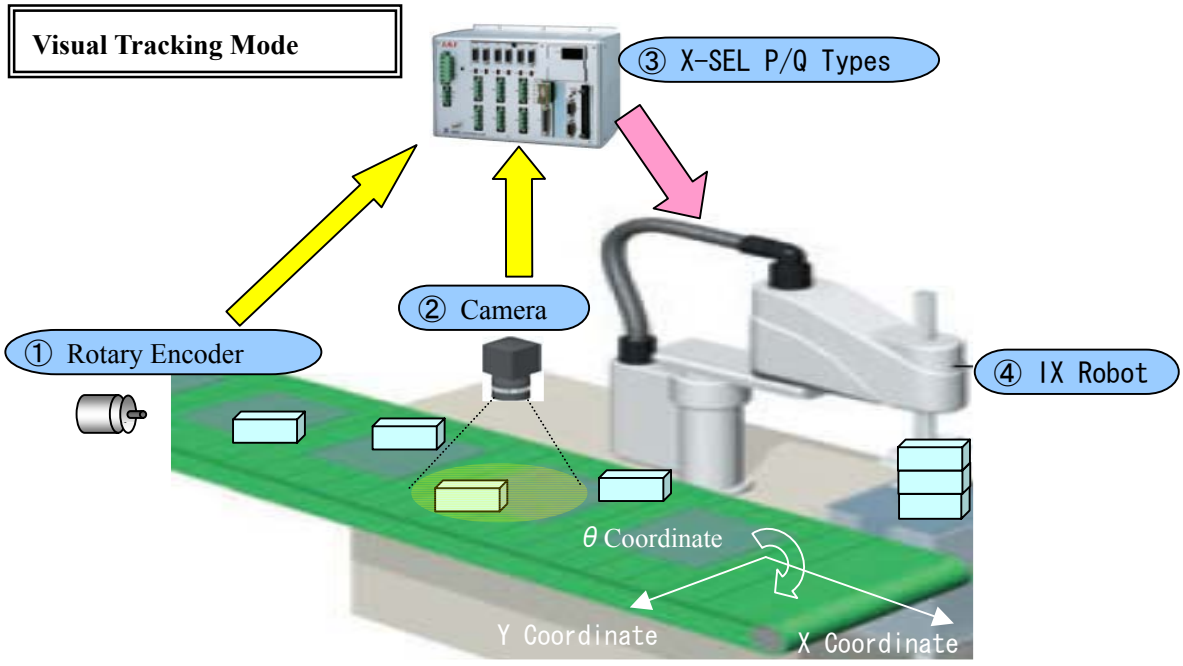
Application Example: Conveyer Tracking by X-SEL-P/Q

Issued on 7/25/2005

Conveyer Tracking Feature Option

The conveyer-tracking feature was added to the options for the Scara Robot IX Series (visual tracking and work sensor tracking modes, X-SEL P/Q types only).

Visual Tracking Mode



① A rotary encoder tracks the travel of a conveyer (X Coordinate)

② A camera provides position data of randomly traveling works on the conveyer (XY θ Coordinates)

③ A X-SEL Controller tracks the works based on the conveyer travel data and the works' position data.

④ It enables an IAI Robot to process the works without interfering with the conveyer.

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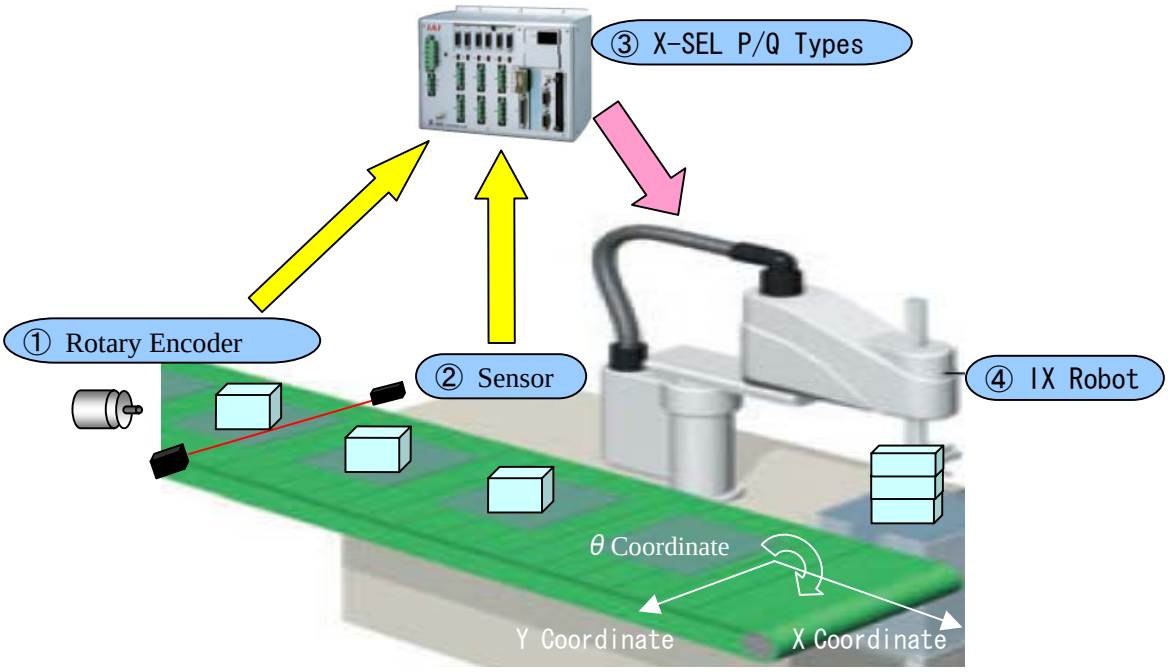
Work Sensor Tracking Mode



① A rotary encoder tracks the conveyer (X Coordinate).
② A sensor detects presence of works with specific Y θ coordinate values.
③ A X-SEL Controller tracks works based on the conveyer travel information and data from the camera.
④ It enables IAI Scara Robot to process works without interfering with the conveyer.

※ Selections between the visual and work sensor tracking modes could be made on the parameter.

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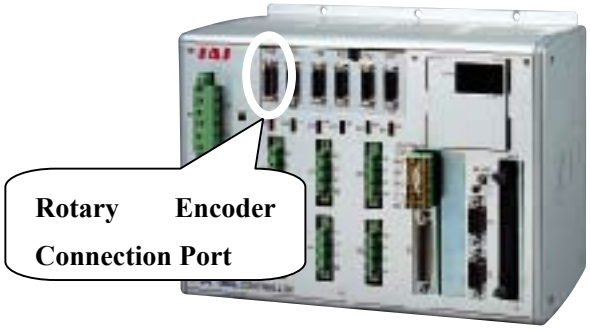
1. SPECIFICATIONS

CONTROLLER

The conveyer tracking system is compatible with X-SEL P/Q types.
（Main application ROM0.06 or newer）
A rotary encoder connector will be added to the above X-SEL P/Q types.



PC SOFTWARE

A separate conveyer tracking software needs to be purchased for the X-SEL controller.

OPTION BOARD **【 Visual Tracking Mode 】**

An EtherNet board needs to be purchased for the visual tracking mode (For communication between a X-SEL and DVT Camera).

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CAMERA 【 **Visual Tracking Mode** 】

A camera needs to be prepared by the end user. The compatible cameras are inclusive to DVT 540/544/550/554/542C/544C/552C/554C.（A lighting system is required for the camera）
Maximum 4 work pieces could be recognized simultaneously.
（X-SEL can calculate positions of total 8 work pieces）

IX SCARA

IX SCARA 250 – 600 are compatible with the option.

ROTARY ENCODER

- A-B Phase differential output type.
- Resolution 2000 – 3600 pulse/rev.
- Encoder speed 5000rpm max.

The above encoder needs to be prepared by the end user.（including the connection between the encoder and a conveyer.）
No specific manufacturer or brand is required.

SENSOR 【 **Work Sensor Tracking Mode** 】

A 3-line 24V sensor (A/B connection capable) needs to be prepared by the end user.

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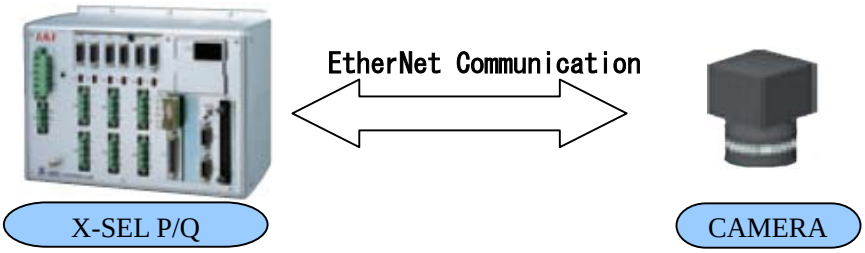
2. FEATURES

CAMERA COMMAND, COORDINATE COMMUNICAITON PROGRAM UNNECESSARY

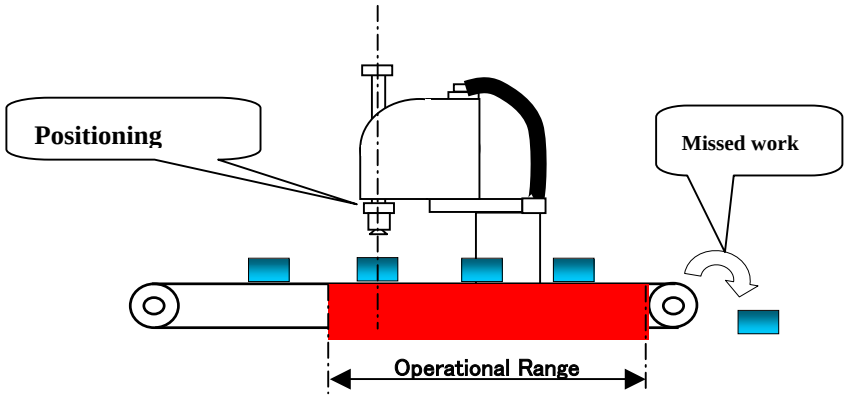
A X-SEL controller automatically performs communications between the controller and the camera for ready mode, vision command, coordinate data transmission, etc., and communication program is not required.



CAPABLE OF MONITORING CONVEYER TRACKING PROCESS

A X-SEL controller can monitor the following.

① Positioning of IX Robot directly above a work piece.
② Work pieces being missed and going over the conveyer.
③ Synchronization of an IX Robot and work pieces in the operational range.



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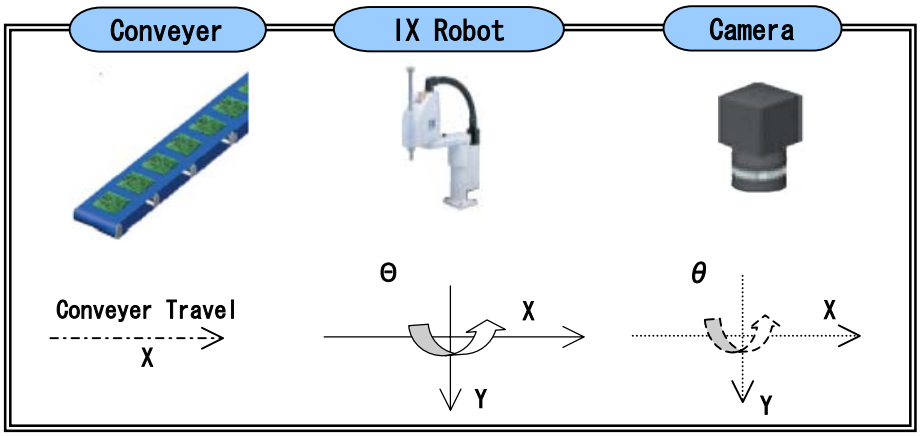
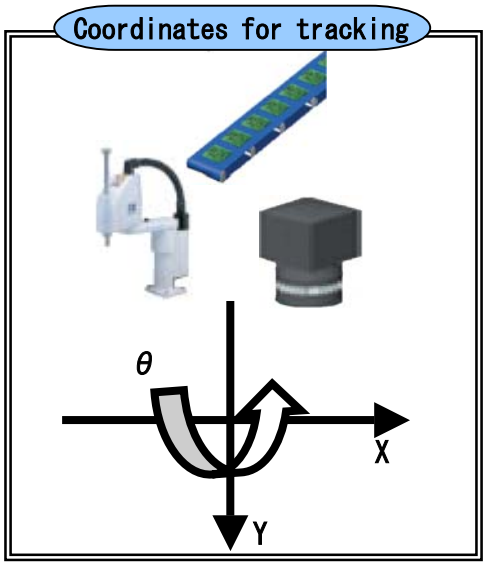
CALIBRATION SUPPORT

IAI software assists users' calibration/coordinate change process among the conveyer, IX Robot, and camera.





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Capable of Monitoring Conveyer Speed Variations

A built-in feature communicates any decrease in the conveyer speed to the X-SEL controller via an input port, and it allows the system to monitor conveyer travel speed variations.

Compatible for Both Continuous & Incremental Conveyer Travel Modes

The IX Robot is synchronized with the conveyer, and the robot automatically responds to changes in the conveyer's motions (reverse, pause, acceleration/deceleration, incremental moves, etc.) in the robot's operational range.

CAUTION !

The performance of the conveyer tracking system is affected by the operation environment, equipment conditions, etc. A careful review of those factors with an IAI representative would be required for installation of the conveyer tracking system.

Example: The factors affecting the accuracy of conveyer tracking

① The number, position, and angle of cameras (shades/shadows could affect camera accuracy.)
② Deviations of the conveyer's travel with respect to the X-Axis
③ Accuracy of the rotary encoder's tracking on conveyer
④ Holding power of work-securing devices (work may shift its position)
⑤ Accuracy of camera's CG calculation on the work piece.
⑥ Trueness of the Z-Axis to the conveyer plain, etc.

The above list is not inclusive; however, the tracking accuracy could be calculated as:

Tracking Accuracy = Sum of the Variations in the above 6 Factors