

# Packaging Machine Control Solutions

An electronic cam brings innovation to your packaging machines



# Craftsmanship at your finger tips

## Easily implement an electronic cam to middle-range packaging machinery

**Our solution improves both packaging productivity and quality**

Are you facing difficulties in introducing an electronic cam to your middle-range packaging machines due to cost reasons or technical reasons?

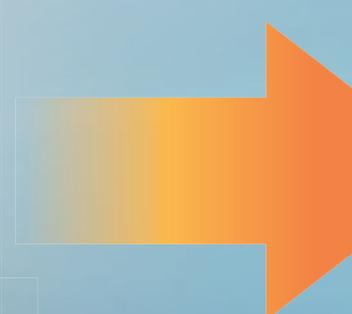
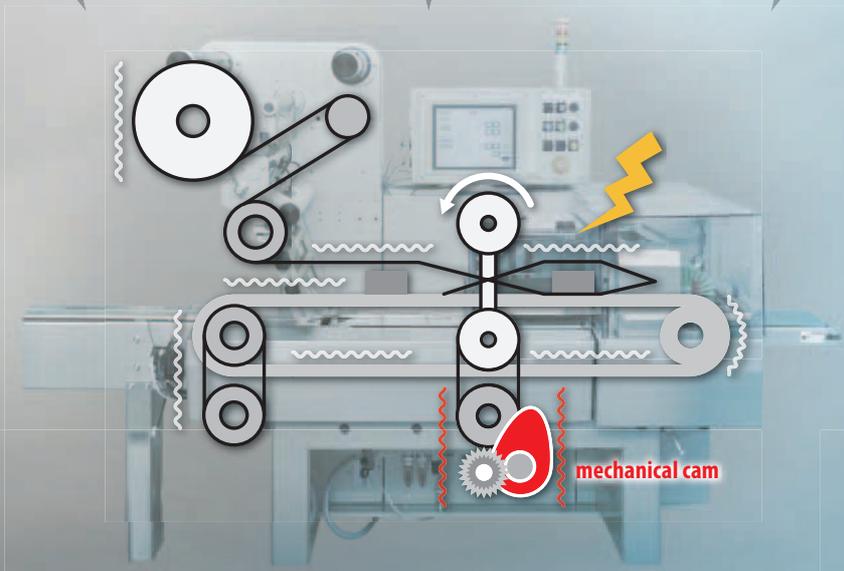
Omron offers solution “electronic cam control” to your packaging machines.

Issues on packaging machinery using conventional mechanical cam

Limit in performance

Difficult to reduce changeover time

Difficult to prevent packaging failure



## Omron easily brings “craftsmanship” to packaging machinery to solve issues by;

- High-speed control with electronic cam** ————— P. 4
- Quick changeover driven by recipe** ————— P. 5
- Prevent packaging failure by a variety of Function Blocks** — P. 6
- Easy design with Sysmac Library** ————— P. 7

## Proposal using electronic cam system!

Improves productivity and quality in a cost effective way



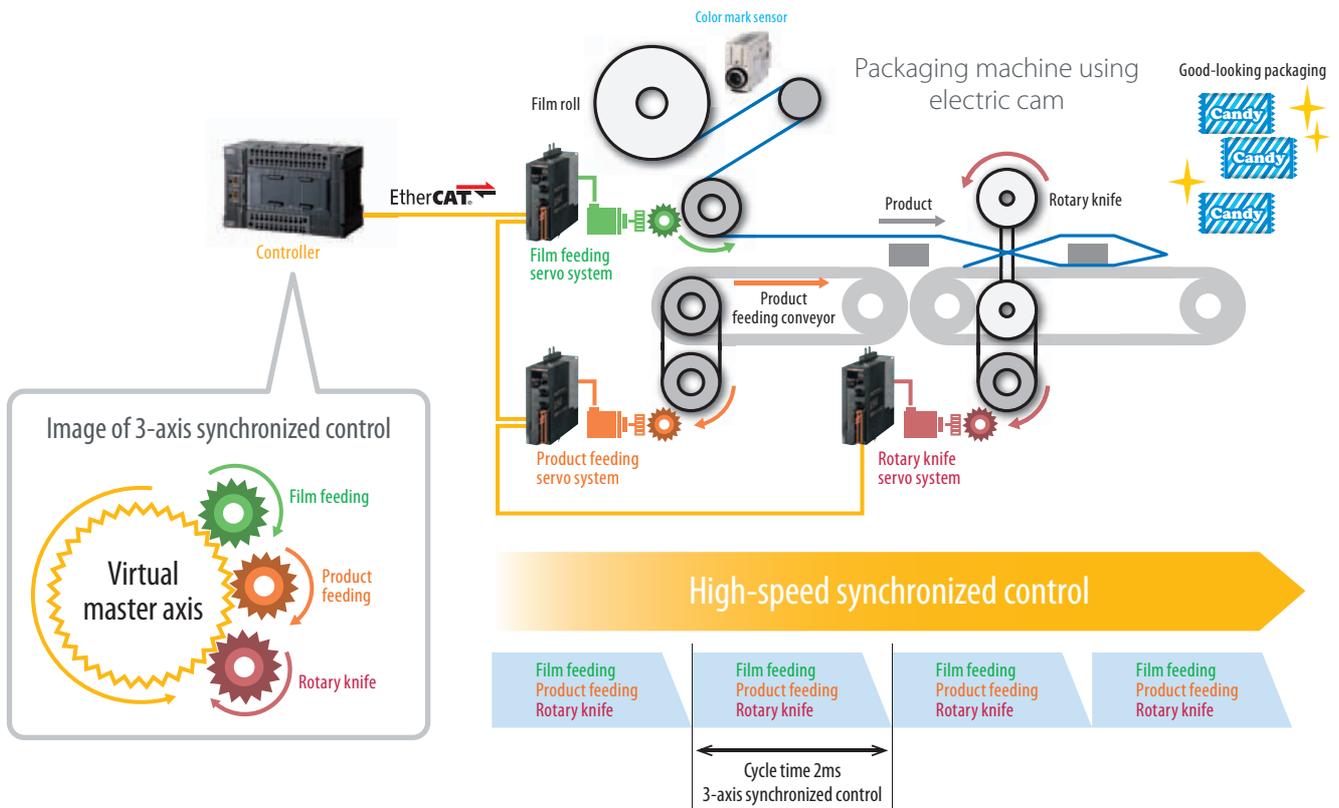
# High-speed control with electronic cam

## Overcoming barrier to higher-speed and higher-precision packaging

The PLC and mechanical cam control cannot accurately synchronize axes.  
 In addition, low precision, vibration, and noise caused by mechanical cam limit high-speed and high-precision packaging.

## Electronic cam optimizes packaging speed and precision

Electronic cam motion control realizes machine cam motion.  
 Electronic cam enables 3 axes - "film feeding", "product feeding", and "rotary knife" - to be synchronized at high speed.  
 This eliminates following errors between axes even during high-speed operation, leading to higher-speed and higher-quality packaging.  
 Packed with Omron's rich technical know-how on control programs, the Function Block (FB) makes advanced electronic cam control easy.



## Function Block easily realizes electronic cam control

Omron's Rotary Knife Function Block brings higher speed and higher precision to horizontal flow packers and enables mechanical cam motion without electronic cam table.

# Quick changeover driven by recipe

## Overcoming barrier to improving productivity

- With conventional packaging machines using mechanical cam, operators have to rely on human experience during complex tuning, which increases changeover time and fails to improve packaging productivity.
- When restarting a packaging machine after stoppage, the machine occasionally produces empty packages due to home adjustment.

## Easy and reliable changeovers without mechanical tuning

Digitalized data by electronic cams makes recipe-driven changeover possible. On the HMI, simply register recipes and change them according to products for changeovers. In this way, you can improve packaging productivity.



Recipe setting screen



Recipe selection screen



Contents of a recipe



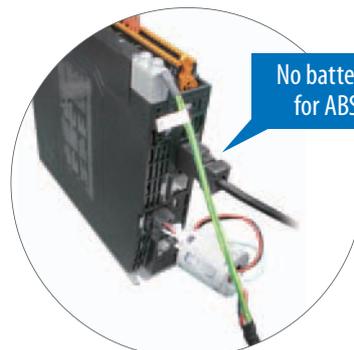
## Restart operation right after stoppage

Introducing an absolute encoder to the servo motor eliminates the need for homing operation when restarting operation after machine stoppage. That means operation can be immediately resumed in the state when the product and film have been stopped. Thanks to battery-free servo drive, battery replacement is no longer required.

1S AC Servo System  
R88M-1□/R88D-1SN□-ECT



No need for homing



No battery required for ABS encoder

# Prevent packaging failure by a variety of Function Blocks

## Overcoming barrier to improving packaging quality

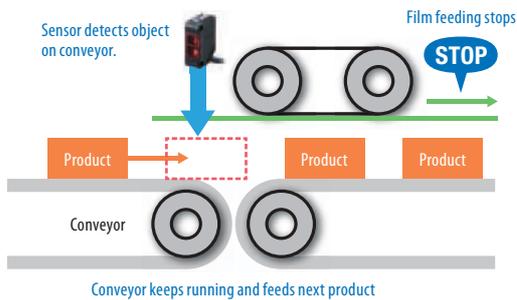
- Empty packages and defectives caused by bite need to be removed at subsequent inspection.
- Defective packages may be produced until decrease in sealing temperature is detected after heater burnout.
- False detection of color marks printed on various packaging materials resulted in defective packaging.

## Preventing packaging failure leads to good-looking packaging

By using the Rotary Knife FB and input signals from a sensor that detects position offset, the following “No product, No feed” and “No gap, No seal” functionalities can be easily added to prevent defective packaging and improve packaging quality.

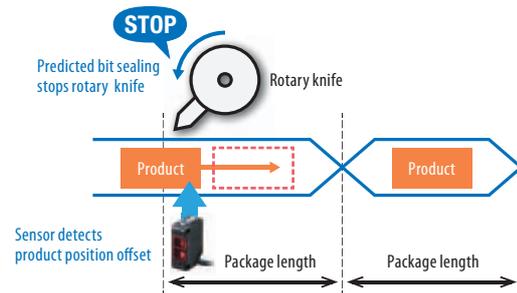
### • No product, No feed

When a product is not being fed, the film feeding stop till the next product is fed. This prevents empty packaging.



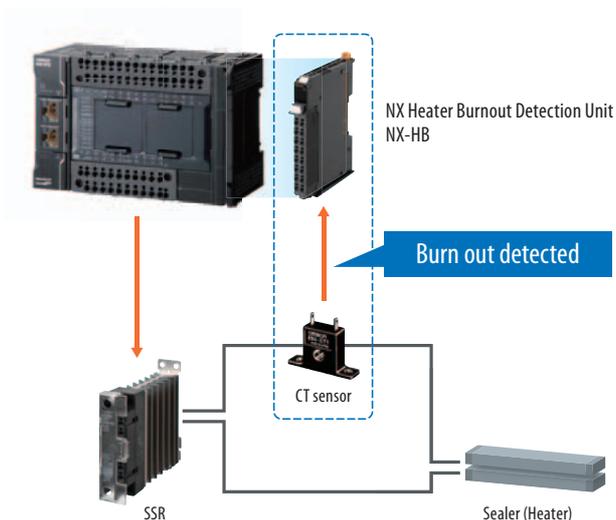
### • No gap, No seal

Check the position offset when detecting the product. Predict the bit sealing from the set package length. The rotary knife and sealing stop.



## Reduce defective packaging during heater burnout

Once a heater burnout is detected, the packaging operation stops, which prevents defective packaging that may produce during the decrease in heater temperature.



## Stable detection of any packaging materials

The Color Mark Photoelectric Sensor stably detects color marks on both glossy and colorful materials, which prevents packaging failures caused by false detection.

Since any packaging materials can be read, the material can be cut at the exact timing, helping produce good-looking packages.



# Easy design with Sysmac Library

## Overcoming barrier to improving design efficiency

A lack of expertise makes it difficult to quickly design motion control from scratch.  
In addition, testing programs is time-consuming.

## Quick and reliable design

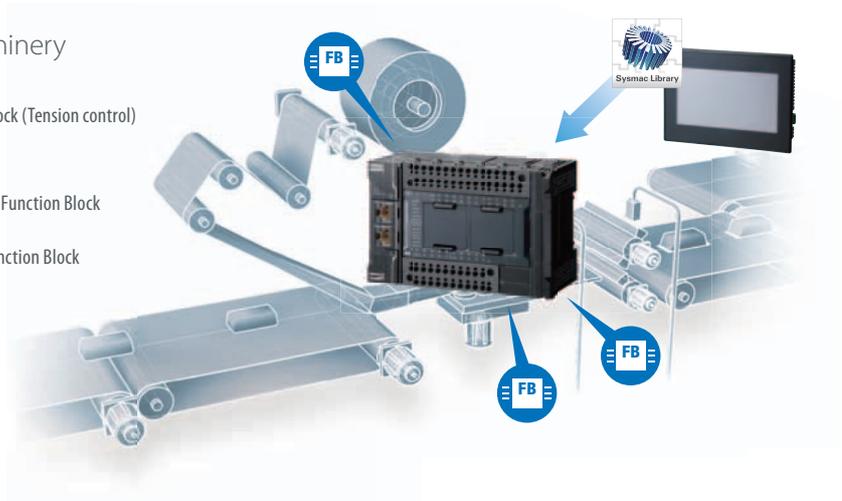
Omron provides the Sysmac Library that includes Function Blocks for horizontal flow packers to maximize the features of Omron products and simplify programming. You can easily design and modify horizontal flow packers.

### • Library usable for packaging machinery



- Rotary Knife Function Block
- Velocity Control Winder Function Block (Tension control)
- Box Motion Sample Program
- Temperature Control Library
- Direct Manipulated Variable Control Function Block (Direct power control)
- Quantitative Discharging Control Function Block (Weighing control)

In addition to sample programs using FBs in the Packaging Machine Library, HMI templates facilitate your design work.



## One software for configuration and programming

The Sysmac Studio is used to set up servo systems, motion, and controllers. Various servo setup functions make startup even easier and faster.



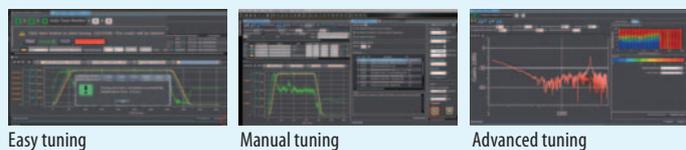
### Data import from Motor Sizing Tool

Data import function for quick parameter setup.



### Gain tuning to meet your way

Three types of functions for fast and accurate gain tuning.



# Omron products for packaging control solutions

## New HMI

NB Simple Programmable Terminal  
NB7W-TW11B

HMI with 65,000 color display and  
Ethernet connectivity ideal for  
middle-range packaging machines.

## New Controller

NX Machine Automation Controller  
NX1P2-1140DT

Compact controller for motion control and data  
handling is fully integrated within the Sysmac  
automation platform.

Temperature Input Unit



## New Servo

1S AC Servo System  
R88M-1□/R88D-1SN□-ECT

125 μs control cycle.  
23 bit high resolution encoder.  
Provides an accurate following control  
in combination with the NX1P.



EtherCAT

## New Sensor

Color Mark  
Photoelectric Sensor  
E3S-DC

Offers stable detection of both  
glossy and colorful packaging.





Ethernet  
EtherNet/IP™

## Software

Software components Sysmac Library  
Packaging Machine Library  
SYSMAC-XR012

The Sysmac Library is a collection of software functional components that can be used in programs for the NJ/NX-series Machine Automation Controllers or Industrial PC Platform NY-series IPC Machine Controller. "Packaging Machine Library" is packed with Omron's rich technical know-how to improve packaging quality and performance.



Automation Software  
Sysmac Studio  
SYSMAC-SE□□□

Fully compliant with open standard IEC 61131-3 and Japanese standard JIS B3503. One software for configuration of the NX Machine Automation Controller and 1S AC Servo System.  
Reusable programming code.



# Omron offers solutions with the future in mind



## Scalable from middle-range to high-end class

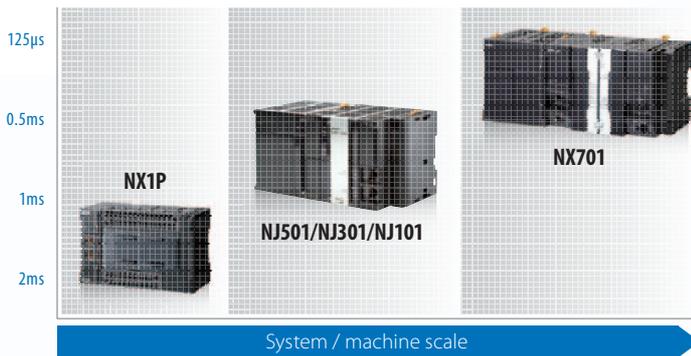
By using NJ5/ NX7, control program for middle-range packaging machines can be used to high-end machines with higher-speed and higher-precision. NA5 HMI screens support Pack ML.

### Scalable control from middle-range to high-end packaging machines

#### NJ/NX Machine Automation Controller

Program for NX1P is usable to NJ501/NJ301/NJ101. Upgrading the controller enables higher-speed and higher-precision packaging and to design the expanded packaging line.

#### Minimum communications cycle



### Sysmac machine control and IT technology



#### Industrial PC IPC Machine Controller

the IPC Machine Controller combines the precision and utility of the Sysmac platform with the versatility and range of Windows programs.



### For reliable traceability and quality packaging



**FQ2 Smart Camera**  
For printing inspection  
(e.g. date, 2D code)



**FH Vision System**  
For visual inspection  
EtherCAT support vision sensor



## Expand single packaging machine to whole packaging line

In combination with NJ5/NX7 and Sysmac solutions including transportation between machines, Pick and Place robots, vision system for inspection, you can build advanced packaging line.

### For Pack ML and remote maintenance

Pack ML support screen



#### NA Programmable Terminal

NA introduces high level integration with NJ/NX (e.g. Tag sharing) and PC-based crystal clear view.

### For European and US safety standards



#### NX Safety Controller

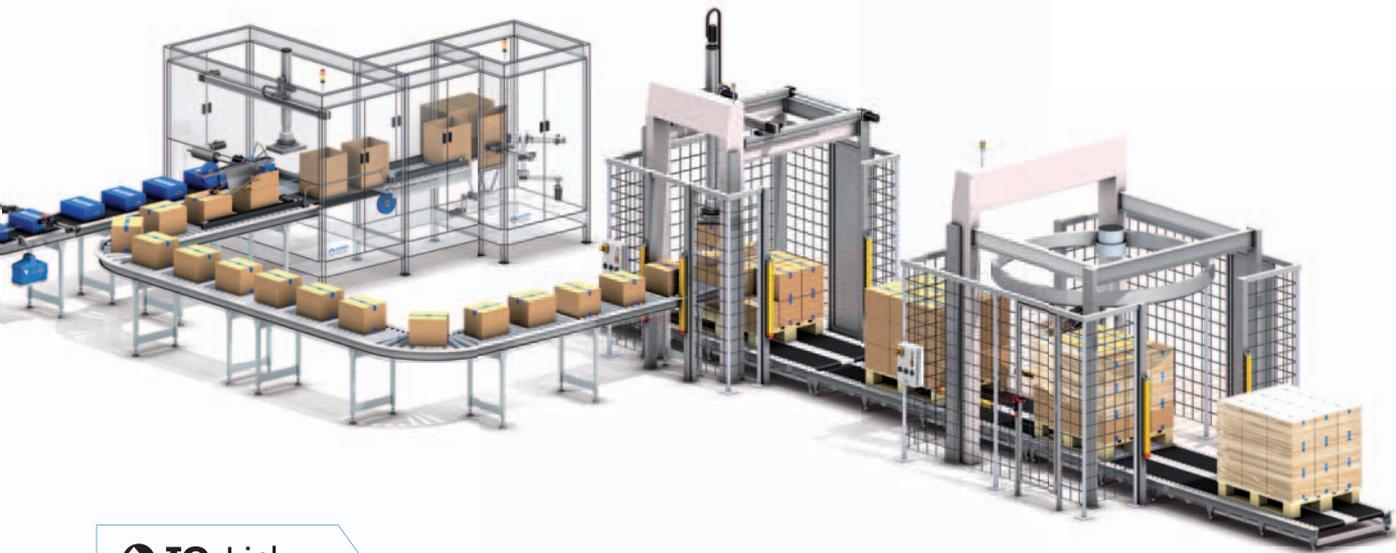
Adds safety system on the EtherCAT communications of packaging machine control. EtherCAT communications enables STO (Safe Torque Off) function without connecting to 1S Servo.

### For transportation between packaging machines



#### Multi-function Compact Inverter 3G3MX2-V1

Provides a conveyor transportation between machines without adding controllers.



## IO-Link

Detection of real time sensor status towards "eliminates packaging line stoppages"



GX IO-Link Master Unit  
GX-ILM08C



NX IO-Link Master Unit  
NX-ILM400



Proximity Sensor  
(Standard model)  
E2E-□-IL□



Proximity Sensor  
(Spatter-resistant model)  
E2EQ-□-IL□



Photoelectric Sensor  
E3Z-□-IL□



Color Mark Photoelectric Sensor  
E3S-DCP21-IL□

Meet a variety of changes in manufacturing



Industrial robot  
Hornet/Quattro/Cobra/Viper

For high-quality and high-speed material handling for products positioning and boxing.

# Product line up

Machine Automation Controller  
NX1P

EtherNet/IP  
EtherCAT



NX I/O

Digital I/O Units  
NX-ID/IA/OD/OC/MD



Analog I/O Units  
NX-AD/DA

Model	Total number of built-in I/O points		Maximum number of used real axes			
	Number of input points	Number of output points		Used motion control servo axes	Used single-axis position control servo axes	
NX1P2-1140DT	40 points	24 points	16 points NPN transistor	8 axes	4 axes	4 axes
NX1P2-1140DT1			16 points PNP transistor*			
NX1P2-1040DT			16 points NPN transistor	6 axes	2 axes	4 axes
NX1P2-1040DT1			16 points PNP transistor*			
NX1P2-9024DT	24 points	14 points	10 points NPN transistor	4 axes	0 axes	4 axes
NX1P2-9024DT1			10 points PNP transistor*			

\* With the load short-circuit protection.

HMI NB/NB Simple



1S AC Servo System  
R88M-1□/R88D-1SN□-ECT



Series	Model	Specifications	
NB/ NB Simple	NB3Q-TW01B	3.5 inch screen	Ethernet
	NB5Q-TW01B	5.6 inch screen	
	NB7W-TW01B NB7W-TW11B	7 inch widescreen	
	NB10W-TW01B	10.1 inch widescreen	

Temperature Input Unit/  
Heater Burnout Detection Unit  
NX-TS/HB



Position Interface Unit  
NX-ECO/ECS/PGO



**IO-Link**  
IO-Link Master Unit  
NX-ILM400



Load Cell Input Unit  
NX-RS



Communication  
Interface Units  
NX-CIF



System Units  
NX-PD/RF/PC/TBX



Color Mark Sensor

Color Mark  
Photoelectric Sensor  
E3S-DC



Color Fiber Amplifier Unit  
E3NX-CA



Automation Software  
Sysmac Studio  
SYSMAC-SE2□□□□



Software components Sysmac Library  
Packaging Machine Library  
SYSMAC-XR012



PackML defines state and transition of packaging machine  
Includes PackML Support Function Blocks

## Related catalogs



**Machine Automation Controller  
NX1P**  
Cat.No. P115



**Programmable Terminal  
NB Simple**  
Cat.No. V438



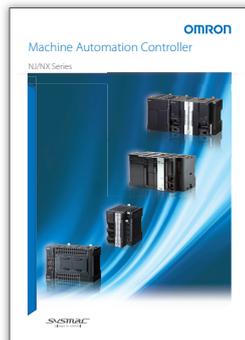
**AC Servo System  
1S series**  
Cat.No. I821



**Sysmac Library  
Packaging Machine Library**  
SYSMAC-XR012  
Cat.No. P111



**Color Mark Photoelectric Sensor  
E3NX-CA/E3S-DC**  
Cat.No. Y216



**NJ/NX Controller**  
Cat.No. P089



**Sysmac Automation Platform**  
Cat.No. P079

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**CSM\_2\_3\_0319**  
**Cat. No. Y219-E1-02**

1216 (0916)