

Sysmac Library for NJ/NX/NY Controller

SYSMAC-XR012

Packaging Machine Library



✓ **Improve packaging quality and performance in a short time.**

Issue 1 Reduce cutting and sealing errors to **stabilize packaging quality.**

Issue 2 Reduce machine vibration and noise to **shorten cycle times.**

Issue 3 **Easily** conform to industry standard PackML.

Packaging Machine Library offers solution!

Combining with high-speed, high-precision synchronous control using the NJ/NX/NY Controller on EtherCAT, the Packaging Machine Library provides versatile functionalities for packaging machines to stabilize cutting position and sealing quality, improve both quality and speed, and facilitate compliance with the PackML standard for packaging machines.

Packaging machine control using Sysmac Library

Telescoping and uneven winding of thin material

Velocity Control Winder Function Block

Control of the tension of winding/unwinding material to increase stability

- Uneven cut length
- Vibration and noise generated by mechanical cam, limits to speedup

- **Rotary Knife Function Block**
- **Box Motion Sample Program**

Synchronous position control to increase speed and precision

Compliance with PackML that is a packaging machine standard across Europe and US

PackML Support Function Blocks & sample program

Powerful support to conform to the PackML standard

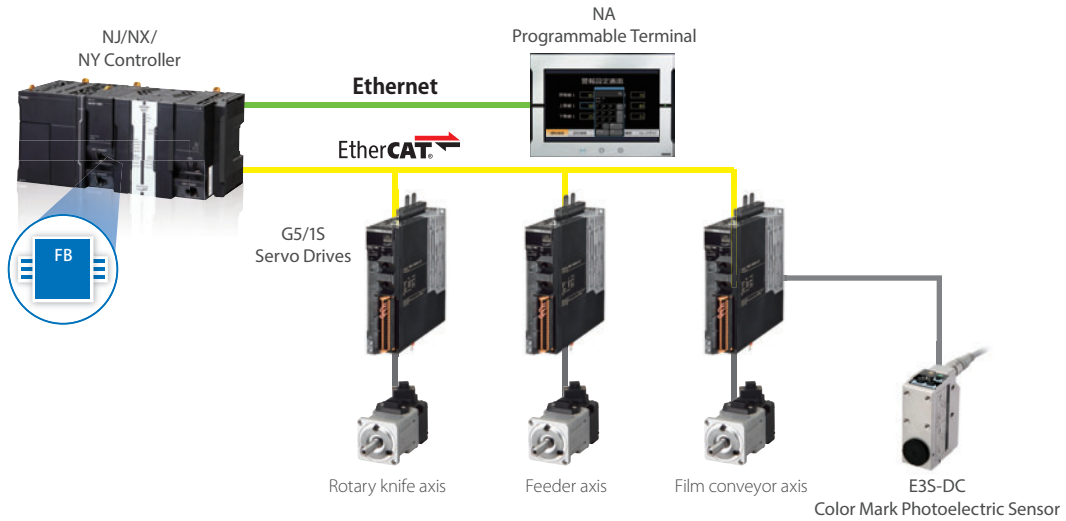
Sealing errors due to seal heater temperature drop

Direct Manipulated Variable Control Function Block (Temperature Control Library)

Direct manipulated variable control to reduce the drop in sealing temperature

System configuration

Rotary knife



Applications

Material cutting control

Issue

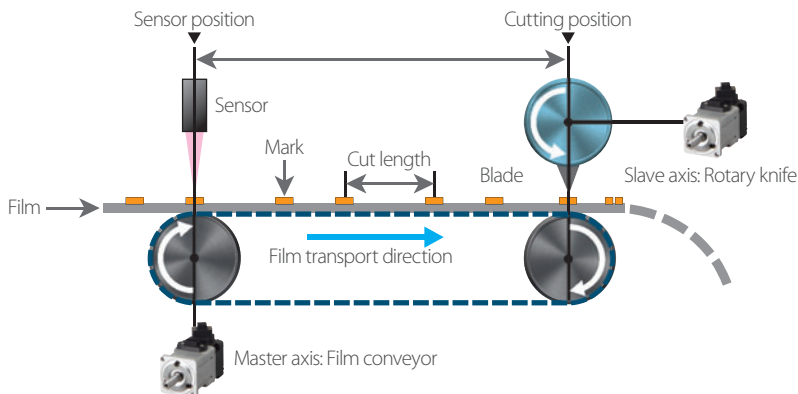
- Uneven cut length
- Vibration and noise generated by mechanical cam, limits to speedup

Solution

Rotary Knife Function Block

Box Motion Sample Program is also available.

High-precision positioning in accordance with film transport distance and mark positions is possible. Its versatile functions enable adjustment to the machine configuration and stabilization of the cutting position.



Master axis: Film conveyor
 Transports the film
 Slave axis: Rotary knife
 Cuts the conveyed film

Choice of modes

- The number of blades (1 to 4) and device conditions can be set
- Cutting configuration can be selected between Continuous mode (fixed cut length) and Mark To Mark mode (cutting at mark positions)

Polynomial 5 Cam Profile to suppress vibration

- Polynomial 5 Cam Profile reduces impact, noise, and vibration
- Advance Angle Compensation can compensate delay in synchronization

Precise cutting position

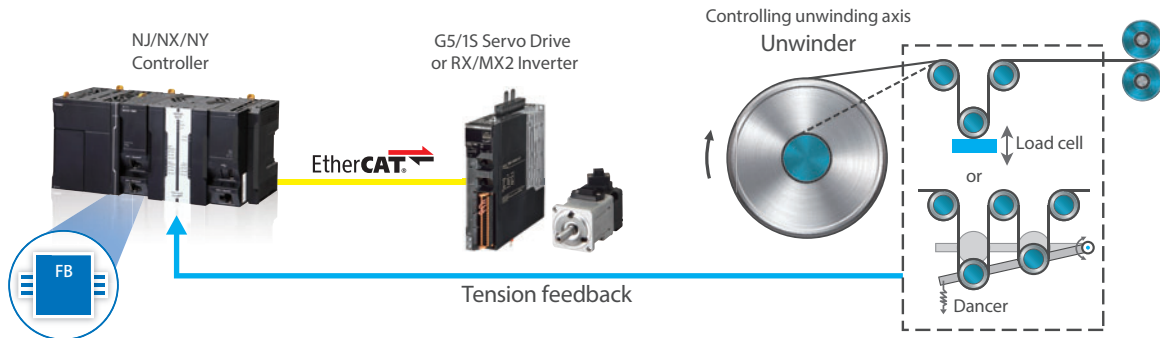
- Marks can be detected precisely by latching detection positions, independent of the control cycle
- Cutting configuration can be fine-tuned by changing settings during operation

Winder/unwinder control

Issue Telescoping and uneven winding of thin material

Solution **Velocity Control Winder Function Block**

The tension of winding/unwinding material is controlled. The material speed, reel diameter, and tension feedback are instantly calculated to stabilize the tension



PackML support

Issue Compliance with PackML that is a packaging machine standard across Europe and US

Solution **PackML Support Function Blocks & sample program**

The PackML (Packaging Machine Language) standard is a guideline that defines state transition of packaging machines and machine-to-machine communication. The use of PackML-compliant PackML Support Function Blocks and sample program to use the Function Blocks facilitates compliance with the PackML standard. The Function Blocks and sample program can be used for Omron controllers ranging from NX701 to NJ101, enabling standardization of various packaging machines.

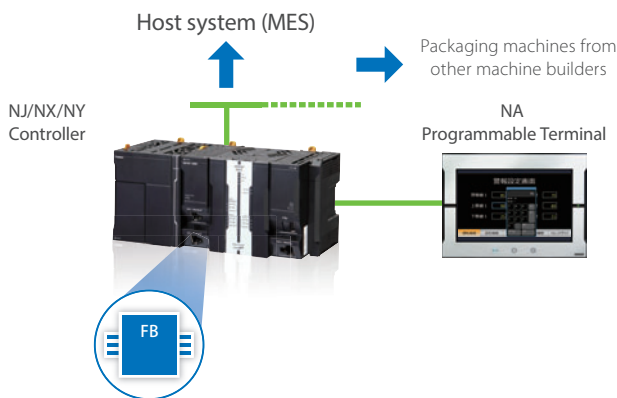
Packaging machine builders
Food manufacturers are requiring PackML-compliant machines...

Benefit to end users

- Unified machine-to-machine communication reduces setup and changeover time of production lines that consist of packaging machines from different machine builders

Benefit to packaging machine builders

- Structured programming, based on state transition and modularization defined by PackML, reduces debugging and development time
- A common method of data exchange in packaging machinery reduces problems when a production line is set up, resulting in fast setup



Sample program & screens

Sample program for PackML is also available. Ask your Omron sales representative for details.

- Sample program including PackTag setting required for communication between host and machines
- Sample HMI screens to display package machine status
- Practices guides for sample program, sample screens, and compliance with PackML

Compatible Models

| Name | Model | Version |
|---|------------------------|--|
| Machine Automation Controller NJ/NX CPU Unit | NX1P2-□□□□□□ (1) | Version 1.13 or later |
| | NX701-□□□□/ NJ101-□□□□ | Version 1.10 or later |
| | NJ501-□□□□/ NJ301-□□□□ | Version 1.10 or later (PackML Support FBs can be used for Version 1.01 or later) |
| Industrial PC Platform NY IPC Machine Controller | NY5□□-1 | Version 1.12 or later |
| Automation Software Sysmac Studio | SYSMAC-SE2□□□ | Version 1.14 or higher (may vary depending on controller model) |

Function Block (FB)/Function (FUN) Specifications

| FB group type | Name | FB/FUN name | Description |
|--|---|--|---|
| Rotary Knife | Rotary Knife | RotaryKnife | Controls the rotary knife. This FB is a software module consisting of the functions necessary for the following applications and was developed to reduce programming time. <ul style="list-style-type: none"> • Cutting web-like products such as sheets • End sealing and cutting operation of the pillow packaging machine • Labeling • Applications that follow the product-flow and process the products |
| Winder, Unwinder | Velocity Control Winder (for Servo) | WinderVelCtrl_Servo | Controls the tension of a continuous material being wound or unwound with servo motor. This FB can be used for the following applications. <ul style="list-style-type: none"> • Winding or unwinding materials from a drum or roll • Feeding wrapping materials in packaging application (unwinder) • Other sheet transfer applications |
| | Velocity Control Winder (for Inverter) | WinderVelCtrl_Inverter | Controls the tension of a continuous material being wound or unwound with inverter. This FB can be used for the following applications. <ul style="list-style-type: none"> • Winding or unwinding materials from a drum or roll • Feeding wrapping materials in packaging application (unwinder) • Other sheet transfer applications |
| PackML Support | PackML Mode/State Machine | PackMLModeStateMachine | Based on the mode/state machine stipulated by PackML, outputs the current mode and state according to the mode change/state transition command. |
| | Dwell Time Measure | PackMLModeStateTimer | Measures and outputs a dwell time (second) in each state and mode of the mode/state machine stipulated by PackML. |
| | Transition Command Display | PMLCtrlCmd | Checks which transition command is the number of Command.CntrlCmd stipulated by PackTag. |
| | State Output | PMLState_Is | Checks which state number stipulated by PackML represents which state. |
| | Transition Command All Reset | PMLTransitionCmd_ResetAll | For the state transition command sPACKML_TRANSITION_COMMAND structure-type variables, this function resets every BOOL member that indicates the state transition to FALSE. This function is used for initializing the state transition request to the host module. |
| | Transition Command Reset State Set | PMLTransitionCmd_ResetAllCmdSetAllSC | For the state transition command sPACKML_TRANSITION_COMMAND structure variable, resets all the state transition commands (Cmd_<state name>) in the BOOL type members which indicates state transition to FALSE, and sets all the Wait state complete report (Sts_<state name>_SC) to TRUE. This function is used for initializing the state transition command to the host module. |
| | Transition Command Summarize | PMLTransitionCmd_Summarize | Output by each lower module as follows, and output them as the State Transition Commands for the host module, <ul style="list-style-type: none"> • Execute OR evaluation on state transition commands (Cmd_<state name>) • Execute AND evaluation on Wait state completion notifications (Sts_<state name>_SC) |
| | Pack Tag Transition Command | PMLTransitionCmd_SummarizePackTagCtrlCmd | Processes and reflects the state transition requests coming from outside of the machine through the Command.CntrlCmd tag of PackTag to the summarize destination as follows. <ul style="list-style-type: none"> • Execute OR evaluation on state transition commands (Cmd_<state name>) • Execute AND evaluation on Wait state completion notifications (Sts_<state name>_SC) |
| | Alarm | Alarm | Defines "Alarm" to support events and reports the state of the defined Alarm to sALARM_STATUS structure-type variables under the host module control. |
| | EM Alarm Status Update | AlarmStatus_Update | Checks whether each alarm status changed against Cfg_EMAlarmStatus that indicates the status of Alarms collected to EM as In/Out variables, and then updates each member of sALARM_STATUS. Also, the FB resets Cfg_EMAlarmStatus based on the instruction given as In variables. |
| | UN Alarm Status Add | AlarmSummation_Add | Adds the specific EM Alarm status given by In/Out variable EMEventStatus for the In/Out variable that retains the Alarm statuses merged to Cfg_UNEventSummation UN (unit/machine). |
| | Alarm Sort and Filter | AlarmSummation_SortFilter | Reflects the results of filtering and sorting that are conducted with the conditions specified by the In/Out variable Cfg_UNEventSummation that retains the Alarm statuses merged into UN (unit/machine), to sALARM array variable Output. |
| DATE_AND_TIME Type Pack Tag ArrayConversion | DT_TO_PackTagDINTarray | Converts the input of DATE_AND_TIME into the date-time array specified by PackTag. | |

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