

Sysmac Library for NJ/NX/NY Controller

SYSMAC-XR006

## Vibration Suppression Library



✓ Increase material handling speed to reduce production cycle time.

### Issue 1

When handling speed is increased, the machine and objects vibrates and vibration settling time is required.

### Issue 2

Slides or spilling that occur during material handling result in poor product quality.

## Vibration Suppression Library offers solution!

Function Blocks in this library suppress vibration after and during high-speed material handling, significantly reducing production cycle time.



## Vibration Suppression Function Block Selection

**Challenge** Suppress vibration.



**Solution** The vibration of the specified resonance frequency is reduced.

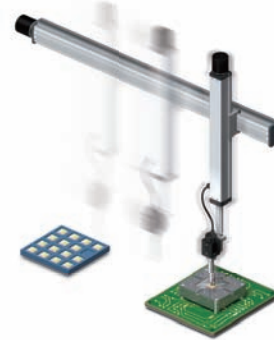
### ■ Choosing vibration suppression over travel time



#### Multiple Frequency VS Filter 1 (MultiVSFilter1)

Vibration can be reduced by specifying up to five resonance frequencies.

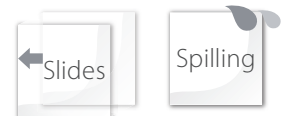
### ■ Balancing vibration suppression with travel time



#### Resonance Frequency Specific Vibration Suppression Parameter Calculation 1 (VSMoveParam1)

Vibration can be reduced by specifying a resonance frequency. (Patent pending)

**Challenge** Suppress slides and spilling.



**Solution** The vibration is reduced by smooth movement.

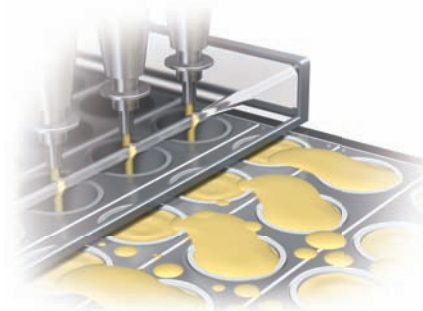
### ■ Specifying travel time



#### Time Specific Vibration Suppression Profile 1 (VSConstTimeProfile1)

The position profile for smooth acceleration and deceleration is calculated according to the specified parameters.

### ■ Specifying distance and velocity in constant velocity zone



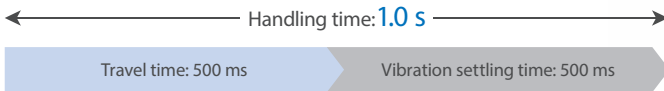
#### Constant Velocity Specific VS Profile 1 (VSConstVelProfile1)

The position profile for smooth acceleration and deceleration is calculated according to the specified parameters.

# Applications

## Semiconductor chip handler

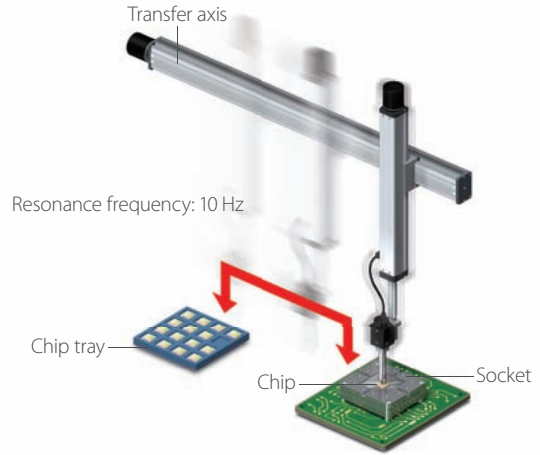
**Issue** The chip handler needs to wait over the socket until the vibration stops.



**Solution** Function Blocks in the Vibration Suppression Library shorten handling time.



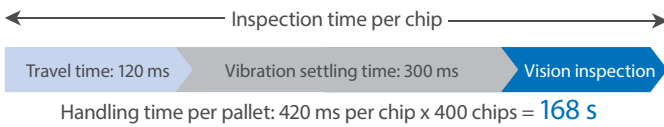
➤➤ Shorten handling time to 1/5



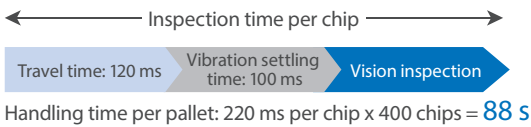
**Application** The XZ axis handler transfers a chip from a chip tray to a socket.

## Semiconductor inspection machine

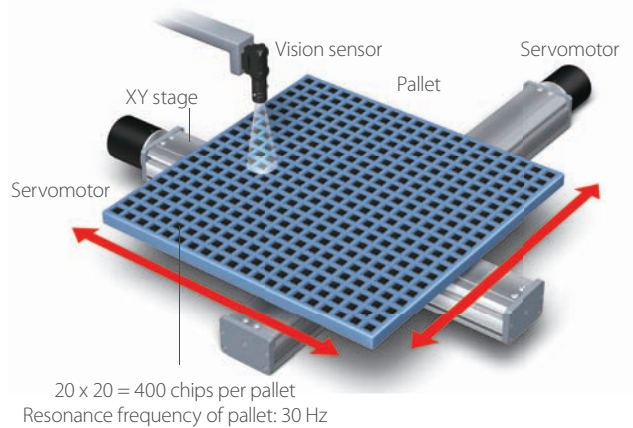
**Issue** The vision sensor cannot inspect a chip until the vibration stops after a pallet is moved.



**Solution** Function Blocks in the Vibration Suppression Library shorten vibration settling time.



➤➤ Shorten inspection time by 80 seconds

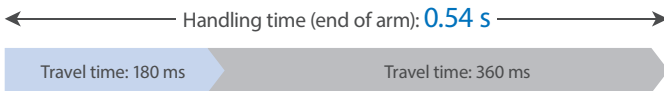


**Application** The XY stage moves a pallet so that the vision sensor can inspect chips one by one.

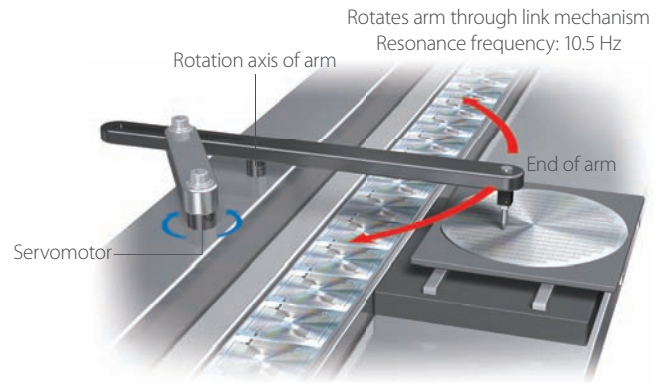
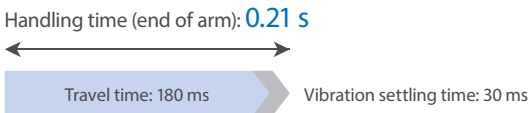
## Semiconductor die bonder

▶▶ Shorten handling time to half

**Issue** The arm cannot bond a chip until the vibration stops.



**Solution** Function Blocks in the Vibration Suppression Library shorten vibration settling time.



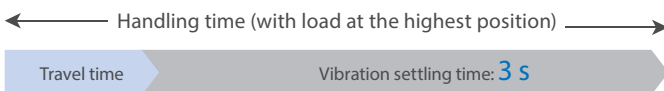
**Application** The arm with a link mechanism bonds a chip to a frame or substrate.

## FPD stacker crane

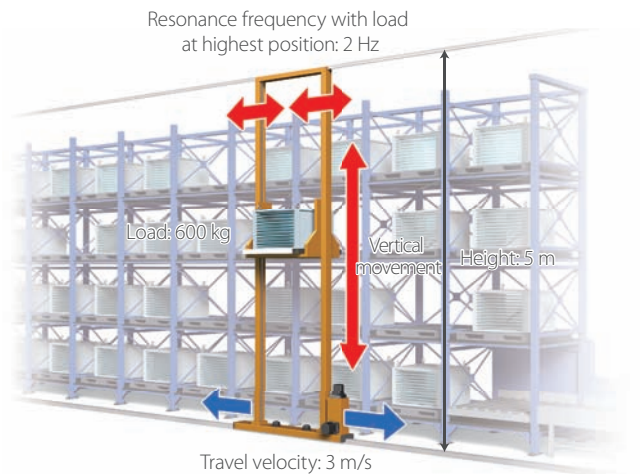
▶▶ Shorten handling time by 2.6 seconds

**Issue**

- The crane cannot load or unload a cassette until the horizontal vibration stops.
- Resonance frequency varies depending on the height position of a cassette.



**Solution** Function Blocks in the Vibration Suppression Library shorten vibration settling time.



**Application** The stacker crane loads and unloads a glass substrate cassette onto and from a shelf.

### Liquid filling and packaging machine

**Issue** The travel speed is limited to avoid splashing liquid onto the sealing part of a pouch.

Travel time: **1.2 s**

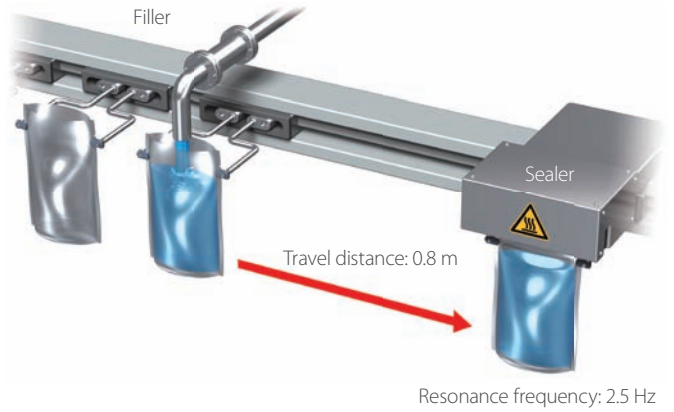
Shorter travel time causes sloshing of liquid in a pouch, resulting in sealing failure due to its wet sealing part.



**Solution** Function Blocks in the Vibration Suppression Library shorten travel time without sealing failure.

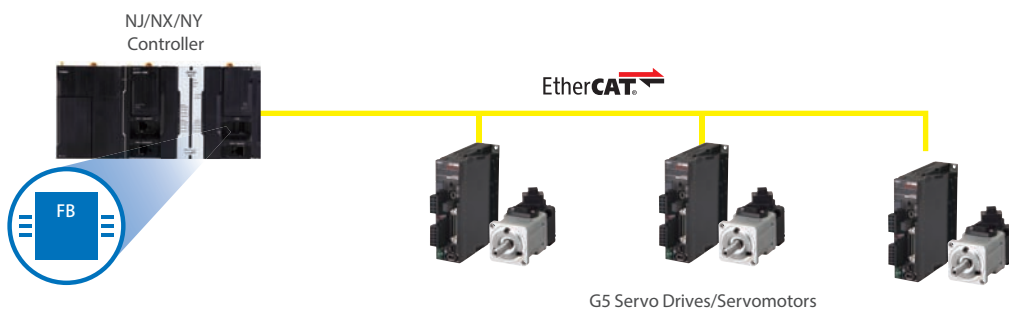
Travel time: **1.0 s**

▶▶ Shorten handling time by 0.2 seconds



**Application** The machine fills a pouch with liquid and transfers it to the sealer to heat seal it.

### System configuration



Programs created by combining Function Blocks in Vibration Suppression Library and motion control instructions are used to suppress vibrations.

## Compatible Models

Name	Model	Version
Machine Automation Controller NJ/NX CPU Unit	NX701-□□□□/NJ101-10□□ *1	Version 1.10 or later
	NJ501-□□□□/NJ301-□□□□	Version 1.10 or later
	NX1P2-□□□□□□(1) *2	Version 1.13 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
G5 Servo Drive with Built-in EtherCAT Communications	R88D-KN□□□-ECT	Version 2.10 or later

\*1. This Library is not available for NJ101-90□□ CPU Units.

\*2. This Library is not available for NX1P2-90□□□□ CPU Units.

## Function Block (FB)/Function (FUN) Specifications

Name	FB/FUN name	Description
Multiple Frequency VS Filter 1	MultiVSFilter1	Creates, from the command position of the axis, the command position that can suppress up to five vibrations that occur on the equipment.
Time Specific Positioning Parameter Calculation 1	TimeToMoveParam1	Calculates parameters needed for creating the command pattern that can reach the target position in the specified time when positioning is performed using MultiVSFilter1.
Resonance Frequency Specific Vibration Suppression Parameter Calculation 1	VSMoveParam1	Calculates the S-curve (i.e., velocity, acceleration, and jerk) parameters for suppressing the vibration that occurs during single axis positioning. High-speed travel is achieved by suppressing vibration of the specified resonance frequency.
Constant Velocity Specific VS Profile 1	VSConstVelProfile1	Calculates the position profile with the specified velocity in constant velocity zone. Calculates a smooth position profile for each of the acceleration and deceleration distances, so that residual vibration at the stopping position can be reduced and the vibration during constant velocity motion can also be suppressed.
Time Specific Vibration Suppression Profile 1	VSConstTimeProfile1	Calculates the position profile for the high level S-curve with a specified travel time. Positioning can be made in smooth velocity and acceleration/deceleration from the start to end points.

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