MITSUBISHI ELECTRIC

Changes for the Better

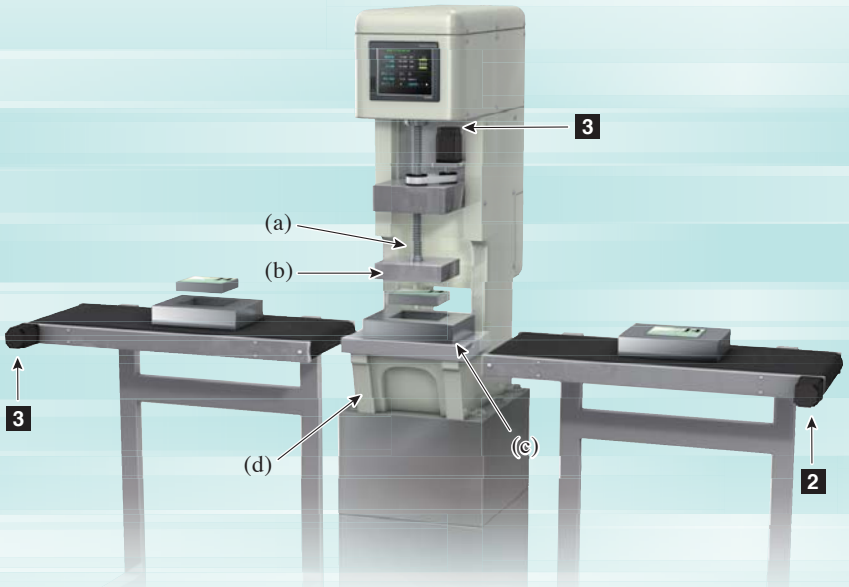
SERVO AMPLIFIERS & MOTORS

For your all production needs

MELSERVO-J4 Solutions

MELSERVO-J4

vol.06 Press-fit Machine



1 Belt Conveyor Axis
2 Belt Conveyor Axis
3 Z-axis

(a) Ball Screw
(b) Presser
(c) Workpiece
(d) Support Table

Control Flow

Belt Conveyor Axis
- Feed material to the machine.

Z-axis for Pressing — Tightening & Press fit control
- Operate in position control before pressing.
- Switch to Tightening & Press-fit control during pressing.
- Switch back to position control after pressing.

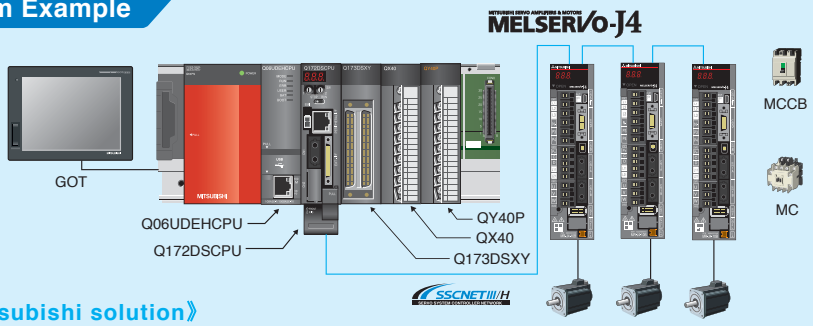
Proceed to the next workpiece.

Issues at production sites

Issue 1 Pressing of the material with less shock to a machine
➡ **Tightening & Press-fit Control**

Issue 2 Monitoring of the machine movement
➡ **Safety Signal Comparison Function**

System Example



《Mitsubishi solution》

Motion CPU	:Q172DSCPU	Servo amplifier	:MR-J4-B	Servo motor	:HG-SR
PLC CPU	:Q06UDEHCPU	GOT	:GOT 1000 series	I/O module	:QX40,QY40P
Safety signal module	:Q173DSXY	Main base unit	:Q35DB		

《Application》
- Bonding
- Pressing
- Clamping
- Cap tightening

Setup Procedure

Step1 Speed/Torque Control Data Setting

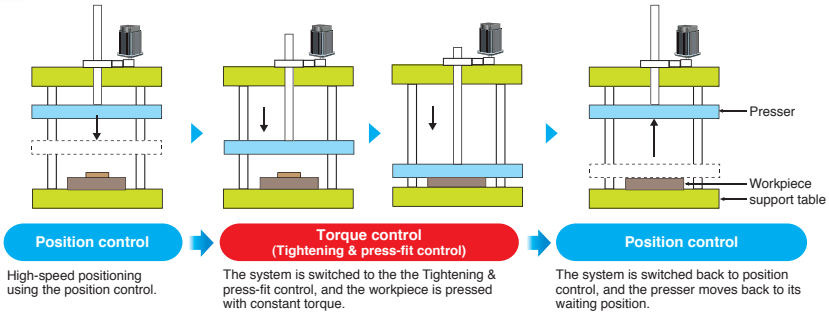
Step2 Program Creation

MELSERVO-J4 Offering the Best Solution

Solution 1 Tightening & Press-fit Control

Achieving Shorter Tact Time with Quick Switching, and Less Shock with Smooth Movement

The system switches the control mode smoothly from position to Tightening & press-fit control without a stop.
The current position is being stored in the system during the Tightening & press-fit control to perform a quick positioning after switching back to the position control.
Thus shorter tact time is achieved.

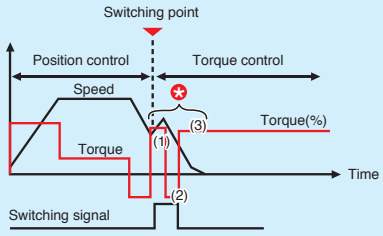


High-speed positioning using the position control.

The system is switched to the the Tightening & press-fit control, and the workpiece is pressed with constant torque.

The system is switched back to position control, and the presser moves back to its waiting position.

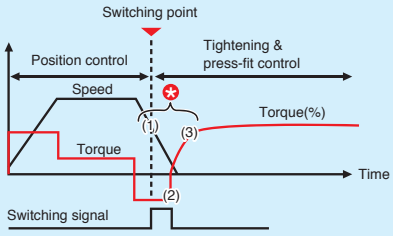
Torque control Sudden acceleration causes shock to the machine when switching control modes.



✪ (1) Switching to torque control, where specified torque(%) is forcibly generated, causes sudden motor acceleration, giving shock to the machine.
(2) System is forced into speed control when passing the speed limit, causing sudden deceleration.
(3) The system is switched to the torque control after the speed is below the required limit.

Tightening & press-fit control A smooth torque causes less shock to the machine when switching control modes.

Smooth switching

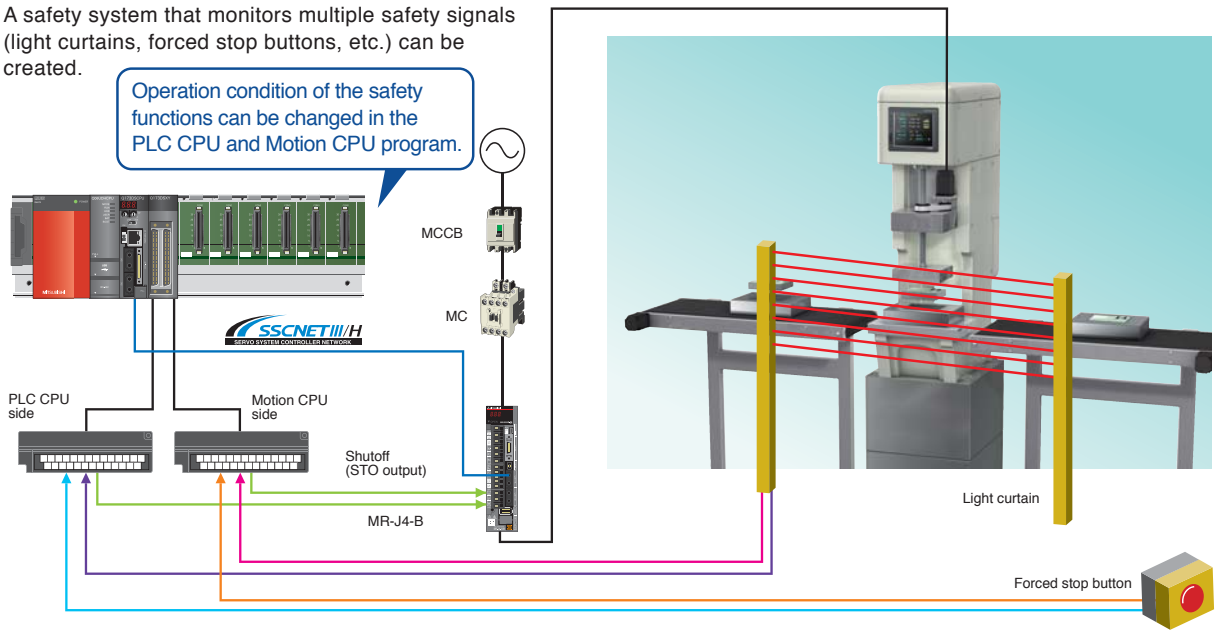


✪ (1) In Tightening & press-fit control, the motor keeps decelerating until passing the speed limit.
(2) The mode is switched to torque control when the speed passes the limit.
(3) The torque increases constantly to the specified value(%).

Solution 2 Safety Signal Comparison Function

Motion Controller and Servo Amplifier (MR-J4_-B) Ensuring Your Safety with the Safety Observation Function, Equipped as Standard

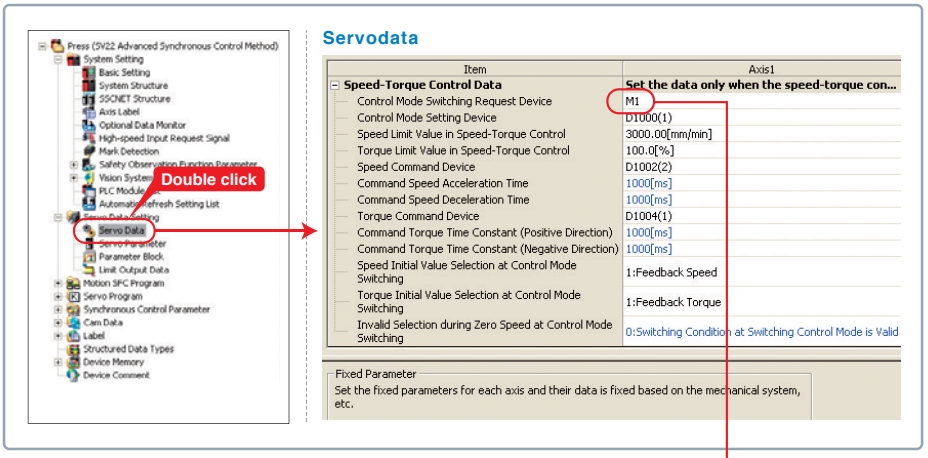
A safety system that monitors multiple safety signals (light curtains, forced stop buttons, etc.) can be created.



Setup Procedure

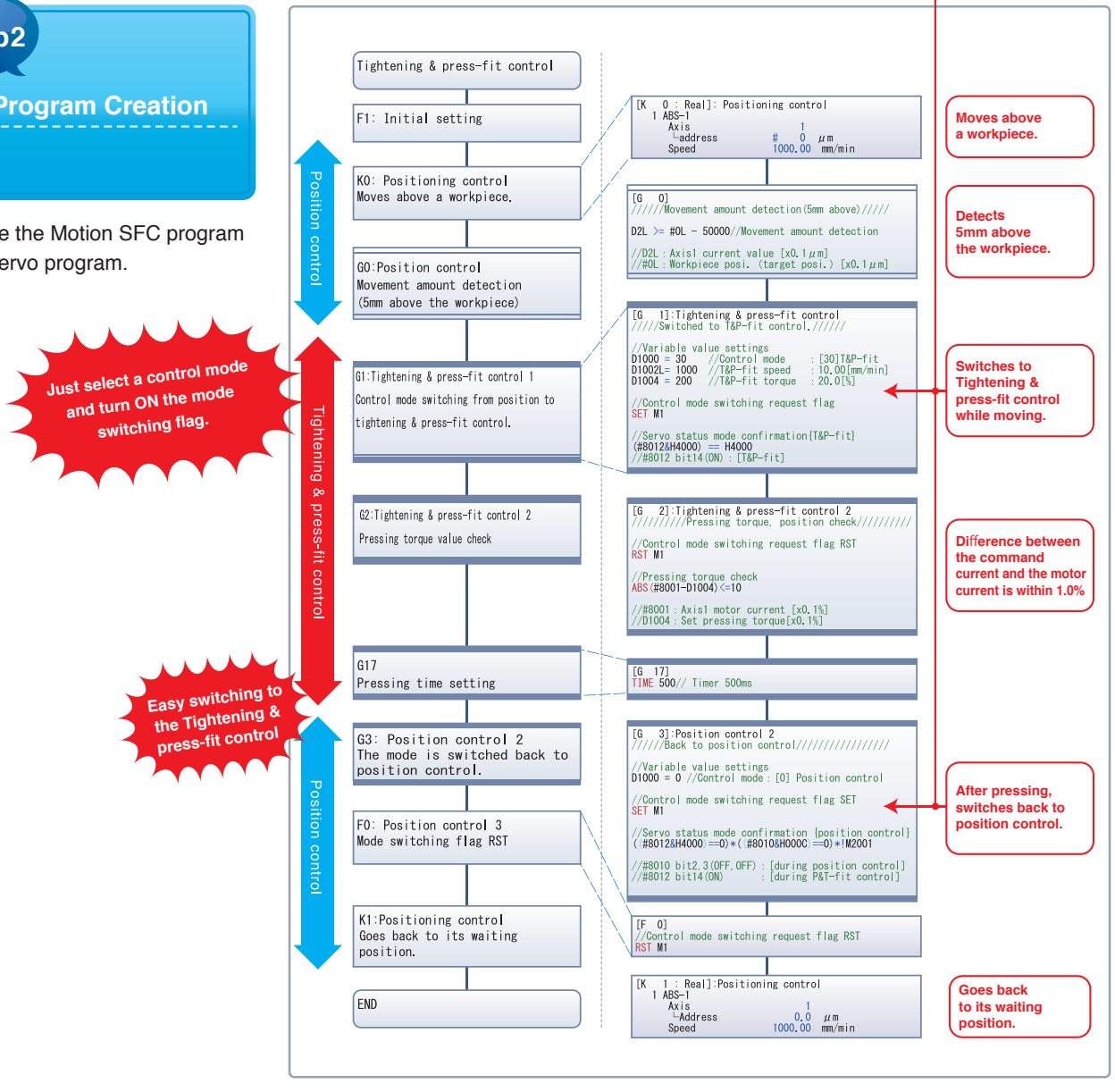
Step1
Speed/Torque Control Data Setting

After completing the System Structure, set the speed/torque data in Servo Data screen.



Step2
Program Creation

Create the Motion SFC program and servo program.



MELSERVO-J4 Features

The Leading Edge in Safety and Convenience

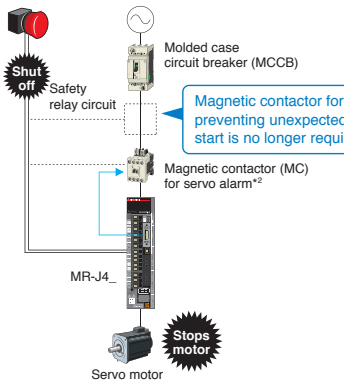
Safety Function — Compatible with Safety Function IEC/EN 61800-5-2 as Standard

MELSERVO-J4 series servo amplifiers have integrated STO (Safe Torque Off) and SS1*1 (Safe Stop 1) functions. Safety system is easily configured in the machine. (SIL 2)

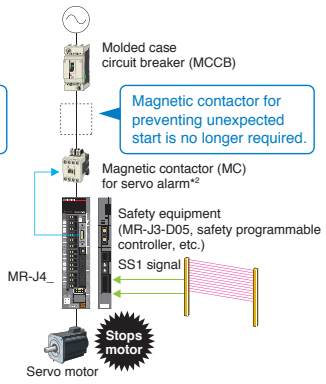
- Turning off the control power of servo amplifier is not required, cutting out the time for restart. Additionally, home position return is not required.
- Magnetic contactor for preventing unexpected motor start is not required.*2

*1. Safety equipment (MR-J3-D05, etc.) is required.
*2. Two magnetic contactors are not required when STO function is used. However, in this diagram, one magnetic contactor is used to shut off the power at alarm occurrence.

[Shut-off by STO function]



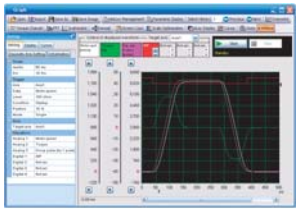
[Shut-off by STO and SS1 functions]



Easy to Use — MR Configurator2, the User-friendly Software for Easy Setup, Tuning and Operation

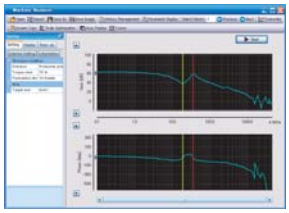
Graph Function

The number of measurement channels is increased to 7 channels for analog, and 8 channels for digital. Display various servo statuses in the waveform at one measurement, supporting setting and adjustment. Convenient functions such as [Over write] for overwriting multiple data and [Graph history] for displaying graph history are available. Waveform measurement for the connected axes is simultaneously performed via Motion controller communication.



Machine Analyzer Function

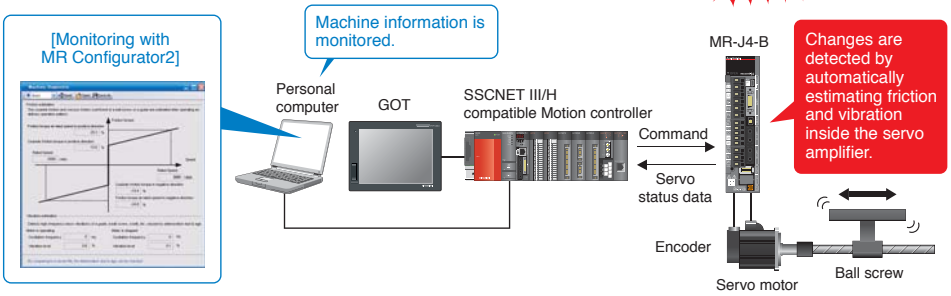
Input random torque to the servo motor automatically and analyze frequency characteristics (0.1 kHz to 4.5 kHz) of a machine system just by clicking the [Start] button. This function supports setting of machine resonance suppression filter, etc.



Maintaintenance Function — Powerful Maintenance Support with Machine Diagnosis Function

Patent pending NEW

This function detects changes of machine parts (ball screw, guide, bearing, belt, etc.) by analyzing machine friction, load moment of inertia, unbalanced torque, and changes in vibration component from the data inside the servo amplifier, supporting timely maintenance of the driving parts



Man, machine and environment in perfect harmony

Solution

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