For all of your production needs

**MELSERVO Solutions**

**Vertical Form, Fill & Seal**

**Issues at production sites**

**Issue 1** Stabilizing the packaging quality
- Easy synchronous control

**Issue 2** Shorter cycle time without increasing shock to the machine
- Cam control

**Issue 3** A reliable safety system
- Safety signal comparison function

**System Example**

**MELSEC iQ-F**
- FX5-40SSC-S

**MELSERVO J4**

**Components**
- PLC CPU module: FX5U-32MT/ES
- Simple Motion module: FX5-40SSC-S
- Engineering environment: MELSOFT GX Works3
- Servo amplifier: MR-J4-B
- Servo motor: HG-KR, HG-SR

**Control Flow**

1. Unwinding axis
   - Unwinds a roll of packaging film.
2. Dancer roll for tension control (g)
   - Controls tension constant.
3. Heat sealer (c)
   - Forms the film into a cylindrical form.
4. Conveying roller axis (x)
   - Feeds the film at constant rate.
5. Seal and cut axis (c)
   - Seals and cuts the top of the pillow bag.
6. Conveyor axis (v)
   - Conveys packaged food to the next process.

**Components**
- PLC CPU module: FX5U-32MT/ES
- GOT: GOT2000 series
- Simple Motion module: FX5-40SSC-S
- Engineering environment: MELSOFT GX Works3
- Servo amplifier: MR-J4-B
- Servo motor: HG-KR, HG-SR
**Solution 1**

**Easy synchronous control**

High quality and shorter cycle time

Driving the unwinding axis and the conveying roller axis by advanced synchronous control can improve process accuracy and achieve high-quality production. Eliminating an interlock also enables a shorter cycle time.

**Operation detail**

- Sweets are filled into a round film tube while the film is being sent down by the conveying roller axis.
- The film tube is sealed and cut.

**Solution 2**

**Cam control**

Smooth sending and stopping of packaging film

Cam control enables high-speed operation with smooth sending and stopping of the packaging film, achieving a shorter cycle time.

**Smooth cam waveform**

Cam pattern of conveying roller axis

- Cam axis current value per cycle
- Possible to create a smooth pattern with cam control.
- Easily achieves cam control with a Simple Motion module.

**Solution 3**

**Safety signal comparison function**

Safety signal comparison function with MR-J4 standard servo amplifiers

The MR-J4-B servo amplifier is equipped with STO (Safe torque off) as standard. Using STO enables the machine to stop safely without turning off the main circuit power supply, resulting in a shorter restart time.
High quality and shorter cycle time can be achieved by using advanced synchronous control to drive the unwinding axis and the conveying roller axis. This improves process accuracy and results in high-quality production. Eliminating an interlock also enables a shorter cycle time.

**Easy synchronous control**

- **Solution 1:** Cam control enables high-speed operation with smooth sending and stopping of the packaging film, achieving a shorter cycle time.

- **Solution 2:** The MR-J4-B servo amplifier is equipped with STO (Safe torque off) as standard. Using STO enables the machine to stop safely without turning off the main circuit power supply, resulting in a shorter restart time.

- **Solution 3:** Safety signal comparison function with MR-J4 standard servo amplifiers.

**Setup Procedure**

**Step 1: System configuration settings**

- Set a servo amplifier in [System structure].
- Set a command generation axis with input axis parameters.

**Step 2: Synchronous parameter settings**

- Set synchronous parameters so that Axis 2 (conveying roller axis) can synchronize with Command Generation Axis 2.

**Step 3: Cam data creation**

- Create cam data of Axis 2 (conveying roller axis).
- Cam data can be imported from a CSV file.
- A cam waveform can be changed for each section by being dragged.

**Step 4: Creation of sequence program and positioning data**

- Set Axis 2 to "synchronous control mode" only by the bit of the buffer memory being turned ON.
- Positioning data of the command generation axis can be set in the same way as the servo amplifier.

**Program example**

<table>
<thead>
<tr>
<th>No.</th>
<th>Operation pattern</th>
<th>Control method</th>
<th>Acceleration time No.</th>
<th>Deceleration time No.</th>
<th>Positioning address</th>
<th>Command speed</th>
<th>Jerk time</th>
<th>M-code</th>
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</thead>
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<tr>
<td>1</td>
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<td>0.100</td>
<td>360.000000 degree</td>
<td>5200.100 degree/min</td>
<td>0 ms</td>
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</table>

**Additional Notes:**

- Sweets are filled into a round film tube while the film is being sent down by the conveying roller axis.
- Magnetic contactors are no longer required.
- Servo amplifiers are registered for the number of axes to be actually used.
- Command generation axis is enabled.

**Cam pattern of conveying roller axis**

- Possible to create a smooth pattern with cam control.
- Easily achieves cam control with a Simple Motion module.
Servo System Features

Advanced synchronous control

Synchronous control with FX series for the first time!

FX-50SSC-S supports synchronous control for the first time among the FX series. Even without complicated programming, simply setting [synchronous parameters] and starting synchronous control for each output axis, can control an output axis in synchronization with an input axis.

[Synchronous parameter] setting screen

Command generation axis

Output axis available for the no. of control axes!

A command generation axis only generates a command, and can be controlled independently of the axis to which the servo amplifier is connected. This axis can be programmed regardless of the number of control axes because it is not counted as a control axis.

RS-485 communication by FX5 PLC

Synchronization with the axis driven by an inverter!

The FX5 PLC is equipped with the RS-485 communication function as standard. Driving an inverter with the RS-485 communication and connecting a synchronous encoder to a Simple Motion module can drive a servo motor in synchronization with the axis driven by the inverter. The RS-485 communication function also can be used as Modbus-RTU communication.

Safety Warning

To ensure proper use of the products listed in this catalog, please be sure to read the instruction manual prior to use.

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