Vertical Form, Fill & Seal

1. Film Feed Roller Axis
   - Registration Mark Detection Sensor
   - Feeder
   - Vertical Thermal Heat Sealer
   - Sealing & Cutting Arms

2. Film Index Axis
   - Proximity Safety Sensor
   - Tension Control Coil Spring Lever
   - Low Roll Detection Sensor
   - Product Present Sensor

3. Conveyor Axis

4. Sealing & Cutting Axis

5. Film Index Axis

Control Flow

1. Film Feed Roller Axis
   - Pull the plastic material from the stock.

2. Tension Control Coil Spring Lever(g)
   - Plastic material is sent to the feeder.

3. Vertical Thermal Heat Sealer(c)
   - The film stock is formed by heat.

4. Film Index Axis
   - The film side is formed.

5. Sealing & Cutting Axis
   - Seals and cuts the plastic film bottom.

6. Conveyor Axis
   - The packed food is sent to the next process.

System Example

Mitsubishi solution

Simple Motion: QD77MS16
PLC CPU: Q64HEDCPCPU
Analog output module: Q64DN
Servo amplifier: MR-J4W3-B
GOT: GOT1000 series
Main base unit: Q50DB
Servo motor: HG-KR/HG-SR
I/O module: QX40/QY40P

Setup Procedure

Step 1: System Configuration Settings
Step 2: Parameter Setting for Synchronous Control
Step 3: Cam Data Creation
Step 4: Creation of Sequence Program and Positioning Data

Application

Applications suitable for this machine operation:
- Food/Beverage bag filling
- Pouch packing
- Powder filling

Issues at production sites

Issue 1: Stabilizing the packing quality
- Synchronous Control

Issue 2: Shorter tact time without increasing shock to the machine.
- Cam Control

Issue 3: A reliable Safety system
- Safety Functions

MELSERVO-J4 Solutions

For your all production needs
**Solution 1: Synchronous Control**

High-quality production is achieved by improving the process accuracy with the 3-axis synchronous control (One sealing & cutting axis, two film index axes). Eliminating an interlock also enables shorter tact time.

**Operation detail**

**The 3-axis synchronization**

(One sealing & cutting axis, two film index axes)

Food is inserted into the film, being sent by the film index axes. Seal and cut the film.

**Solution 2: Cam Control**

Cam control enables the smooth sending and stopping of the film material. Thus high-speed operation and the shorter tact time are achieved.

**Smooth waveform**

Cam pattern of the film index axes

Possible to create the smooth pattern with the cam control.

Easily executes the cam control with the Simple Motion modules.

**Solution 3: Safety Functions**

MR-J4-B series servo amplifiers have integrated STO (Safe Torque Off) function. The machine can stop safely without turning off the main circuit power supply, cutting out the time for restart.

Compatible with Safety Functions IEC/EN 61800-5-2 as Standard
Setup procedure

**Step 1**
**System Configuration Settings**
Set the servo amplifiers and virtual servo amplifiers.

**Step 2**
**Parameter Settings for Synchronous Control**
Set the axis-2 synchronous parameter for the axis-9 virtual servo amplifier.

**Step 3**
**Cam Data Creation**
Create the cam data for the film index axes and the sealing & cutting axis.

**Step 4**
**Creation of Sequence Program and Positioning Data**
Create a program that starts the synchronous control of the three axes (1 to 3) and the positioning operation of the axis 9.

- Synchronous control starts just by turning ON the bit of the axis.
- Operation starts from the positioning data No.1 by starting the axis of virtual servo amplifier.

You can create a program just by setting data at the assistant screen.

Energy Saving  Realizing Energy-conservative Machine Using Regenerative Energy

In the multi-axis servo amplifier, the regenerative energy of an axis is used as driving power energy for the other axes, contributing to energy-conservation of whole machine. “Power Monitor function”, which is available with the standard amplifier, enables the visualization of the power flow on screen.

Resource Saving  Reducing the Use of Valuable Resources

The new environment-friendly HG rotary servo motor series uses 30% less permanent magnet than the prior HF series due to the optimized design of magnetic circuit.

Reduced Wiring  Sharing the Connections Drastically Reduces the Wiring

In 3-axis servo amplifier, the three axes use the same connections for main and control circuit power, peripheral equipment, control signal wire, etc. Thus, the number of wirings is greatly reduced.

Advanced One-touch Tuning  Quick setting by Just One Click

Servo gains including machine resonance suppression filter, advanced vibration suppression control II, and robust filter are adjusted just by turning on the one-touch tuning function.