MELSEROV-J4 Solutions

vol.02 Rotary Knife

For your all production needs

1 Rotary Knife Axis
(a) Mark Sensor
(b) Rotary Knife
(c) HMI
(d) Belt Conveyor
(e) Synchronous Encoder

Control Flow
- Belt Conveyor
  Feed the sheet.
- Mark Detection Function
  Capture the current feed value, etc. with the mark sensor ON.
- Compensation readjustment of the rotary knife axis based on the registration mark.
- Rotary Knife Axis 1
  The axis rotates at the speed where the sheet feeding speed and the rotary knife speed are synchronized to cut the sheet.
- Cam Auto-generation Function
  The stock of the processed sheet

Issues at production sites
- Issue 1 Easy cam creation on HMI screen
  Cam Auto-generation Function
- Issue 2 Cutting the sheet using the registration mark as a reference
  Mark Detection Function

System Example

Application
- Steel & paper cutting
- Perforation
- Labeling
- Stamping
- Scanning

Setup Procedure
- Step 1 System Configuration and Mark Detection Setting
- Step 2 Synchronous Control Parameter Setting
- Step 3 Sequence Program and Positioning Data Creation

Simple Motion: QD77M/S2
PLC CPU: Q08UD/EDCPU
Main unit: Q35D8
Servo amplifier: MR-J4-B
GOT: GOT1000 series
Inverter: FREQR0L-A700
Servo motor: HG-SR
I/O module: QX40/QY40P
CC-Link Module: QJ81B11N
Reduced Designing and Programming Time and Increased Ease of Use

**Solution 1** Cam Auto-generation Function

This function can create a cam automatically according to the sheet length and synchronization width, and the rotary knife axis dimension, which greatly reduces the designing and programming time.

Auto-generated cam data for cutting the sheet:
Belt conveyor speed = Rotary knife speed

**Solution 2** Mark Detection Function

Accurately Cutting by Responding Dynamically to Any Fluctuations

This function detects any fluctuations caused from the sheet tension or slippage when sending the sheet, and can cut the sheet at the set position by compensating these errors between the current sensed position and the standard position, referring to the registration mark.

Capture the current feed value, etc. with the mark sensor ON. (Mark Detection Function)

Calculate the error compensation length from the current feed value.

Start the auxiliary axis to compensate the error by adjusting the rotary knife.

Easy error compensation
Setup procedure

**Step 1**
System Configuration and Mark Detection Setting

Set the system configuration and mark detection.

- Double click on the system configuration setting window.
- Double click on the mark detection setting window.
- After the parameter setting, turn ON the “External command valid” signal for the mark detection operation start.

**Step 2**
Synchronous Control Parameter Setting

Set the parameter where the rotary knife speed (axis 1) is synchronized to the belt conveyor speed.

- Double click on the synchronous control parameter setting.
- Set the Axis #1 Synchronous Parameter to synchronize to the synchronous encoder.
- Set the virtual servo amplifier to the auxiliary shaft.
- Set the auxiliary shaft.
- Set the Cam axis length per cycle, Cam stroke amount, and Cam No., etc.

**Step 3**
Sequence Program and Positioning Data Creation

Create the program that starts the inverter which drives the belt conveyor after the rotary knife (axis 1) synchronization starts.

- MOVP H1 U01 G36320
- MOV M1
- SET Y20
- RST Y20

**PLC CPU**
- Axis 1 starts synchronous control
- Belt conveyor start
- Belt conveyor stop
The Leading Edge in Safety and Convenience, Designed to Harmonize with the Way You Work.

**MELSECVO J4 Features**

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

**One-touch Tuning Function**
Adjustments including estimating load to motor inertia ratio, adjusting gain, and suppressing machine vibration are automatically performed for the maximum servo performance just by clicking the start button. Check the adjustment results of settling time and overshoot.

**Tuning Function**
Adjust model control gain finely on [Tuning] window manually for further performance after the one-touch tuning.

**TOC Reduction**
Large Capacity Drive Recorder
Servo data such as motor current and position command before and after the alarm occurrence are stored in non-volatile memory of servo amplifier. The data read on MR Configurator2 during restoration are used for cause analysis.

**TCO: Total Cost of Ownership**

**High-accuracy**
Improving Machine Performance with High-performance Motors
Rotary servo motors achieve high-accuracy positioning and smooth rotation with a high-resolution encoder and improved processing speed.

**Resource Saving**
Environment-friendly Servo Motors
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. (for HG-KR43)

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**Man, machine and environment in perfect harmony**

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