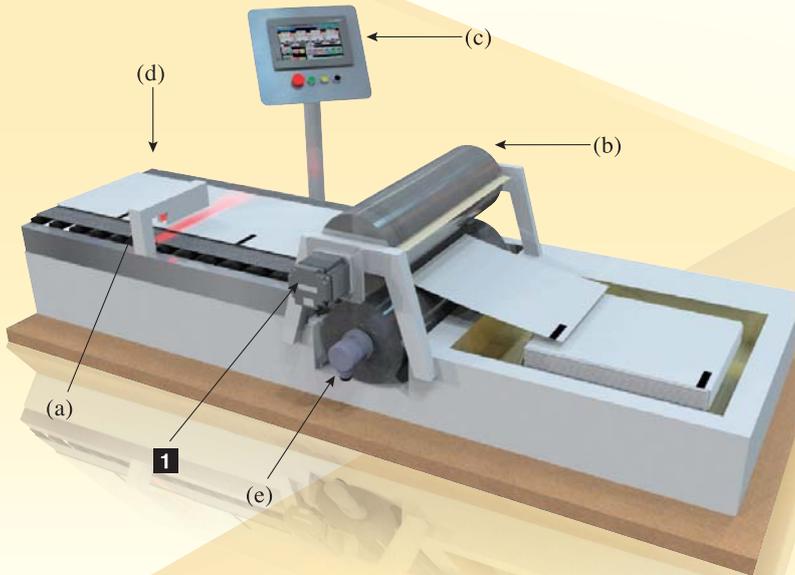


For your all production needs

MELSERVO-J4 Solutions

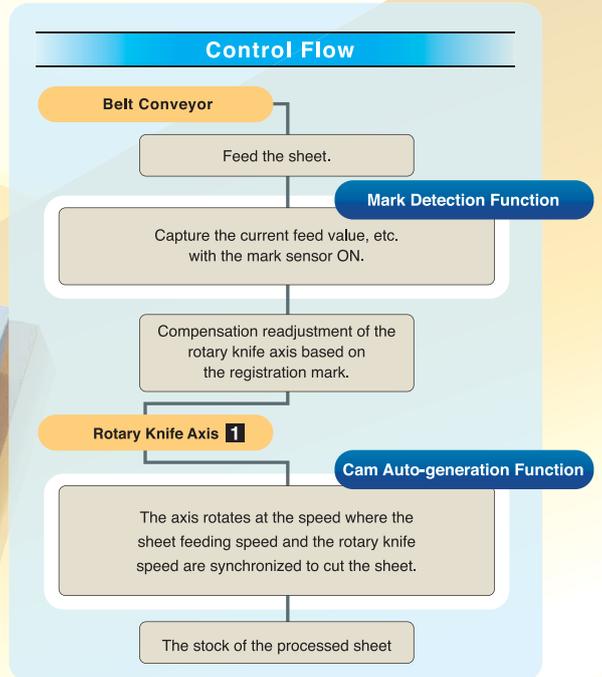
MITSUBISHI SERVO AMPLIFIERS & MOTORS
MELSERVO-
J4

vol.02 Rotary Knife



1 Rotary Knife Axis

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



Issues at production sites

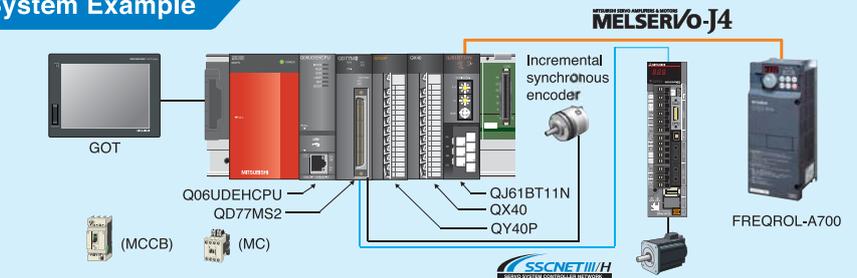
Issue 1 Easy cam creation on HMI screen

➔ **Cam Auto-generation Function**

Issue 2 Cutting the sheet using the registration mark as a reference

➔ **Mark Detection Function**

System Example



《Mitsubishi solution》

- | | | |
|-------------------------|---------------------------|----------------------------|
| Simple Motion : QD77MS2 | Servo amplifier : MR-J4-B | Servo motor : HG-SR |
| PLC CPU : Q06UDEHCPU | GOT : GOT1000 series | I/O module : QX40, QY40P |
| Main base unit : Q35DB | Inverter : FREQROL-A700 | CC-Link Module : QJ61BT11N |

《Application》

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

Setup Procedure

Step1

System Configuration and Mark Detection Setting

Step2

Synchronous Control Parameter Setting

Step3

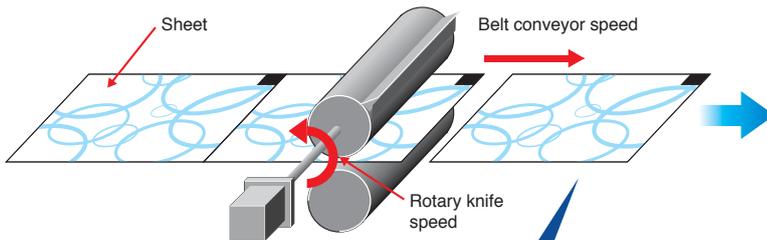
Sequence Program and Positioning Data Creation

Solution 1

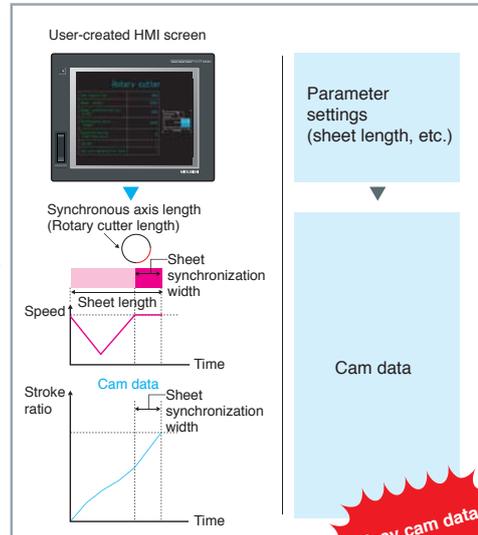
Cam Auto-generation Function

Reduced Designing and Programming Time and Increased Ease of Use

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

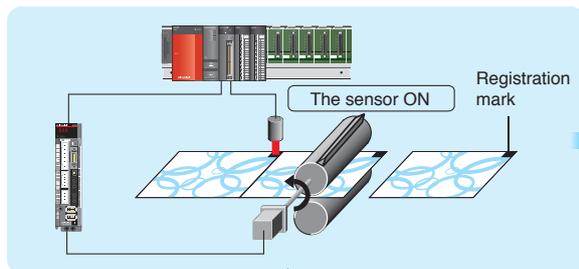


Solution 2

Mark Detection Function

Accurately Cutting by Responding Dynamically to Any Fluctuations

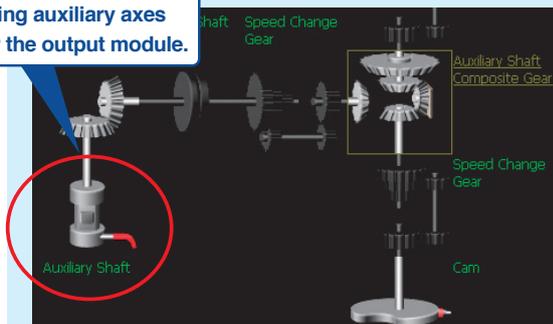
This function detects any fluctuations caused from the sheet tension or slippage when sending the sheet, and can cut the sheet at the set position by compensating these errors between the current sensed position and the standard position, referring to the registration mark.



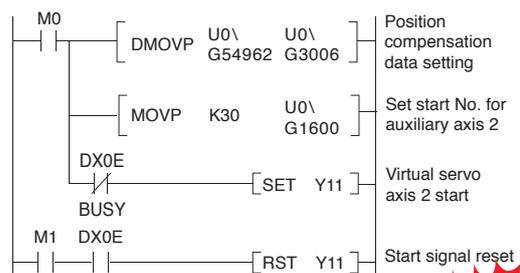
Capture the current feed value, etc. with the mark sensor ON. (Mark Detection Function)

Calculate the error compensation length from the current feed value.

Compensate the error using auxiliary axes for the output module.



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.

System structure

Project: Q077MS16
 System Setting
 System Structure
 Mark Detection Parameter
 Servo_Parameter
 Positioning Data
 Synchronous Control Parameter
 Cam Data
 Monitor
 Digital Oscilloscope

Mark detection setting window

Item	Setting 1
Mark detection setting	
Pr.800:Mark detection signal setting	2
Pr.801:Mark detection signal compensation time	0 μs
Mark detection data setting	
Pr.802:Type	12:Cam Axis Current Value
Pr.803:Axis No.	1
Pr.804:Buffer memory No.	0
Pr.805:Latch data range upper limit value	0 PLS
Pr.806:Latch data range lower limit value	0 PLS
Mark detection mode setting	
Pr.807:Mark detection mode	Continuous Detection Mode
Pr.807:Number of detections	0

Easy mark detection setting

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.

Synchronous control parameter

Project: 0000:Q077MS16
 Intelligent Function Module
 System Setting
 System Structure
 Mark Detection
 Parameter
 Servo_Parameter
 Positioning Data
 Synchronous Control Parameter
 Input Axis Parameter
 Cam Data
 Digital Oscilloscope

Synchronous control module setting

- Main shaft
 - Pr.400:Axis No. 001:Synchronous Encoder Axis
- Sub input axis
 - Pr.401:Axis No. 0
- Main shaft composite gear
 - Pr.402:Main 1:Input+
 - Pr.402:Sub 0:No Input
- Main shaft gear
 - Pr.403:Numerator 1
 - Pr.404:Denominator 1
- Main shaft clutch
 - Pr.418:Type 1:Servo Input Axis
 - Pr.418:Axis No. 2

Output axis

- Cam axis cycle unit
 - Pr.436:Unit setting selection 0:Use Units of Main Input Axis
 - Pr.436:Unit 0:mm
 - Pr.438:Number of decimal places 0
 - Pr.439:Cam axis length per cycle 4194304 PLS
 - Pr.441:Cam stroke amount 4194304 PLS
 - Pr.440:Cam No. 1
 - Pr.444:Cam axis phase compensation advance time 0 μs
 - Pr.445:Cam axis phase compensation time constant 10 ms
 - Pr.446:Synchronous control deceleration time 0 ms
 - Pr.447:Output axis smoothing time constant 0 ms

Auxiliary shaft

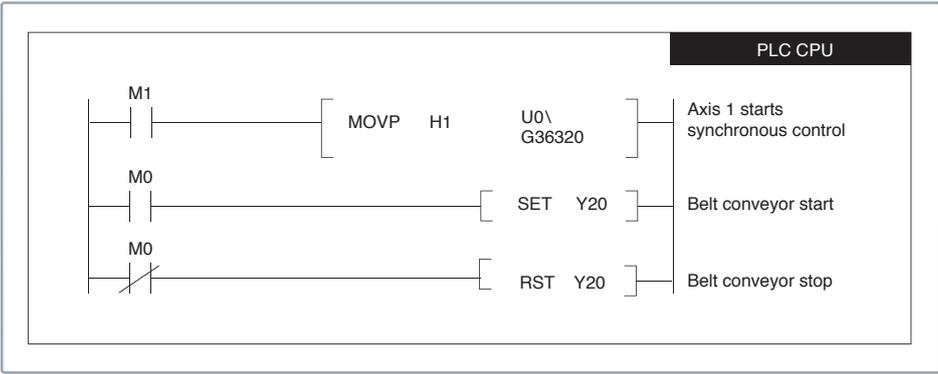
Set the Axis #1 Synchronous Parameter to synchronize to the synchronous encoder.

Set the virtual servo amplifier to 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.



MITSUBISHI SERVO AMPLIFIERS & MOTORS
MELSERVO-J4
Features

The Leading Edge in Safety and Convenience,
Designed to Harmonize with the Way You Work.

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

One-touch Tuning Function

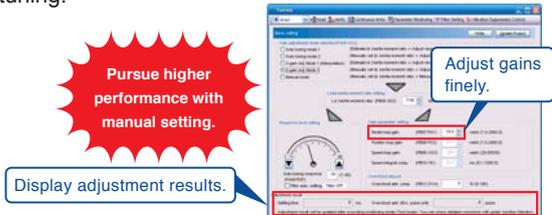
NEW

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

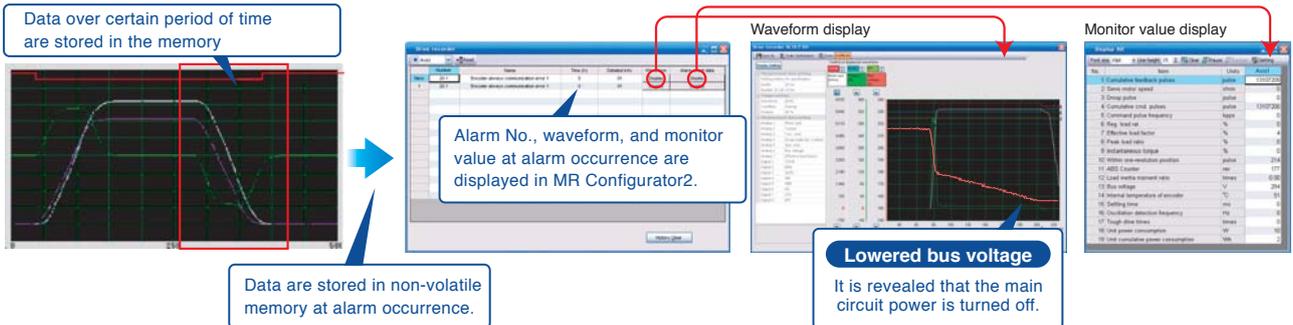
Adjust model control gain finely on [Tuning] window manually for further performance after the one-touch tuning.



TOC Reduction Large Capacity Drive Recorder

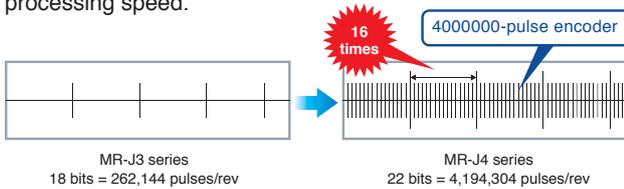
TCO: Total Cost of Ownership

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.



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)



Man, machine and environment in perfect harmony

Solution

MITSUBISHI ELECTRIC CORPORATION

HEAD OFFICE: TOKYO BUILDING, 2-7-3, MARUNOUCHI, CHIYODA-KU, TOKYO 100-8310, JAPAN
NAGOYA WORKS: 1-14, YADA-MINAMI 5, HIGASHI-KU, NAGOYA, JAPAN