for a greener tomorrow

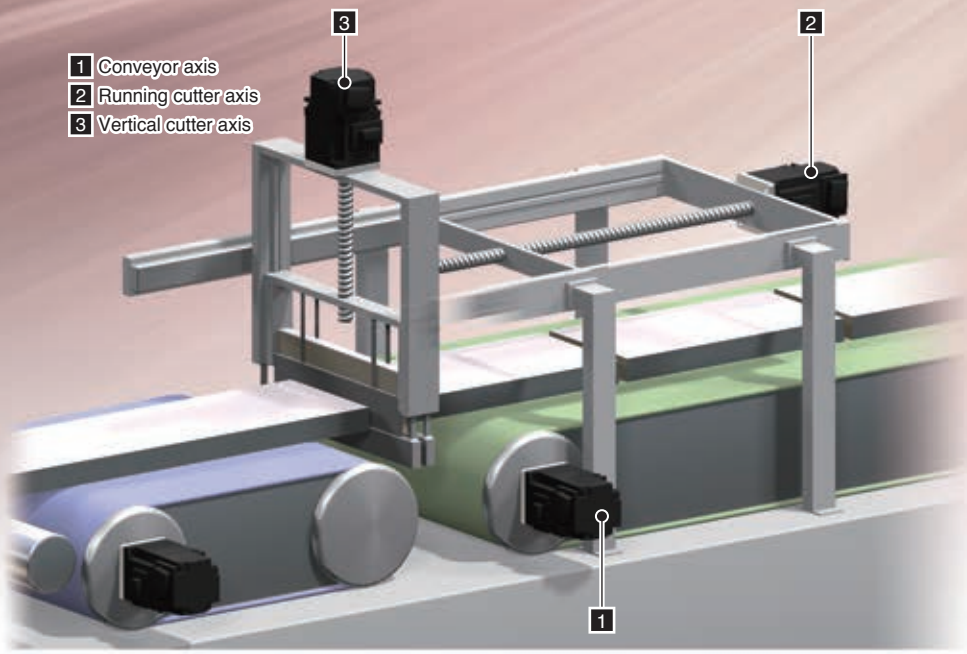
MITSUBISHI ELECTRIC
Changes for the Better

For all of your production needs

MELSERVO Solutions

vol.12

Flying Shear



Control Flow

- Conveyor axis
- Feed a workpiece.
- Running cutter axis
- Synchronize running speeds of the conveyor and cutter.
- Vertical cutter axis
- Cut the workpiece.
- Running cutter axis
- Return to the initial position.
- Repeat the operation.

Issues at production sites

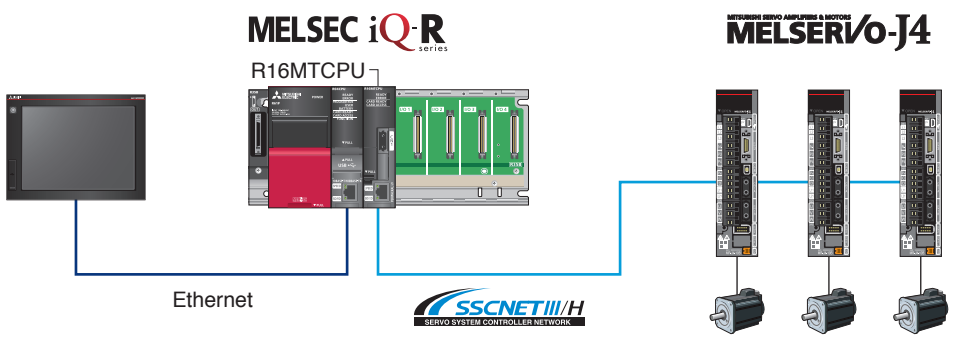
Issue 1 Processing without stopping the conveyor

➡ Easy settings with advanced synchronous control

Issue 2 Fixed length cutting

➡ Address mode and smoothing method for clutch in advanced synchronous control

System Example



[Applications]

- Rolled material cutting machine
- Horizontal form-fill-seal machine

<<Components>>

PLC CPU ····· R04CPU	Motion CPU ····· R16MTCPU	Servo amplifier ··· MR-J4-B
Main base unit ····· R35B	Engineering environment ···· MELSOFT GX Works3	Servo motor ····· HG-KR
Power supply module ··· R61P	MELSOFT MT Works2	GOT ····· GOT2000 series

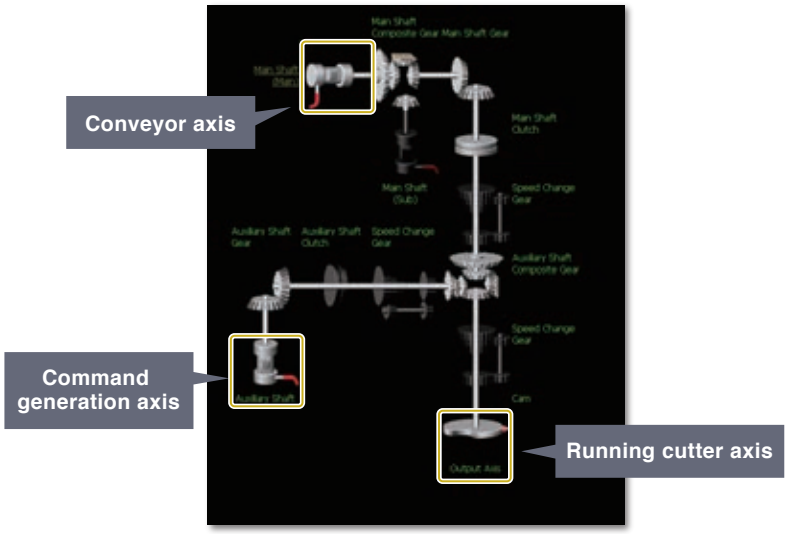
Offering Exceptional Solutions

Solution 1 Advanced synchronous control

Synchronous control with cam and clutch realized simply by parameter settings

The running cutter axis is synchronously driven with the conveyor axis. A main shaft is set as a current feed value of the conveyor axis and connected to a cam via a clutch and a composite gear in settings for advanced synchronous control.

A command generation axis (the axis only for command generation) is set as an auxiliary axis and driven for a return motion of the cutter at main shaft clutch OFF.



Solution 2 Address mode and smoothing method for clutch

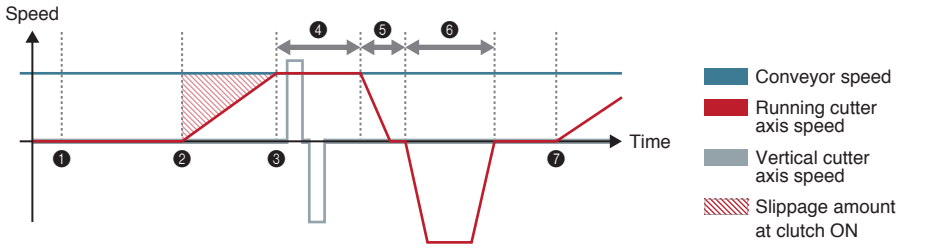
Positioning by "slippage amount at clutch ON" setting

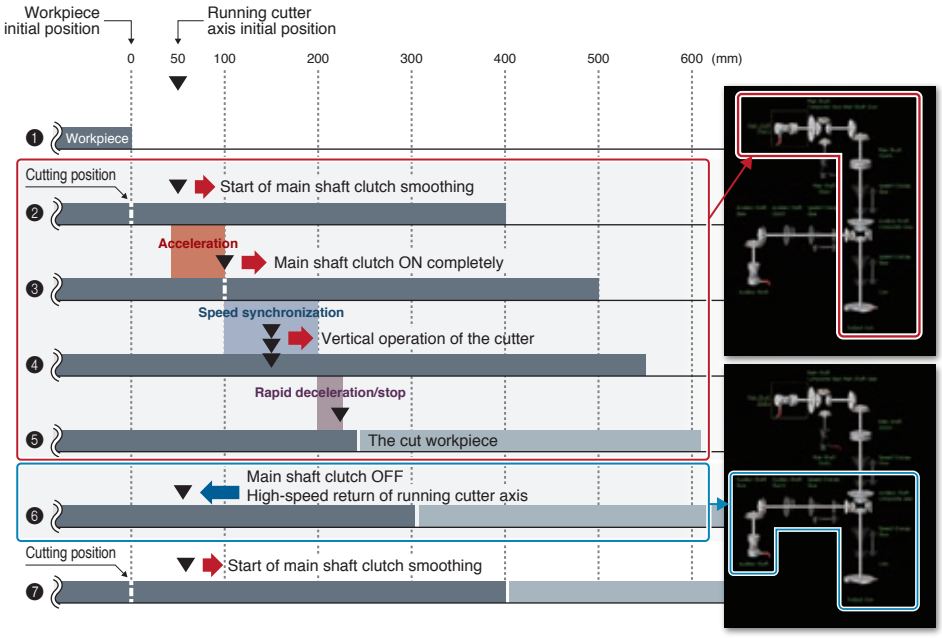
The cutting position and the position, at where the cutter speed is synchronized with the conveyor speed, become the same position by setting as [Slippage amount at clutch ON] = [Workpiece initial position] - [Running cutter axis initial position].

The workpiece is cut during synchronization of the conveyor axis speed with the running cutter axis speed, and the running cutter axis is stopped by turning off the clutch after the completion of cutting.

The command generation axis set as the auxiliary axis, is then driven to bring back the running cutter axis to the initial position.

For subsequent operations, the reference address for clutch ON is calculated in the program, and the operation to cut the workpiece at the set cut length, is repeated.



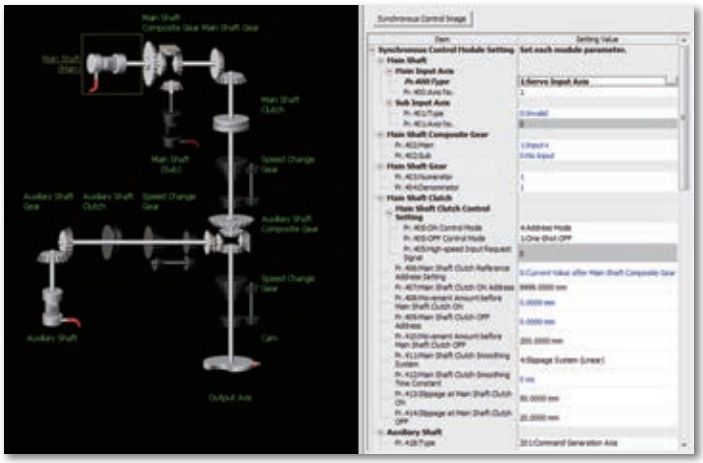


Setup Procedure

Step 1 Synchronous parameter settings

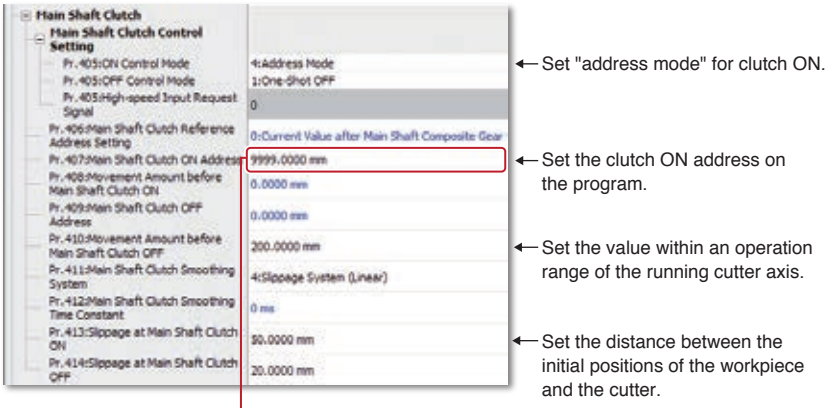
Set synchronous parameters of the running cutter axis as follows;

Main shaft (main): Conveyor axis
Main shaft clutch: Setting as described in Step 2
Auxiliary axis: Command generation axis
Cam: Linear cam (cam No. 0)



Step 2 Main shaft clutch setting

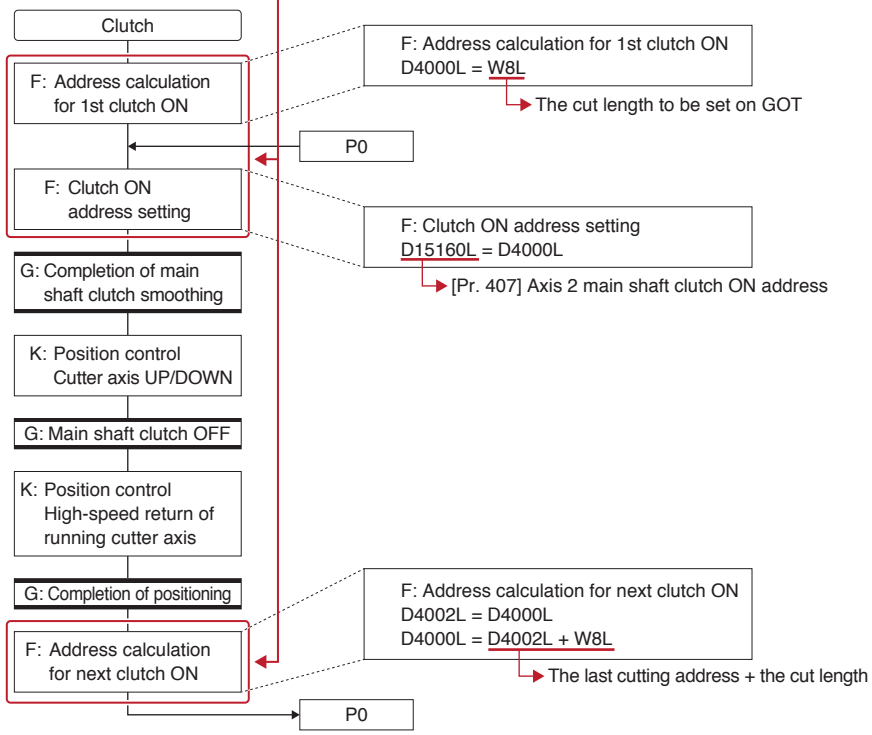
Set the main shaft clutch ON control mode to "address mode". Set the clutch ON address on the program.



Step 3 Motion SFC program creation

Create a servo program and other Motion SFC programs for conveyor feed, clutch operation, and other operations.

[Program for main shaft clutch operation and cutter axis operation]



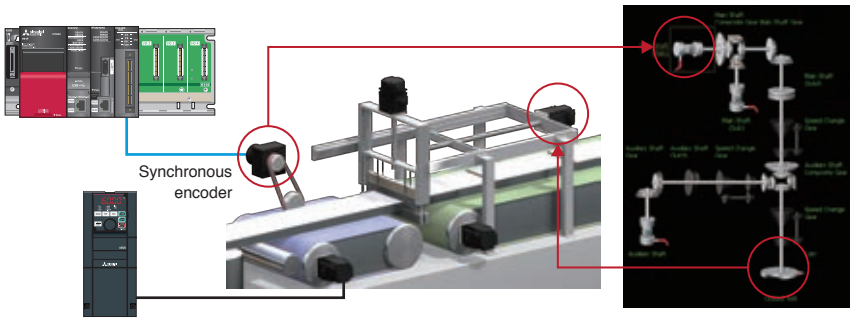
Servo System Features

The flying shear configuration can be easily changed to the one with a synchronous encoder or mark detection function.

Input axis setting — Setting a synchronous encoder as an input axis

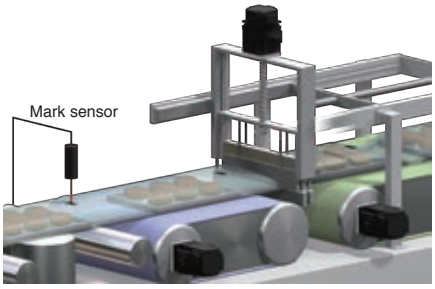
When the conveyor is driven by an inverter, a synchronous encoder can be mounted and used as an input axis.

(Note): A high-speed counter module is required when using the synchronous encoder.



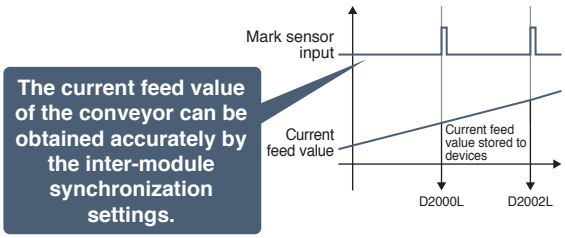
External input clutch — Cutting using a register mark

The register mark detection signal can turn on the clutch as a trigger when feeding workpieces with register marks on them.



Mark detection function — Cutting position compensation with a mark sensor

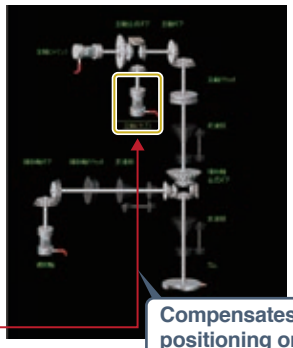
The change in the cut length caused by expansion and contraction of a sheet, is compensated by using the address mode for clutch ON and an external mark sensor.



The current feed value of the conveyor can be obtained accurately by the inter-module synchronization settings.

Actual distance between marks D2020L=D2002L−D2000L

Difference between D2020L and D1000L (sheet length) D2040L=D2020L−D1000L



Compensates by positioning only for the amount of the difference.

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L(NA)03135-A 1611 Printed in Japan 〈IP〉

New publication, effective November 2016.
Specifications are subject to change without notice.