Rotary Knife—Cut to Length

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A rotary knife cuts continuously fed material (web, extrusion, wire, etc.) to specified lengths. The feed and knife axes of motion are synchronously controlled. The solution for this application includes two Indexers, a pacer encoder and an operator touch panel. The knife blade tip must be precisely controlled and travel at a very specific tangential velocity at the point of contact with the material. A series of product recipes are required and are based upon predetermined input variables such as feed length, speed synchronization angle and over-speed coefficient.

The application software for implementation of this generic Indexer solution is available without charge from ORMEC.

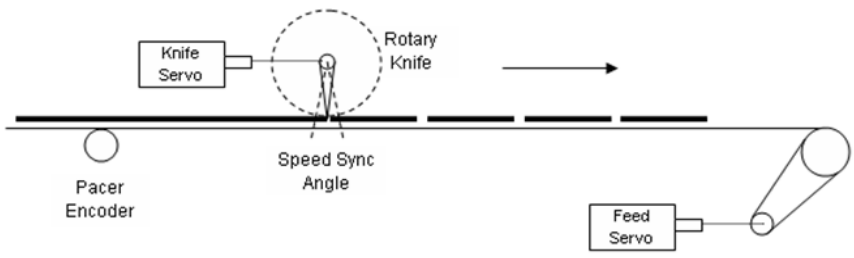
Benefits of an ORMEC Solution

The ORMEC XD-Indexer Servo Drive system with an operator touch screen MMI is a complete system.

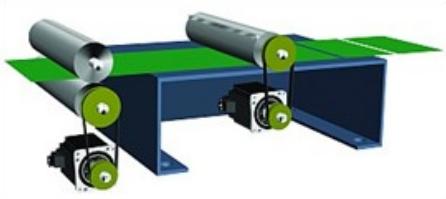
- No PLC or programmable motion controller is required to control the drives.
- Machine logic and calculations are performed within the programmable operator panel using a built-in, BASIC-like macro language.
- Recipes are stored in the MMI panel's non-volatile memory or on removable flash memory card.

ORMEC Engineers have industry expertise with this application.

System configuration



The XD-Indexer system is comprised of a feed axis Indexer, a knife axis indexer, drives for knife and feed servomotors, a pacer encoder and an MMI touch panel.



Application

A rotary knife cuts the continuously moving material into discrete products. While cutting, the knife must be synchronized to the material's speed. When the knife is clear of the web, it must be advanced or retarded to allow for the difference in product length and knife pitch circumference.

Continuously fed material is cut to specific lengths with a rotary knife. Industries that use this application include packaging, food processing, and printing.

Operation

On system power up, an initial screen displays a list of recipes to be run. The desired recipe is selected and loaded by the operator.

Up to 50 unique recipes are available for selection.

Operation can be initiated in either manual or automatic mode.

In manual mode the knife motor and the feed motor can be jogged and homed.

ORMEC Indexer System

Hardware

- Two XD-Indexer servo drives
- Pacer encoder
- ORMEC MMI touch panel

Software

- MotionSet - XD-Indexer
- EasyBuilder - MMI panel

Communication Interfaces

- ModBus TCP

Recipes

- Up to 50 unique
- Product specific variables
  - Feed length
  - Speed synchronization angle
  - Over-speed coefficient
- Set-up variables (non-product specific)
  - Knife outer diameter (OD)
  - Knife jog velocity
  - Knife home velocity
  - Knife home offset
  - Feed jog velocity
  - Feed PLS1* ON position (used to control auxiliary devices such as valves, relays, etc.)
  - Feed PLS1 ON time

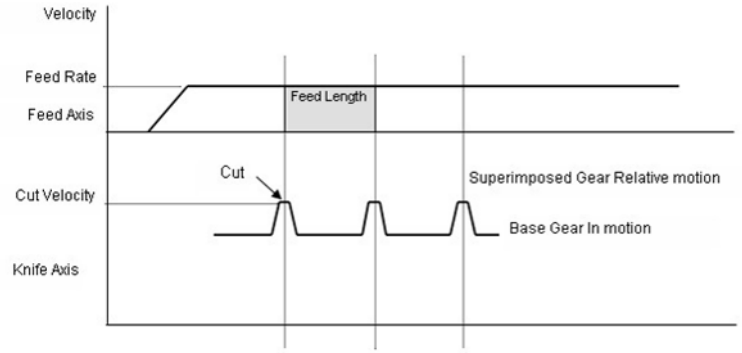
*PLS = Programmable limit switch. It is used to control a digital output based upon position and time.

Set-up variables such as jog, home and offset velocities are specified as the system parameters.

The real-time operating parameters are displayed and the sequencing can be halted from this display.

Operation details

Upon system power up, the initial MMI display shows the list of recipes that may be run. The operator selects and loads the recipe. Based on process variables, the system calculates a knife motion profile and determines the rotary speed of the knife as it contacts the material. This insures synchronization between the knife and the material being cut.



This illustrates typical velocity profiles for the feed and knife axes.

In the automatic mode, the machine sequence is initiated from a Run button on the panel. The Stop button is used to halt the feed axis while the knife axis stays geared (position-synchronized) to the Pacer encoder. The EXIT button terminates both Indexers' motion.

Fault conditions for each Indexer are continuously monitored. If one Indexer has a fault, both Indexers will be disabled. A summary of errors are reported and viewable from an Error Log screen.

Homing and jogging of the knife and feed motors can be performed from a Manual operation screen.

At ORMEC we are experts in motion control solutions, and have a wealth of experience in a wide variety of industries. As your automation partner, we offer a comprehensive range of automation integration services.

For more information on the XD-Indexer and how to download this rotary knife software please contact us by phone (585) 385-3520 or email us at sales@ormec.com