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CUT TO LENGTH: STACKING CONTROL

Cut to length process using rotary knife cutter and stacker, coordinating three axes of servo motion control.

Description

A web of material is fed into the machine by feed/pinch rolls. The machine must cut the web into regular length pieces registered with a mark on the web. The cutter speed must be synchronous to the web speed while the cutter is engaged with the web. Once cut, the pieces are stacked into a pile of product of a certain count size.

Solution

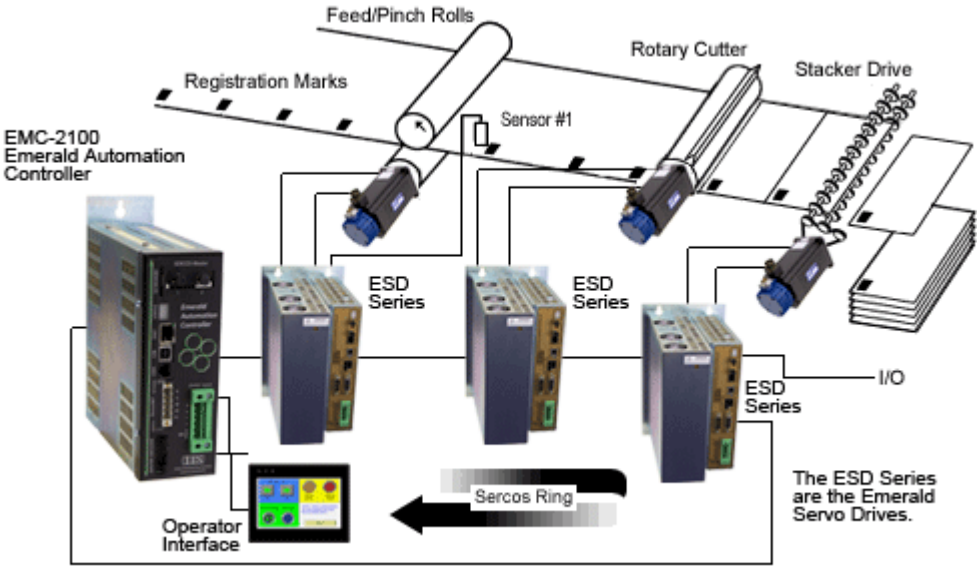
The IIS Emerald EMC-2100 automation controller coordinates the motion of all three servos in this master slave application using a SERCOS network. A servomotor is connected to each of the three main sections, feed/pinch rolls, rotary cutter and stacker wheels.

An operator interface is connected directly to Emerald and is used for programming the cut length, stacks count, and line speed and is also used for diagnostics and error messages.
An application program for the Emerald controller was developed using the Emerald Development Environment PC software to implement the following motion requirements:

- A software “motor” or pacer was configured to be the master for all three servomotors. The pacer was programmed to make one turn per product pitch.
- The web feed/pinch servo is programmed using an electronic ratio from the pacer. The ratio is set such that the programmed amount of web is fed. The

electronic ratio of the feed/pinch roll servo is modified based on the registration sensor #1 just downstream of the feed/pinch rollers. Modifying the ratio keeps the registration marks aligned with the cutter.

- An electronic cam, driven by the pacer, is used to control the motion of the rotary cutter. The cutter is programmed to make one revolution per product pitch in coordination with the pacer. The cutter axis matches line speed during the angle of cutter blade engagement then may speed up or slow down depending on the product length.
- The stacker axis is also driven by the pacer axis via an electronic cam. The stacker runs above line speed when the cut piece first engages the stacker rollers to create a gap between the current and next product. The stacker rollers then slow down significantly below line speed to gently drop the cut piece on the stack.



https://www.iis-servo.com/applications/cut-to-length-with-stacking-control/