



Electronic Line Shaft with Ratio Control

For plants that use mechanical line shafts as part of their production system, accuracy of those systems is critical to assuring consistency in quality and operation. Cimtec has developed an upgrade solution to enable electronic control of line shafts, resulting in higher operational efficiencies, reduced maintenance, and increased overall quality. This application can be applied to nearly any industry that uses line shafts for processing sheet material, including textiles, paper, printing, and film.

In facilities that use a mechanical line shaft to synchronize the two separated sides of a machine, a physical shaft connects the two sides of the line. The shaft has to be sufficiently stiff to avoid bending and to transmit torque with minimal distortion. Any change to the production line or ratios required a complete upgrade of the mechanical hardware.

The alternative is to electronically synchronize the two sides of the machine. An electronic line shaft replaces the mechanical connections with software, controlling follower motors with a master axis. Today's control technology allows for accurate control of line shafts using standard control hardware, including a mid-range PLC, standard drives and motors, and a high-speed PLC LAN.

Cimtec's Electronic Line Shaft Solution

The Cimtec approach uses a mid-range PLC with three two-axis positioning modules (APM) operating as an integrated motion controller. The APM sends velocity commands to the AC drives, and the position loop on the APM is closed with encoder feedback. While the PLC exchanges data with the APM for overall machine control, the APM modules control the position loop independent of the PLC scan time. An analog input from a dancer provides tighter closed loop control. Motion control and PLC are now able to operate on the same backplane, simplifying operator interface. With a single program for logic and motion, machine programming can be executed more easily and with greater accuracy. This option can be applied using AC, DC, vector or servo drives.

Benefits of Upgrading to an Electronic Line Shaft System

Upgrading a traditional mechanical line shaft to an electronic line shaft provides a variety of benefits:

- Lowers costs by eliminating mechanical line shafts, particularly in complex systems such as multi color printing where several lines are required



- Reduces manufacturing and start-up times, because fewer custom parts are required and factors like phase and ratio can quickly be changed in software
- Simplifies maintenance through the use of standard control components and fewer mechanical components
- Increases system throughput by reducing downtime and providing higher quality levels
- More efficient than a DC system that uses separate digital controls, which can be difficult to centrally pinpoint problems and malfunctions
- Leads to faster and more flexible machine setups
- Allows for modular machine design

For plants struggling with aging mechanical line systems and the extensive maintenance and downtime associated with these systems, an upgrade to an electronic line shaft system can breathe new life into a production line and significantly increase its efficiency.