

**Industry: Mechanical engineering, printing industry**

**Products Used: Motion controllers, Servo drives, Modular PLCs**

# Replacing a line shaft with a motion control system

Nowadays, a growing number of users are running up against the limitations of conventional automation technology. This was also the experience of Thieme, a manufacturer of screen printing machines in Teningen, Germany. However, the company found a highly-effective alternative: A motion control system from Mitsubishi Electric was chosen as the foundation for a new machine concept, in which electrical drives and a virtual line shaft replace their mechanical predecessors.



“Maximum productivity with minimum labour overheads” was one of the most important specifications for the engineers designing the new THIEME 5000 XL screen printing machine. One of the biggest challenges was the large-scale printing format of up to 2,000 x 3,050 mm. Many components in existing systems, including the central drive system and the mechanical line shaft, could not have been integrated in the new large-format version.

The combination of a motion controller and servo drives turned out to be the ideal solution for the problem, even though it meant that the entire drive concept had to be completely redesigned. One of the key requirements was that it should be possible to translate the existing mechanical solution as precisely as

possible to the new system – both to keep development overheads low and to avoid losing the company’s investment in years of development. The Melsec System Q motion controller met all these requirements. System Q’s programming language made it possible to implement existing mechanical solutions with graphical representations. In addition to this it combines motion control, PLC and industrial PC modules in a single platform, so that the machine control system could also be integrated in the system.

In the new system the former main drive was programmed as a virtual servo motor connected to a virtual line shaft. The 30 drives connected to the servo axes could also be placed in their proper positions with a simple Drag & Drop operation. The system can also program virtual equivalents of a wealth of other mechanical components, including transmissions, roller feeders, linear axes and cam discs. In turn, this design made it possible for the drives to be precisely synchronised for complex movement sequences.

Individual axes of such printing machines need to be operated independently of the line shaft for servicing, configuration and repair work. In the past this was a time-consuming task involving physical uncoupling of the axes. With the new motion controller solution the operator just needs to select a setup mode, reducing the overheads to just a few minutes for reprogramming.

In addition to the easy integration in System Q another major advantage of the motion controller system was the fact that it provided a matched, all-in solution including drives with absolute position encoding and extremely compact servo amplifiers. The integrated automation solution provides easy access to all system components from every control console, eliminating the need for time-consuming manual adjustments.

Thanks in no small part to this innovative motion technology the Thieme engineers succeeded in designing a very advanced new generation of machines that maintains 95 percent continuous availability and bringing setup times down to less than five minutes per printing station.

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