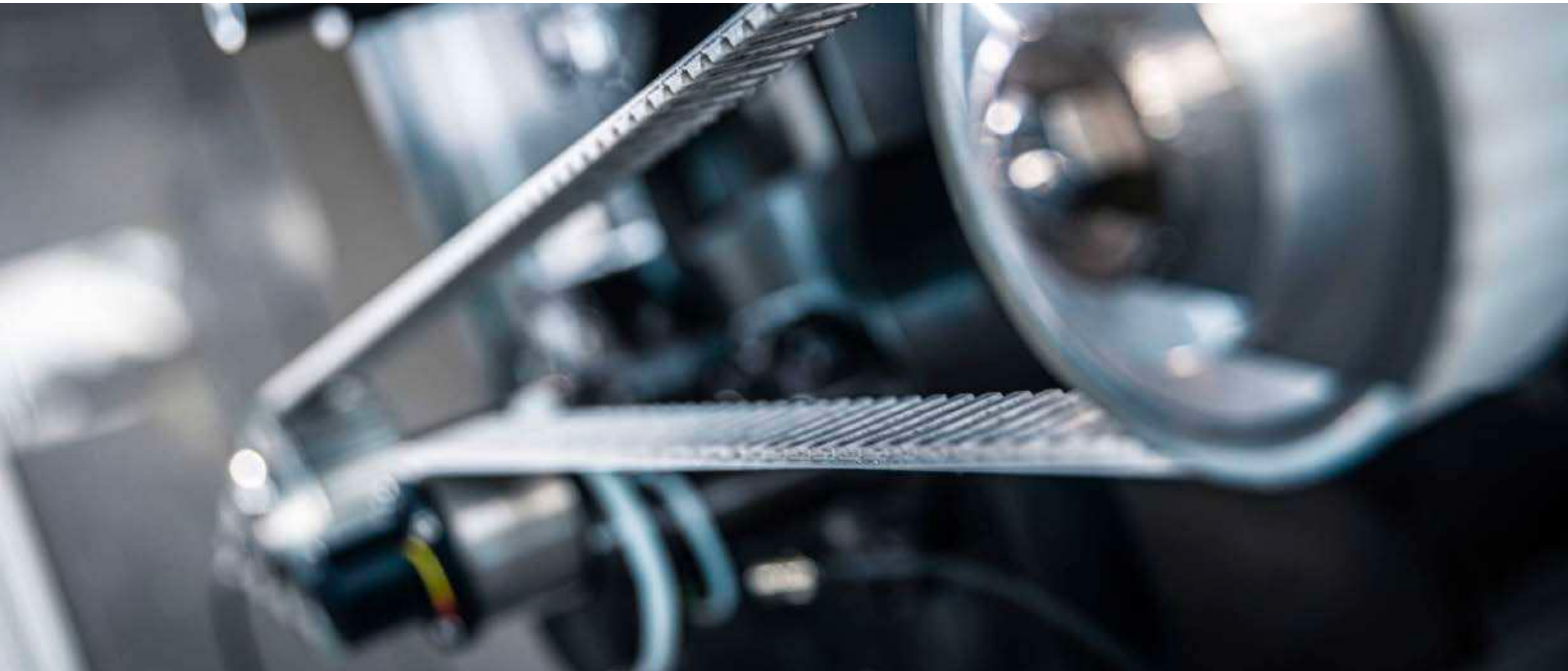




BRECO Antriebstechnik Breher GmbH & Co. KG |
Case Study Mechanical Engineering, Special Machine Construction

Joint Development for BRECO: Energy-Efficient Endurance Test Stand for Timing Belt Drives

In the development of an endurance test stand for timing belt drives, BRECO and colleagues from Eckelmann FCS brought in their expertise. The result: The influence of operating loads is generated by a motor operated as a generator.

“BRECO is committed to acting in an environmentally conscious and sustainable manner. Thanks to the intelligent DC link coupling in our new test stand, we no longer have to “burn” any surplus energy. What we appreciate about working with Eckelmann FCS is their technical expertise, great flexibility and their customer-oriented approach.”

Dr.-Ing. Thomas Steinert | Managing Director, BRECO



Objective

The objective was to develop an energy-efficient universal test stand for the BRECO technical center. The energy consumption of the endurance test stand for timing belt drives was to be significantly reduced.

The Eckelmann FCS team developed the software and programmed a solution for evaluating the test results.

In the implementation of this demanding drive and control technology task, BRECO was supported by Eckelmann FCS GmbH, which has been a partner in the control of production systems for decades.

The Client

Complicated drive, transport, and positioning tasks are the specialty of BRECO Antriebstechnik Breher GmbH & Co. KG (BRECO). For over 50 years, BRECO has been the market, innovation, and quality leader in the field of polyurethane timing belt technology.

At the main plant in Porta Westfalica, 300 employees produce timing belts and timing pulleys. The company is a global partner in mechanical and plant engineering, a specialist in innovative drive technology, and develops inventions and patents in close collaboration with customers and university institutes that set standards and benchmarks for the competition.

Performance by Eckelmann

- › Eckelmann FCS offers both the flexibly scalable portfolio of drive and automation technology as well as complete solutions for machine automation.
- › The drive experts at Eckelmann FCS have optimally set the drives for the application in terms of energy.
- › Utilizing powerful proprietary service tools for the parameterization and setup of servo drives and controls.
- › In the programming of individual user interfaces, everything from CODESYS V3.5 standard applications and HMI interfaces to custom user interfaces is feasible.
- › The PLC application realized with an E°EXC controller from Eckelmann was programmed by Eckelmann FCS application engineers under CODESYS V3 and an individual user interface was created.
- › The user can interact with the application via a robust standard operating terminal from Eckelmann FCS mounted on a swivel arm to set up and start test programs.
- › Control cabinet planning and construction from a single source.

Machine/Application

On the new test stand, the braking torque is generated by a second motor operating as a generator. Through a loss-optimized intermediate circuit coupling of the drives, the braking energy gained can be fed back into the drive system. By providing suitable set profiles from a higher-level PLC to the drives, the universal test stand can thus be operated with negligible energy consumption, and climate control of the control cabinet can be omitted.

The modular hardware structure and the FPGA-based design of the powerful E°Darc C drive system from Eckelmann FCS used here make it possible to integrate application- and technology-specific know-how directly into the servo controller. The new universal test stand can test timing belt drives under real conditions.

Constant high-dynamic acceleration and braking as well as braking torques that simulate operating loads can quickly drive up energy costs on such test stands, especially since the application often runs continuously for weeks — always near nominal operation.

This also speaks for the particular suitability and robustness of the E°Darc C drive technology for machining centers, where Eckelmann FCS drive controllers usually bring tool spindles up to speed (up to 40,000 1/min) and handle similar loads.

Drive Tool Spindles:	Quality Leader in Polyurethane Timing Belt Technology:
1,000 1/min	50 Years



➤ Proud of the solution for the energy-saving, highly efficient endurance test stands for timing belt drives: Dr.-Ing. Thomas Steinert, Managing Director of BRECO (right) and Bernd Serve from Eckelmann FCS Sales.



➤ Goal achieved: sustainable reduction of energy consumption through DC link coupling. A look inside the control cabinet reveals the E°Darc 48 high-speed servo controllers. The company subsidiary Eckelmann FCS used them to implement the drive technology for the test stand, which has a maximum output of 52 kW but only consumes 2 kW from the mains.

Special Features

- Eckelmann FCS realized the drive technology for the test stand with high-speed servo controllers of the type E°Darc C48, which have a maximum power of 52 kW but only consume 2 kW from the mains. The energy consumption was significantly minimized through intermediate circuit coupling. Minor losses only occur due to friction in the mechanical structure and heat losses in the motor and power electronics.
- In intermediate circuit coupling, the two 400 V inverters use a common intermediate circuit. If one or more inverters are operated in generator mode, energy from the intermediate circuit can be made available “free of charge” to the inverters currently operating in motor mode. If the generated energy is not fully used or stored in the intermediate circuit capacitors, it can be dissipated to a braking resistor via a brake chopper.
- For the special solution, FCS’s expertise in control cabinet construction was used. Both the compact servo inverters and the compact controller fit into a small control cabinet directly under the mechanical structure and take up only a small air volume.

Do you have any questions?

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