



A PRODUCTION LINE WORKING LIKE CLOCKWORK – EVEN WITH MANY DIFFERENT VARIANTS

TEAM Automation Berlin has implemented a system for producing a wide variety of lubricant dispensers using joining technology by Kistler



The successful implementation of the assembly line is the result of close collaboration between Kistler, SKF Lubrication, and TEAM Automation Berlin. From left: Jörg Nimz (Kistler) and Volker Marx (SKF Lubrication)..



Development Manager Daniel Egri in front of the automation system implemented by TEAM Automation Berlin

How can you manufacture a wide variety of product types with short cycle times on a single, fully automated line? TEAM Automation Berlin demonstrates how it's done, using a custom machine to assemble lubricant distributors, designed for SKF. The most important success factor in this automation project: strong partners who bring technical expertise and the necessary dedication to the table. One such company is Kistler, whose electromechanical joining system (servo press) and process monitoring system ensure precise, flexible, and repeatable assembly.

Anyone looking to reduce friction in machinery will turn to SKF's lubrication solutions. The international company, with approximately 300 employees at its Berlin location, helps ensure efficiency and longevity in a wide range of machinery. Although the lubrication process is always the same, the lubricant distributors and metering units, for example, vary in many technical details depending on the final product. Combined with small batch sizes of just a few hundred units, the sheer number of product variants has become a challenge for SKF. Automating the production process for lubricant dispensers seemed like an insurmountable task. At the same time, the demand for shorter cycle times and even higher, consistent production quality was growing.

TEAM Automation Berlin was up for the challenge. The specialist in custom machine building has been

implementing sophisticated automation solutions for various industries for two decades. The production line developed by TEAM Automation Berlin combines fully automated mass production with the flexibility to manufacture different parts without the need for time-consuming changeovers. This allows SKF to remain flexible and efficient.

"We are already very familiar with Kistler's joining technology from previous projects. We chose the NCFE joining module specifically for its cost-effectiveness in terms of reducing operating costs and scrap, its speed, and also for the durability that is typical for Kistler products."

Andreas Nowak, CEO of TEAM Automation Berlin GmbH

Modular automation solution for greater flexibility in the production of high-variety components

"Our solution consisted of a modular assembly line based on a longitudinal transfer system," explains Andreas Nowak, CEO of TEAM Automation Berlin GmbH. All components are automatically fed into the line, assembled, inspected, and finally packaged. The movements of all workpiece carriers are synchronized in fixed cycles. Each individual assembly step is designed to flexibly accommodate different product variants. Mathematically, this results in several thousand variants that the system can produce fully automatically.

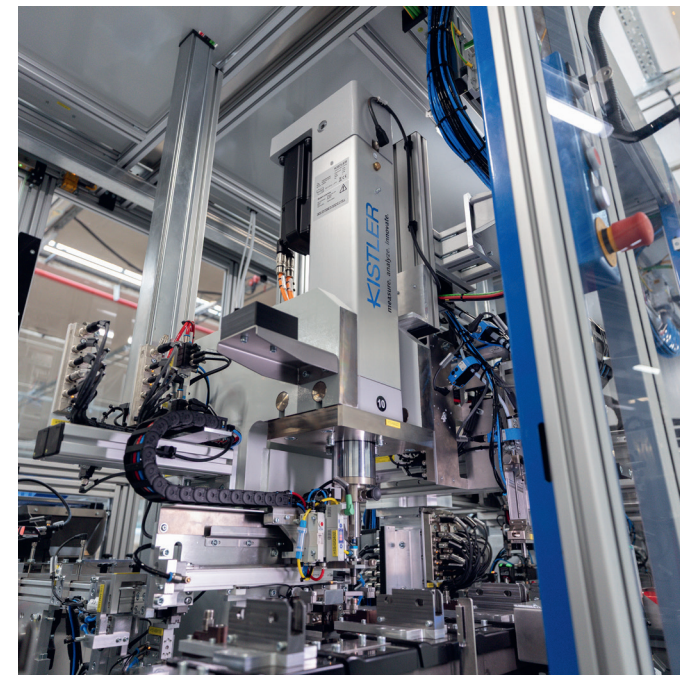
It is even possible to process up to two product variants in parallel without interrupting the production flow. "A key factor in our solution's success is the reliability of the individual components responsible for feeding, assembly, and packaging. That's why we rely on partners who stand for quality and durability," reveals Andreas Nowak.

Complex automation of the joining process – possible with strong partners only

To ensure that TEAM Automation Berlin can successfully carry out such challenging projects, the engineering company has built up a network of reliable partners. This includes Kistler. At its facility in Lorch (southwestern Germany), the company develops and manufactures electromechanical door solutions for demanding applications. The SKF production line had specific requirements for the joining process – since this step, too, needs to accommodate different variants. At the end of the assembly process, the lubricant distributors are either screwed shut or sealed by pressing in a disc. Depending on the product variant, the discs to be joined vary in size and thickness, and some are even made of different materials. Kistler's electromechanical joining modules, which can be controlled continuously, provide the necessary flexibility.

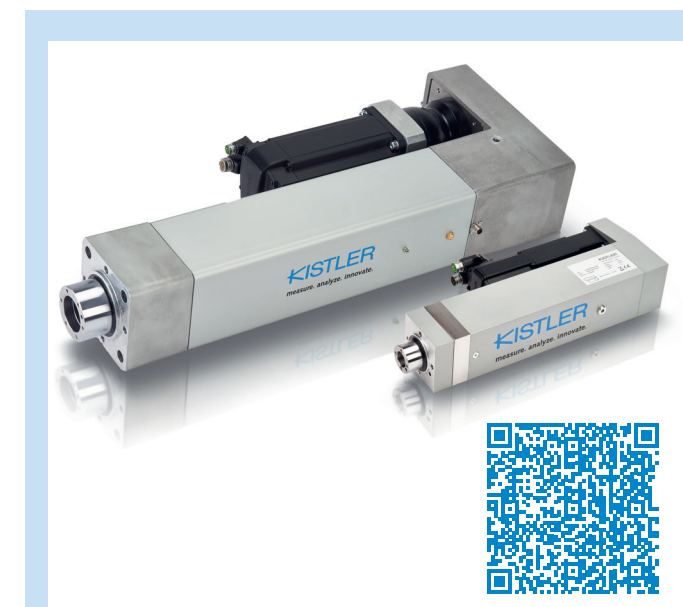
Force-displacement-monitored press-fitting with short cycle times

For the joining process itself, the system feeds the discs individually via a common feeder and moves them into the pressing position. This process step must be precisely synchronized with the movement of the workpiece carrier, as the next disc is already being positioned during the joining process. This highly dynamic sequence is made



With a cycle time of just five seconds, Kistler's electromechanical joining module NCFE positions itself, performs the press-fit operation with force-displacement monitoring, and completes an equally rapid retraction.

possible by the joining technology used. The module moves into position at high speed, performs the pressing operation with precision, and executes an equally rapid retraction – all within a cycle time of approximately five seconds.



NC joining module NCFE Type 2162A with integrated strain gauge force sensor

* Custom models with strokes up to 1,000 mm, a maximum force range of 700 kN, or angled designs are available upon request.

High-precision, energy-efficient, and traceable joining and press-fitting

Of the seven series of electromechanical joining systems offered by Kistler, AUMANN uses the NCFN model in various production stations.

Kistler's electromechanical joining systems (servo presses) offer advantages in automated assembly:

- Integrated real-time force-displacement monitoring
- Very high energy efficiency compared to hydraulic and pneumatic systems
- Precise force control (strain gauge or piezo) based on integrated strain gauge sensors using proven Kistler technology
- Easy integration thanks to multiple interfaces

For specialized joining and press-fit applications, Kistler offers custom models with strokes of up to 1,000 mm*, angled designs, and an extended force range of up to 700 kN*.



The maXYmos NC process monitoring system from Kistler evaluates and documents the XY curves of the joining processes.

The electromechanical technology of the NCFE joining module also saves energy compared to pneumatic or hydraulic alternatives.

The joining process is monitored by the servo press's integrated force-displacement monitoring system and by Kistler's maXYmos NC process monitoring system, which evaluates each joining and press-fitting operation and documents and analyzes the XY curves based on the measurements. Using defined measurement windows (evaluation objects), the joining process can be precisely monitored and carried out with the highest repeatability.

The system control automatically adapts the joining process to the specific requirements of the various product variants without the need for mechanical adjustments. As a result, the press-fitting process integrates seamlessly into the overall process optimizing both quality and cycle time instead of becoming a bottleneck. "We are already very familiar with Kistler's joining technology from previous projects. We chose the NCFE joining module specifically for its cost-effectiveness in terms of reducing operating costs and scrap, its speed, and also for the durability that is typical for Kistler products," said Andreas Nowak.



Fully automated assembly line for lubricant distributors featuring a wide range of variants, precise press-fitting and assembly technology, and short cycle times – supported by Kistler's servo press NCFE and the process monitoring system maXYmos NC.



The maXYmos NC process monitoring system controls, monitors, evaluates and documents characteristics of two measurands XY for joining and press-fitting processes in combination with joining modules and the associated servo amplifier IndraDrive.

maXYmos NC Process Monitoring System for Joining and Press-Fit Operations

Key Features / Benefits

- Process monitoring system with integrated sequencer
- 128 independent programs, each with up to 10 evaluation elements
- Real-time capability thanks to servo amplifiers with SERCOS III
- Onboard fieldbus interfaces (PROFIBUS, PROFINET, EtherCAT, EtherNet/IP)
- Statistics and logging of measurement results (Q-DAS, CSV, PDF, XML, IPM 5.0, QDA9, QWX)
- Self-monitoring and diagnostics as well as visualization and remote control (VNC)
- Integrated curve memory for up to 5,000 curves (only for Type 5847B0)



Product quality and maximum repeatability are no problem thanks to the maXYmos NC process monitoring system. Daniel Egri from TEAM Automation Berlin takes a look at the force-displacement measurements.

Success through close collaboration

"Electromechanical joining technology, with all its advantages, is of course the foundation. In addition, we have found a reliable partner on equal footing in Kistler, who understands our needs and responds quickly to unforeseen challenges. Our long-standing experience in joint projects and the short decision-making processes have been instrumental for us to meet the demanding time frame and process requirements," explains Andreas Nowak. Especially when it comes to complex custom machines with a wide range of variants, it becomes clear that reliability and mutual understanding throughout the project are just as important as the performance of the components used. "The assembly line was a success not only for us, but our customer SKF was also very satisfied."



With TEAM Automation Berlin's flexible automated assembly line, Kistler's servo press enables precise and repeatable assembly. This allows SKF Lubrication Systems to efficiently produce different variants of the lubricant distributors with short cycle times.



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