



Watch movement assembly

Making time

From its home in Biel, Switzerland, Lécureux supplies the watchmaking industry with automated systems for the assembly of watch movements. To meet steadily increasing demands for speed and flexibility, the company equips every new development, including its modular AUTHOR assembly tables, with automation technology from BSR. Nevertheless, CEO Daniel Affolter is confident that manual watchmaking won't be disappearing entirely anytime soon.





The AUTHOR series of assembly tables built by Lécureux in Orpund, Switzerland can be installed individually, in an island, or – as pictured here – as a complete line for manual or semi-automated assembly of watch movements.



What does an aquarium pump have to do with watchmaking? More than you'd expect, actually. Back in 1961, Bernhard Lécureux used an aquarium pump to build the first prototype of a power screwdriver – an invention that would soon become an indispensable tool for the watchmaking industry. The young watchmaker had the brilliant idea to convert the pump from his fish tank to function as a vacuum and connect it to a specially constructed screwdriver.

The suction holds the tiny screws used to assemble the intricate mechanical components of a watch – known as the movement – in place on the tip of the screwdriver. With the addition of a small motor, the electric screwdriver had been born. More than 50 years later, it is still the flagship product of the Lécureux company, which now has 100 employees around the world.

New AUTHOR table featuring B&R technology

In addition to its trademark screwdrivers, the Lécureux portfolio includes complete lines able to assemble up to 1,000 watch movements per day. Many of these began featuring B&R automation components in 2010.

Since 2014 this has included the AUTHOR series. This modular system of watch movement assembly tables can be installed individually, as an island with multiple stations or as a complete assembly line. Up to six lifting tools per table – or three per table when installed as a line – bring the workpiece into position. Each year, Lécureux delivers between 15 and 100 AUTHOR systems around the world.

Small modules, strong support

Prior to the cooperation with B&R, Lécureux had used a controller

developed in-house for the AUTHOR table. As the demands on the controller grew in scope and complexity over the years, the company decided to tighten its focus on its core competencies and seek an external controls supplier.

"When selecting the new controller, size was a decisive criteria for us," explains Affolter. "The equipment used to assemble watch movements is very small, so we needed a supplier whose portfolio includes very compact modules. The X20 controller from B&R offers exactly that."

According to Affolter, service also played a key role in the company's decision. With the nearby B&R office, technical support is always close at hand. "At B&R, we're not just a number," says Affolter. "They take our matters very seriously as a customer." The company's positive experience with B&R dates back to an earlier project, where a B&R was used for a specialty machine. "The decision to head down this new path with B&R as our supplier for automation hardware was an easy one."

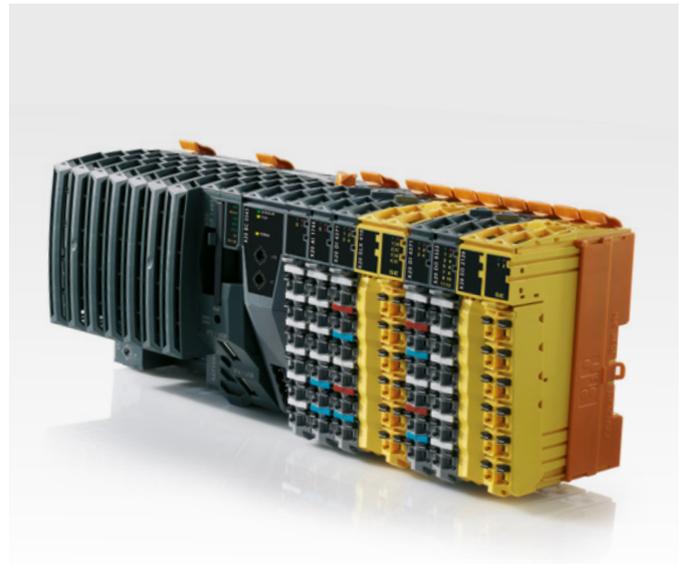
More speed, precision, convenience and flexibility

The transition to the new automation hardware went, well, like clockwork. "We started off by sending our programmers to a very well-organized seminar at B&R," recalls Affolter. "They benefited greatly from that and were confident developing software for the new controller within a week. The few times we did run into trouble, we were able to rely on quick and competent support from B&R."

Lécureux customers have enjoyed the advantages of the new B&R controller for several months now, with the new model offering a



With up to six different lifting tools per AUTHOR table, workpieces can be positioned quickly and precisely as needed for each assembly step.



A safety controller from B&R gives the AUTHOR table the safe input channels it needs to read digital signals.

considerable boost in speed and positioning precision as well as improved data traceability.

Users of the new AUTHOR table also have access to a wider range of configuration options. The AUTHOR system offers intuitive operation via a state-of-the-art HMI application running on a 7" B&R terminal. Still, there's no need for customers using the predecessor model to worry: the generations are fully interoperable and can be combined seamlessly.

X20 system: The heart and mind of the AUTHOR

Every station, whether manual, semi-automated or fully automated, is controlled and monitored by an X20 controller with two gigabytes of CompactFlash memory. The I/O modules are connected via POWERLINK. B&R also provides the stepper motors and the corresponding controllers for the lifting tools. The stepper motor module allows the winding currents to be controlled independently, which has a positive effect on energy consumption, thermal stress and service life throughout the entire system. Individually configurable values for holding, maximum and nominal current provide maximum flexibility. A CAN interface makes it possible to connect complex auxiliary devices.

Assembly still needs a helping hand

Although it would be possible to design a watch movement that could be assembled on a fully automated line, Affolter is convinced that the conventional design will continue to require human intervention. "If you look at the gear train," he says, "you've got two gearwheels that don't mesh, so they can be placed automatically. The third gearwheel has to mesh with the first two, so it and the



Daniel Affolter
CEO, Lécureux

"B&R technology gives us the flexibility we need to master whatever challenges the future brings."

bridge that goes over it are assembled manually. This takes a kind of finesse that robots have so far been unable to imitate."

Particularly in cases like this, where you have a direct hand-off between automated and manual processing steps, a well-designed safety solution is essential. A safety controller from B&R gives the AUTHOR table safe input channels that can be used to read digital signals in safety-related applications up to PL e / SIL 3.

The future of watch movement assembly

Watch movement assembly will continue to be shaped by the factors of flexibility, modularity, multi-caliber capability, retrofitability and plug-and-play functionality. "B&R technology gives us the flexibility we need to master whatever challenges the future brings," concludes Affolter. That's why his company will be equipping future projects and products with B&R controllers. When it comes to installing the watch movement into the case, however, automation is still out of the question. Although the mounting of the face and hands could be automated with sufficient precision, the marriage between movement and case is a matter watchmakers prefer to take into their own hands. ←