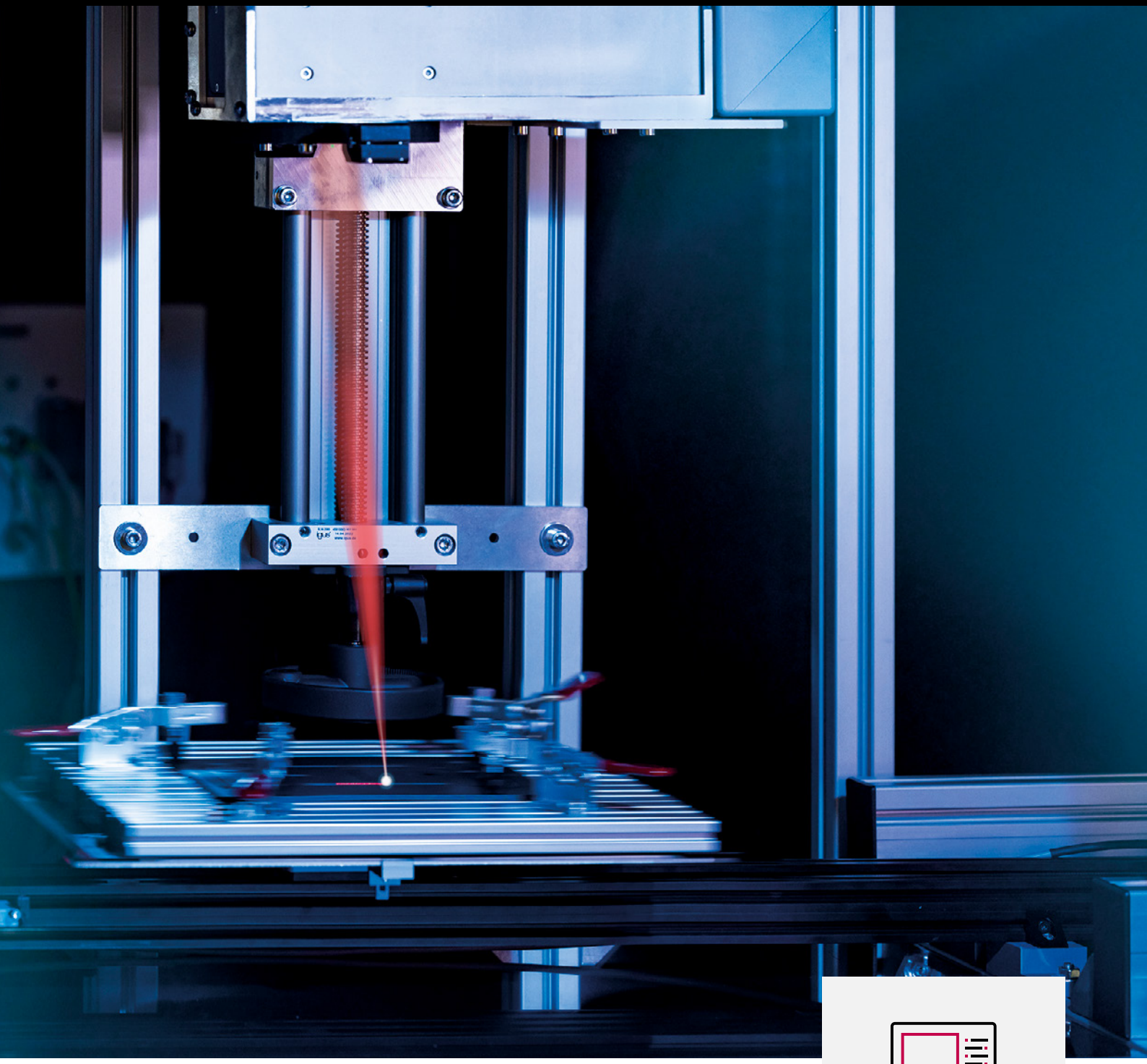
BLACKBIRD



Software add-on
On-the-fly
technology

OTF MotionSync

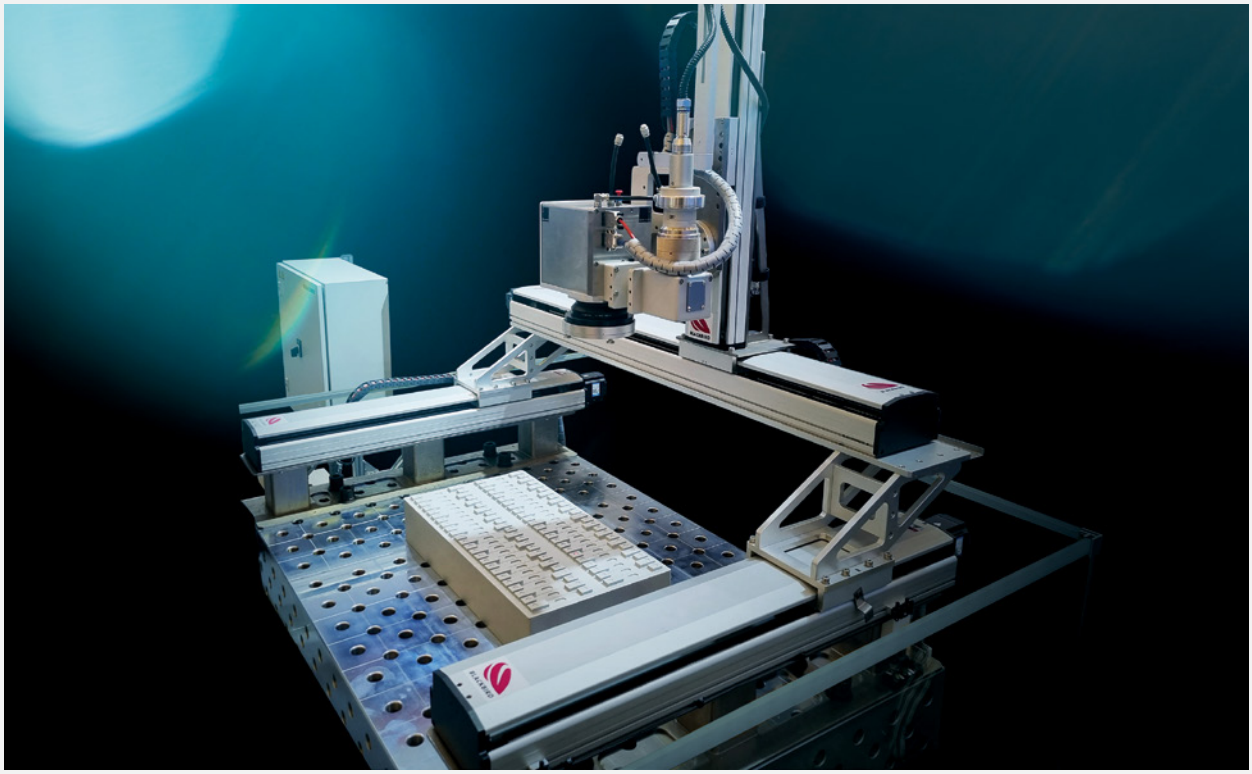
Synchronized Laser Welding with Axis Systems

- Precise weld positioning during on-the-fly processes
- Suitable for large workpieces or continuous production
- Robust, efficient and low-cost production

Challenge and Solution Approach

Remote laser welding (RLW) offers clear advantages over conventional joining processes: faster processes, flexibility and higher quality.

However, static RLW processes often do not fully utilize this potential. Blackbird was able to significantly increase efficiency with its development of the dynamic 'on-the-fly' (OTF) process with robots back in 2008. However, for high-precision applications, such as in e-mobility, the positioning accuracy of robots is often not sufficient. Users need a solution that guarantees both high precision and efficiency in order to achieve the required throughput.



OTF MotionSync Gantry

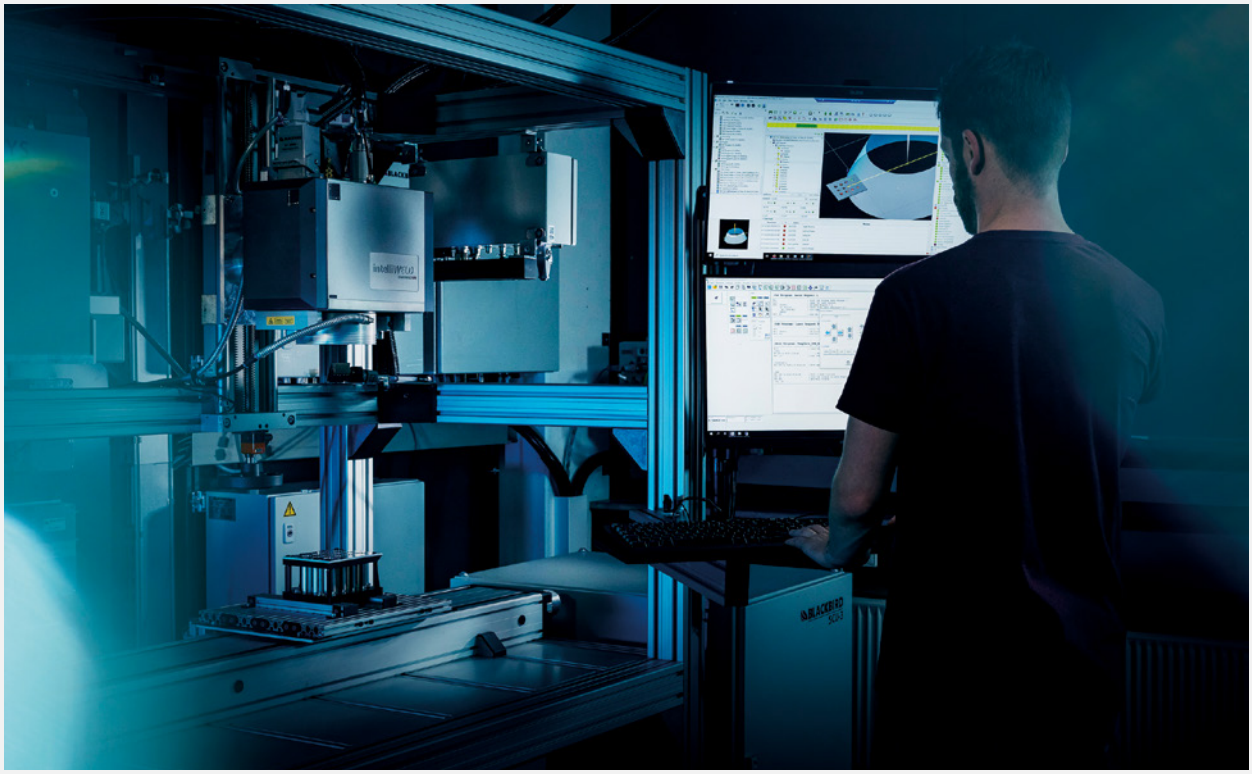
The OTF MotionSync Gantry technology package offers an efficient solution for high-precision remote laser welding thanks to the option of integrating two synchronized linear axes. With this setup, the achievable working area of the scanner can be greatly extended (> 1,000 m^2 possible) and welding can be carried out on larger components accordingly.

During set-up mode of the process, the programmed movement of the linear axes is recorded in order to provide the control system with the ideal movement sequence. Each time the program is started, the scanner controller automatically checks whether the scanner is at the defined start position – otherwise the welding process is not started. During program execution, the linear axes move the scanner across the welding points while it performs the welds in synchronization with the movement. The position of the scanner is compared with the ideal position using encoder values.

Position deviations are detected immediately and the program is automatically aborted if the tolerance limits are exceeded, e.g. to avoid unwanted beam angles of the processing laser.

With OTF MotionSync, Blackbird offers a further development of its proven on-the-fly technology, which is based on many years of experience in industrial laser welding. Thanks to innovative position synchronization when using linear axes, OTF MotionSync can enhance the accuracy and robustness of the welding process. The scanner controller synchronizes the welding program with the axis movement, which is operated by a higher-level controller. The position of the linear axes, which can guide both the scanner and the component, is checked in real time using encoder values and scanned at a frequency of up to 4 MHz.

Two variants of OTF MotionSync are available for users: OTF MotionSync Gantry is designed for single part-based OTF processing, whereas OTF MotionSync Continuous is optimized for applications with continuous part feed.



OTF MotionSync Continuous

The OTF MotionSync Continuous technology package enables fully synchronized on-the-fly welding processing in continuous operation. Components move continuously through the scan field while their positions are recorded and monitored using encoder values from the axis.

This software package is ideal for automated production lines and can be used with both a linear axis and a rotary axis to ensure precise positioning of the welds on moving components. The execution of the welding program is started by a trigger signal and synchronized with the movement of the component. Changes in the feed speed are automatically compensated by the scanner control system.

However, if there are excessive deviations from the ideal movement, the welding process is interrupted to prevent scrap. As soon as the welding task is completed, the next component can be processed in order to maximize the efficiency of the entire production process.

Benefits and Application Examples

OTF MotionSync Gantry is ideal for high-precision welding of large individual components or for numerous components in component carriers. The synchronized movement makes it possible to position the laser beam precisely on the component, significantly increasing productivity and thus reducing the effective costs per component. OTF MotionSync Gantry is ideal for battery production in the e-mobility sector and is used for welding cap-can connections, busbars and wall boxes, among other things.

OTF MotionSync Continuous was specially developed for the continuous processing of individual components. It enables continuous, high-precision welding, eliminates waiting times and thus ensures maximum process speed and throughput. As a result, the efficiency of automated production lines can be raised to a new level and the production costs per component can be reduced. OTF MotionSync Continuous is also favored in the e-mobility sector, for example in the production of bipolar plates, batteries or the overlap welding of thin foils.

Purchase Options and Services

Both product variants – Gantry and Continuous – are included in the OTF MotionSync software add-on. Existing SCB controllers can be upgraded to OTF MotionSync with a simple software update and if necessary a hardware upgrade kit to benefit from the new functions.

Our service team is happy to assist you with setup and parameterization. For further information and personalized advice, please do not hesitate to contact us.

Technical specifications

Maximum sampling rate of encoder values	4 MHz
Typical positioning accuracy of axis (OTF MotionSync Gantry)	0.01 mm
Typical positioning accuracy of axis (OTF MotionSync Continuous)	0.0002 mm
Maximum axis length for OTF MotionSync	up to 120 m

Blackbird Robotersysteme GmbH
Carl-Zeiss-Str. 5 | 85748 Garching n. Munich / Germany
T: +49 89 307 484 700 | info@blackbird-robotics.de

Blackbird Robotics (Shanghai) Co., Ltd.
338, #1, #526, Fute 3rd Road East | FTZ - Shanghai, 200131 | P.R. China
T: +86 216 037 78 88 | info-CN@blackbird-robotics.com