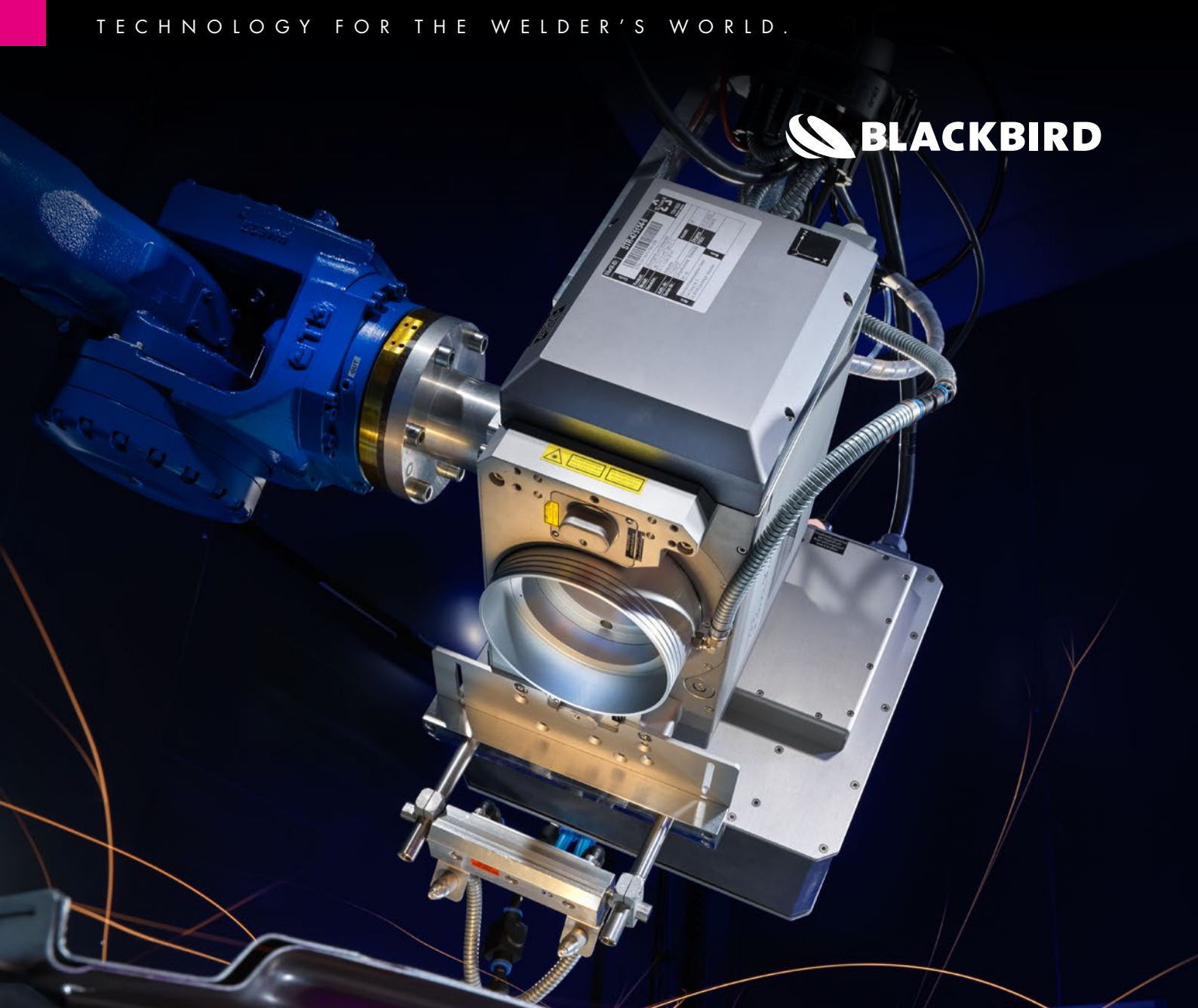
TECHNOLOGY FOR THE WELDER'S WORLD.

BLACKBIRD



Powerful remote laser welding of vehicle components

Blackbird technology package for highest quality requirements for hang-on-parts, seats and battery boxes

Holistic solutions with sophisticated remote laser welding technology for high demands on short cycle times in vehicle production.

ABICOR BINZEL® LASER SYSTEMS

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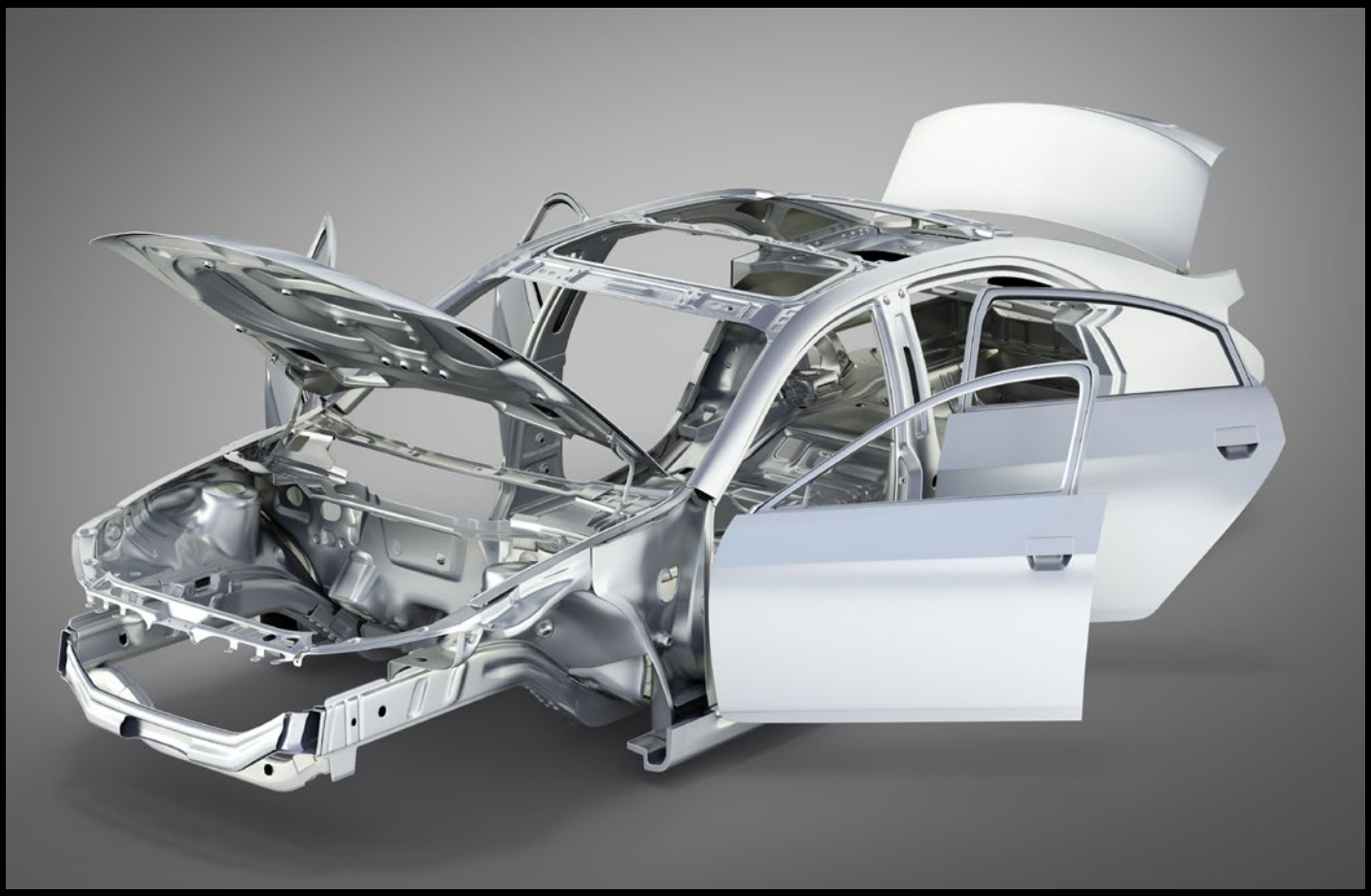
Joining processes in automotive production

When high quality requirements and short cycle times clash

Highest accuracy, precisely set weld seams, extremely high welding speed, economical processes – welcome to remote laser welding.

Production processes for vehicle components are subject to high quality requirements with comparatively short cycle times. Particularly in the welding of doors, seats and battery boxes, there are specific challenges that require innovative approaches.

Challenges in laser welding of strength-relevant vehicle parts



▶ Welding doors

Particularly in the joining of car doors, the trend is increasingly towards fillet welds. For both steel and aluminum, this requires very precise guidance of the laser beam with only a few tenths of a millimetre of permissible deviation. In addition, possible gaps between the parts to be joined must be detected and bridged by adaptive parameter adjustment.

▶ Welding of seat modules

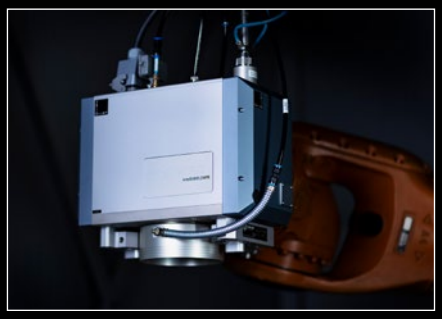
Welding-intensive modules with a large number of overlap seams are often subject to high demands on short cycle times. This results in the need to decouple robot and welding movements from each other. For this purpose, the laser beam must be positioned very quickly and at the same time exactly reproducibly, which is made possible by highly dynamic scanner systems.

▶ Welding of battery boxes

As part of the body structure, battery boxes must also meet high requirements in terms of lightweight construction and stability at the same time. For this reason, aluminum alloys with high strengths are mostly used, but they are challenging in terms of weldability. It is therefore all the more important to influence the time of solidification of the weld seam so that the risk of cracking at this critical moment is reduced. For this purpose, static or dynamic beam shaping adapted to the application is an option.

The technology package from Blackbird Robotersysteme GmbH offers a smart solution for these special challenges.

Application-specific configuration

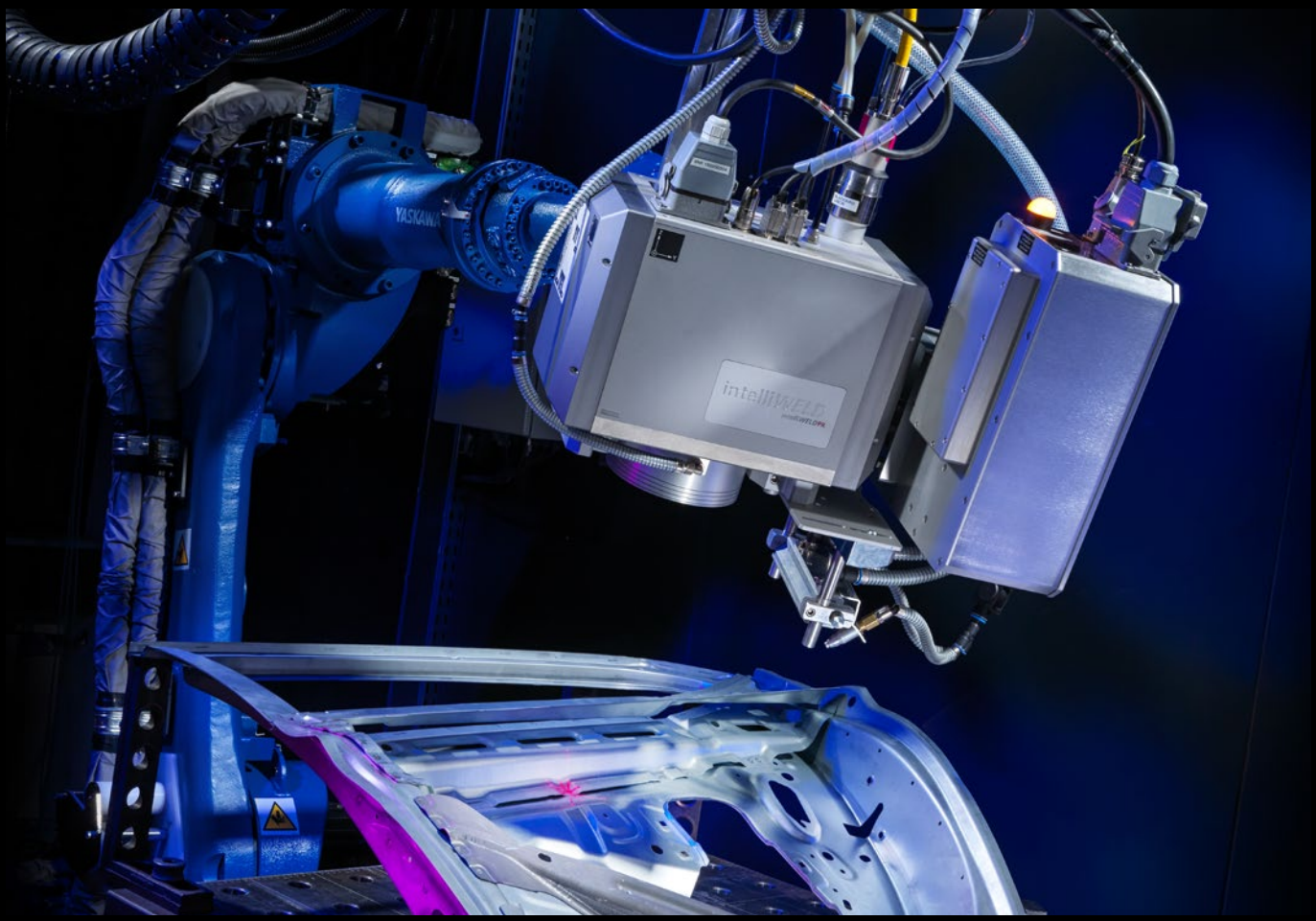


Flexible use for steel and aluminum materials

The Blackbird technology package combines sophisticated control technologies, highly dynamic scanner systems, optimally adjusted optics and outstanding user-friendliness. With this complete system, everything simply fits when it comes to laser welding in automotive production.

RobotSyncUnit (RSU) – intelligent software
ScanControlUnit (SCU) – highly efficient control
intelliWELD – powerful 3D scanner

Due to an oscillation of the laser beam superimposed on the welding movement, it is possible with this configuration to weld not only steel but also aluminum alloys without filler material. For fillet welds at the lap joint, this oscillation enables adaptive bridging of a gap previously measured between the upper and lower sheet.



Economical on-the-fly synchronisation

High speed, precision and quality

If a large number of short seams have to be welded at various positions, the cycle time can be significantly reduced through optimum synchronisation between the robot path and the scanner movement.

While the robot moves the scanner optics along the workpiece at a constant distance and continuous speed, the laser beam is quickly and precisely directed to the processing point from a linear path by the mirror systems. When comparing this on-the-fly technique with welding with fixed optics without scanner mirrors, the slow approach and stop over the welding spot is eliminated. In this way, unproductive downtime can be massively reduced.

The powerful SCU3 (ScanControlUnit) ensures that the Blackbird on-the-fly synchronisation of robot and scan movements, which has been tried and tested for years, optimally uses the laser beam as an energy source and thus enables short cycle times. The offline programming option supports the programming process on the component by enabling path and cycle time optimisation to be carried out on the PC.

OCT technology – seam tracking. Process monitoring. Quality control.

In optical coherence tomography (OCT), the component surface is scanned at high frequency by an optical measuring beam. By comparing it with a reference beam of defined length, the distance is measured locally and precisely and a height profile is created, which enables the reliable detection of joints and component edges. In addition, OCT can be used to detect surface irregularities on weld seams and to determine the depth of the keyhole during deep welding. The latter allows conclusions about the seam depth already during the process.

The combination of an impact position detection with a downstream inline inspection of the seam topology makes OCT a powerful tool for automated production, for example in door manufacturing.

Blackbird technology package for remote laser welding of vehicle components to the point

- **Flexible in application for steel and aluminum materials**
  increased process reliability through laser beam oscillation and gap bridging algorithms
- **Precise weld seams with short cycle times**
  optimised through on-the-fly technology and offline path programming
- **Reproducible seam properties in automated production**
  supported by OCT for seam tracking, gap measurement and determination of seam topology

Blackbird & ABICOR BINZEL

Your holistic solution package

Blackbird's highly developed, powerful and reliable technology is combined with ABICOR BINZEL's worldwide sales and service network. This guarantees a holistic solution through:

- a sophisticated technology package
- an international network of experts
- worldwide application and service support

ABICOR BINZEL® LASER SYSTEMS

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