

DETECT ISSUES WITHIN SECONDS.
REDUCE REJECTS. ENSURE SAFETY.





KNOW YOUR LASER BEAM - SAVE TIME AND MONEY

Laser light and the automotive industry are tied closely together. Both **laser-based manufacturing and laser-based sensing** play a key role in today's mobility. If you use a laser in materials processing, the processes can only sustainably turn out high-quality products if the laser beam is of reliably high quality. Laser-based sensing applications such as LiDAR and gestures recognition can only guarantee safe usage as long as the laser beam consistently meets specs.

In the **production environment**, even slight deviations of the focal point or unexpected variances in laser power can have a major effect on entire processes. Measuring the laser parameters is important not only during development and/or production of the laser system: To prevent the production of bad parts, the laser beam should also be monitored continuously while employed in manufacturing processes. And should bad parts be traced back to a laser-based manufacturing machine, it is imperative to be able to pinpoint what happened with the beam at any given time.

Due to the tremendous progress in **autonomous driving**, new and different laser applications are gaining in importance: high-power VCSELs as used in LiDAR systems, and lowpower VCSELs for proximity sensors or face and gesture recognition. Finding the right measurement device is the first step to ensuring the quality and sustainability of the process, as well as the safety of the products' end users.

With its Ophir® brand, MKS Instruments offers the widest variety of laser measurement devices on the market – a comprehensive overview can be found in our annual catalog. Here we present a selection of key products of special interest for automotive applications. Talk to us about your measurement challenge. We will gladly provide you with an individual solution!



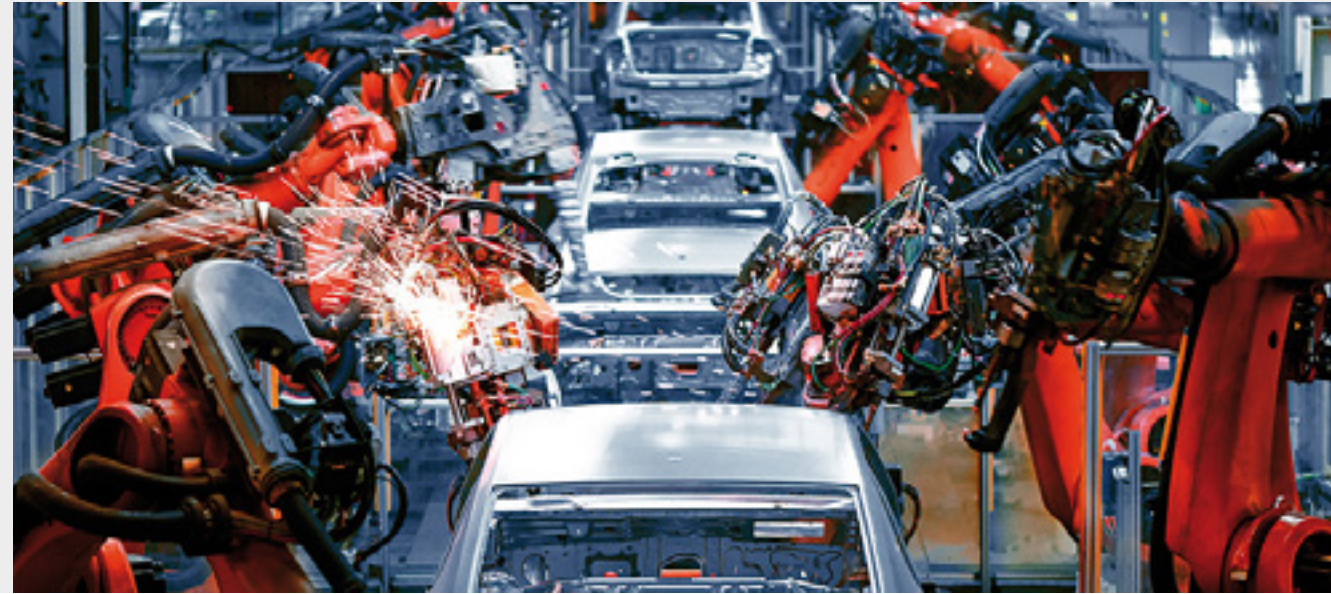
BATTERY WELDING PROCESSES

What if you could detect issues within seconds?

E-mobility is one of the key drivers in the automotive industry. Mass production of battery packs places particularly high demands on laser welding systems. In some cases, 15,000 and more welded electrical contacts connect the individual cells to a pack: Each one must be of superior quality, so the packs can be configured to the desired operating voltage and capacity. Because precise joints are critical, it is indispensable to monitor the laser beam to assure the safety and performance of the finished battery, as well as to guarantee production yield.

When integrated into the laser welding process, **Ophir Helios** allows fast measurements of the laser power taken during loading cycles. While laser power is a good first indicator, delicate applications require more comprehensive measurements that can be taken with the non-contact **Ophir BeamWatch®**. The technique exerts no influence whatsoever on the laser beam, nor does the beam affect the device. The laser focus shift can be assessed in only seconds, which saves time searching for the root cause of any quality issues. Predictive maintenance of laser-based processes reduces consumables and ensures high yields of quality parts.

Finding the right measurement device is the first step to ensure quality and sustainability of the process and the safety of the users



BODY IN WHITE

What if you could reduce the number of rejects?

In the body-in-white stage, laser cells are commonly used for spot and seam welding as well as for brazing. Due to the high power of the laser beams used in the process, it is quite a challenge to measure the power, focused spot and caustic focal position of the beam. But if the strength of the weld is compromised, it can lead to problems further down the production line – with more rejects and cost-intensive rework of laser welds, particularly in visible areas.

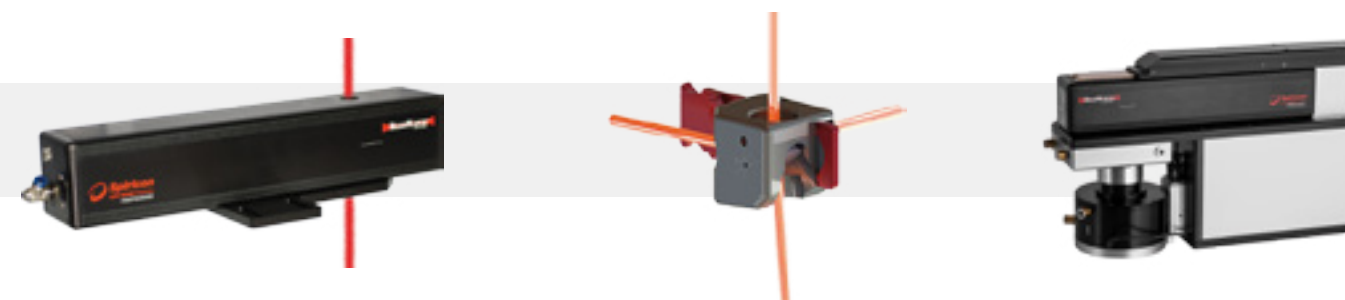
Here, using the non-contact **Ophir BeamWatch** measurement device can save an enormous amount of time and money. The compact system is lightweight and easy to use for regular measurements, either in the production cell or for trouble-shooting. As there is no limit on the power, **Ophir BeamWatch** is suited for testing any high-power laser in the NIR spectral range. Measurements are taken in seconds; the comprehensive software then immediately analyzes the beam parameters, thus avoiding rejects.

WELDING POWERTRAINS

What if you could ensure the quality directly in-line?

Attention paid to improving the power-to-weight ratio and reducing wear and tear have led to the optimization of differential gears. In turn, ever more bolted joints have been replaced by laser welds. Essential to ensuring the quality of these welds is knowing the key parameters of the laser beam. But time is money, and – at least with traditional methods – measuring a high-power laser could take up to half an hour and require complex, heavy-duty measurement equipment.

Implementing **Ophir BeamWatch Integrated** within the automated manufacturing cycle ensures the welding process' quality and stability. The device offers several industrial interfaces to deliver the measurements directly to the centralized data hub (PLC/SPS), so data can be available for instant assessment and stored for long-term analytics. As soon as an anomaly is detected, the laser operator can take corrective action in an educated way – preventing the fabrication of bad parts.



LASER BEAM MELTING

What if the quality consistently met your expectations?

Additive manufacturing is making inroads into high-volume production. But while, so far, it has mostly been used to produce secondary parts, there is a movement to completely revolutionize the automotive industry. However, ignoring current costs per part, one technical issue still impedes the widespread use of AM technology in the manufacture of key metal parts: The product quality must be reliably high and replicable.

Ophir BeamWatch AM closes this “repeatability gap”. It delivers reliable results every time – whether in R&D, in production, or in the field. Measurement takes place inside the AM production chamber, within a compact housing sealed by a pneumatic shutter and purge gas. No time-consuming manual alignment of the Z-axis is necessary. **BeamWatch AM** makes it possible to know the condition of your LBM system and its optical performance before starting a large build job and putting dozens of manufacturing hours and expensive metal powder at risk.



VCSELS

What if you could ensure both eye safety and energy efficiency?

Vertical-cavity surface-emitting lasers (VCSELs) are found in a variety of automotive applications. VCSELs as used in proximity sensors need only low electrical power, whereas higher wattages are required by methods such as LiDAR, as implemented in autonomous driving. To guarantee eye safety and energy efficiency, suitable measurement methods are called for.

Developed for purposes like these, the **Ophir IS1.5-VIS-FPD-800 Integrating Sphere** is optimized for testing VCSELs. It combines multiple measurement capabilities in a single device: A precision photodiode delivers calibrated average power measurement, a fast photodiode provides pulse shape characterization on an oscilloscope, and an SMA fiber-optic adapter makes for easy connection to a spectrometer. Ensuring that the VCSEL beam is within parameters protects people and animals from uncontrolled laser radiation, and it also helps to balance energy consumption with performance.

WHY MKS?

CRITICAL TECHNOLOGIES

World-class technology and development capabilities for leading-edge processes



PROVEN PARTNER

Recognized leader delivering innovative, reliable solutions for our customers' most complex problems



OPERATIONAL EXCELLENCE

Consistent execution across all aspects of our business



COMPREHENSIVE PORTFOLIO

Largest breadth of product and service solutions for the markets we serve



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WHY OPHIR? Ophir is a brand within the MKS Instruments Light & Motion division. The Ophir product portfolio consists of high-performance laser and LED measurement technology. Ophir stands for:

- **Stability** – For more than 40 years, Ophir has developed laser measurement systems. This integrates perfectly with the long-term stability and growth of MKS, itself founded in 1961.
- **Variety of products** – Ophir's product range includes sensors to measure laser power and energy; beam profilers to measure focus shift and beam quality, including industry-leading non-contact measurement systems; and technologies to measure LED luminaires
- **Individuality** – In addition to the continuously growing portfolio of standard sensors, Ophir develops customer-specific OEM solutions for individual application requirements.
- **Service** – Ophir offers service and calibration centers worldwide that are ISO17025 certified or are in the process of accreditation.

For further information please visit www.ophiropt.com

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