PRIMES

PRODUCTS FOR LASER BEAM ANALYSIS
IN AUTOMOTIVE INDUSTRY

Laser Beam Diagnostics for Industry 4.0

Tomorrows production will face high demands: It will have to be intelligent, flexible, efficient, and sustainable. But isn't it already like that today? Ever briefer product life cycles are satisfying ever more rapidly changing demands and correspondingly bring with them high demands for process system flexibility. Top-notch quality is a key factor here and detecting deviations is an integral part.

Stopping machines embedded in a 24/7 network of interrelated steps is often an economic disaster. Maintaining consistent quality of the laser beam is a basic prerequisite to ensure reliable cycle times in production. The laser is a tool vulnerable to wear, however, and even the smallest irregularity could result in lower workpiece quality or unnecessary excess waste. With regular focus analysis, you can track even gradual changes in the laser beam, interfere in a targeted manner, and perform predictive maintenance: Is it caused by the beam waist location, beam symmetry, an alignment error, or thermal effects?

Harsh production environments, limited construction space and constant mechanical stress: This too can be a face of state-of-the-art Industry 4.0. PRIMES offers solutions suited to these and many other challenges in laser beam diagnostics. For heavily polluted production environments, we use particularly robust components to protect the valuable lenses and mirrors of the measuring devices. When space is limited, we use especially compact measuring devices or adapt special optical elements to widen the incoming laser spot. Almost everyone along the value chain of high power lasers, including laser manufacturers and the automotive industry, trusts in the quality of PRIMES devices for laser beam diagnostics – as part of their strategy for efficiency and flexibility.

Fast, reliable and highly accurate – PowerMeasuringModule PMM

The industrial standard for power measurements of high power lasers, fully integrated in your automated process.

The PRIMES PowerMeasuringModule PMM is the industry standard for measuring high power lasers in industrial processes. It offers fast and reliable quality assurance in rough and synchronized production environments. With standardized interfaces, it's easy to integrate and delivers highly accurate measurement results to the machine interface. Using the calorimetric principle, it provides extremely fast measurements within 3 seconds, allowing for qualification during production line part exchanges.

Fast laser power measurement enables precise process control, quickly identifying irregular processes due to defective components.

This reduces scrap production and allows for better planning of service calls, saving time and costs in a price-sensitive production environment. **New:** The PMM's field of application was extended to low average powers as well as pulsed beam sources. The use in the blue and green spectral range is particularly suitable for laser processing of copper materials and in battery production for e-mobility.

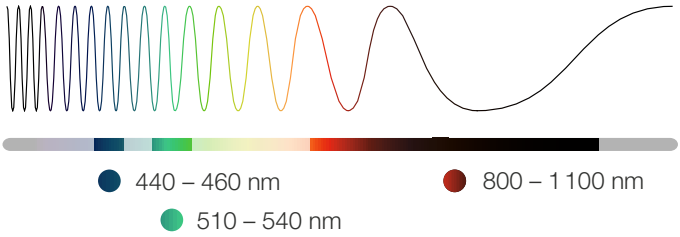
Additionally, the **PMM AP3sM**, features an integrated Micro Lens Array for measurements up to 200 kW/cm² close to the focus, optimizing space usage even further.

Caustic Power Beam profile Focus shift

Fiber and disc laser

Diode laser

Ultrashort pulse laser



	PMM
POWER RANGE	400 W – 12 kW
BEAM QUALITY M^2	Single mode and multi mode
BEAM DIAMETER	Up to 30 mm
HIGHLIGHT	Accuracy ± 3 % Reproducibility ± 1 %
INTERFACES	PROFINET®, PROFIBUS®, DeviceNet™, Ethernet/IP™, EtherCAT™

Conclusion

The PowerMeasuringModule delivers highly accurate measurement results in almost no time. As an easy-to-integrate solution, the robust, industry proven measuring device is available with all common interfaces. The PRIMES PMM is your reliable partner for process control in industrial laser applications, proven by more than 5.000 units installed worlwide.

Autonomous and durable – FocusParameterMonitor FPM

2-in-1 online beam characterisation, measuring power and caustic, designed for seamless integration into production environments.

The FPM is a compact, autonomous sensor that measures laser power, power density distribution and caustic online. It is designed for the integration in a production line and can perform measurements during part changes or other down times within a fraction of a second. The FPM is the ideal tool to monitor the overall performance of your laser station.

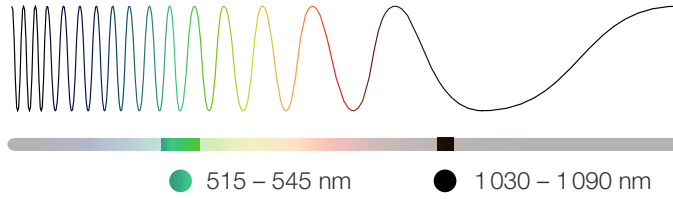
The FPM can perform caustic measurements conform to ISO 11146. It is easy to integrate and requires no cooling. Measurements require short laser pulses only, which resembles the welding process of high precision tasks (remote welding of e.g. battery packs or hairpin welding). This allows to detect irregular beam properties before they can lead to a defective part. With the FocusParameterMonitor, seamless documention of the laser performance is possible – which is crucial for costly value chains like the production of batteries and fuel cells.

Caustic Power Beam profile Focus shift

Fiber and disc laser

Diode laser

Ultrashort pulse laser



	FPM
POWER RANGE	400 W – 8 kW
BEAM QUALITY M^2	Single mode and multi mode
BEAM DIAMETER	75 µm up to 2000 µm
HIGHLIGHT	Automatic beam characterization and TCP verification
INTERFACES	PROFINET®, PROFIBUS®, Ethernet (Webserver)

Conclusion

The FocusParameterMonitor measures laser power, captures the power density distribution and calculates the characteristics of the focussed laser spot autonomously. The data is automatically transfered to the machine PLC and can thus be easily checked and stored. By setting upper and lower boundaries, it is possible to detect a drifting process and to warn the operator. The measurement results can be documented for quality assurance. The FMP has a compact and robust design, features field proven PRIMES technology and is nearly maintenance free.

PRIMES – A leading company for laser beam diagnostics.

We offer innovative and process-optimized measuring devices for focus characterization and performance measurement of laser beams. Our wide range of high-precision, durable products is essential in many industrial applications. Researchers and developers widely recognize PRIMES tools in industry and universities. Thanks to the in-house design of the entire hardware and software, we can offer optimal solutions for various laser measuring tasks, system characterizations, or error analyses.

Established in 1992 and headquarted in the Rhine-Main region in Germany, PRIMES is globally renowed as a valued partner, represented by a well-established subsidiary in Japan and 14 distributors worldwide.

PRIMES

PRIMES GmbH
Max-Planck-Straße 2
64319 Pfungstadt
Germany
T +49 6157 9878-0
info@primes.de
www.primes.de

Version: 1.0 EN, June 2023