

MORE LIGHT

Visionline – Optical Surface Inspection & Profile Measurement

**Reliable and automated
testing of technical surfaces.**

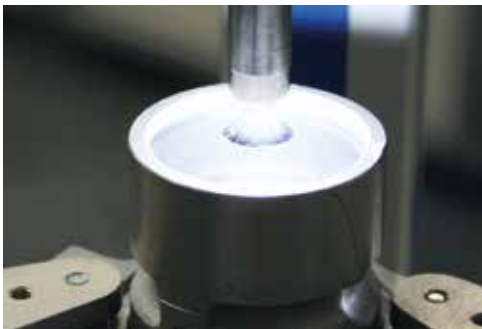
Your partner for measuring solutions

The Light & Production Division of Jenoptik is a global specialist in the optimization of manufacturing processes.

Our many years of experience and know-how in the field of industrial measurement technology and optical inspection, modern laser-based material processing and highly flexible robot-based automation enable us to develop tailor-made manufacturing solutions for our customers in automotive, aerospace, healthcare and other manufacturing industries.

As an experienced and reliable partner for high-precision, tactile and non-tactile production metrology, we support you with our global sales and services network.

Depending on the requirements, our tactile, pneumatic and optical measuring systems take on a wide range of tasks for the inspection of surface and form as well as the determination of dimensions, throughout every phase of the production process including final inspection or in the metrology lab. Our systems provide you with precise measured data within the shortest time frames.



Inspecting inside bores



Inspecting plane surfaces



Measuring micro structures

Our Visionline solutions provide you with a wide range of application options for optical surface inspection and profile measurement. The systems can be integrated into automated production processes, and deliver reproducible, robust results.

Surface inspection

- Cavities
- Pores
- Scratches
- Recesses
- Spalling
- Burrs

Profile measurement in cylinder bores

- Groove width
- Groove base width
- Micro structures

Please scan for detailed Visionline information



Innovative, optical inspection of various surfaces

Reliable test results

With Visionline solutions, the inspection process is automated and delivers operator-independent and reproducible results. This avoids the errors of visual inspection and ensures that only really high quality products are processed and delivered.

Optimized processes

The immediate inspection of all workpieces directly after the processing step allows statements about the manufacturing quality. The feedback of the test results into the production process helps to identify and remedy problems at an early stage.

High quality products

For an optimized quality assurance process, the test results are clearly documented and made available to the production line for further processing. Detailed displays make any defects visible and allow for immediate rectification. This increases the product quality and thus the satisfaction of your customers.

Reduced inspection costs

Automated 100-percent inspection of technical surfaces saves you time and money. To speed up your inspection process, Visionline systems inspect surfaces in the shortest possible time and deliver objective results without operator influence.



Advantages of optical inspection

- Wear-free and reliable thanks to optical testing technology
- Fast inspection with short measuring cycles
- No retooling of the systems when changing workpieces
- Safety in case of misalignment of the workpiece thanks to collision protection
- 100-percent control
- No operator influence
- Reduction of pseudo-errors and unrecognized defects (slippage)



IPS B5. Optical internal inspection systems for reliably detecting defects in bores from 5 mm

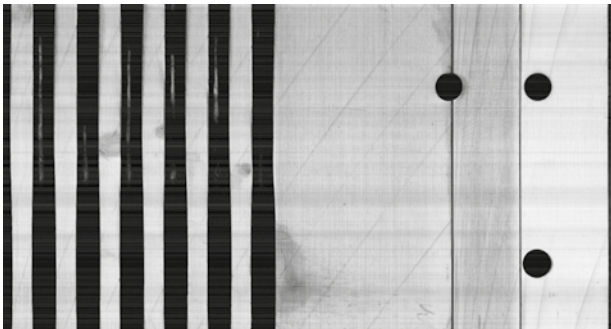
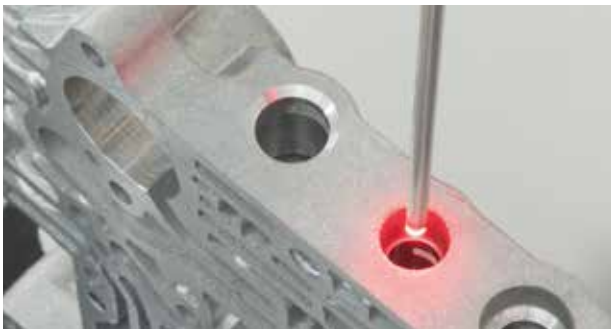
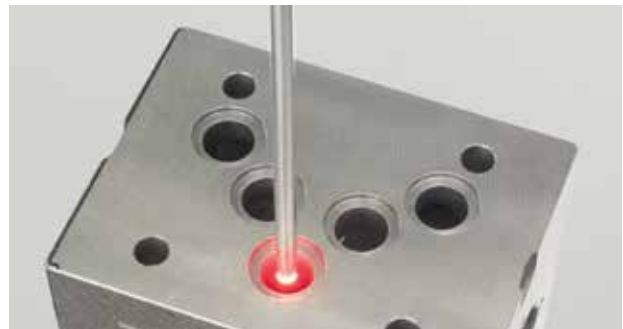


Illustration of a bore inside surface



Valve control plate bore inspection



Inspection of bore surfaces in a mobile hydraulics block

The IPS B5 internal inspection sensor scans the entire surface of a bore. The sensor delivers high-resolution and distortion-free images of the surface in order to reliably detect small defects.

System features

- Automatically inspects interior surfaces within bores using a wear-free and reliable 360° lens
- Objective test results without influence of the worker
- Detects common surface defects such as cavities, pores, scratches, etc.
- Image pickup whilst in motion and within the required cycle time
- Diameter range 5 – 14 mm

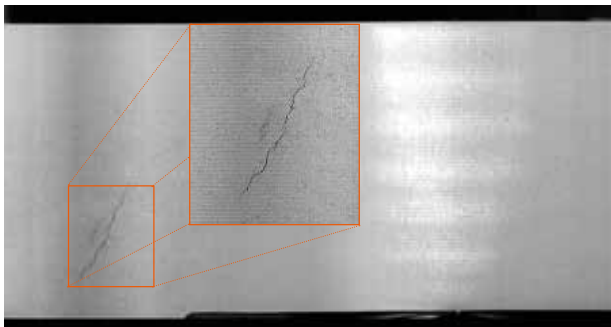
Modular system concept

- Offline with manual loading
- In-line with automated workpiece handling
- Flexible robot system
- Multiple sensors as well as combination with other sensors (e.g. IPS F200 3D) in one system is possible

Application examples

- Valve control plates
- Control slide bores
- Injection pump housings
- Hydraulic valve housings
- Cylinder head (injector bore)

IPS B10. Internal inspection sensor for optical surface inspection of bores from 14 mm



Crack detected on cylinder surface



Inspection station for inspecting brake master cylinders



Inspecting the inner bore of a con rod eye

The IPS B10 inspection sensor enables precise inspection of bore surfaces. Even the tiniest imperfections are detected reliably and within the required cycle time.

System features

- Utilizes the latest CMOS image sensor technology and a 360° lens for reliable and automated inspection
- Robust detection of common surface defects such as cavities, pores, scratches, etc.
- Head-on collision protection to avoid damage in case of workpiece misalignment
- High acquisition rate for shortest inspection times
- Diameter range 14 – 50 mm, therefore no conversion necessary when changing workpieces

Modular system concept

- Offline with manual loading
- In-line with automated workpiece handling
- Flexible robot system
- Multiple sensors as well as combination with other sensors (e.g. IPS F200 3D) in one system is possible

Application examples

- Brake master cylinders and brake disks
- Pump housings
- Con rods
- Injection pump housings
- Hydraulic/pneumatic valve housings

IPS B100. Internal inspection sensors for optical surface inspection in cylinder bores from 68 mm



Simultaneous inspection in four cylinder bores using four IPS B100 sensors



Robot-guided inspection cell



Inspection station with manual loading



Above-conveyor system for inline engines

The IPS B100 internal inspection sensor automatically scans the entire inner surface of cylinder bores and delivers high-resolution images of surface defects in the fast production cycle.

System features

- Automatically inspects the inner surfaces of bores using a 360° all-round lens
- Detects common surface defects
- Easy integration into the manufacturing process for 100-percent inspection
- Process-reliable differentiation of defects and residual dirt from drying
- Diameter range 68 – 110 mm

Modular system concept

- Offline with manual loading
- In-line with automated workpiece handling
- Flexible robot system
- Multiple sensors as well as combination with other sensors (e.g. IPS F400 3D) in one system is possible

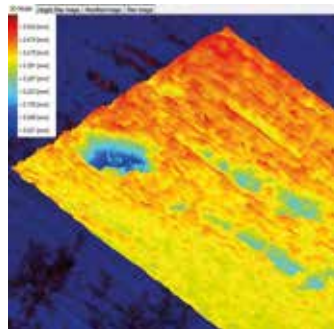
Application examples

- Crank cases
- Cylinder liners
- High-pressure housings
- HGV con rods
- Steering boxes

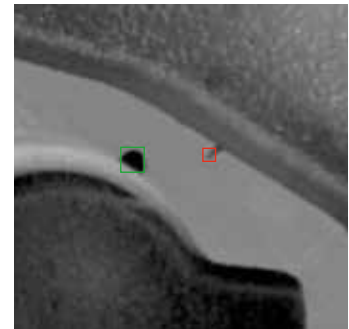
IPS Fx00 3D. Optical inspection systems for automatic inspection of plane surfaces



Plane surface inspection using the IPS F100 3D



Evaluation of surface defects



Red: edge flaw, green: contamination



Offline inspection station



Full inspection of cylinder bore and plane surface on the engine block

As a result of their fast speed, the IPS Fx00 3D systems are used for full inspections of plane surfaces. Innovative camera and lighting technology and adaptive, dynamic masking are used to distinguish between genuine surface defects and contamination with a high level of process reliability.

System features

- Automatically inspects plane faces
- Detects common surface defects such as cavities, pores, scratches, etc.
- Image pickup whilst in motion and within the required cycle time (fly-over technology)
- Short inspection times thanks to a fast scan rate
- Adaptive, dynamic masking for reliable edge inspection
- Powerful 3D technology
- Offers a complete solution for full inspection of e.g. crank cases in conjunction with bore inspection
- Scan width 100, 200 or 400 mm, depending on model

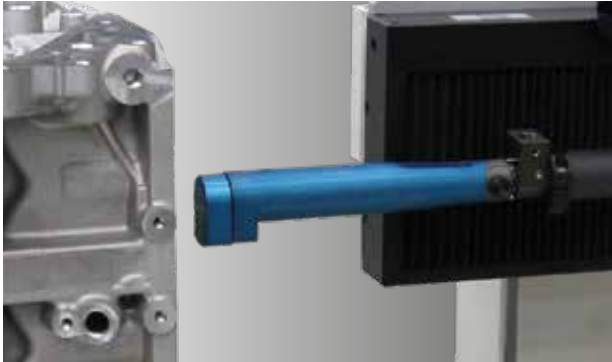
Modular system concept

- Offline with manual loading
- In-line with automated workpiece handling
- Multiple sensors as well as combination with other sensors (e.g. IPS B100) in one system is possible

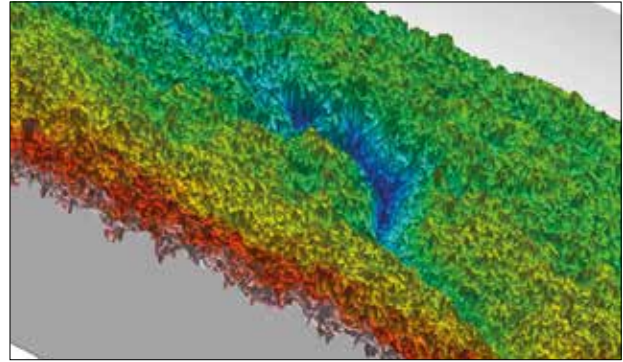
Application examples

- Crank cases
- Cylinder heads
- Valve plates
- Rough cast liners

CCS R50. Optical measuring systems for determining micro structures



Measuring micro structures



3D topography measurement

Thanks to chromatic-confocal point sensors, the optical measurement systems CCS R50 deliver high-precision surface measurement in cylinder bores.

System features

- Automatically measures micro structures in cylinder bores
- Can be integrated into fully automated systems
- Possible to carry out 3D topography measurements

Modular system concept

- Offline with manual loading
- In-line with automated workpiece handling
- Multiple sensors as well as combination with other sensors (e.g. IPS B100) in one system is possible

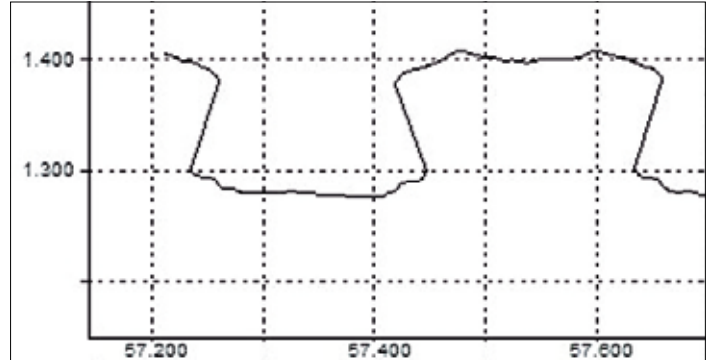


Overall view of the CCS R50 measuring system

CCS C100. Optical measuring systems for the determination of dovetail profiles



Measuring a cylinder bore



Dovetail profile in a cylinder bore [µm]

The optical measurement systems CCS C100 come with chromatic-confocal point sensors and deliver high-precision surface measurement in cylinder bores.

System features

- Automatically measures dovetail profiles in cylinder bores
- Automatically composes and evaluates the profile that has been measured
- Measures profile at four peripheral positions
- Measures the groove geometry across the entire length of the bore

Modular system concept

- Offline with manual loading
- Multiple sensors as well as combination with other sensors (e.g. IPS B100) in one system is possible



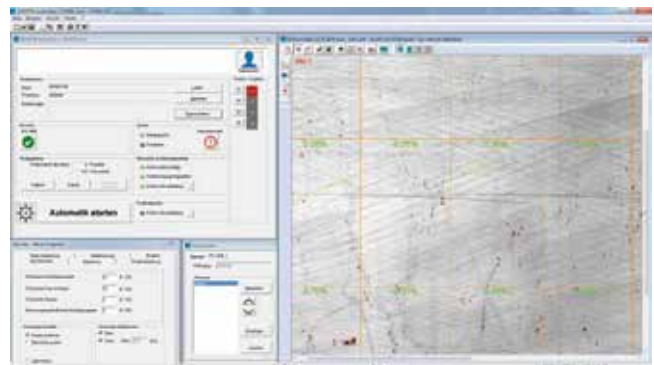
Combined cylinder inspection using IPS B100 and CCS C100

Evovis Vision. Software with clear user guidance for reliable inspection results

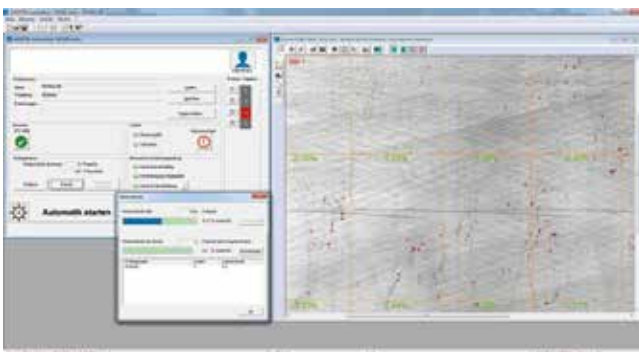
The graphical, function-oriented user interface of the Evovis Vision inspection and analysis software guarantees that you can operate the IPS systems for bores or plane surfaces simply and accurately. Numerous functions and wizards simplify the use of the software. It takes just a few simple steps to tailor the inspection system to a specific workpiece. This means that Evovis Vision ensures full quality control of each workpiece in accordance with the specified cycle time of the production line.



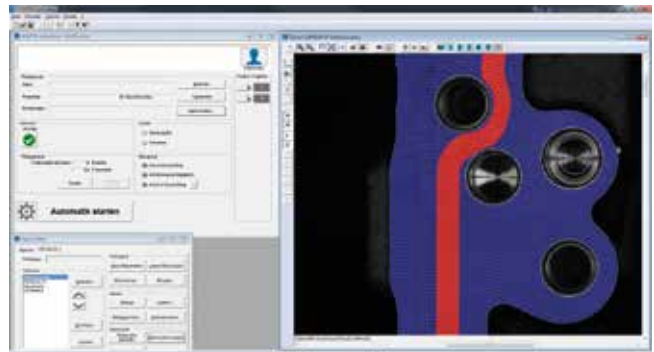
Defining inspection criteria and inspection zones



Automatic surface analysis



Statistical analysis using qs-STAT®



Adaptive, dynamic masking

System features

- Clear user interface and easy-to-understand icons
- Numerous wizards make it easy to create inspection plans
- Full evaluation and analysis functions for full quality control of manufactured parts
- Can be used for semi-automatic or fully automatic systems
- Interface to the line control system for integration in the production process control system
- Records and evaluates surface defects such as pores, scratches, cavities, etc.
- Evaluates regular and irregular structures
- Dimensions of cross bores and chamfers
- Determines relevant inspection zones with individual classification
- Measures surfaces in the image plane, e.g. edges or bore diameters
- Clearly documented results and detailed representations
- Robust detection of defects through adaptive, dynamic masking

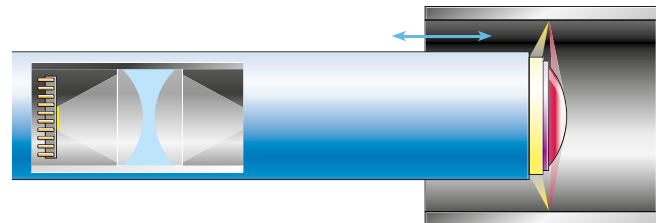
Effective assurance of your product quality

Thanks to our comprehensive expertise, we deliver innovative and future-oriented systems. Surface inspection is fast and reproducible thanks to optical non-contact metrology. Depending on the inspection task, various technologies are put to use in order to achieve optimum results.

Operating principle

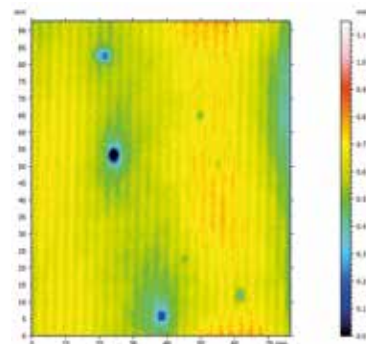
Optical bore inspection

A 360° all-round lens is moved into the bore and produces an image of the inner surface of the bore. The circumference lines in the bore are displayed as circle lines in the image plane of the sensor. This creates an undistorted, complete image of the inner surface of the bore.



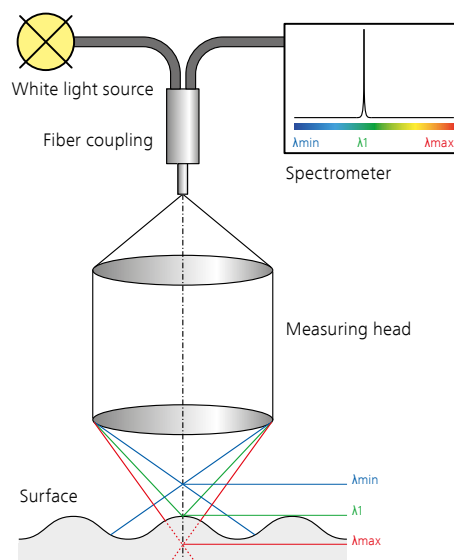
Optical plane surface inspection

The plane surface sensor is moved over the workpiece and creates a high-contrast image of the machined surface (fly-over technology). Thanks to the innovative image pickup technology, a topography of the surface is determined. Thereby, recesses and raised areas can be distinguished from dirt accurately.



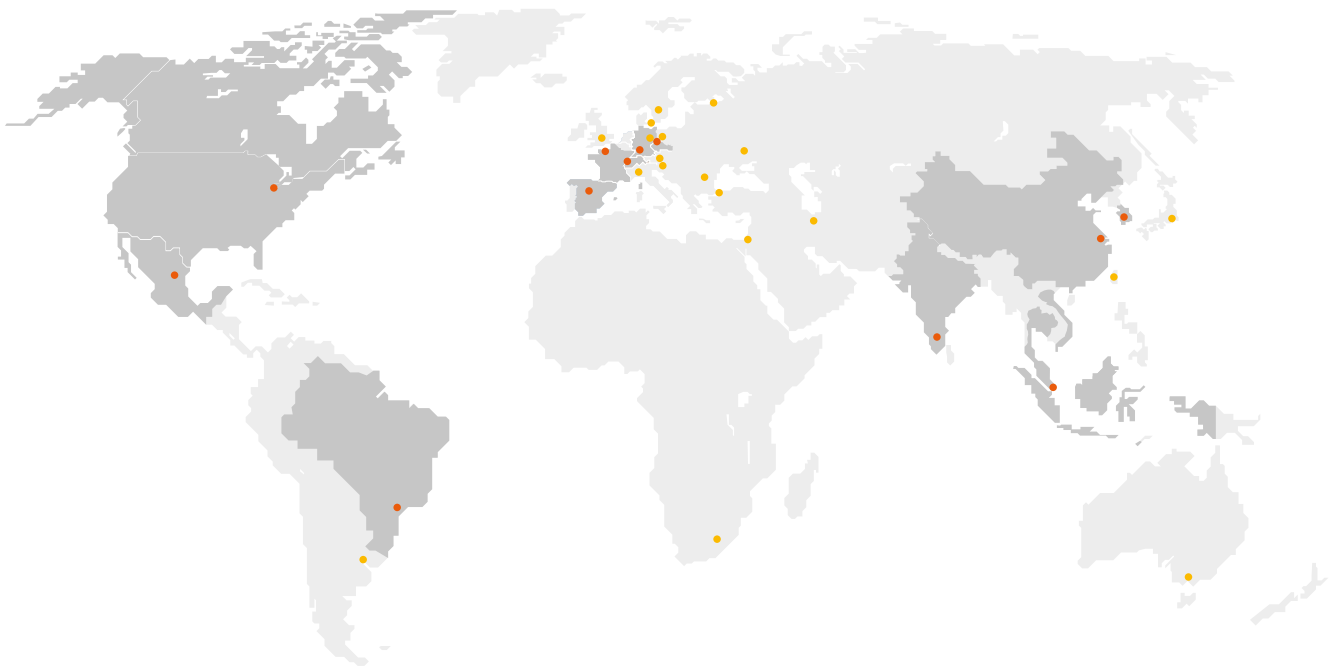
Optical measurement of structures

The front lens with high chromatic aberration (strong diffraction of light) is guided over the surface. Only the focused light is sufficiently reflected and analyzed in the spectrometer. The distance information is coded in the wavelength (color) of the reflected light.



We assist you worldwide

Our qualified employees are available to assist you across the globe. We have subsidiaries and distribution partners in key industrial nations, meaning that we are always close by to offer you optimum support as a reliable partner.



Visit us on YouTube.

JENOPTIK Industrial Metrology Germany GmbH | Alte Tuttlinger Strasse 20 | 78056 Villingen-Schwenningen | Germany
P +49 7720 602-0 | F +49 7720 602-444 | metrology@jenoptik.com | www.jenoptik.com/metrology

