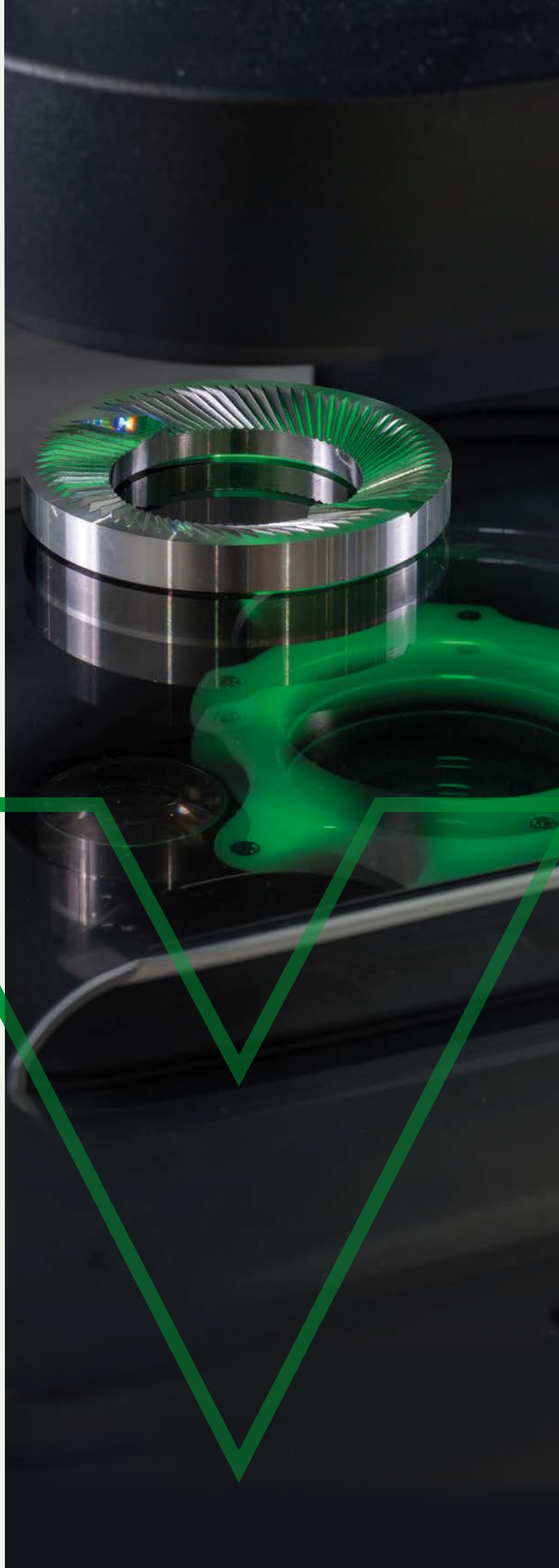
metrios
by VICIVISION

CONFOCAL SENSOR

designed for
Metrios 332 and 532



Z-AXIS MEASUREMENT EVEN ON OPTICALLY CRITICAL SURFACES

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WHAT IS A CONFOCAL SENSOR?

The confocal sensor is a non-contact optical measurement system.

Each wavelength is focused at a different distance along the optical axis. The system detects the wavelength that is perfectly focused on the surface of the part and determines the distance with high accuracy.

Its role on Metrios 332 and 532

The confocal sensor adds information to Metrios 332 and 532 optical measuring machines that image-based 2D measurement alone cannot provide directly and robustly: the height dimension (Z), including depths and steps, with non-contact measurement and high repeatability.

MEASUREMENT CHALLENGES, PRACTICAL ANSWERS

Measurement scenario	Confocal sensor response
Reflective surfaces	Stable and repeatable measurement
Transparent materials	Accurate surface detection
Geometries with depth	Direct Z-axis measurement with greater accuracy even on critical surfaces
Delicate components	Non-contact measurement

THE MOST COMMON DIMENSIONAL CHALLENGES

Grooves and steps

Depth measurement of recesses, grooves and steps on turned or milled components.

Critical surfaces

Stable and repeatable measurements on glossy, reflective or transparent surfaces.

Thickness

Thickness inspection even on transparent or semi-transparent materials such as glass and films.

TYPICAL INDUSTRIES

Medical, engineering plastics, electronics and precision automotive.

WHAT ARE THE BENEFITS?

1 NON-CONTACT MEASUREMENT

No risk of scratches or deformation on delicate surfaces or easily deformable.

2 SCRAP REDUCTION

Measurable Z dimensions that help control functional requirements such as assembly, sealing and seating.

3 DIRECT INTEGRATION

2D + Z acquisition in the same cycle: fewer instruments, fewer steps and fewer bottlenecks.

4 ACCURACY AND RESOLUTION ON THE Z AXIS

High-resolution point measurement and high repeatability on the Z axis, reducing operator-related variability.

TECHNICAL DATA

Repeatability	MPE	Working distance	Measuring range	Focal spot diameter
1.5 µm	3 µm + l/100	67 mm	9 mm	32 µm



THE UPGRADE THAT ADDS VALUE TO THE MACHINE

Integrating the confocal sensor extends the capabilities of Metrios 332 and 532 machines without changing the overall inspection setup.

The machine can therefore handle Z dimensions, depths and height differences together with 2D optical measurements, increasing the number of features that can be inspected in the same cycle.

A more versatile configuration makes it possible to handle new geometries, materials with different optical properties and more complex dimensional requirements, reducing the need for dedicated systems. Metrios machines can evolve along with production needs while retaining a measurement platform already familiar to operators and protecting the value of the investment over time.

USE CASES: WHERE CONFOCAL TECHNOLOGY MAKES THE DIFFERENCE

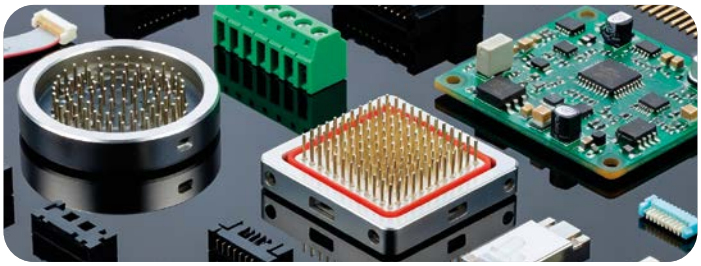
Thickness measurement on transparent or semi-transparent materials

Measuring the thickness of transparent or semi-transparent materials, such as glass, films and thin sheets, is complex. It requires the precise distinction of two interfaces (front/back), a task for which traditional triangulation and 2D technologies are not ideal without specific setups.



Electronics and mechatronics

On complex electronic components, such as connectors, pins, PCB components and mixed glossy/matte surfaces, height dimensions such as pin coplanarity, solder height and standoff often require dedicated inspection stations, adding complexity and time to the production process.



Pockets/counterbores/countersinks on plates

Checking Z dimensions, such as depth or seating height, on pockets, plates or countersinks is often critical. On materials such as aluminium or steel, including glossy surfaces, operators frequently rely on manual tools such as gauges or height gauges. This approach introduces significant measurement variability and slows down the quality control process.



Components with varying surfaces and colours

In systems based on Focus Variation, Z-dimension acquisition depends on identifying the point of maximum focus on the component. On parts featuring heterogeneous materials and glossy, matte, transparent or low-contrast surfaces, variations in optical conditions can reduce signal quality, affecting measurement accuracy, speed and repeatability.



O-ring seats and grooves

Rapid inspection of the width and depth of O-ring seats or grooves on turned or milled components, made of steel or aluminium with machined or ground finishes, is crucial. With 2D optical vision alone, depth is not directly visible and additional instruments are required, introducing complexity and potential errors.



THE CONFOCAL SOLUTION

The confocal sensor complements 2D optical measurement by acquiring the Z dimension without contact.

In a single cycle, it can inspect depths, steps, heights, level differences and coplanarity and, in compatible applications, measure the thickness of transparent or semi-transparent materials.

The measurement principle does not rely on the contrast of the image acquired by the camera and can therefore operate on surfaces with different colours, finishes and reflectivity levels. The result is more complete and repeatable dimensional inspection, with fewer instruments, fewer manual steps and less operator-related variability.

TECHNICAL BENEFITS OF THE CONFOCAL SENSOR IN PRODUCTION ENVIRONMENTS

TOUCH PROBE VS CONFOCAL

The confocal sensor differs significantly from traditional contact probes, offering key advantages in terms of part integrity, speed and automation potential.

	Touch probe	Confocal
Contact	yes	no
Speed	low	high
Effect on part	possible (e.g. deformation, scratches)	none
Automation	limited	high

This comparison highlights how confocal technology overcomes the limitations of contact systems, providing faster and safer measurements that are ideal for modern production.

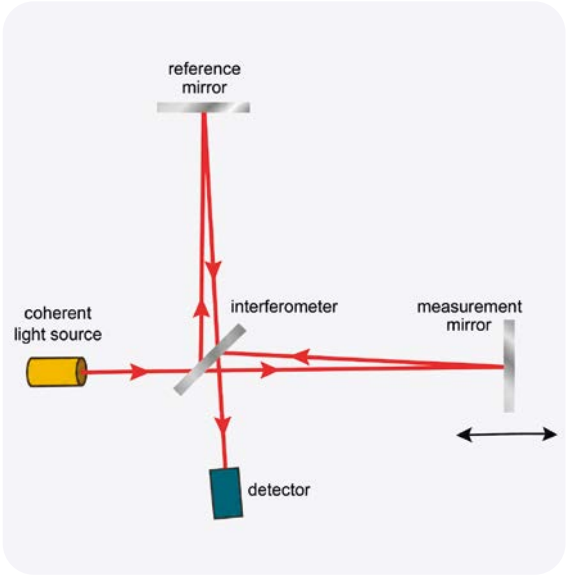


INTERFEROMETRY VS CONFOCAL

White-light interferometry offers extremely high accuracy, but the confocal sensor stands out for its industrial robustness and lower sensitivity to environmental conditions, making it more suitable for production environments.

	Interferometry	Confocal
Accuracy	very high	high
Environmental sensitivity	high	medium
Industrial robustness	limited	high

While interferometry can offer slightly higher accuracy under controlled conditions, confocal technology emerges as the more practical choice for industrial applications thanks to its reliability in less-than-ideal environments and its inherent stability.

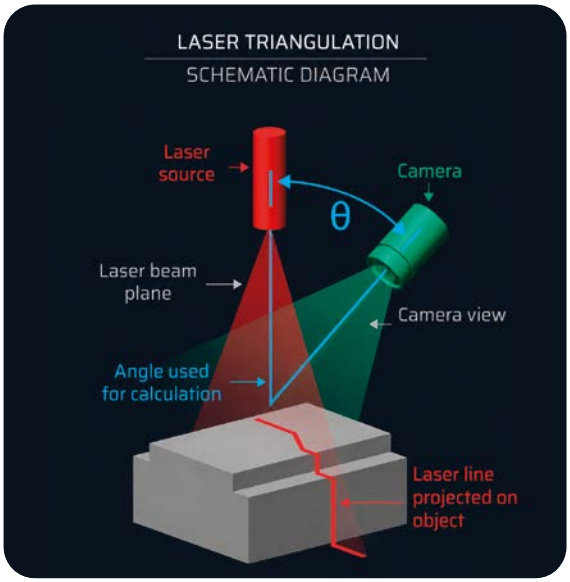


LASER TRIANGULATION VS CONFOCAL

The confocal sensor differs from laser triangulation through its higher accuracy and robustness across a wide range of surfaces, making it ideal for complex applications in industrial environments.

	Laser triangulation	Confocal
Accuracy	medium	high
Critical surfaces	limitations	excellent performance
Application flexibility	medium	high

This comparison highlights how confocal technology offers a significant advantage in measurement capability, especially in applications where laser triangulation reaches its limits, delivering more reliable and versatile results.



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