



HANDHELD
MEASUREMENTS



MOTION
ANALYSIS



ROBOT
METROLOGY

METRIS OPTICAL CMM SOLUTIONS



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Optical technology is currently the driving force for innovation in the metrology world. Metris provides highly accurate portable CMMs based on linear CCD cameras. An innovative benefit is the ability to perform accurate motion measurements in addition to the traditional static inspection capabilities of fixed bed CMMs. Today, these Optical CMM products are industry proven solutions that have been accepted in the automotive and aerospace industries.

A wealth of applications ...

AUTOMOTIVE

The K-Series optical measurement solutions cover a wide spectrum of automotive applications from the design process up to final assembly.

- Fixture verification
- Single part and assembly inspection (body and trim parts)
- Guided assembly of prototypes
- Body closure enhancement
- Interior measurements
- Comfort analysis
- Body & chassis development
- Degradation analysis
- Robot guided manufacturing

MOTOR SPORT

Today the K-Series Optical CMM systems are vital tools in the development, testing and legality verification of sports cars in venues such as Formula 1 and World Rally Car Championships. Metris is an official supplier to Spyker F1 team and "SUPER AGURI F1 TEAM", but also supplies to the FIA and many other leading Formula 1 teams.

AEROSPACE

Metris is a reference partner in the aerospace and space industry for test and measurement systems. The Metris optical sensors are used to test space robots & other kinematics structures such as landing gears. Other applications comprise the measurement of wing deformations, door closures, engine mounts and flap & slat motions.

NAVAL ENGINEERING

Testing the design of a hull in a towing tank is an important stage in ship building. The behavior of scale models is accurately measured in towing tanks, using Metris optical measurement systems. The optical sensors, used by all major towing tanks engineering labs, track the position and the orientation of the models, which is vital for simulation certification.



AUTOMOTIVE OEM

Audi, BMW, DaimlerChrysler, Ferrari, Fiat, Ford, GM, Honda, Hyundai, Jaguar, Mazda, Mitsubishi, Nissan, PSA, Renault, Opel, Seat, Toyota, Volkswagen, Volvo, etc.

AUTOMOTIVE SUPPLIERS

Bosch, Cummins Engine, GE Plastics, Faurecia, Goodyear, Johnson Controls, Lear, Magna, Magneti Marelli, Michelin, Rotax, etc.

Optical measurement technology

KEY BENEFITS

COST REDUCTIONS

The K-Series Optical CMMs are used for multiple applications, and as such they become more cost effective. The K-Series' flexibility and mobility enables faster interventions, reducing production stops, scrap production and labor.

PORTABLE OR MOBILE

The optical measurement systems are available in both a portable and mobile configuration. Whether used at one single plant or at different locations around the world, there is always a system configuration that fits your needs.

SOLID STATE QUALITY

The carbon-fiber structure makes the system truly solid state. There are no moving parts, which can deteriorate accuracy over time.

AUTO-ALIGNMENT SAVES TIME

The initial alignment of a work piece is monitored by 3 LEDs mounted directly on the part. The camera-to-part position is constantly monitored and updated, saving time and improving measurement quality.

PROVEN COMPETITIVENESS

K-Series Optical CMMs set up faster and measure more flexible than laser tracking systems, due to features such as auto-alignment and auto-detected exchangeable probe tips. When compared to articulated arms, they offer a better accuracy in a larger measuring volume, with more freedom of movement. The Optical CMMs also outperform white light scanning systems as the 3D data, captured up to 1000Hz, is instantly available and requires no further post-processing.

OPTICAL CMM

The K-Series camera systems are used for 3D-CMM inspection, motion analysis and robot metrology. As such the K-Series is a flexible and cost efficient industrial measurement concept.

K-SERIES MODELS

K-Series Optical CMMs are available in three measurement volumes. The K400 is used for smaller parts or components; the K500 is used for sub-assemblies and the K600/610 are typically used for full vehicle analysis or large components.

MEASUREMENT PRINCIPLE

K-Series cameras measure the position of infrared LEDs by means of **3 linear CCD cameras** mounted in a carbon-fiber structure. Through triangulation, the 3D position of each LED is calculated in space and is immediately available. The LEDs are built into the handheld **SpaceProbe** or **K-Scan**. These ergonomically designed devices enable an inspector to measure the actual 3D data of an inspection part in single point or scanning mode.



SPECIFICATIONS

	Measurement volume (m3)	Measurement distance (m)	2s Single point accuracy (mm)	Temperature range (°C)
K400	6	4	up to 60	10-35
K500	11	5	up to 60	10-35
K600	17	6	up to 60	10-35
K610	17	6	up to 37	10-35

* Full specifications are available in product data sheets

Ready for scanning and probing

FLEXIBLE HANDHELD MEASUREMENTS

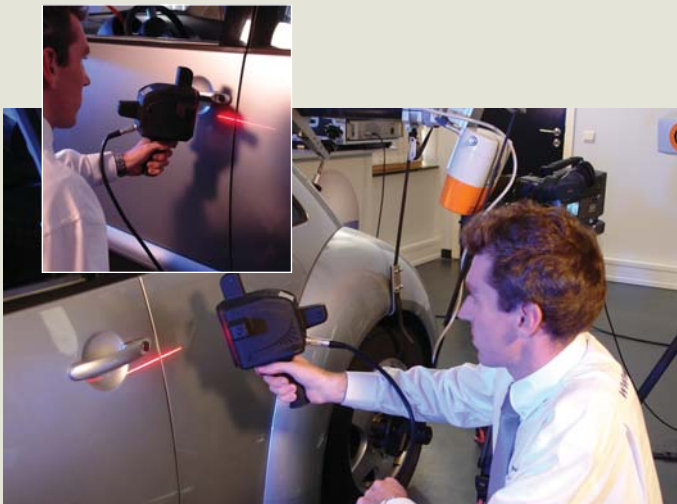
The K-Series Optical CMMs are the ideal tools for handheld CMM measurements. The flexible systems can be as well equipped with innovative 3D laser scanning probes for digitizing surfaces as with classical touch probes for point measurements.

K-SCAN MMZ

The K-Scan MMZ is a walk-around scanning solution combining the Metris ModelMaker Z laser scanner and the portable K-Series Optical CMM. The K-Scan is ideally suited for on-site 3D digitizing tasks where minimal set-up time and fast results are key requirements. The robust, light-weight probe features two different stripe widths (75 and 145mm). The large working range from 1,6 to 6m, enables measurements on full cars. The resulting point clouds, acquired at a rate of about 23.000 points per second, are further analyzed in the Metris Focus Inspection or Reverse Engineering software.

SPACEPROBE

The SpaceProbe has 9 tracking LEDs to make **highly accurate position measurements**. The probe allows traditional touch trigger measurements or scanning measurements. The automatic tip detection enables a large variety of extensions, ball and point probes.



KEY FEATURES

K-SCAN MMZ

- Portable scanner
 - Minimal set-up time
 - On-site scanning
- Optical tracking of K-Scan
 - Effortless measurements
 - Walk-around scanning without mechanical constraints
- Non-contact scanning
 - Full digital copy of parts
 - Suitable for flexible or fragile parts
 - No need for gauge fixtures



SPACEPROBE

- Robust, lightweight design
- Ergonomic position of trigger buttons to control measurements
- Sound and LED measurement feedback
- Wireless kit available
- Multiple probe tip extensions for e.g. cavity measurement

SPECIFICATIONS

	K-Scan MMZ70	K-Scan MMZ140
Max. stripe length	75mm	145mm
Single point accuracy ¹	50 µm	60 µm
Typical length accuracy K610 ²	±70 + 25.L µm	
Scanning speed	30 stripes/s (23040 pts/s)	
Laser class	2M	

¹ 1σ typical scanning error on individual radius values when scanning a reference sphere.

² ± 2σ on length deviation between center points of two scanned spheres in range 3.5-5m from camera (L in meters).

Bringing motion in metrology



MOTION ANALYSIS

DISPLACEMENT MEASUREMENTS

Validating simulation models in the real world with physical parts is a critical analysis in automotive, aerospace, naval and civil engineering. For these applications, Metris provides solutions for non-contact industrial motion and displacement measurements based on the K-Series Optical CMM. The combination of high-speed optical sensors and modular designed DMM software applications suit every single motion analysis task in the different industrial engineering fields.

BREAKTHROUGH ADVANTAGES OVER MECHANICAL SENSORS

In the past, cable transducers, LVDTs and encoder based mechanical sensors were used to measure displacement in multiple degrees of freedom. The Metris Optical CMM eliminate the cumbersome set-up work as LEDs are mounted and calibrated in minutes, not hours. Moreover, they can measure **high frequency macro motions** much more accurately by adding only a few grams of instrumentation mass to the test piece.

LABORATORY TESTING

Automotive and aerospace engineers use K-Series Optical CMMs to measure position and deformation of suspensions, engines, exhausts, convertible roof systems, landing gears etc.

ROAD TESTING

The **WheelTracker** is the on-board version of the K-Series Optical CMM. Mounted with a carbon-fibre structure on the car body, the non-contact measurement system tracks the 6 degrees of freedom motion of wheels. Fully weatherproof, it measures wheel motions up to 200Hz with an accuracy going up to 0,08mm, anywhere a car could go.

ENGINE MEASUREMENTS

The **EngineTracker** is based on the same technology, but specifically designed to measure the motion of the engine while driving. Up to 4 WheelTrackers and 1 EngineTracker can be connected to 1 compact, lightweight controller unit.

KEY FEATURES

MOTION ANALYSIS

- Easy and fast transducer setup
- Limited instrumentation mass
- Measurement range from 0 to 1000Hz
- Measure up to 256 3D or 85 full motion objects
- Automation ready for measurements and processing

WHEELTRACKER / ENGINETRACKER

- Non-contact optical measurements
- Synchronized measurement of 4 wheels and 1 engine
- High resolution (0,05mm) and accuracy (0,08mm)
- Short set-up time (< 1 hour per wheel)
- Data output: digital (TCP/IP) or analog

Introducing absolute accuracy

ROBOT METROLOGY

THE DIGITAL FACTORY

Industrial simulation predicts in detail the production processes and methods, that will be used in the real world. The gap between simulation and real life is closed with measurement and calibration systems. Robotic devices typically have inaccuracies up to 10mm, where product quality demands specifications lower than 1mm. Metris provides a complete product line to close this gap, enabling massive cost reductions in re-using simulation data.

ROBOT CALIBRATION

K-Series systems in combination with **ROCAL robot calibration software** are a world reference in the automotive and aerospace industry. After the measurement of 25 to 60 robot positions, ROCAL software generates a robot signature containing all identified kinematic and flexibility parameters. Fully calibrated and under full payload, industrial robots will achieve **absolute accuracies up to 0,4mm** in their entire working volume. This way offline generated programs can be downloaded and immediately used. This saves real costs and time for re-teaching robot programs onsite.

ROBOT TESTING

Today, robots need to perform in standard applications such as spot-welding, gluing, laser cutting, painting etc. The **Roboscope software**, the oscilloscope for robots, helps you to optimize your applications, achieving important cost savings. Path and position accuracy, robot speed, compliance and mechanical play are important elements to optimize robot tasks. K-Series measurement systems with Roboscope software can identify all these parameters and predict process quality, saving tremendous test and iteration costs.

ADAPTIVE CLOSED LOOP CONTROL

The K-Series can also be used to track a robot tool position and send this data in real-time back to the controller. With this information, the robot position errors due to external forces or influences can accurately be adjusted.

ROBOTIC SCANNING

K-Robot integrates the Metris Laser scanner on a robot. The K-Robot is tracked by the K-Series Optical CMM enabling in-line inspection and troubleshooting.



SPECIFICATIONS

- Contactless 6 DOF measurements (position & orientation)
- Wireless solution available
- Integration possible on most robot types
- Proven technology used by most robot manufacturers

APPLICATIONS

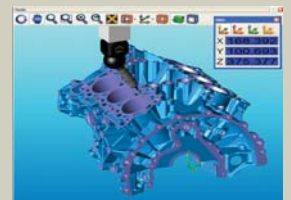
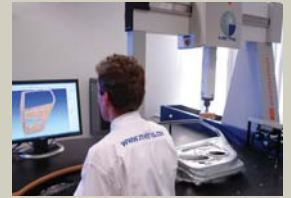
- Robot calibration to obtain absolute accurate robots
- Cell alignment
- Static and dynamic analysis of robot performance
- Matching offline programming onto the physical robot cell
- Relative motion measurement between robot and moving object



THE METRIS COMPANY

Metris designs, develops and markets a unique range of 3D hardware and software inspection systems for the automotive and aerospace sectors. The company offers world-class metrology solutions for both design and manufacturing communities. The comprehensive product family covers the full range of measurement volumes required by customers, in both fixed and portable configurations and with optical and touch sensors.

Metris provide best in class precision equipment and metrology solutions for classical CMM measurements featuring **Metris LK bridge and horizontal arm CMMs**. Metris is the market leader for CMM based laser inspection, with the **Metris LC and XC laser scanners** offering full surface and feature measurement. **Metris Optical CMMs** are portable, handheld coordinate measuring machines, with a proven track record in engineering, pre-production and quality control applications. The Optical CMMs can also be used in motion analysis and robot calibration applications. **Metris ModelMaker 3D scanners** are the best-in-class articulated arm scanners for inspection and reverse engineering. The **Metris Laser Radar** is the top solution available to the manufacturing industry that provides a fully automated, non-contact measurement and inspection capability for large-volume applications of up to 60 meters. The **Metris iGPS** is a modular, large volume tracking system enabling factory-wide localization of multiple objects with metrology accuracy, applicable in manufacturing and assembly. Metris completes its product portfolio with a full range of complementary software solutions for **inspection** and **reverse engineering** applications. The Metris Headquarters are based in Leuven (Belgium) with additional production and development centers in UK (Derby, London), USA (California, Detroit, Virginia), China, Russia and Bulgaria. Metris provides a worldwide network of sales and support offices located in Europe, Asia and the United States.



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