



iSpace - Turn your shopfloor into a metrology enabled workspace



Metrology, tracking and positioning for large volume applications

iSpace drives Metrology Assisted Production

iSpace is a modular large volume metrology concept that covers a wide range of metrology tasks and manufacturing uses. iSpace assists customers in deploying a metrology-driven manufacturing capability.

As the backbone of a Metrology Assisted Production environment, iSpace acquires accurate geometry data that are used to consistently increase the precision and speed of manufacturing operations.

SCALABLE SYSTEMS FOR LARGE VOLUME METROLOGY

iSpace systems can be scaled from small work cells to facility-wide installations by just adding more transmitters. The measurement volume is configured to the size of the application, resulting in 360° part coverage.

UNIFORM ACCURACY FOR INDUSTRIAL LARGE SCALE APPLICATIONS

The typical accuracy of an iSpace system is 200µm. Where traditional metrology equipment accuracy decreases with distance and as a result of leapfrogging-related measurement errors, iSpace accuracy is uniform throughout the entire measurement volume, regardless of the size of the metrology enabled area.

INHERENT ROBUSTNESS

Unlike traditional laser-based metrology tools, iSpace offers 360° part coverage without line-of-sight issues thanks to transmitter redundancy. Continuous health monitoring including on-line compensation in case of transmitter displacement and drift, guarantees optimum system performance without user intervention.

EASY TO DEPLOY AND STRAIGHTFORWARD TO USE

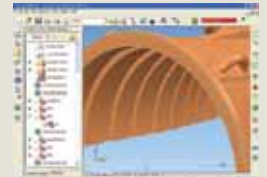
Installing iSpace on the shop floor is easy and straightforward: just set up the transmitters on their portable tripods and calibrate the system by walking around in the measurement volume while holding a calibrated scale bar. As such, shopfloor measurement eliminates the need to transport large heavy parts to/from the measurement room.

MULTI-USER FOR CONCURRENT APPLICATIONS

iSpace has the unique ability to serve multiple users simultaneously without performance loss. Once a work cell is iSpace-enabled, additional users and new applications can be added with minimum additional investment. Next to supporting a range of handheld metrology devices, iSpace positions tools or tracks multiple objects simultaneously, such as automated guided vehicles (AGVs) in a manufacturing environment.

OPEN SOLUTION THAT GROWS ALONG WITH YOUR MEASUREMENT NEEDS

As a modular and scalable solution, iSpace offers a broad application reach. Using off-the-shelf iSpace components, tailor-made tooling and the software development kit (SDK), all elements are present to build a custom solution that perfectly meets your needs.



Metrology applications

Ideally, large parts or components are verified on the shop floor where they are produced. Measuring large heavy parts using traditional metrology tools may require transportation overhead to bring the parts to the measurement equipment. iSpace overcomes these challenges by converting your workspace into a metrology enabled facility where users can easily measure multiple parts.

Aircraft fuselage inspection

- Measure individual points on a fuselage using iMCA
- iMCA allows for easy measurement of hidden points in the workspace



Full car body inspection

- Operators use iProbe to measure multiple car bodies without leap-frogging
- Ideal for concurrent measurement of jigs/tooling



Measurement of features on large turbine casting

- iProbe is used to measure surface features across the entire casting
- Full freedom measurement through wireless connection between PDA and portable client



Expandable measurement volume ...

TRANSMITTER ASSEMBLY WITH INTEGRATED DETECTOR UNITS



TAILORED CONFIGURATIONS FOR EACH APPLICATION

The iSpace portfolio consists of 3 standard setups, with 4, 6 or 8 transmitters. More transmitters create a larger measurement volume and further improve line of sight. The **4-series** iSpace setup is easy to deploy, providing a smaller and unobstructed measurement volume. The **6-series** setup is typically used where left/right measurements are taken on a vehicle body, for example, while the **8-series** preserves the best line of sight in a measurement volume with a footprint up to 1200 m².

Each iSpace setup is available in different configurations: the **x-series** configuration is a portable lightweight system that is easy to set up. The **s-series** are delivered with **base stations**, that provide reference detectors for continuous health monitoring.

The top-line **i-series** inherently provide highest accuracy and system robustness. They utilize fixed **iSpace monuments** to capture position and scale reference points throughout the workspace. After having determined the positions of the reference points during system setup using an external measurement device, iSpace continuously monitors these monuments to be able to maintain transmitter positions at highest accuracy.

Tracking applications

iSpace offers dynamic tracking in support of precision assembly of large parts and continuous monitoring of tools and objects. As such, closed-loop iSpace measurements are directly integrated into the production and assembly stages, realizing a first-time-right Metrology Assisted Production process.

Dynamic tracking of ship models in towing tank applications

- Ship models are equipped with iSpace receivers
- iSpace dynamic measuring to monitor real-time ship behavior



Tracking and monitoring of industrial robots

- Sensors are embedded into robot and fixtures
- Single setup to monitor robots on a factory-wide scale



Aligning and joining large subassemblies

- Fuselage sections, wings and body components are equipped with iSpace sensor to track position
- Monitoring of drilling and riveting robotic machining systems



... with countless applications

iPROBE - LIGHTWEIGHT 6 DOF METROLOGY PROBE

The iProbe is a wireless handheld measurement device that provides exchangeable and inclinable 6DOF measurements within an iSpace or iGPS enabled workspace. Equipped with a stylus probe tip, the iProbe allows for accurate large volume inspection in the most flexible way. The iProbe can also be configured as a 6DOF localizer for 3rd party instruments. Accuracies are dependent on the iSpace setup, but are equal throughout the complete measurement volume. Its ergonomic design and wireless operation make iProbe suitable for long duration measurement.

iMCA - iSPACE ENABLED ARTICULATED ARM

The moveable iMCA tripod stand is designed to support a metrology grade MCA articulated measuring arm to operate anywhere within the iSpace enabled workspace. The iSpace determined position and orientation of the iMCA stand is combined with the coordinate information received from the MCA arm in order to measure a single point in the iSpace coordinate system. This 'extends' the working volume of the articulated arm and provides a large, continuous working cell without having to 'leapfrog' measurements.

DYNAMIC TRACKING KIT

The Dynamic Tracking Kit (DTK) is an add-on to any iSpace system to support dynamic referencing and 6DOF part tracking. The DTK can be semi-permanently fixed to a part or jig and used for 6DOF tracking or dynamic referencing within an iSpace volume. The DTK can be configured to track a part's local coordinate system by following a straightforward alignment procedure.

STANDALONE OR METROLOGY SERVER BASED

In a single application, data processing and system monitoring is handled by a portable, combined client/server workstation that runs the Surveyor control software and a (3rd party) application. In case of concurrent applications, the data streams and system monitoring are controlled by a metrology server that manages the connectivity between the measurement systems and multiple portable client applications.



Positioning applications

Acquiring real-time positioning information is essential in a wide range of large volume applications. iSpace can determine the exact position of large objects or parts, but can also measure the exact location of tools to suit 3rd party applications, such as coating thickness measurement, drill marking, robot-guided painting, etc.

Positioning of subassemblies to align for final ship assembly

- Robust operation guaranteed for outdoor application
- Components are equipped with iSpace receivers to support computer-guided assembly



Applying marker positions for final machining purposes

- iProbe is equipped with a miniature drill to mark positions
- Operator is guided to correct position to create a mark



Coating thickness measurement in aerospace applications

- iProbe is equipped with a coating thickness tool
- Exact position recording of coating measurement



Full freedom operation in large volumes

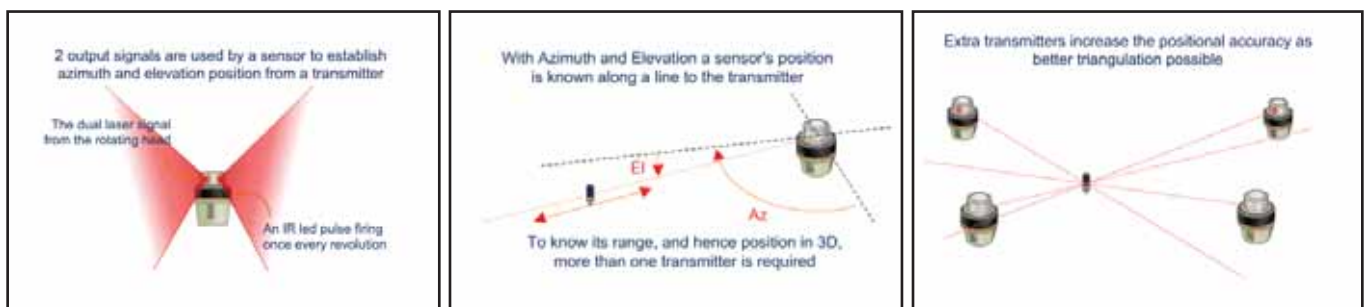


iGPS TECHNOLOGY PROVIDES THE BUILDING BLOCKS FOR THE iSPACE SYSTEM

iGPS is a scalable measurement concept that converts a workspace into a metrology enabled work volume. The operation of an iGPS system is comparable to a global positioning system (GPS) in a car, but it is designed for industrial applications on a facility-wide scale. GPS satellites are replaced by infrared iGPS laser transmitters that activate a measurement field as large as an entire room or facility.

iGPS features accuracies that are roughly a hundred thousand times higher than consumer GPS systems. Tools, parts, probes and equipment, such as AGVs, can be equipped with iGPS receivers that are tracked by the transmitters. As such, positions can be measured or dynamically tracked with a high degree of confidence in order to provide accurate metrology data or to facilitate tracking and positioning applications.

To obtain accurate positioning, receivers need line of sight from minimum 2 transmitter fields. Adding more transmitters enlarges the measurement area, improves robustness by guaranteeing line of sight, and further increases measurement accuracy. iGPS is a flexible metrology solution that offers full freedom operation for indoor and outdoor use. The iSpace systems are standardized configurations built with iGPS components focusing on ease of installation and use.



iSpace delivers significant value to the customer, right from the start!

Configurations and specifications

ISPACE SETUPS

	4 series	6 series	8 series
Transmitter count	4	6	8
Available configurations	x, s	x, s, i	x, s, i
Typical footprint of measurement volume	from 10x10m up to 40x40m		
Typical use case	<ul style="list-style-type: none"> • Smaller volume • Unobstructed line of sight • Lower accuracy 	<ul style="list-style-type: none"> • General purpose • Standard system size • Moderate line of sight obstructions 	<ul style="list-style-type: none"> • Larger volumes • Obstructed line of sight • Maximum accuracy

ISPACE CONFIGURATIONS

	x	s	i
Hardware configuration	Free network of transmitters	Transmitters plus base stations	Transmitters plus monuments
Calibration method	Traceable scale-bar	Traceable scale-bar	Traceable reference network
Accuracy ^{1,2}	<250 µm over 3x scale-bar length ³	<250 µm over 3x scale-bar length	<200 µm uniformly over monument volume
Typical use case	<ul style="list-style-type: none"> • Portable/Deployable setup • Short term measurement and tracking • Engineering or R&D focused • Less health monitoring 	<ul style="list-style-type: none"> • Semi-portable or semi-fixed installations • Longer term measurement and tracking • Production focused • High level of health monitoring 	<ul style="list-style-type: none"> • Fixed installation • Always-on production system • Maximum system robustness, accuracy and reliability

¹ For optimum performance, it is recommended to keep the distance between sensors and transmitters between 3 and 35m and guarantee individual sensors to be within line of sight of at least 4 transmitters.

² System performance testing according to B89 and ISO10360 in conjunction with an independent accredited measurement standards lab. iSpace is a network based metrology system which does not follow traditional uncertainty models. Coordinate uncertainties are interdependent, do not scale with range and are repeatable within the volume.

³ Requires stable transmitter positions and environmental conditions

ISPACE TOOLS AND OPTIONS

	Available series	Description
Metrology server	6, 8	Allows multiple independent clients to be used in the same iSpace network leveraging scalability
Dynamic Tracking Kit	4, 6, 8	Kit of 4 vector bar sensors allowing 6 DOF tracking of an object in the iSpace volume
Handheld vector bar (5DOF)	4, 6, 8	2 sensor vector tool providing handheld inspection capability
iProbe (6DOF)	4, 6, 8	4 sensor 6 DOF tool providing handheld inspection capability with customizable probe tips
iMCA	6, 8	Support base for Metris CMM arm that utilizes the iSpace system for automatic alignment

RELATED PRODUCTS

- Hardware
 - iGPS
 - Laser radar
 - MCA Metris articulated arms
- Supported software
 - Metris Surveyor, CMM-Manager
 - NRK Spatial Analyzer
 - Delcam PowerInspect
 - Verisurf
 - Maerklen Tango!3D
 - Software development kit (SDK) for 3rd party integrations

ENVIRONMENTAL REQUIREMENTS

Operating temperature (standard performance)	10°C to 30°C (50°F to 86°F)
Storage temperature	-20°C to 50°C (-4°F to 122°F)
Relative humidity	10% to 75% (non-condensing)

Metris HQ
Geldenaaksebaan 329
B-3001 Leuven
Belgium
tel. +32 16 74 01 00
fax +32 16 74 01 03
info@metris.com

Metris Germany
tel. +49 6023 91733-0
sales_germany@metris.com

Metris USA
tel. +1 810 2204360
sales_us@metris.com

Metris Japan
tel. +81 52 709 3877
sales_japan@metris.com

Metris France
tel. +33 1 60 86 09 76
sales_france@metris.com

Metris UK Ltd.
tel. +44 1332 811349
sales_uk@metris.com

Metris Korea
tel. +82 31 399 5951
sales_korea@metris.com

Metris Belgium
tel. +32 16 74 01 00
sales_belgium@metris.com

Metris China
tel. +86 21 6448 1061
sales_asia@metris.com

Metris India
tel. +91 11 2275 32 44
sales_india@metris.com

More Metris offices
and resellers at

www.metris.com