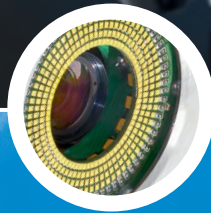
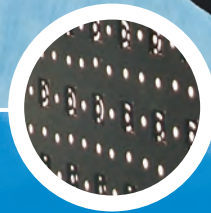


MoveInspect HF | HR

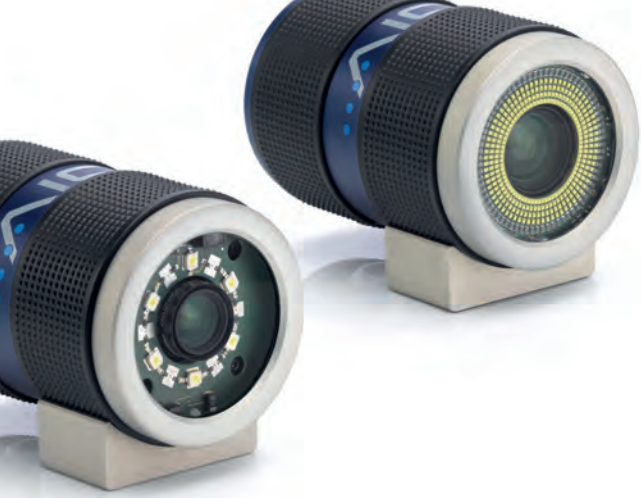
3D measurement of dynamic processes



MEASURE THE ADVANTAGE



AICON
3d.systems



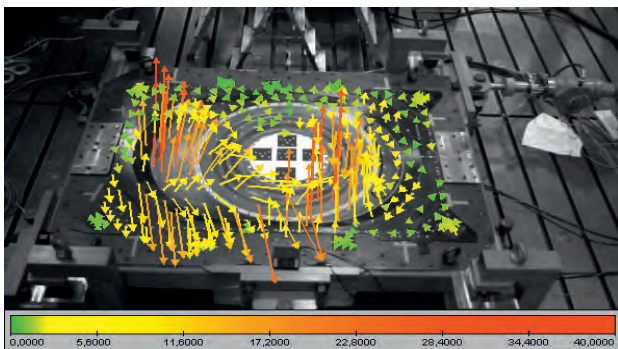
MoveInspect HF | HR

3D measurement of dynamic processes

Areas of application

In order to sustain its own competitive capability, every company has to meet the challenge to develop products within shorter periods, and manufacture them at lower costs. In so doing, the inspection of parts with respect to their motion and deformation behavior plays a decisive role.

In which situation is the object deformed unintentionally during production operations? How does an element behave under load? How stable is the material? When does it fracture? AICON's optical measuring system MoveInspect is applied to detect these geometric changes three-dimensionally and to find precise answers to each question with the help of the measured data.



Component testing

It is available in two versions using different digital cameras: MoveInspect HF (high frequency) and MoveInspect HR (high resolution). That means, the applied digital cameras vary in acquisition frequency and resolution according to the measuring task.

MEASURE THE A

The high-end version is able to conduct tests without a time limit at a frequency of 1,000 Hz. Both versions, however, allow for the analysis of any number of measuring points as determined by the operator. This is a true breakthrough in optical metrology.

The following are typical applications for MoveInspect:

3D motion and position analysis

- Door slam testing
- Analysis of the closure processes of hoods (e.g. trunks), convertible tops and windows
- Testing of body component vibrations
- Control of industrial robots
- Monitoring of machines and components

3D deformation analysis

- Defect analysis in the production line (e.g. during welding)
- Behavior of components in wind tunnel and climate chamber
- Analysis of collision damage
- Material testing, structure analysis

6D positioning

- positioning and adjustment of single-spot and rigid bodies





D V A N T A G E

Extendable with a probe

MoveInspect HF and HR are part of AICON's MoveInspect Technology, which is a high performance modular system concept that brings together a wide range of measuring technologies. This gives you a true advantage: For new measuring tasks, you can simply extend your current system with additional components and software modules from MoveInspect Technology. For example, you can easily upgrade your MoveInspect HR system with the hand-held MI.Probe. Thus you are able to conduct probing tasks, too, without acquiring a completely new system.

Functional principle

Tests with MoveInspect take only a fraction of the time and effort that traditional sensors such as linear position sensors need in laboratory tests.

Adhesive targets are placed at all points which are to be measured. As these targets are very inexpensive consumable supplies, MoveInspect is also the ideal system for destructive testing. Then MoveInspect is oriented in a way that all measuring points are located in the field of view of the cameras. After a short calibration (duration: approx. 2 minutes), the system is ready for operation. The collected data of the coordinates are automatically transferred to the connected measuring software. Different modes are available to analyze the measurement: offline (i.e. later), online, or during the measurement in real time.

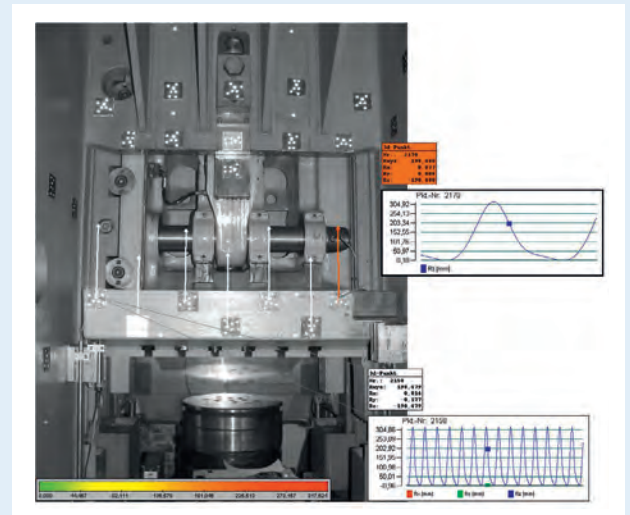
For each point in time, the MoveInspect software determines, e.g. the 3D coordinates of object points, the 6-DOF coordinates of solid bodies, and the speed of the points and solid bodies. The calculation is based on the principle of spatial image triangulation (photogrammetry) and is fully automated.



Practical example: Defect analysis in production process

Production defects can be detected and corrected right on site because MoveInspect may directly be integrated into running production. Although fixtures and production machines are periodically inspected with regard to their dimensional accuracies, problems arise in production nearly every day. For example, it may happen that a robot-based welding shop would suddenly deliver parts that are inaccurate and not true to gauge. Therefore, production machines, fixtures, and materials are checked step by step in order to find the cause of the deviations as quickly as possible.

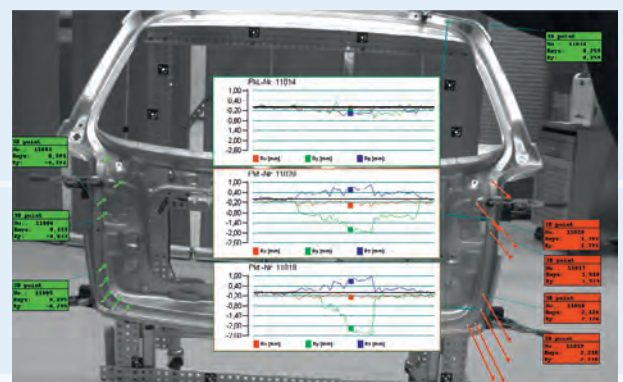
Yet causal research is very laborious without optical metrology. MoveInspect is able to significantly support this research. The measurement system is set up in running production. It continuously keeps track of each production step and observes both the machines and the part. Consequently it is possible to reveal quickly where in the production process the mistake has occurred.



Inspection of machine behavior

Your advantages at a glance:

- Identification of the 3D position and speed of a variable number of measuring points for an unlimited time period
- Performance of long-term tests at frequencies up to 1,000 Hz
- Significantly reduced setup work in comparison to traditional sensors such as linear position sensors
- Direct link to central data acquisition system
- 3D deformation analysis also possible in destructive testing thanks to inexpensive target accessories
- Clear visualization of results including shifting vectors, way-path-diagrams and video sequences
- Further fields of application by upgrading the system



3D and 6D motion analysis



Part inspection

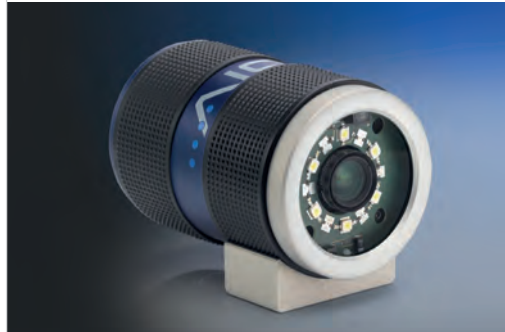


User interface

Specifications

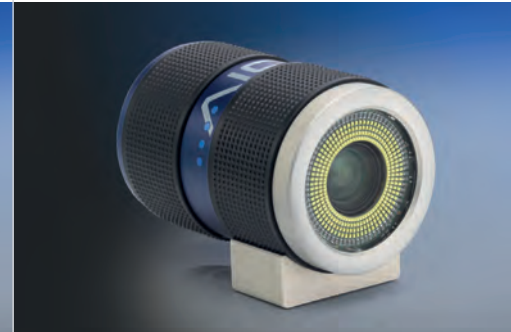
MoveInspect HR

Measurements up to 30 Hz



MoveInspect HF

Measurements up to 1,000 Hz



Hardware	MoveInspect HR camera	MoveInspect HF camera
Sensor	MoveInspect HR camera	MoveInspect HF camera
Resolution up to	5.0 megapixels (depends on configuration)	1.3 megapixels
Number of cameras	adaptable to the measuring task 1, 2 or more cameras on tripods or 3 cameras on a camera bar	2 cameras on a camera bar
Distance of cameras	variable	variable
Body	camera body suits industrial needs (IP 65)	camera body suits industrial needs (IP 65)
Flash	LED ringlight	LED ringlight
Acquisition frequency	up to 30 Hz (depends on configuration)	up to 1000 Hz
Size (for setup with camera bar)	1,000 mm x 100 mm x 100 mm	1,000 mm x 100 mm x 100 mm
Weight (measurement system)	approx. 8.5 kg	approx. 7.0 kg
Control unit	syncbox for 1-4 cameras (cascadable), ext. synchronization, power supply 90-240 V, Lemo connector	syncbox for 1-4 cameras (cascadable), ext. synchronization, power supply 12 V or 90/240 V, Lemo connector
Data transfer	TCP/IP	TCP/IP
Processing computer	high-end laptop computer, industrial pc possible	high-end laptop computer
Operating system	Microsoft® Windows® 7 (64 Bit)	Microsoft® Windows® 7 (64 Bit)
Accessories	MI.Probe + equipment, camera bar, tripods, quick releases, high end laptop computer, calibration tool, reference cross, one set of coded targets (150 pcs), thereof 75 on magnetic mount, 5,000 targets black-and-white (Ø10 mm), transportation box, tripod bag	camera bar with tripod and quick release, high end laptop computer, calibration tool, reference cross, one set of coded targets (ANCO-code), 5,000 retro reflecting targets (Ø10 mm), transportation bag, tripod bag
Software	MoveInspect Software	MoveInspect Software
Interfaces	interface to all established data acquisition systems (e.g. DIAdem, MatLab)	interface to all established data acquisition systems (e.g. DIAdem, MatLab)
Measuring Modes	Offline, Online, Realtime	Offline, Online, Realtime
Typical accuracy for 1 m ³	up to 0.02 mm (depends on configuration)	up to 0.1 mm

Technical data are subject to change without notice.





MoveInspect HF | HR

3D measurement of dynamic processes

MoveInspect HF | HR – systems of AICON's MoveInspect Technology

MoveInspect Technology brings together a wide range of optical measuring technologies into one high-performance modular system. That means that you can combine the individual components such as sensor, probe and computer with the appropriate software.

Thus MoveInspect Technology is a powerful and versatile CMM for probing, tracking and targeting. And as all components are portable, you can always measure right on-site.

A unique investment – in every respect.

MEASURE THE ADVANTAGE



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MoveInspect Probing

Portable CMM and hand-held probe MI.Probe



MEASURE THE ADVANTAGE



probe handle connection with bayonet-lock



Specifications MI.Probe	
Probe	
Design	torsion free carbon fiber bar with protective housing
Dimensions	length 400 mm or 900 mm; diameter 20 mm
Tracking	optical retroreflective markers (6 or 9 pieces)
Stylus	connection with crew coupling; different lengths, types and directions of probe tips
Weight	250 g, 330 g
Operating Unit (handle)	
Design	handle with control electronics and bayonet-lock
Data transfer	bluetooth connection to operating PC
Power supply	rechargeable battery
Communication	3 status LEDs, 3 trigger buttons
Weight	400 g



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MoveInspect Probing

Configure the system according to your needs

The **MI.Probe** works with all MoveInspect HR Systems. According to the user's requirements with respect to object size and measuring accuracy, the system can be configured in the following versions:

MoveInspect HR Start

Beginner system with medium accuracy for the fast acquisition of 3D points with a freely positionable camera and the hand-held **MI.Probe**

typical accuracy for 1 m³: up to 0.20mm
(depends on configuration)

recommended object size: 1 m - 5 m



MoveInspect HR Large

Measuring system for the highly precise acquisition also of large objects with two or more freely positionable cameras and the hand-held **MI.Probe**

typical accuracy for 1 m³: up to 0.05 mm
(depends on configuration)

recommended object size: 0.5 m - 8 m



MoveInspect HR Precise

Measuring system with highest accuracy for the acquisition of 3D points with a camera bar and the hand-held **MI.Probe**

typical accuracy for 1 m³: up to 0.02 mm
(depends on configuration)

recommended object size: 0.5 m - 5 m



ChamberCam

Component testing in environmental chambers



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Revolutionary approach for measuring dynamic stability in environmental chambers.

It's a true dilemma: On the one hand, new components have to be tested under extreme climatic conditions in order to analyze their stability. On the other hand, no measuring device on the market would acquire data in real time inside the environmental chamber – until now! The answer to this problem is ChamberCam, an innovative technology developed by AICON and launched by the company DIS (Dynamic Intelligent Solutions) from Clinton Township, Michigan, USA

Challenge environmental chamber

The initiative for this project originally came from DIS. Searching for ways to offer more value to its customers, DIS had a vision to seek out a technology to measure components and systems while they were subjected to extreme climatic conditions. An innovative process such as this had not been automated before and would ultimately revolutionize the testing industry.

“Until now, manufacturers could only measure a product before and after it was exposed to a predetermined temperature and humidity profile, making it difficult to know exactly how much and when a part might change under various conditions,” confirms Larry Arnone, vice president of DIS. “Our company is a provider of measurement services, so we were regularly facing this problem. One day we came up with the idea of finding a partner who could procure us with the necessary technology to measure inside the environmental chamber during the test – and we fortunately found this partner in AICON.”



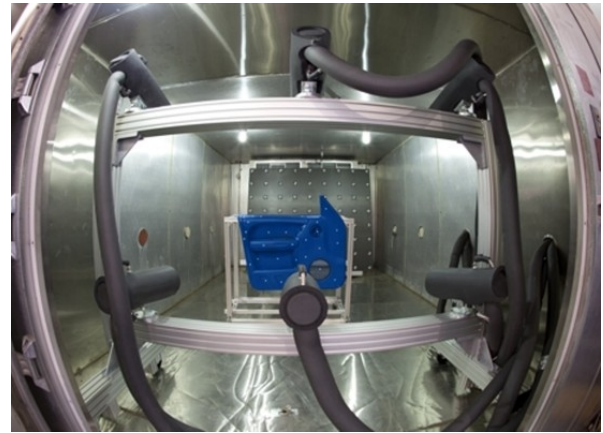
▶ Measurement in a climate chamber



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AICON's reply: MoveInspect Technology

ChamberCam is based on AICON's MoveInspect Technology. However, to endure the extreme temperatures that can occur in environmental chambers, AICON modified the system significantly: AICON's engineers developed a special housing for the cameras being resistant to temperatures from -50°C up to +150°C. Concurrently the team worked on the framing to mount the cameras on to, changes in the software, and on an environmental management system.

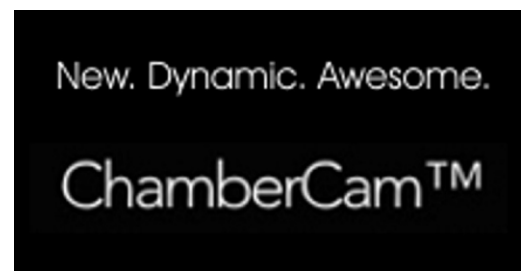
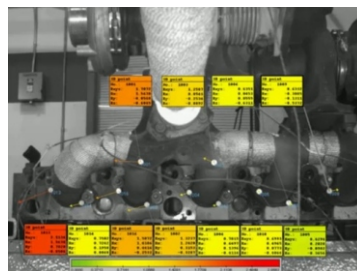


• AICON's cameras during the measuring operation

Precise measurement results under extraordinary conditions

The result is a precise measuring system, reducing development time and providing detailed data about the stability of a component. No matter how long the test lasts – from several minutes to several days – the user can clearly see at what point of time, and under which temperature, a structural damage occurs. Dimensional data are captured at hundreds of points on the part, up to 15 times per second. Of course, the operator gets a comprehensible measuring report, too. For DIS as a service provider this report function is very important as customers ask for a clear documentation of the test.

Since the measuring system is light-weight, it can easily be carried to another test facility, while the set-up merely takes a few minutes.



• Screenshots ChamberCam

Jim Arnone, president of DIS, summarizes the utility of ChamberCam with the following words: "Once visitors understand what dynamic data acquisition is, that they can capture points as they move, a light bulb turns on their heads."

One technology – any measurement

MoveInspect Technology brings together a wide range of optical measuring technologies into one high-performance modular system. That means that you can combine the individual components such as sensor, probe and computer with the appropriate software.

Thus MoveInspect Technology is a powerful and versatile CMM for probing, tracking and targeting. And as all components are portable, you can always measure right on-site.

A unique investment – in every respect.

MoveInspect Technology



DPA Mobile



Highly precise and easily portable measuring system with hand-held digital camera for 3D measurement of signalized points

- deformation analysis
- tolerance analysis
- fixture measurement
- CAD comparison
- measurement of large objects

MoveInspect HR Start



Beginner system with medium accuracy for the fast acquisition of 3D points with a freely positionable camera and hand-held MI.Probe

- fast alignment
- easy positioning tasks
- tolerance check and nominal / actual value comparison with medium accuracy requirements
- fast digitizing

MoveInspect HR Large



Measuring system for the highly precise acquisition also of large objects with two or more freely positionable cameras and hand-held MI.Probe

- precise alignment
- exact positioning
- measurement of GD&T features
- CAD comparison
- accurate digitizing especially of large objects

MoveInspect HR Precise



Measuring system with highest accuracy for the acquisition of 3D points with a camera bar and either hand-held MI.Probe or measuring targets

- fast measurement of GD&T features
- deformation analysis
- acquisition of dynamic processes
- highly precise digitizing of medium-sized objects

MoveInspect HF Fast



Measuring system for the acquisition of fast movements of signalized objects with two high-speed cameras on a camera bar

- acquisition of fast dynamic movements
- deformation analysis
- vibration analysis
- control of fast processes
- time-path analysis

WheelWatch/EngineWatch



Measuring system for the acquisition of 6D wheel and engine movements on a moving vehicle or in a test station with one high-speed camera per wheel or engine

- accurate measurement of all wheel parameters including track, camber inclination, spring travel, steering angle and wheel clearance
- 6D measurement of engine movements

MoveInspect DPS/ProCam



MoveInspect DPS for online 3D dummy positioning according to international regulations with mobile measuring head and hand-held probe

ProCam for pre- and post-crash measurement of crash vehicles with mobile probe to detect interior and exterior deformations

