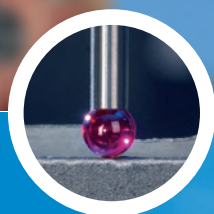


# MoveInspect DPS | ProCam

Optical 3D metrology for vehicle safety testing



MEASURE THE ADVANTAGE



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## Importance of passenger protection increases

In new car development, crash and sled tests are conducted in order to minimize the passengers' risk of injury. Both complete vehicles and single components such as airbags or belt systems are analyzed. In order to receive necessary approvals, car manufacturers have to respect a multitude of standards and regulations.

An indispensable tool to reduce the time required for measurement and analysis consists in a convenient system. AICON, specialized in 3D measurement for a long time, has tailored a sophisticated combination speeding up the entire procedure: MoveInspect DPS to position the dummies and ProCam Crash to evaluate the measuring points before and after the crash test.

## Easy adaptation to each individual task

The large scope of application does not affect the ability of these systems to match perfectly particular circumstances. Both modules are based on the MoveInspect Technology platform, which incorporates several portable coordinate measuring instruments at the same time.

Some additional components are enough to prepare the set to a completely new task. MoveInspect DPS may be used for dummy positioning or for universal measurement task, as required. Dynamic applications can be solved as well: Inside the MoveInspect Technology family, high - frequency cameras are available, quickly to be integrated into the intended configuration.

Variations in the task or the extension to another application therefore do not entail any problems. In such a case, it will not be necessary to purchase a completely new system: All of the possible modules can be obtained from one single source, accurately designed for serving the common purpose.

M E A S U R E T H E

## MoveInspect DPS

Online 3D dummy positioning in vehicle safety testing

### The right position is essential

When performing a crash test, it is essential that the dummy is positioned and seated in the vehicle precisely according to the standards and regulations the test is based on.

### How MoveInspect DPS works

The MoveInspect DPS system comprises a rotating camera bar with three high resolution digital cameras with infrared ringflash, a notebook for system control, a wireless probe, accessories to target the points on the dummy, and the software module DPS in AICON 3D Studio.

### Mobile applications

The camera bar comes complete with a stand on wheels, allowing for mobile set-up of the entire system. The system is immediately ready for operation and the location of DPS can be changed quickly. No setup time accrues. The active infrared ringlight allows for reliable measuring independent of any surrounding light. Sensor and probe are not mechanically connected, so that the user can move freely any time.





## A D V A N T A G E

### Easy dummy positioning: software module DPS

The software module DPS has been specially developed for the purpose of dummy positioning. Combined with the DPS system, it serves as optical 3D positioning equipment that controls the 3D position of the dummy relative to the vehicle during the positioning process. By means of measuring points or adapters, the current dummy position is recorded in real time, and compared to nominal data. The differences between the target positions and reference positions are displayed graphically or numerically.



Another feature offered is the measurement of additional coordinates of single points, lengths or angles with the probe according to a predefined measuring plan. The results are shown in a measurement report. Further individual processing via an XML export is available

### Application for both sled and crash barrier facility

AICON's MoveInspect DPS is the only system for dummy positioning that is able to simultaneously record multiple measuring points in vehicle 3D coordinates. Using the wireless probe, DPS combines the qualities of a 3D positioning system with those of a mobile CMM.

Within a few minutes, the user can execute all of the steps required for positioning, including preparation and additional measurements. The portability of the system makes it applicable for dummy positioning both in vehicles for crash barrier and on bucks for sled tests. The high positioning accuracy guarantees reproducible, user independent results and facilitates the comparison to simulation data.



With all points on the dummy measured and displayed simultaneously in vehicle coordinates, the operator can quickly put the dummy into its target position. The integrated dynamic referencing proves to be a very helpful tool, since it will be sufficient to record the referencing with respect to the vehicle coordinates only one single time, at the beginning of the procedure. Afterwards the user is free walk around the vehicle as desired, or to select a different position for the dummy. Even when the vehicle is moving, the MoveInspect is always aware it's the current position in the vehicle coordinate system.

# ProCam

Fast and easy crash vehicle measurement

## How ProCam works

The mobile probe ProCam consists of an active probe with a high resolution CCD camera, a portable PC for system control and the software module ProCam Crash that is used as a plug-in to the AICON 3D Studio measuring software. The probe is equipped with a measuring tip to touch object points. During the measurement, the camera is held facing a field of control points that is located nearby, either on portable or on fixed panels.

## Easy to use: active probe

The lightweight, hand held probe is ergonomically designed. Measurements are triggered easily by pushing the button on the handle. The reference targets are then illuminated by the integrated infrared ring flash, and the system calculates, displays, and records the coordinates of the probe tip. ProCam operates independently of surrounding light.



Application in a pre-calibrated room

## To reach the most difficult points: interchangeable probe tips

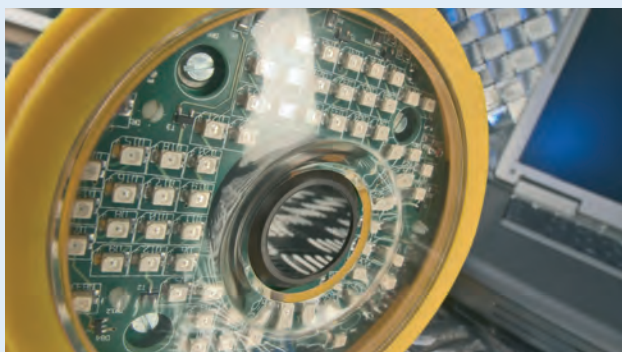
Extension probe tips are exchangeable and available in various shapes and lengths allowing the measurement of any point with ProCam, e.g. points behind obstructions, under seats or behind the instrument panel. No calibration is required after an exchange.

## Flexible, precise – and fast at the same time

The ProCam system is mainly used in a pre-calibrated room or bay. However, when target panels are used, it also permits mobile application. For the stationary operation of ProCam, reference targets are fixed to walls and/or ceiling, and the coordinates of the reference points are measured with high precision. This reference volume may be any size; therefore the system even measures very large vehicles.

As the measuring system is portable, the same probe can be operated in several measuring rooms. Consequently, the vehicle can remain in the same room for further instrumentation. Thus the establishment of several measuring stations is possible without considerable extra costs.

The accuracy of ProCam is independent of the object size. It merely depends on the distance between probe and reference targets. When applied in a measuring room, ProCam is able to conduct the complete measurement of a vehicle with only one alignment to the vehicle coordinate system. Through this, a homogeneous accuracy of  $\pm 0.1 \text{ mm} + 0.1 \text{ mm/m}$  is achieved for the whole vehicle volume. In the process, the measurement of 180 points takes less than two hours. This is a huge saving of time when compared to conventional systems.



## Dedicated to crash tests: measuring software ProCam Crash

ProCam Crash is a software module that has been specially designed for the measurement of vehicle geometries before and after crash tests. It guides the user through the measurements in an intuitive way. The software can be learned easily and uses integrated functions to optimize the measuring procedure. The user is able to define the details of the measuring procedure before the measurement starts.

## Maintain order: structured measuring plans

First, the software calculates the alignment of the vehicle with an arbitrary number of points defined by diverse types of features (slot, circle, plane, etc.). An elaborate mechanical positioning of the vehicle, e.g. on a granite table with a damping system, is not necessary. The points to be measured are stored in a structured measuring plan in a tree-hierarchy. Thanks to overview pictures, the user immediately knows the position of a measuring point on the vehicle. The measured points are highlighted in the tree-hierarchy, which permits the user to follow the progress of the measurement.

During the post-crash measurement, the same points are touched a second time; they are recorded in the same coordinate system and directly compared to the results of the pre-crash measurement. The existing deformation between the points is determined automatically and can be documented and visualized with the help of user specific reports.

## Unbeatable efficiency

The hand held probe allows for easy and fast measurement all around the vehicle. Relocation of the measuring equipment does not require realignment. For this reason, ProCam is by far the most powerful system for vehicle crash measurement.



# Specifications

## MoveInspect DPS

## ProCam



System	MoveInspect DPS	ProCam Crash
Application	online dummy positioning in vehicle safety testing	pre- and post-measurement of crash vehicles
<b>Hardware</b>		
Camera	MoveInspect measuring head with 3 high resolution cameras	ProCam probe with high resolution CCD camera
Resolution	5.0 megapixels	2.0 megapixels
Lens	high performance lens, f=8.0 mm, minimal distortion	high performance lens, f=6.5 mm, minimal distortion
Data transmission	IEEE 1394	IEEE 1394
Flash	IR-LED ringflash	IR-LED ringflash
Controlling computer	notebook	notebook
Operating System	Microsoft® Windows® 7	Microsoft® Windows® 7
Accessories	active probe, calibration plates, exchangeable probe tips, dummy adapters, wheeled tripod	exchangeable probe tips, carbon fiber target panels
<b>Software</b>		
Driver software	MoveInspect	ProCam
Control software	AICON 3D Studio with DPS	AICON 3D Studio with ProCam Crash
Automatic on the job calibration	yes	yes
Generation of templates for measuring plans	yes	yes
Transformation into vehicle coordinate system	yes	yes
Automatic referencing	yes	no
Deformation analysis	yes	yes
Interface to external analysis software	yes	yes
Interface to external data bases	yes	yes
<b>System parameters</b>		
Length measuring accuracy	± 0.1 mm + 0.15 mm/m of distance to measuring head	± 0.1 mm + 0.1 mm/m of distance to reference
Measuring volume	up to 3 m x 3 m at max. 3.5m distance to measuring head	depends on reference area
Max. measurement frequency	5 Hz	5 Hz



## MoveInspect DPS | ProCam

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### MoveInspect DPS | ProCam – 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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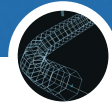
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**NEW**

# MoveInspect Technology for FMH tests

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## The optical measurement system MoveInspect HR from AICON 3D Systems is now applicable for Free Motion Head (FMH) Tests!

A new interface enables the use of the MoveInspect HR system for FMH tests. This unique interface between the measurement technology of AICON and the software FMH-Wizard from Concept Tech GmbH is particularly relevant for head impact determination under FMVSS201u.



► Camera bar of AICON 3D Systems with FMH-facility from Concept Tech

## Free Motion Headform

In the FMH experiments so-called Free Motion Head Forms, free-flying aluminum head forms with rubber coating, are shot at the various surfaces of the vehicle interior. On the basis of the measured acceleration, the severity of the expected head injuries can be calculated. The aim of these tests is to determine and reduce the risk of acceleration-induced injuries to the head of the car occupants early in the vehicle development phase. The guidelines are very strict for vehicles that should be licensed in North America. They are defined in the head impact determination FMVSS201u.

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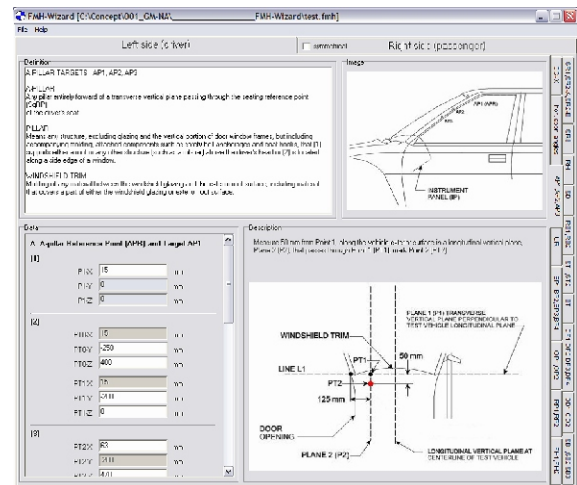
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## FMH tests with AICON's MoveInspect HR

To comply with the provision under FMVSS201u, the vehicle developers have to measure and verify a variety of configurations and combinations. AICON's optical measuring system and the FMH-Wizard streamline the test process and provide more accurate measurement results. The Wizard identifies all relevant measuring points on the vehicle (as specified by FMVSS201u) and guides the operator through the complex measurement procedure. All these points can be tagged and measured with the MoveInspect HR system of AICON. The operators benefit from the efficiency of the measurement system. The results are generated more quickly and user-independent. Due to the self-referencing of the system accurate measuring results can be realized, even at the smallest movements of the test vehicle.

## Positioning with Move 6D

Additionally, the newly developed software module Move 6D for the AICON 3D Studio supports the implementation of the FMH testing. Move 6D simplifies the positioning of two or more rigid bodies to each other, the controlling of their position and the orientation in space. During FMH tests it can be used for positioning the launch facility of the aluminum heads relative to the vehicle. As a part of AICON'S MoveInspect Technology, the Move 6D software is also applicable and expandable for many other measurement tasks.



• Screenshot of Concept Tech's FMH-Wizard



• MoveInspect HR camera bar



• Screenshot of the software module Move 6D