

# DPA

3D coordinate measurement with hand-held digital camera



MEASURE THE ADVANTAGE





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## Industrial metrology

Industrial metrology is a basic component of state of the art production processes. Areas of application include production control, quality inspection, and product development.

AICON's DPA is a light weight 3D measurement system that allows for onsite inspection and error detection without time consuming interruption of production lines. Parts no longer have to be transported to the coordinate measuring machine (CMM).

## MEASURE THE

AICON's DPA is also especially suitable for use when the environment requires that time on site is minimized. The powerful DPA software delivers results within seconds of completion of the measurements. Moreover, it is very useful in areas where movement is restricted as it does not require stable measuring instrument positions.

**The following are typical applications for the DPA system:**

### 3D inspection

- Inspection of sheet metal parts and tolerance analysis
- Fixture inspection
- Comparison with CAD
- Roundness inspection, e.g. tunnels or tanks
- Measurement of large steel fabricated structures

### 3D process analysis

- Deformation analysis in vehicle safety tests
- Deformation analysis of sheet metal and plastic parts, e.g. in environmental chambers or strain tests
- Motion analysis, e.g. of components under load



## Applications

AICON's DPA will measure parts from a few millimeters up to many meters in size. Objects as large as entire aircrafts can be measured. AICON's DPA system employs a hand-held camera and is therefore particularly suitable for use on large objects that cannot be moved to a CMM and must be measured at their current location.



## A D V A N T A G E



Special coded adapters support the signalisation of boreholes, edges etc.

### Extendable for new measuring tasks

The DPA system is 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. Follow-up investments for additional complete systems are no longer necessary.

### Measuring principle DPA (Digital Photogrammetric Analysis)

AICON's DPA systems are portable 3D measuring machines that use a high resolution digital camera for data collection. The part, which may be of any size, is photographed from a number of directions.

These photographic images are processed either simultaneously with data collection (online processing) or after data collection (offline processing) with AICON's powerful software. The software automatically calculates the 3D coordinates of all targeted points.

The calculation is based on the principle of spatial image triangulation (photogrammetry) and is fully automated. Pre-calibration of the camera is not necessary because the software employs an integrated simultaneous calibration procedure.

In addition to 3D coordinates, DPA provides statistical analysis of the results with specific accuracy information about each coordinate. This allows for instant evaluation of the quality of the measurement.



## Work flow 3D inspection

Targets or adapters are placed at all features relevant to the inspection. There are adapters for boreholes, edges etc. as well as special adapters for measuring reference points. In addition, trim lines, punch holes etc. can be measured without any additional targeting. The targeted part is photographed with a high resolution digital camera from different directions.

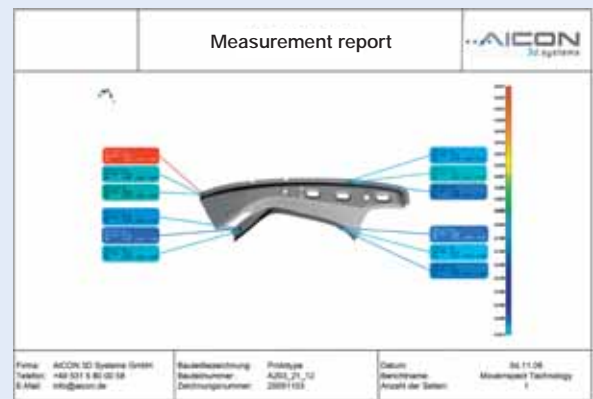
Then, with the help of DPA technology, the 3D coordinates are calculated and transferred to the measuring software automatically. Afterwards, the software compares the results with CAD – either automatically or manually – and a useful measurement report is generated.

## Benefit

The traditional inspection of parts often requires their transport to a CMM. This is time-consuming and often results in a delay in the availability of the results of the survey.

The DPA system offers the capability of conducting the inspection of sheet metal and other parts onsite. This not only saves time and money but

also allows for immediate process modifications if required. Fast and automatic analysis of data and production of the final report increases manufacturing reliability and makes quality controls possible at any time without elaborate preparation.



The measurement software automatically displays the inspection results.

DPA is integrated with many measurement software packages, thus allowing for highly automated measuring processes, from processing the photo of the targeted object to the generation of final reports. Software packages that DPA is designed to work with include PolyWorks®, Rapidform™, Metrolog®, Geomagic® and others.

## Work flow 3D process analysis

Targets or adapters are placed at all points which are to be measured. Photographs are then taken of the object from different viewing directions with a high resolution digital camera. The photographs are automatically analysed on location. If the measurement task is a deformation analysis, the part is subjected to the required force or environmental condition.

At the end of the deformation process, the object is again photographed with the digital camera. Data may also be collected at the intermediate points in the study, if desired. 3D movement of the measured targets is calculated by AICON 3D Studio measuring software. A variety of useful reports can be created.

The results are in the form of vector depictions of the deformations between two or more states. Results may be shown as a graphic overlay or as a comparison to CAD. In this way, processes can be analysed and interpreted very rapidly.

## Benefit

In order to shorten the development cycles of increasingly complex parts, it is necessary to collect product dimensional quality information quickly and easily. DPA technology meets these requirements by providing effortless onsite data analysis. These results can then be directly integrated into the product development process.

DPA provides dense high quality 3D information. This data allows for fast and precise evaluation of the dimensional quality of a part, thereby contributing to a reduction in development time.



Color-coded vectors show value and direction of the deformation.

## System Specifications



Hardware	DPA (Digital Photogrammetric Analysis)
Digital camera	Nikon D3x with Nikkor 28 mm
Camera resolution	6048 x 4032 pixels (24.5 mega pixels)
Data transmission	W-LAN or removable storage device
Measurement accuracy	2 $\mu\text{m}$ + 5 $\mu\text{m}/\text{m}$ (RMS) 3 $\mu\text{m}$ + 7 $\mu\text{m}/\text{m}$ (3 Sigma)
Picture angle	74°
Illumination	white light flash
Storage time	5 images per sec.
Processing unit	high end notebook
Operating system	Microsoft® Windows® XP / 7 / Vista
Accessories	scale bars, coded targets, standard targets, adapters
Software	
Photogrammetric processing	DPA
Control software for post processing and reporting	AICON 3D Studio, PolyWorks®, Rapidform™, Metrolog®, Geomagic® etc.
Automatic on the job calibration	yes
Automatic referencing	yes
Deformation and motion analysis	yes
Adapter correction	yes
Feature measurement	yes
Application areas	<p>3D Inspection</p> <ul style="list-style-type: none"> <li>- Inspection of sheet metal parts and tolerance analysis</li> <li>- Fixture inspection</li> <li>- Comparison with CAD</li> <li>- Roundness inspection, e.g. tunnels or tanks</li> <li>- Measurement of large steel fabricated structures</li> </ul> <p>3D Process Analysis</p> <ul style="list-style-type: none"> <li>- Deformation analysis in vehicle safety tests</li> <li>- Deformation analysis of sheet metal and plastic parts, e.g. in environmental chambers or strain tests</li> <li>- Motion analysis, e.g. of components under load</li> </ul>

Technical data are subject to change without notice.



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## DPA – 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.

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## AICON 3D Systems GmbH

Head office:  
Biberweg 30 C  
D-38114 Braunschweig  
Germany  
tel. +49 (0)531-58 000 58  
fax +49 (0)531-58 000 60  
info@aicon.de  
www.aicon3d.com

APAC Office (Region Asia/Pacific):  
18th Fl. Kyoung-Am Bldg.  
157-27, Samseong-dong  
Gangnam-gu  
135-090 Seoul  
Korea  
tel. +82 2 3450 1630  
fax +82 2 3450 1510  
asiapacific@aicon.de