

# MOBILE 3D PROBE

*Carl-Thomas Schneider,  
AICON GmbH, Celler Straße 32, D-38114 Braunschweig, e-mail: ct.schneider@aicon.de*

## 1 Mobile 3D Probe

The mobile 3D measuring technology is gaining more and more importance in industry. The transportation of objects to coordinate measurement machines is time-consuming and leads to delays and interruptions of production and to extended set-up times. A mobile 3D measuring system offers a quick and flexible control on the shopfloor, avoids expensive production interruptions and reduces set-up times to a minimum. These advantages offers AICON's mobile 3D probe **ProCam**<sup>3</sup>.

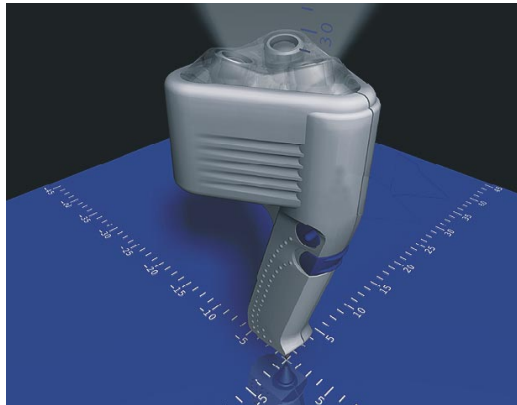


Figure 1 – Mobile 3D Probe **ProCam**<sup>3</sup>

## 2 Operation Principle

The mobile measuring device ProCam consists of an active probe with three integrated CCD cameras and a portable PC for the system control. The probe is equipped with a measuring tip to touch object points. During measurement the cameras are facing a field of control points that is located nearby on portable or fixed panels. Pushing a button at the probe releases the measurement after the tip has contacted the object. The result is immediately shown on the computer. The resulting 3D coordinates can be analysed either with an integrated tool or linked with third party analysing software. So it is possible to represent the measured points in comparison with CAD data.



Figure 2 – Mobile measuring device ProCam<sup>3</sup> in action

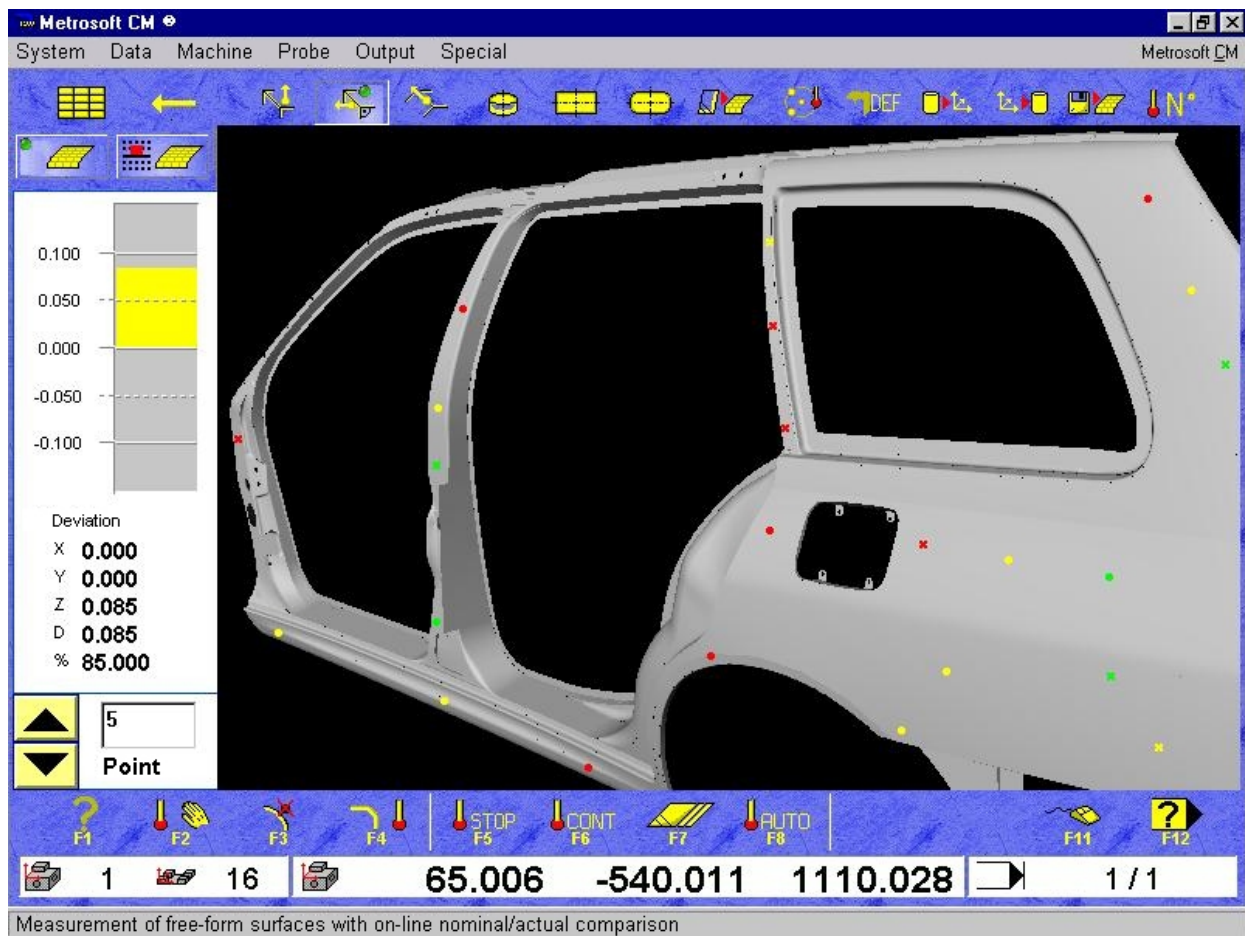


Figure 3 – Third party analysing software Metrosoft CM

### 3 Active Probe

The probe that is designed according to ergonomic aspects incorporates three micro-CCD cameras. The measurement is released by pushing a button at the handle. The measuring points are illuminated by an integrated flashlight enabling the system to be operated independently from any surrounding light.

The T-box to be carried at the belt includes the control electronics, display and control panel with which the complete software is controlled.





Figure 4 – Mobile 3D probe ProCam<sup>3</sup>

#### 4 Probe Tip

The probe tips are exchangeable and available in various shapes and lengths allowing the measurement of any point e.g. hidden points or holes.

The probe tip is attached to the measuring probe with a standard bayonet joint and can be exchanged as often as desired requiring no calibration after the exchange.

#### 5 Target Panels

By using fixed or transportable target panels it is possible to install stationary or mobile measurement stations. The transportable target panels are made of carbon fibre plates with a size of 600 mm x 800 mm, 800 mm x 1,200 mm or any individual size. Each panel is equipped with reference targets which are optically coded for identification. The target panels are measured with high precision and can be placed near the object with fixtures like tripods or clamps.

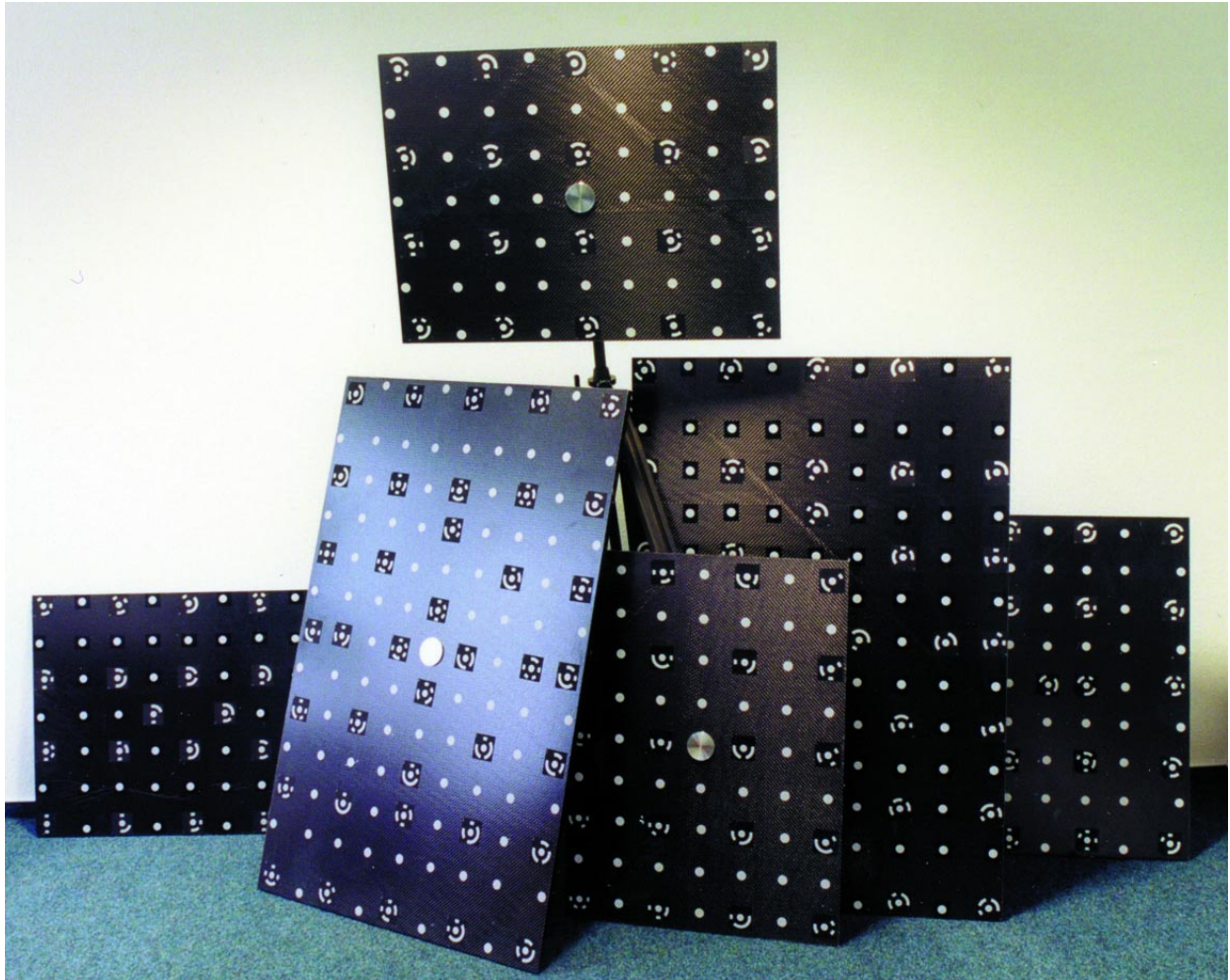


Figure 5 – Target Panels

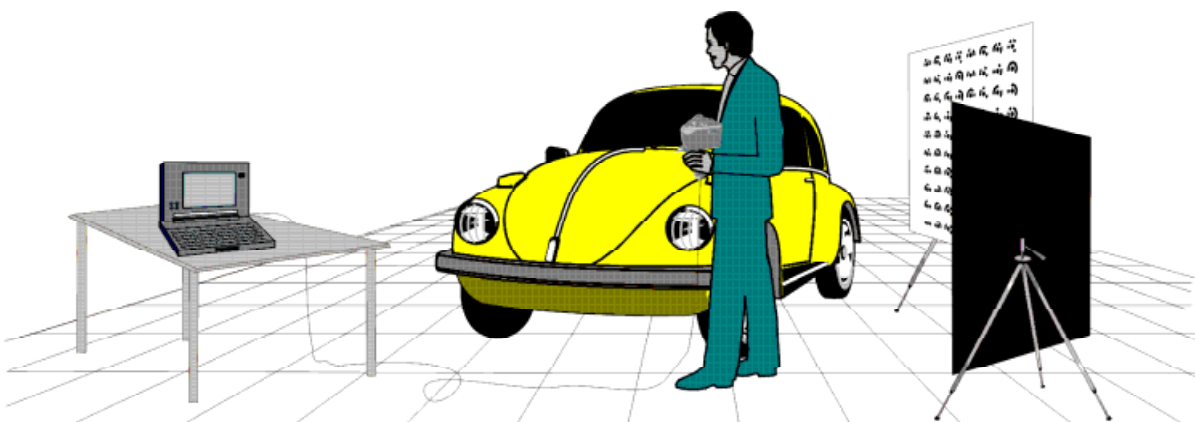


Figure 6 – Mobile measurement station

For the stationary operation of ProCam, reference targets are fixed to a wall or ceiling, and the coordinates of the reference points are once determined with high precision. The measuring volume may have any size so that objects of any size can be measured.

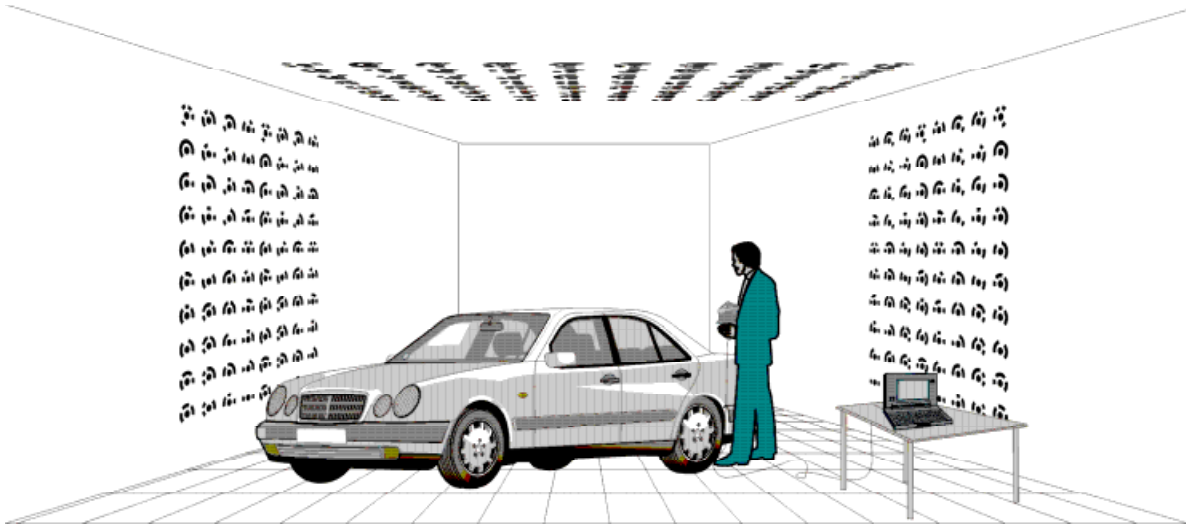


Figure 7 – Stationary measurement station

## 6 Accuracy

The accuracy of ProCam is independent from the size of the object. Only the distance between probe and reference targets is relevant. The accuracy is appr.  $5 \times 10^{-5}$  of the distance (e.g. distance 2 meter, accuracy  $\pm 0.1$  mm). This offers a very high accuracy potential for small and especially large objects.

## 7 Application

The field of application of ProCam regarding both the stationary and mobile use is nearly unlimited.

In a manufacturing hall, it is for example possible to easily install measurement stations at various places so that only one probe can be flexibly used for measurements at different places. It is not necessary to consider erection or set-up times, since the system is ready for operation within a few minutes.

The mobile application allows a fast check on site. The component no longer has to be transported to a measuring device so that a decision can be made directly on site on the basis of the measuring results. This reduces set-up and testing times and thus shortens product development and production start-up.



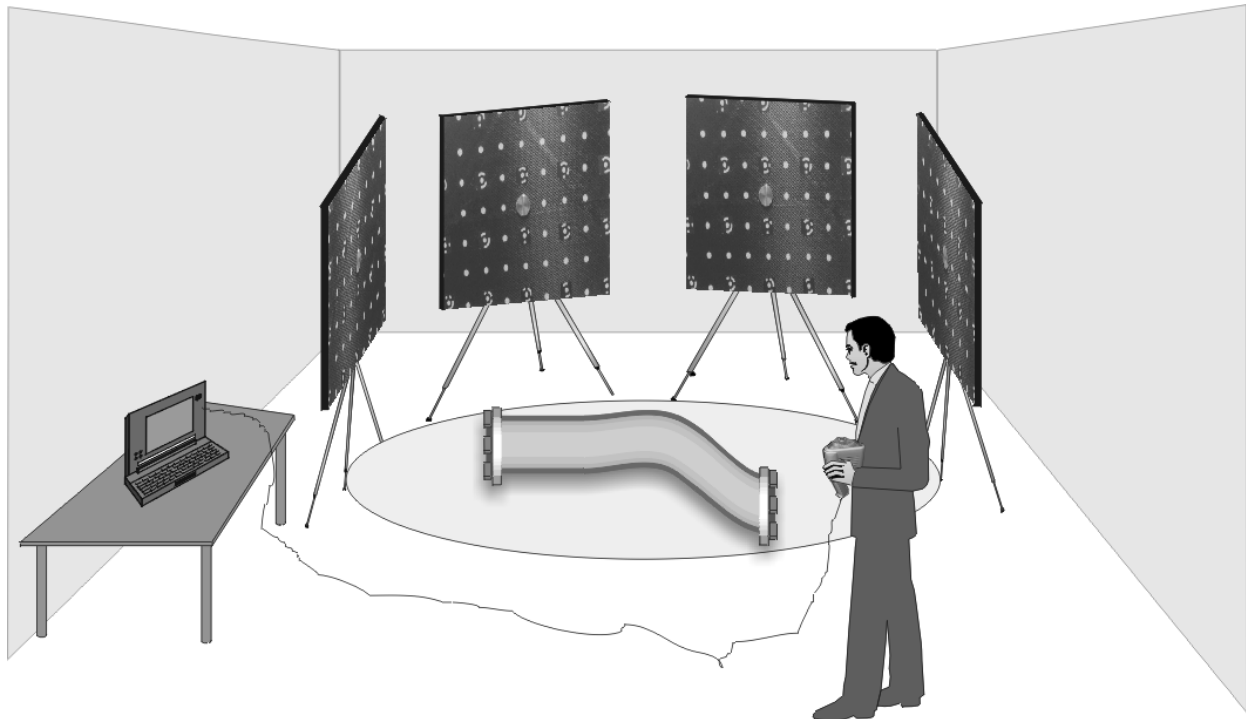


Figure 8 – A typical measuring task

The following measuring tasks are typical for the use of ProCam:

- Deformation analysis in the crash measurement
- Measurement of large welded constructions
- Final component check and variance comparison with CAD data
- 3D measurement directly at testing stands
- Tool measurement
- Setting up and positioning of subassemblies