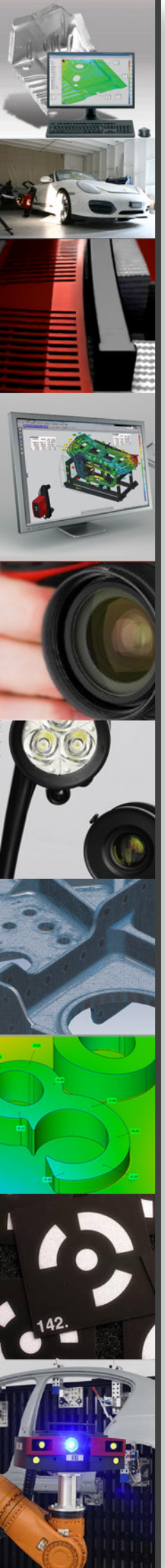


SCAN-XPRESS

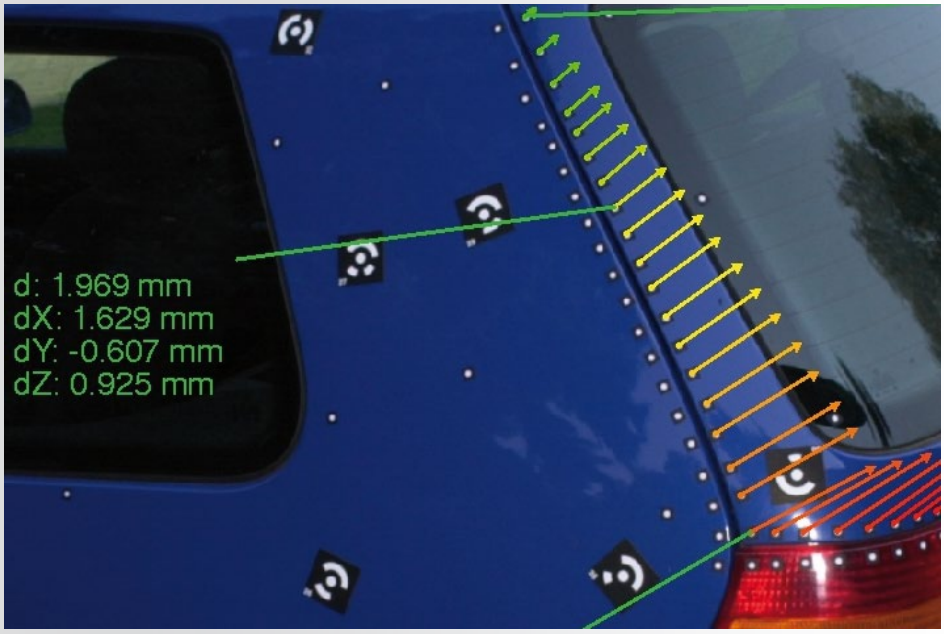
EXCELLENCE IN 3D MEASUREMENT

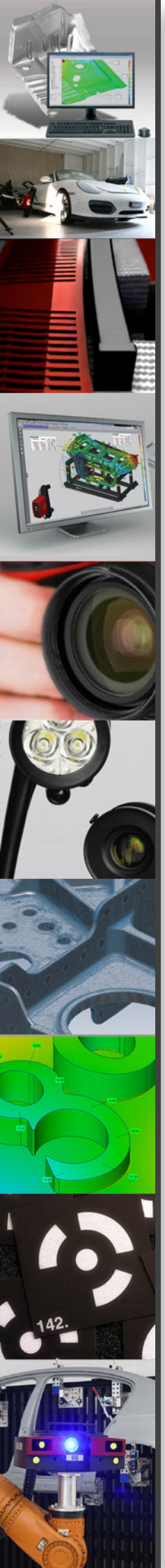
Application Example: Component Testing

Deformation Analysis of Car Components

Measuring Systems: TRITOP
Keywords: changes in gap-width, global warpage of parts of the car body

This example shows how the photogrammetric system TRITOP is used for local as well as global deformation analysis by the automotive industry.





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In the testing departments of the automotive industry prototypes are exposed to all kinds of strain, in order to determine the interactions between body, attached parts and the interior. This is done using standard experiments, e.g. environmental chamber experiments with temperature changes of up to 130 degrees, long-term stability measurements and overload tests. Apart from the technical criteria that must be met during these tests, the visual specifications have gained in importance. Keywords in connection with this trend are changes in gap-width and global warpage of parts of the car body.

The photogrammetric system TRITOP with its new deformation module offers a reliable analysis and a graphic visualisation of such deformations. This tough and flexible measuring technique can be used even under extreme environmental conditions as e.g. temperatures from -40 to +90 degrees or in the limited space of a car's interior.

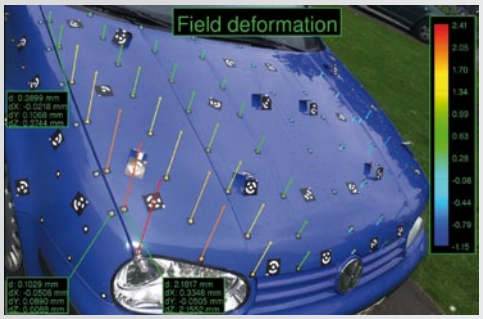

Fig.1: Deformation of a car bonnet

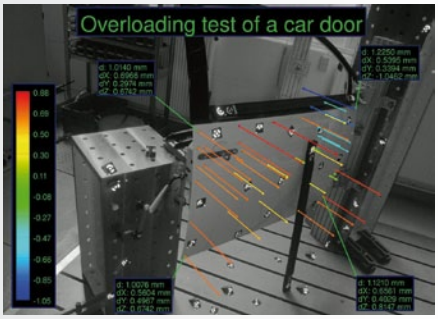

Fig. 2: Displacements of a car door

First of all, an arbitrary number of circle markers are applied by the user as points of measurement onto the surface that is to be measured. Using a high-resolution digital camera and the TRITOP software, the 3D coordinates of these points are determined. The project-oriented deformation module enables the convenient administration of any number of deformation steps. Apart from the 3D coordinates of the points of measurement, the 3D displacement vectors with regard to the individual states can be determined. This information is projected into the 2D images and thus, by using arrows and error color map display methods, enables a clear and quick interpretation of the component's deformation. The user can furthermore use tailor-made analysis tools to measure, visualize and protocol gap-width changes and gap alignment.

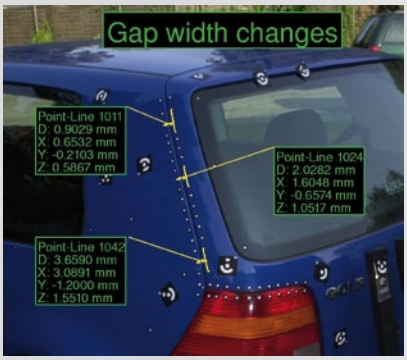

Fig. 3: Gap-width change

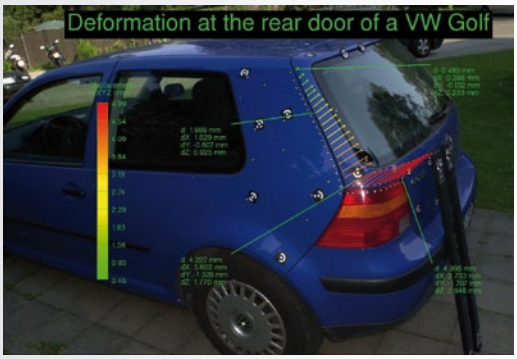

Fig. 4: Deformation at the rear door

The 2D images with the superimposed measured values allow conclusions to be drawn about the weak points of the components and welded or screwed connections, so that measures to eliminate them can be taken. Fig. 1 shows the applied global deformation of a car bonnet, fig. 2 the displacements of a car door after an overload test, fig. 3 a measured gap-width change between C-pillar and the tailgate and fig. 4 the deformation at a rear door.