

Application Note

Volkswagen Commercial Vehicles: Optical Measuring Room on 5,400 m²

Location / country: Września, Poland

GOM systems: Double-robot measuring cell (3x), ATOS ScanBox 6130 (2x), ATOS Triple Scan, ATOS Core, TRITOP, PONTOS

GOM software: ATOS Professional

Sector: Automotive industry

At the new Volkswagen plant in Września, production quality for the VW Crafter is ensured using ground-breaking measuring technology.



The new plant operated by automobile manufacturer Volkswagen in Września, Poland, was officially opened in October 2016. Within only 23 months, a highly modern production facility was built at the new site, and will be used in future for building the VW Crafter delivery van model. Up to 100,000 vehicles a year can be produced on an area covering 300 football fields. For this purpose, the body shop, cubing center, paint shop and final assembly have been built from scratch at Września along the lines of the VW energy saving program entitled "Think Blue. Factory.". Chief Executive Officer Jens Ocksen explains: "The plant in Września is a role model for European transporter construction – state-of-the-art technology yet environmentally efficient at the same time." Individually configurable vehicle bodies and equipment variants are the features of contemporary automobile production and a decisive competitive advantage. Production at the plant in Września was planned accordingly. The VW Crafter built in Poland is based on a completely new platform. This means 70 % of production can cover exclu-

sively made-to-measure solutions. Volkswagen achieves this largely through automation. In order to implement the wide range of variants and individual orders, 430 robots carry out 68 % of the welding and gluing procedures in the body shop as well as material transport tasks. The automation level in the paint shop is 65 %.

New challenges for quality assurance

Customer-specific production in Września also requires new concepts with regard to quality assurance. Given the 1,100 equipment variants of VW Crafters that can be configured, the range of parts to be measured is vast: underbody, front end, closed and open bodies, cab as single or double cab, etc. Therefore, the measuring hall with its 5,400-m² floor space has been integrated into the body manufacturing line close to production. The cubing center with Meisterbock, virtual assembly and a full-size Powerwall are directly connected to the measuring hall via a passageway.



Fig. 1: Optical measuring room connected to cubing center and body manufacturing line

In terms of quality assurance, Volkswagen is using non-contact measuring technology almost exclusively. The equipment of the measuring hall in Września chiefly includes automated optical measuring systems supplied by GOM: two Series 6 ATOS ScanBox systems as well as three double robot measuring cells and several mobile optical measuring machines. These are used for extensive inspection of assembly modules and body shells through to completely painted bodies. Everything is designed for measuring the vehicles that are up to seven meters long and almost three meters tall. The measuring results of the optical systems from GOM are used for a full-field 3D geometry check, including border lines and hole pattern by comparing nominal and actual data. Given the variety of the components to be measured, creating and providing the measuring and inspection

programs represent decisive functions. Robot paths and sensor positions should be calculated automatically and independently from the user, and above all they should not block the running measuring cells. The functions of the integrated GOM software such as the virtual measuring room (VMR) and Auto Teaching offer good solutions. In the VMR, components, sensors, the measuring cell and kinematics are simulated so that paths and positions of the robot and the sensor can be calculated automatically. The component CAD provides the basis for determining the measuring positions. At the same time, inspection planning can take place on a decentralized basis irrespective of the measuring system. The measuring and inspection program is stored as a template and called up later by the factory employee in Kiosk mode at the measuring cell.



Fig. 2: Inspection of VW Crafter BIW in a double robot measuring cell

Higher throughput thanks to optical 3D metrology

The measuring systems from GOM are referred to by Volkswagen as “fast runners”, and are even used by the component suppliers located in the vicinity of the plant in Września. This is because the new location in Poland was planned without a press shop. Instead, the suppliers of the pressings and add-on parts carry out the goods outgoing inspection using the same measuring technology and the same component fixtures as are used at Volkswagen.

On the body construction line itself, six inline robot measuring cells supplied by Zeiss check individual points, hole positions and edges. The accurate, optical measuring results are used for process monitoring by means of data correlation between the relative measurements. The systems detect unusual fluctuations, although there is no

further possibility of fault analysis. Absolute measurement of the parts in the measuring room with GOM machines, on the other hand, makes it possible to draw targeted conclusions about the actual cause of the process non-conformity.

Volkswagen is reaping the rewards of many years of cooperation with the measuring technology manufacturers. The consistent interplay between sensors and software from the same company is a decisive factor for VW alongside implementation of relevant functions. However, what counts for Volkswagen when selecting the measuring system is facts: requirements must be met, and above all verified. The accuracy of the systems has been checked and certified by an independent body. Moreover, the systems are subjected to thorough testing by Volkswagen itself time and time again.

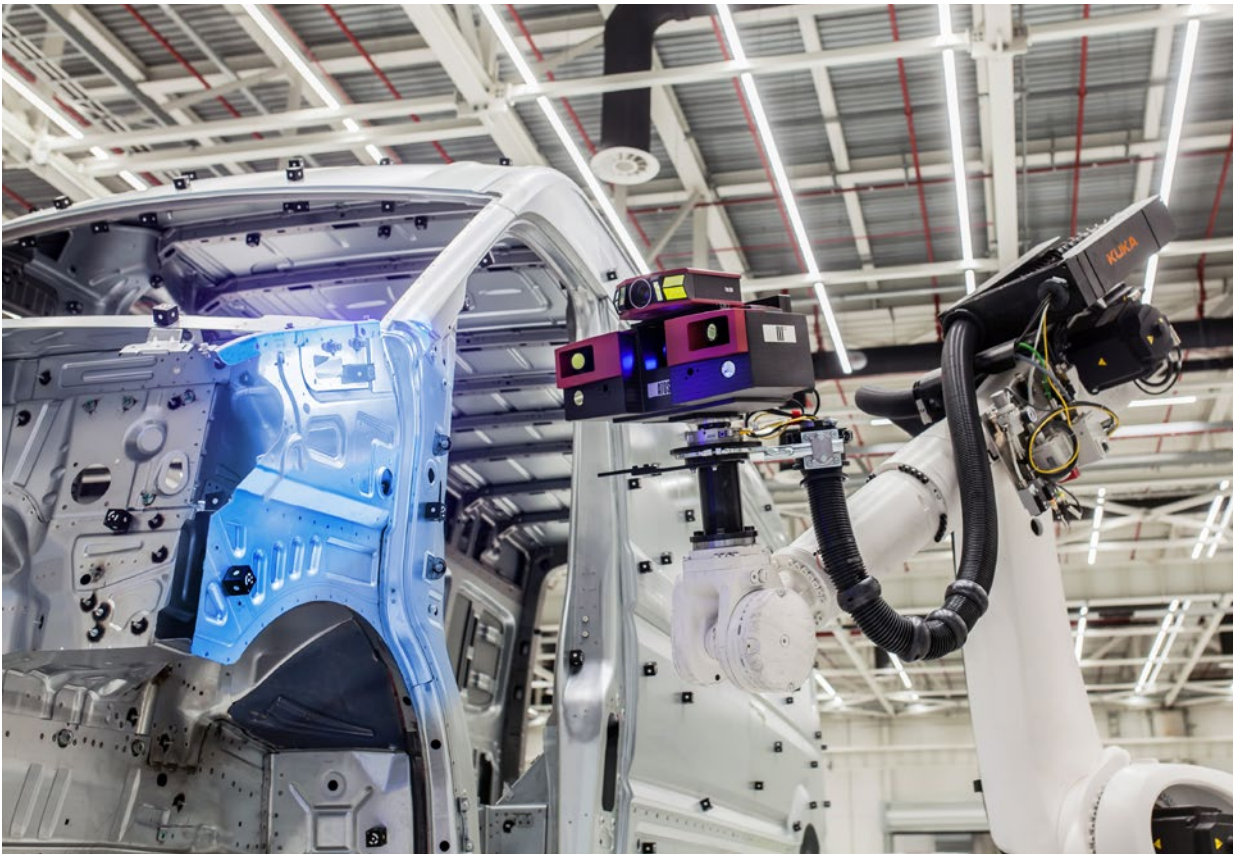


Fig. 3: Full-field inspection of BIW components with ATOS TripleScan



Fig. 4: Underbody part inspection in ATOS ScanBox Series 6

The reorientation from tactile to optical, full-field measuring technology is due to the completeness and comprehensibility of the results provided. "The optical measuring room is the measuring room of the future – for people and technology," says Werner Steinert, Head of Measuring Systems at the Września site. With more than 25 years of experience in automobile construction, it is clear to him that measuring technology must always deliver a benefit: "After all, uncontrolled processes are bad processes."

Full-field measuring technology

The decision to use optical, full-field metrology is also prompted by an understanding by Volkswagen that people have to be able to use and understand the measuring technology well. The 56 employees of the optical measuring room were hired locally and trained in parallel with construction of the plant. In this way, the training of users in the measuring technology system will not become a bottleneck in today's automobile construction. After

all, the full-field 3D data is easy to grasp, i.e. it is visually comprehensible. The non-contact and full-field coordinate measuring technology also enables Volkswagen to achieve a density of information that is not possible by tactile means. The 3D measuring results make it possible for the processes to be provided with effective feedback control without taking up more time for the product. They also serve to check not only the function but also the visual appearance and design based on dimensional accuracy, thereby achieving the exacting quality requirements of Volkswagen and its customers. Consequently, optical, full-field measuring technology is not only state-of-the-art but also groundbreaking.

The Volkswagen plant in Września makes it clear that optical metrology represents the path to the future of measuring technology because of full-field digitizing: In future, each component should undergo full-field digitizing so that soon only 3D volume models will have to be compared with one another, without the need for measuring reports to be written any longer.

Volkswagen Commercial Vehicles

The Volkswagen Commercial Vehicles brand is responsible within the Volkswagen Group for the development, production and distribution of light commercial vehicles. The model range comprises delivery vans, transporters, multipurpose vehicles, camper vans and pick-ups. Today, the Group produces commercial vehicles at its four plants in Hanover, Poznań, Pacheco and Września. In 2015, Volkswagen Commercial Vehicles delivered more than 430,800 vehicles to customers all over the world.

GOM

GOM develops, produces and distributes software, machines and systems for 3D coordinate measuring technology and 3D testing based on latest research results and innovative technologies. With more than 60 sites and more than 1,000 metrology specialists, GOM guarantees profound advice as well as professional support and service. More than 10,000 system installations improve the product quality and manufacturing processes in the automotive, aerospace and consumer goods industries.