



The FaroArm is able to convince users in everyday operation, thanks to its mobility and reliability.

High Potential for Innovation

A portable FARO measuring arm has replaced conventional gauges for measuring bolts at a major automobile manufacturer. The FaroArm Platinum not only provides the premium manufacturer with considerable savings potentials from the standpoint of costs, but is also convincing due to its mobility and reliability in two-shift operation.

A large number of innovative technologies are deployed during the manufacturing process of the new BMW 7 Series in Dingolfing (Germany). Among them is a mobile measuring arm of the FaroArm Platinum series with a measuring range of 3.7m, which has been in use since the beginning of 2008 for measuring bolts that are distributed throughout the

entire car for, among other things, attaching cable harnesses and brake lines. Using the measuring arm also means that gauges are no longer needed. In addition, the new 7 Series is the first BMW vehicle in which the bolts are measured using the FaroArm.

In addition to the Platinum series models, the FaroArm is also available as Fusion and Quantum model, as well as in five sizes with a spherical measuring range between 1.8 and 3.7 metres. Due to its capability to move in six or seven axes and its patented internal counterbalancing, the measurement system can also be used in difficult-to-reach places. The system's measuring handle is equipped with four buttons that are used to control the arm; acoustic feedback provides the user with information on the status of the measurement. The logic built into the arm uses rotary sensors in the joints to calculate the spatial position of the measuring probe. Overload sensors loca-

ted in each joint warn the user when the arm is exposed to excessive handling forces, thus ensuring precise measurement results. The measuring arm consists of connection elements of a composite material developed by FARO – this not only permits a low weight (between 9 and 10 kg), but is also the basis for the excellent handling of the measuring system.

In the course of production of the BMW 7 Series, random measurements of coarse-threaded bolts and earthing bolts are made on one vehicle per shift during the break, during which the system is at a standstill, so that production flow is not interrupted. The bolts are first measured in an inline measuring system by a robot with a laser sensor. In the next step, bolts that cannot be measured in this system because, for example, they are 'hidden' in the tunnel, are measured using the FaroArm.

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4 GOOD REASONS

The measuring arm can be mounted and operated very easily, regardless of the surface being worked on.

1 Mobility: Large and heavy components must no longer be transported to the measuring machine. Quality control can be completed on-site with the measuring arm. A patented temperature compensator assures reliable measurement results.

2 Flexibility: Thanks to the use of multiple rotary axes, the measuring probe can be positioned at the point to be measured, even if it is difficult to reach.

3 Counterbalance: The internal weight counterbalance in the FaroArm enables measurements to be completed beneath its clamping frame and allows unencumbered work.

4 Universal mounting: The measuring arm can be mounted and operated very easily, regardless of the surface being worked on.



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HOW THE FAROARM WORKS:

In order to measure a specific point, the measuring probe is positioned at the spot to be measured. The rotary angle encoder located in the arm calculates the exact position of the probe.



>>To do this, the body shell is placed on a diverting frame and transported to a diversion and reworking workplace belonging to the floor assembly division in the production area. This is where the measurement technician first makes calibrations in the vehicle. Then he moves a sleeve over the bolt – and the measurement is already available. In other words, he did not have to touch the bolt. The approximately 60 bolts that are to be measured with the FaroArm Platinum are furthermore displayed by software that guides the user through the measurements. Compared to the previous method, this process also brings advantages in terms of time; as the gauges had to be inserted first.

Since work in Dingolfing is carried out in two-shift operation, the FaroArm is deployed twice a day. However, in another application it is only used every two months. Because bolt measurement with the inline measuring system is referenced measurement, the Dingolfing plant needs a system for comparison. They also use the FaroArm for this. In this context, all the bolts in an entire vehicle are measured. Then the measurement experts examine how the data behave in relation to one another and the inline measuring system is calibrated on this basis. The measuring arm replaces the measuring room in this case.

In addition to advantages in terms of time, using the mobile measuring system gives automobile manufacturers the opportunity



The measurement technician moves a sleeve over the bolt, which means that he does not have to touch it.

to replace their gauges. After all, they not only cost a large sum to purchase, but also require time-intensive tightening, including calibration in the measurement room, if the bolts are changed. In the case of the 50 to 60 gauges that the BMW plant has used for these measurements so far, this results in a considerable savings potential. In contrast to the measuring methods used before, the FaroArm also allows for the determination of precise positions, whereas the gauges only showed the deviations. The mobility and reliability of the FaroArm Platinum also provide valuable benefits in the context of the resulting measurements. The measuring arm has certainly proven itself at the BMW plant, where eight other FaroArms are in use in other areas. It fully fulfills the task at hand, namely to use the portable measurement system to test whether the welded bolts are in the correct position.

As the measurement experts are also very satisfied with the service, it can be concluded that the FaroArm has fulfilled expectations. Moreover, the premium manufacturer has not only proven its spirit of innovation in the new BMW 7 Series – which is impressive due to its elegant design and state of the art technology – but also in the 'refinement' of the mobile measurement system: In order to measure the bolt more quickly, the BMW technicians have built an adapter that can be screwed onto the front of the FaroArm. The ball with which the measurements are usually made is removed. The sleeve is precisely one-tenth larger than the bolts. The engineer only has to place it over the bolt and check whether it rests satisfactorily on the plate – then he can carry out the measurements which only takes only about a second.

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ABOUT FARO

FARO (NASDAQ: FARO) develops and markets computer-aided coordinate measurement devices and software. Portable equipment from FARO permits high-precision 3D measurements and comparisons of parts and compound structures within production and quality assurance processes. The devices are used for inspecting components and assemblies, production planning, and inventory documentation, as well as for investigation and reconstruction of accident sites or crime scenes. They are also employed to generate digital

scans of historic sites. Worldwide, approximately 10,000 customers are operating more than 20,000 installations of FARO measurement systems. The company's global headquarter is located in Lake Mary, Florida/USA, its European head office in Korntal-Münchingen near Stuttgart (Germany). FARO has branch offices in Brazil, Canada, China, France, India, Italy, Japan, Korea, the Netherlands, Poland, Spain, Switzerland, Turkey and the UK.

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FAROARM

The FaroArm product line consisting of Quantum, Platinum, and Fusion, are flexibly deployable, portable measuring systems for 3D measurements. They meet the high accuracy requirements posed by development and production. The FaroArm measures, digitizes, or creates a CAD component analysis right in production or during assembly. The measurement arms are available with six or seven axes and with four measuring volumes.

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