

CUSTOMER SINCE 2002

Mercedes-Benz

Mercedes-Benz is a German automobile manufacturer with a history spanning more than 130 years. The company develops and produces passenger cars, trucks, and buses and is one of the leading manufacturers in the premium segment. Mercedes-Benz employs around 170,000 people worldwide and operates at numerous locations.

Challenge

At the Düsseldorf plant, safety- and function-critical screw connections in risk classes A and B according to VDI 2862 had to be reliably secured. In addition to compliance with high quality standards, audit-proof documentation was required. The aim was to digitize testing processes, efficiently integrate different screwdriving techniques, and raise quality assurance to a new level.

Solved by QST

Digital test data acquisition

Fast key integration

Statistical evaluation & curve analysis

Efficient test planning

audit security

700

Vans per day

200

Screwdriving operations per shift

>110

Employees actively work with QST



All in all, QST made the bolting process for vans even safer. In the commercial vehicle segment, other plants have now also been equipped with the solution due to the good experience.

MICHAEL KOSTKA

Assembly Planning Engineer, Mercedes-Benz Düsseldorf

Do you have any questions?

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Mercedes-Benz Düsseldorf: Sprinter achieves quality lead with QST for bolted joints

By using CAQ software, the Mercedes-Benz plant in Düsseldorf has made its bolting processes even safer - bolted joints in the A and B categories according to VDI 2862 are checked regularly.

Mercedes-Benz Düsseldorf plant has been making automotive history for over 50 years. It is one of the most modern plants in the world and the central production facility for vans - more than 3.5 million vans have already been built here. The Sprinter has been manufactured in Düsseldorf since 1994. The top priority for the 6,600 employees on site is to produce vehicles of the best quality, with optimum performance and high cost-effectiveness. The latest comfort and safety technology is used to achieve this.

With the introduction of the QST software in August 2012, quality assurance in the production of Sprinters was expanded and raised to a new level just in time for the plant's 50th anniversary. The central CAQ solution from CSP GmbH & Co. KG makes it possible to reliably assess the joining of components. Measured values from processes, machines and tools can be statistically evaluated with QST. At the Mercedes-Benz plant in Düsseldorf, the focus is particularly on bolted joints. The decision in favor of QST was easy for those responsible, as the solution was already in use as a standard in many Mercedes-Benz plants for securing component connections. A reference visit to the passenger car plant in Sindelfingen convinced the Düsseldorf project team of the software's performance and capabilities. As in other industrial plants, very high standards must be met at Mercedes-Benz, and not only because of its own quality requirements.

Of course, generally applicable industry guidelines must also be complied with and reliably documented. These include, in particular, a VDI guideline for the automotive industry, which specifies the requirements for bolted connections. Guideline 2862 divides bolted joints in vehicle construction into three risk classes and defines the minimum properties of the bolting system used. According to this, risk class A includes all safety-critical bolted connections that pose a risk to life and limb in the event of failure - for example, if the wheel falls off. Risk class B includes function-critical bolts. If the bolts are not tightened properly, the car could break down - without any danger to the occupants. Finally, category C includes the even less critical bolted connections, which in the event of failure merely lead to customer annoyance but do not impair the function of the vehicle.

Residual torque within the tolerance limits?

At the Mercedes-Benz plant in Düsseldorf, QST ensures safety categories A and B. On workdays, the plant operates around the clock in three shifts. Every day, 700 vans roll off the assembly line. The random checks of the bolted joints are carried out very closely: for a defined number of vehicles per shift, the bolted joints are checked with the aid of QST depending on the tools used. In the course of this inspection, it can be determined whether the measured residual torque is within the defined tolerance limits. The values are determined very carefully on the basis of complex calculations of 50 individual values. Among other things, this takes into account the fact that certain components and materials such as sheet metal and paints behave differently when bolted together. The highest quality electronic test keys are used as test equipment.

To check the quality of the bolted joints, the bolted joints are first summarized and structured in route plans. In this way, a distinction is made between bolted joints on the front axle and on the rear axle of a vehicle. The bolted joints for the respective measuring range are always loaded as an up-to-date route from the central QA torque database onto the electronic key. For each vehicle to be inspected, the respective vehicle number is scanned as a bar code from the fender and then the corresponding actual and target values are stored for this. Along the line, the inspector now works through the bolted joints and feeds the result data of the bolted joints back to QST. The aim is to obtain IO values that are visualized by a green light symbol. In case a bolted joint was not "OK", the case is reported to a foreman and the components have to be re-bolted or bolts have to be retightened. In addition, it must be checked: Was the NOK bolting an isolated case? Or does it happen more frequently? In such cases, the quality assurance staff must investigate whether, for example, paint or oil has influenced the bolting process. With the software's curve module, users can also graphically evaluate and analyze all curve data measured on the basis of a bolted joint and stored for the individual process checks. This makes the entire bolting process highly transparent. If general problems or trends in the process become apparent, appropriate measures can be taken quickly.

Verification for audits & Co.

An additional benefit of QST is that the software can also be used to reliably provide evidence of a stable process during audits, as the solution documents and centrally stores all measured values. If, for example, a process is audited, the correct bolting can be proven at the push of a button.

QST manages all master data that can be administered and accessed for the execution of process inspections up to the storage of inspection results. Via additional modules, master data from other systems can also be imported into the software database at the Düsseldorf plant.

The software supports a wide range of quality assurance tasks at the Düsseldorf plant, from planning to inspection management. In total, more than 110 employees at the Düsseldorf plant work with the software. The assembly planners, for example, enter the latest bolting cases into the solution. The inspectors load this data from the software onto their electronic key and play back the data of the bolting cases. The inspectors also record supplementary notes for NIO values such as "slipped" in QST. The test equipment administrators, in turn, maintain the individual data for the sampling inspection, store test data, serial numbers and other data. They also evaluate the bolting curves. The colleagues of the inspection administration are also supported by QST. They generate weekly reports from the database on, among other things, actions, curve evaluations and the quality of the inspections.

Line runners check 200 screwdriving cases per shift. After the introduction in 2012 and corresponding training, a pilot phase began in which the random checks of the screwdriving cases were carried out by group runners per shift. In the summer of 2013, the company switched to a concept with line runners. This means that only one employee per shift and one stand-in are needed to inspect the bolted joints. Another advantage is that these specialized employees are then much more

experienced in handling test keys and assessing data and are not under time pressure. Each line runner then checks about 200 bolting cases in his shift. Michael Kostka, planner for assembly planning at Mercedes-Benz in Düsseldorf, assesses the cooperation with the manufacturer CSP during the introduction of QST very positively: "The specialists for process data and component connections were able to help quickly with any questions and problems. Our employees were familiarized with the software in training sessions. All in all, QST made the bolting process for vans even safer. In the commercial vehicle segment, other plants have now also been equipped with the solution due to the good experience." CSP has since installed QST in all Mercedes-Benz passenger car and van plants worldwide. At some locations, such as the Bremen plant, the software has even been in use for more than twelve years. Other plants have been added over the years: These include, for example, a plant in Beijing, which has also been safeguarding component connections with QST since November 2012.

User profile Mercedes-Benz, Düsseldorf plant:

Quality under the sign of the star: at the Düsseldorf plant, more than 700 vans are produced every day in three-shift operation. The year 1950 marked the beginning of automobile production at the site, when passenger cars were still being built here. Since 1962, production has focused on vans. All closed models for Europe and North America are built here. A new Sprinter model with outstanding features such as crosswind assist and braking distance warning has just been announced. With around 6,600 employees and 200 apprentices, the plant is the second largest industrial employer in the Rhine metropolis. In total, the plant covers an area of 688,000 square meters - equivalent to around 1,100 soccer fields.

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