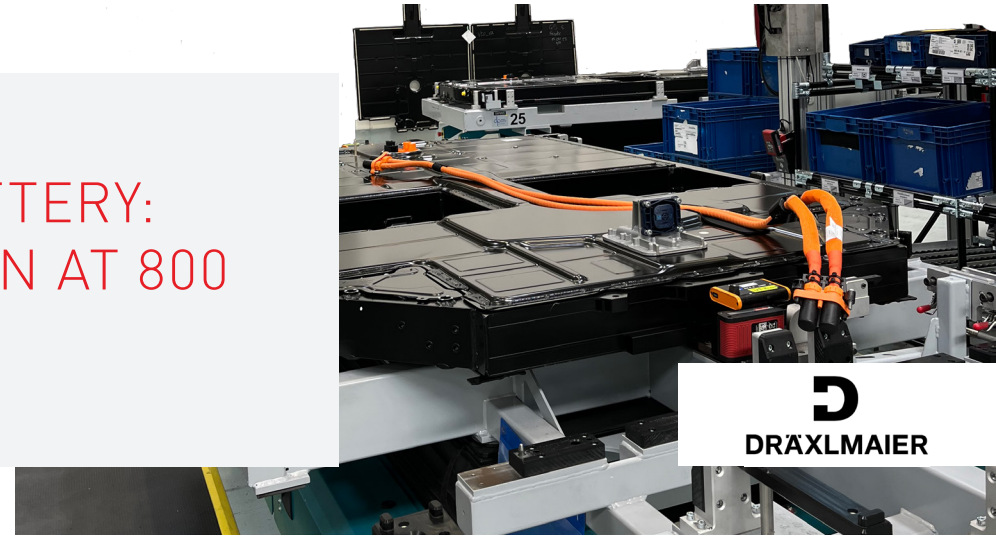
CASE STUDY

HIGH-VOLTAGE BATTERY: SAFE INSTALLATION AT 800 VOLTS



HIGHLIGHTS

Industry

E-mobility
automotive supplier

Products

- nexonar Real-Time Location System (RTLS)

Country

Germany

Challenges

- Fitting hundreds of screws on high-voltage batteries in the correct sequence and with position monitoring
- Employees should be able to fit screws with flexibility, good ergonomics and in parallel to one another using the screwdriving tools provided

Solutions

- Monitoring and control of manual assembly steps with the nexonar Real-Time Location System

Background

DRÄXLMAIER has 74,000 employees worldwide and is a premium supplier to the automotive industry. The company's customers include Porsche, Audi, Volkswagen, Daimler and BMW.

At the Sachsenheim site, DRÄXLMAIER produces 800-volt batteries, each requiring hundreds of screws to be attached. Every screw fitted is category A, which according to VDI/VDE 2862 sheet 1, means that the highest safety standards must be achieved for every screw fitted.

Every screw must be successfully fitted in the intended location with the correct screw-insertion parameters. Each time a screw is assembled, its fitting results are automatically documented to provide evidence of the required quality.

Many processes in battery assembly are automated. Robots take over the task of inserting screws and are programmed to identify every location a screw is meant to be inserted. However, the screw insertion can sometimes fail in robot systems which need to be reworked manually by employees. Whether automated or manual, the same quality requirements apply.

THE CHALLENGE

A supplier to the premium automotive industry, DRÄXLMAIER has to consider countless norms and standards in production, as well as meeting the demanding requirements of its customers. This means, for example, that every screw must be fitted with absolute positional accuracy and the process must be documented.

The hand-held system which was previously used still offered a lot of potential in terms of positioning accuracy and ergonomics, so a comparison was made with the nexonar system. With its high degree of measuring accuracy, unrestricted ergonomics (free, handheld screwdriver) and straightforward commissioning, nexonar scored very well here. As a result, the system also quickly achieved a high level of acceptance amongst employees.

A positioning solution was sought that offered absolute freedom from error. The screwdriving tools are only given the go ahead for a step-in assembly if they are located over the correct screw. Every rework step must also be 100% monitored and documented.

Another high priority was the capacity for standardization and the user-friendliness of the fitting technology so that it can be used at all of the company's sites worldwide. At the same time, the company is also keen to ensure that employees strongly identify with their work and are highly motivated.

THE SOLUTION

To produce the high-voltage batteries, battery packs are inserted into the frames by robots and fixed automatically. This is followed by the placement of so-called busbars and a few more manual work steps. Whilst some work steps are always carried out, other work steps are only selected under certain conditions. DRÄXLMAIER is able to control any relevant position – regardless of whether it is a releasing or a connecting action.

The work steps are now monitored by nexonar's infrared positioning technology. Several IR cameras and IR trackers work together on the tools and batteries. To be able to direct horizontal screws, in a controlled manner, the tools are also equipped with several trackers. This ensures that a tool tracker can be identified in the camera field-of-view at any time, and allows the employees to move freely around the room with their tools. Position control means that the tool will only start when it is at the specified screw-insertion position.

THE CRITICAL DISTANCE IS ONLY 16MM

The highest demands on the system happen during the busbars being mounted and positioned. The (critical) distance is only 16 millimetres from one screw head centre to the next.

The conditions are made more difficult by the positioning tolerance of the automated guided vehicles (AGVs). To counteract this, the AGVs are equipped with reference trackers. The purpose of these is to precisely measure the position of the battery storage unit. The workstations themselves are equipped with several cameras which ensure that the tools and the position of the product can always be identified. Trackers are installed on the tools themselves. These ensures the necessary measurement accuracy. These measures guarantee that employees are always at the correct screw position, even if there is another screw a few millimetres away.

The screwdriving tools are fitted with permanently installed infrared trackers which allow the exact position of the tool to be determined. Reference trackers are also attached to each of the batteries so that their position in the room is also transmitted exactly. The addition of a well-aligned cluster of cameras ensures that all screw-insertion locations can be accurately detected.

“We are able to ensure that all screws are fitted according to specification!”

Christian Grötzinger,
Product Manager, DRÄXLMAIER Group

REWORKING STATION

If there is an error in the automated assembly process, the step will need to be reworked by an employee. This can mean the loosening of a screw that has already been tightly fitted. Since tightened screws are difficult to distinguish from each other, the nexonar system verifies that only the relevant screws are removed – in a controlled manner – in order for it (or a new screw) to be inserted correctly (“OK”). Position control with nexonar ensures that employees carry out the dismantling and correction in the right place.

BENEFITS

DRÄXLMAIER

Those responsible can now meet their high-level requirements in a straightforward way. Plus, employee satisfaction has risen significantly.

- Employees can now fit screws freely and with flexibility using their screwdriving tools, without needing to move an awkward handling system.
- Each screw is placed precisely in position. Both at the «initial fitting stage»' and at the reworking station, where all screw insertions are carried out seamlessly.
- Each screw insertion is documented. The nexonar software ensures that the position of each screw is known as part of its parameters. This provides complete traceability.

With nexonar, manufacturers can precisely locate any object – dynamic or static – in real time and without latency, to within ±1 mm. This allows components and tools to be positioned with a high degree of precision. The system is particularly suitable for demanding tasks in the automotive, aviation or aerospace industries, where there is no room for error.

"We can also react to changes in workstation configuration in a straightforward way, as the nexonar system is flexible and can be adapted and expanded due to its modularity. This also allows us to respond to specific customer requirements and develop individually tailored solutions."

Maximilian Wien,
Sales Manager, Desoutter

"We were very positively surprised that, even with the test system, everything worked flawlessly right from the start."

Christian Grötzinger,
Product Manager, DRÄXLMAIER Group

Speak to our team to discuss our options

CONTACT US

Desoutter