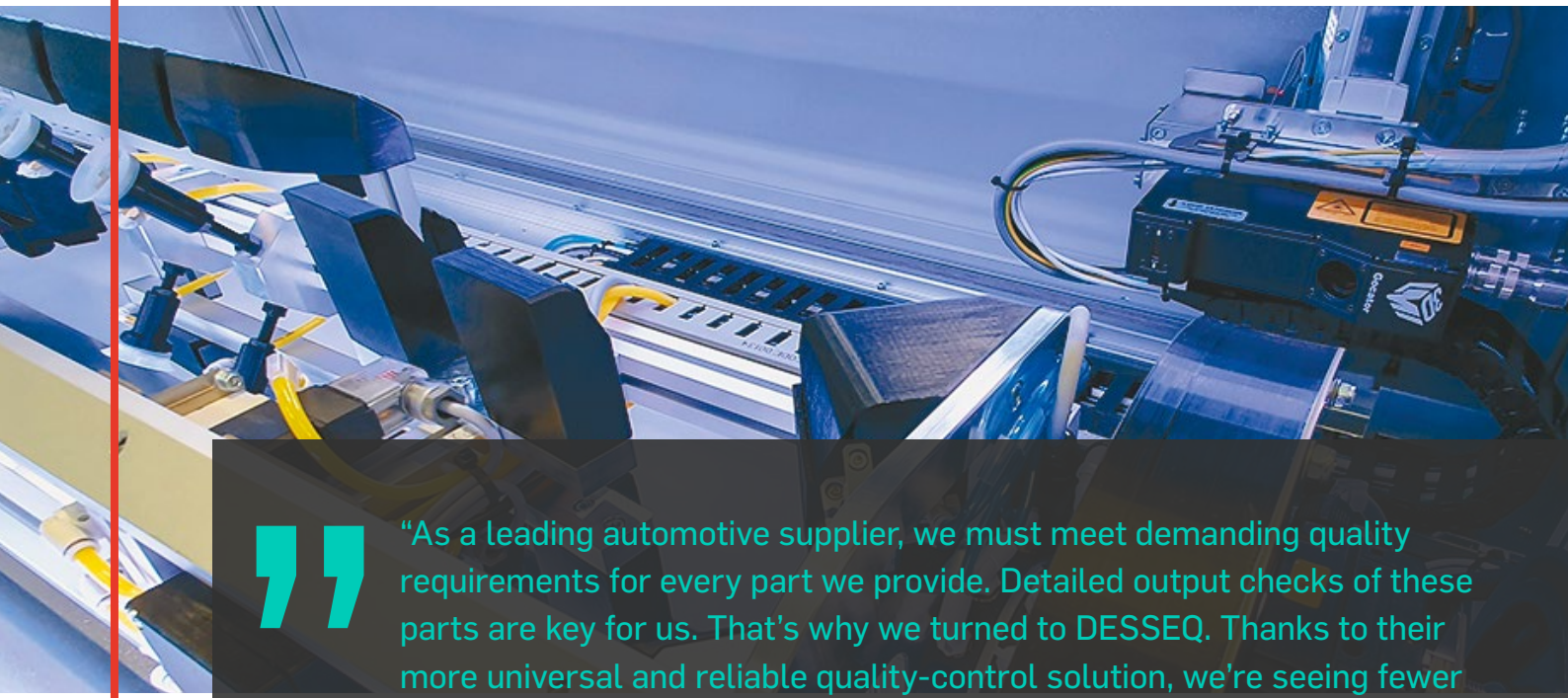
Case Study

Precise and Automatic Quality Control for Plastic-component Assemblies



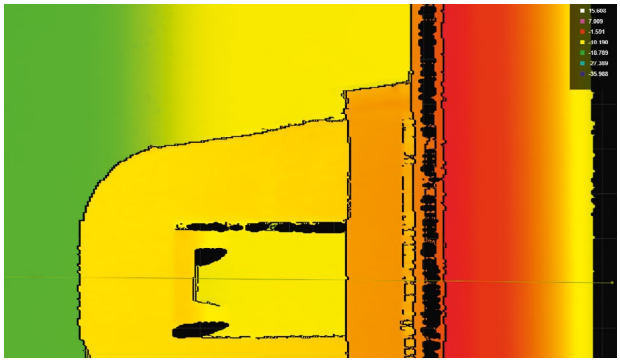
"As a leading automotive supplier, we must meet demanding quality requirements for every part we provide. Detailed output checks of these parts are key for us. That's why we turned to DESSEQ. Thanks to their more universal and reliable quality-control solution, we're seeing fewer complaints, and our operators do less manual labour."

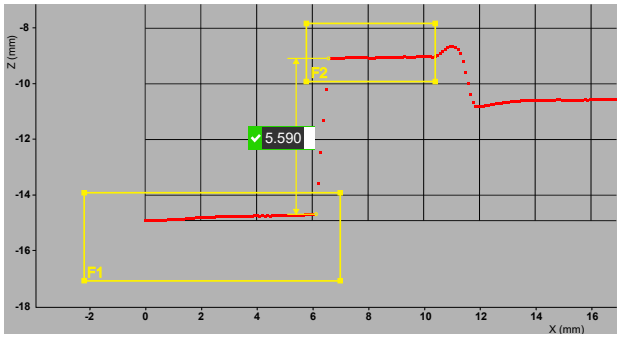
Michal Brček, Production-Manufacturing Engineering Leader at NOVARES CZ Janovice

Baseline situation

Representatives of NOVARES CZ Janovice sought to **replace their existing sensor stations for checking plastic components on an assembly line**. These checking stations – mechanical jigs with optical or induction sensors – were single-purpose, had limited features and in many cases were insufficient for thoroughly checking the monitored parameters. Each check always needed its own sensor, and the checks only assessed e.g. the presence of selected parts in the component's finished assembly.

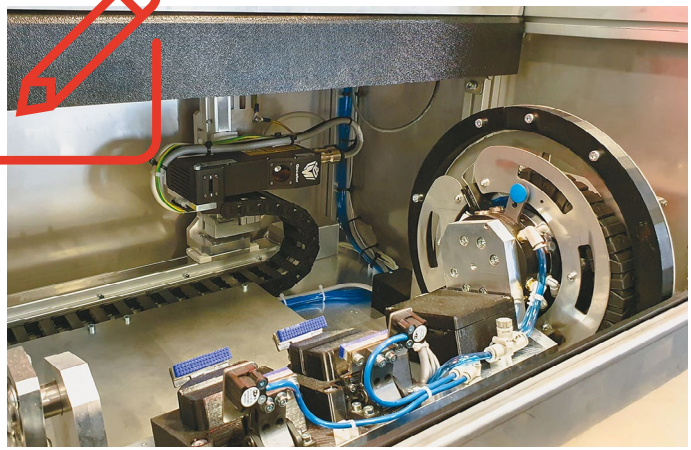
The company was originally considering a camera system; this is the request with which they turned to DESSEQ. Based on the testing and pre-selection of possible solutions, however, DESSEQ proposed **a more universal approach enabling more thorough optical verification using 2D scanners**. The first phase began with the installation of two EOL (End of Line) boxes with built-in scanners for two assembly lines. Based on the success of this cooperation and of the EOL box concept, the company requested the expansion of this delivery into five smaller portable devices (to be placed at compatible workstations on the production line) **and one large box** implemented as a full-fledged separate station.





Project goals

1. Eliminating incorrect mounting of plastic components.
2. Expanding the output-checking options and making these checks more precise.
3. Achieving an automatic process free of major operator involvement.
4. Making the solution universal – so it can be moved to a new line when production processes change.



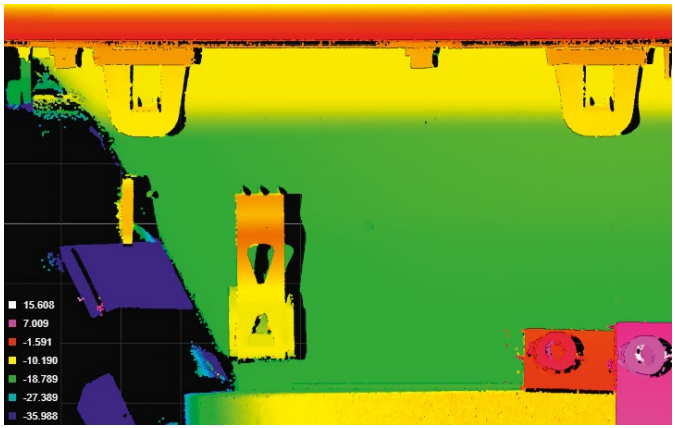
Solution

The EOL boxes are deployed at the exit from the assembly lines. In the course of the automatic quality-control cycle, **the assembled plastic component is placed in a closed box and rotated into its checking position.** The "heart" of each EOL box is a **2D laser scanner**. This scanner moves along the checked component and records it on the vertical plane, gradually creating a **3D model** of it. The individual checks are then run on that model. Checks are generally run for the presence of all the parts of the component assembly, correct mounting and the precision of the key geometric parameters. Since this project involved checking different variants of air conditioning vents in cars, one special aspect of the solution **was providing mobility checks for vent flaps** by verifying that they were correctly assembled.

It was necessary to develop a **device-control hardware and software solution** to enable communication with the 2D scanner used, in order to fulfil the project requirements. After this, the individual checks were set up and were fine--tuned against a testing batch of components – this included defining the scope of tolerance fields and assigning unique IDs to individual checks. A precise record of this data is used for acquiring statistical data on production defects and, where needed, ensuring traceability for the data on a specific part.

Project's specifics

- Each checking cycle takes 50–60 seconds on average; this corresponds to the production line takt time.
- Its output is three snapshots; each snapshot contains 30–50 checks, but they are able to hold up to 100.
- The precision of the 2D scanners' measurements is in the hundredths of a millimetre.
- The customer can to some extent adjust parameters' assessment on their own. For example, they can change limits for measured values or shift measurement fields.
- The solution can be customised and optimised to reflect changes to the length etc. of the checked plastic parts – and for the large EOL box specifically, the parts checked were up to 1,000 mm long. If a new part type enters production and its dimensions partly match those of an original part, it is enough to adapt a positioning jig or produce a new one. It is then an easy job to exchange it. Everything else (the EOL box itself and the SW solution) remains the same.
- A fairly wide range of exchangeable positioning jigs can be placed in one box.



The benefits of the solution

- It can ensure fulfilment of the strict inspection requirements demanded in automotive.
- It provides precise statistics on component defects to assist in remedying them within the production process.
- It can transmit individual checks' outputs for use in ensuring component traceability.
- It is expected to reduce customer complaints.
- It increases the part checking rate while respecting the line's required takt time.
- In the long term it saves the costs of purchasing single-purpose equipment.
- The data from its checks serves as feedback telling the production manager the production process is OK.
- It makes part checking more detailed and precise.
- It saves operators' time – they place a component in the box, start the check and can then focus on other work.
- It eliminates manual labour and increases operator safety.
- It is highly universal, variable and comprehensive – the boxes can be used on multiple assembly lines.
- It can be adapted to future customer requirements.

NOVARES CZ Janovice

NOVARES, headquartered in France, is a global manufacturer of plastic automotive components and systems. It manufactures components for the motors, air vents, door handles and internal linings of car bodies and interiors, such as columns, instrument-panel components and central consoles. It also manufactures plastics used in hybrid and electric vehicles. It owns a total of 43 plants in 23 countries around the globe. Its revenue is 1.3 billion EUR (2019 data). Every third automobile manufactured worldwide contains a NOVARES solution. The Czech Republic is home to two NOVARES plants – in Žebrák and in Janovice.