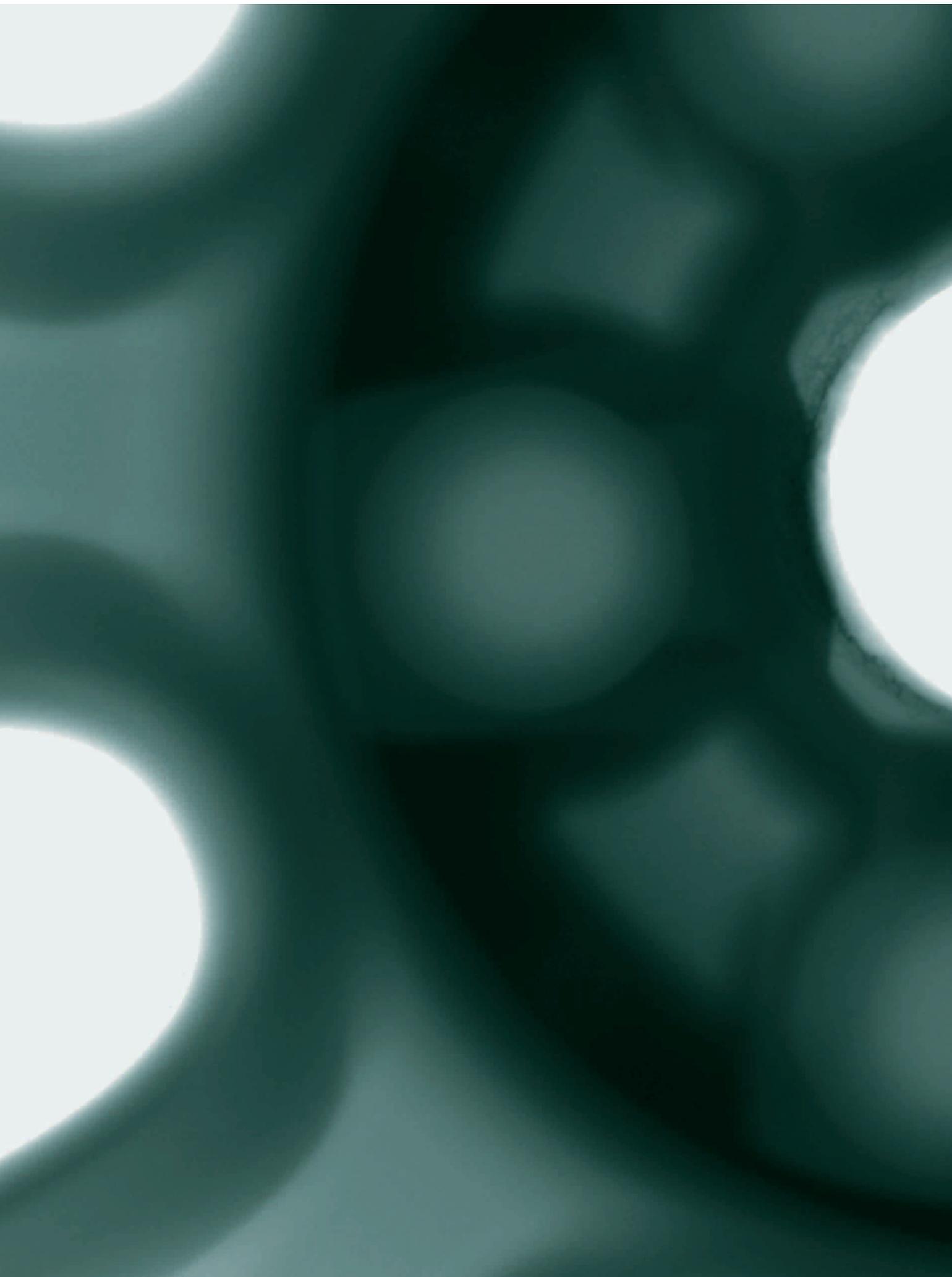


Testing system for alloy wheels with ready-to-install handling gantry

# Alloy wheels, through to X-ray!

**Alloy wheels should not only look great**, but also contribute to a safe and enjoyable driving experience. A fully automatic testing system is helping to get things moving by X-raying the cast parts for even the tiniest of flaws – delivering the fastest quality check on the market at present. The high throughput rates are achieved thanks to a ready-to-install handling gantry.





**Ready-to-use precision:** Erhardt + Abt only had to connect the handling gantry with the gripper unit using defined interfaces.



“The handling gantry was supplied ready-to-install. This allowed us to concentrate fully on the engineering and design of the testing system.”

Felix Richter, design engineer with Erhardt + Abt

**T**he radioscopy process is running at full tilt. At intervals lasting just a few seconds, the heavy rectangular partition opens and closes. One after the other, gleaming silver test specimens disappear inside to be X-rayed. The “patients” in this case are unmachined cast alloy wheels. “Rapid acceleration and dynamic cornering may be exciting for drivers of sports cars, but they subject the alloy wheels to extreme loads. This means that manufacturers are obliged to conduct thorough tests. Even the smallest air bubbles, pinholes or foreign bodies in the aluminium cast can cause the wheels to break,” explains Felix Richter, engineer with Bavarian automation specialists Erhardt + Abt, who developed “HeiDetect Wheel”, a fully automatic in-line testing system that offers significant benefits in mass production. At the heart of the system is an X-ray test system with detector developed by the Fraunhofer Institute for Integrated Circuits (IIS). Its powerful vision system detects even the tiniest of casting defects quickly and reliably.

#### **Rapid handling**

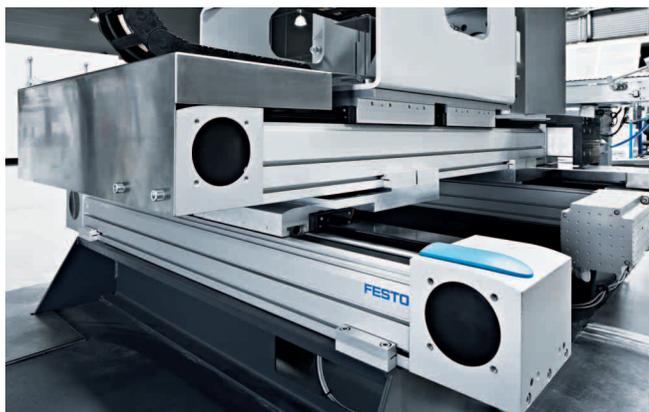
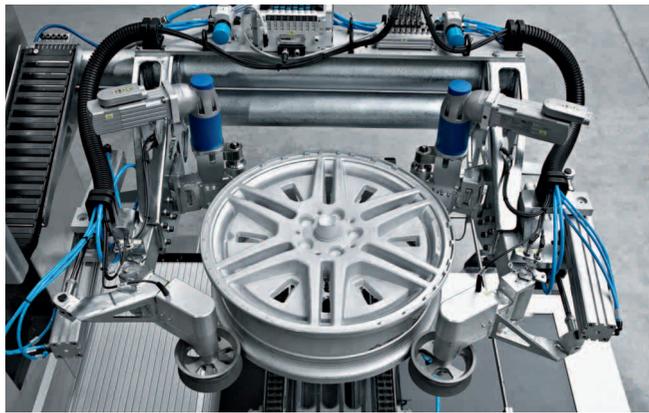
A handling gantry from Festo is responsible for delivering the high process speed. It transports up to 140 wheels per hour through the system. It was implemented according to the exact specifications of Erhardt + Abt. “The system has an extremely compact design. At some points the distance to the housing is just two to three millimetres. This demanded maximum precision from Festo,” says Richter approvingly. Festo delivered the gantry as a ready-to-install unit. Richter’s team simply had to connect up the interfaces and base plate of the system and then mount the radiation-safe steel-lead-steel chamber on top of it.

Before the wheel enters the system, an upstream station reads its technical data, including diameter and height, using a bar code. The gripper unit in the X-ray cabinet gets ready for action in accordance with the registered values and moves into the optimal position. As soon as the partition opens and the alloy wheel enters, the gripper grasps it using its support wheels. A multi-position cylinder ADNMM ensures a perfect grip

by adapting the movable front pair of rollers precisely to the wheel size. To ensure that even the smallest detail is recorded, two servo motors of type EMMS turn the wheel clockwise around the hub during the X-ray process.

#### **A tough nut**

Including the fixed alloy wheel, the gripper supports up to 168 kg. “Ensuring that the gantry construction had the necessary rigidity and dynamic response, that was a tough nut to crack. Particularly as the operating temperatures can fluctuate between 15 and 60 degrees Celsius depending on the time of year and throughput,” explains Wolfram Turnaus, sales engineer at Festo. It’s his job to work with customers in search of new solutions. In this case he needed to find high-performance cushioning for the partition. As soon as an alloy wheel enters the X-ray cabin, the 90 kg partition drops like a trap door. “It closes in just 0.6 seconds,” says Turnaus. A conventional oil-pressure shock absorber or servo-controlled drive were ruled out for the partition due to cost and maintenance reasons.



**Seamless transfer:** A chain conveyor transports the alloy wheel directly to the open gripper, which secures it for the X-ray process using four support wheels (top).

**Sophisticated dynamics:** Six EGC-185 axes connected in parallel ensure maximum dynamic response and rigidity (bottom left).



**Landing on the “air cushion”:** Two flange-mounted air chambers ensure that the partition closes quickly yet gently.

### Full, yet gentle braking

A simple, yet effective solution is a cushioning block: “You have to imagine it as being like an air pump. The cushioning block always holds a certain air volume so that the partition falls, as it were, into an air cushion and thus into the end-positioning cushioning,” explains Turnaus. The cushioning block in turn controls a pneumatic valve. As soon as the partition opens, the chamber for the “fresh-air cushion” is completely exhausted using a second valve. “The cylinder can thus extend as quickly as possible and brake fully, but gently at

the last moment,” adds Felix Richter. The entire system including its steel-lead-steel outer shell weighs 6.2 tonnes. To prevent X-rays from escaping when the partition is opened, the system restricts the X-ray voltage. This significantly increases the service life of the X-ray source and there is no need for an upstream double door system. Felix Richter is very pleased with the end result: “Festo has not only given us the freedom to concentrate on other tasks, but also contributed to construction of the fastest wheel testing system on the market at present.” ■

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**Lightning-fast trap door:** The 90 kg partition closes in 0.6 seconds and is decelerated at the last moment by a cushioning block.

## Erhardt + Abt Automatisierungs- technik GmbH

Hauptstraße 49  
D-73329 Kuchen, Germany  
[www.roboter.de](http://www.roboter.de)

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