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LEAK TESTING, ASSEMBLY TECHNOLOGY & AUTOMATION

4 DRIVE UNITS, 14 ROBOTS, 16 ASSEMBLIES & 8 LEAK TEST STATIONS

If you are wondering how the implementation of state-of-the-art leak testing and sophisticated assembly technology with highly complex automation can look in practice, this reference project with an extensive production plant for AUDI housings from the e-mobility sector will give you some answers.
In the production hall of our customer GF Casting Solutions Werdohl, topics such as "Industry 4.0" and "IoT" become tangible when an enormous dynamism within the production process lures our automation specialists out of their reserve.
What is it specifically about?
The housings for four different AUDI drive units pass through extremely different machining, cleaning, assembly and leak testing steps in a specific sequence, fully automated and intelligently coordinated by various control levels. At the same time, comprehensive process and production data is delivered, naturally including pinpoint component traceability. And that's not all: within the six cells there are special technical features such as a gantry with 3 robots and – according to our partner ABB – a unique working range of 50 meters. Assembly technology has some impressive technologies, such as joining with inductive heating, the fully automated application of individual adhesive beads and state-of-the-art verification options such as data on position and temperature monitoring or volume measurements of applied sealant using a 3D camera.

Sounds exciting? For a deeper insight into the project, we have compiled detailed and in-depth information on the following pages.
You can also find videos of the plant on our website:

SOME INDIVIDUAL OPERATIONS AT A GLANCE (CELL 1 & 2)

Possibility of direct component infeed via circulation belt

Inlet incl. buffer storage via modular vertical lift

Three robots on one axis for intelligent component handling

Depending on the component type, various machining operations in 15 machining centers

Versatile interim storage options

Transfer of the processed components to cell 2

Pre-cleaning of parts contaminated with coolant (rear axle-HA)

HA: Manual loading of the feeder drawer for heat sinks and bearing bushings

HA: Inductive heating of the heat sink

HA: Joining the bearing bush

HA: Acclimatization in the rack system

HA: Provision of the assembly part at the manual workstation

SOME INDIVIDUAL OPERATIONS AT A GLANCE (CELL 1–3)

HA: Manual pre-assembly of the heat sinks, followed by automatic assembly

HA: Screw connection of the heat sink with parameter monitoring

HA: Handover of the component for further processing

Removing a component (front axle VA) from pre-cleaning

VA: Inductive heating of the component

VA: Automatic sealant application incl. control by means of 3D scanner

VA: Joining of the bearing bush incl. position and temperature monitoring

VA: Handover of the component for further processing

Removal of a component (rear axle, type Performance – HA-P)

HA-P: Inductive heating and joining of the bearing bushing from below

HA-P: Dimensional control of the joining position, followed by transfer for further processing

After processing: Transfer component to cell 3 for cleaning and drying

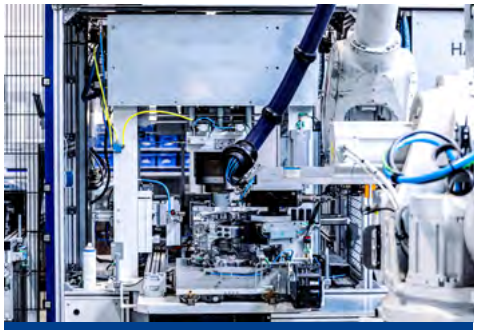
SOME INDIVIDUAL OPERATIONS AT A GLANCE (CELL 3–5)

Removal of the component from the washing cell

Acclimatization in the rack system

Automatic plug assembly & screw-in of screw plugs

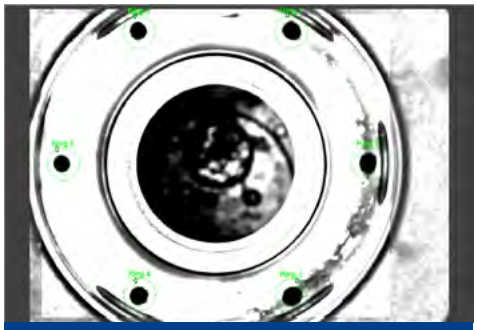
Transport to transfer rack cell 4



Leak testing of the unassembled housings

Clamping of the component as well as automatic pinning

Manual pre-assembly of cooling ring



Camera-based verification of pre-assembly

Automatic assembly cooling ring

Transfer to the cooling ring screw station

Positioning in transfer rack to Cell 5

Loading for assembly of sheet metal covers

SOME INDIVIDUAL OPERATIONS AT A GLANCE (CELL 5 & 6)

Automated removal of the sheet metal covers

Sealant application

Positioning and screwing the sheet metal covers

Deposit in rack system for curing of sealant and transfer to cell 6

Removal from shelf system

Leak testing of the fully assembled components

Rejection of the tested components

Manual final inspection

Manual work station for sheet metal ring assembly (rear axle, type Performance)

Quality control reassessment

Scanning and labeling of the finished parts

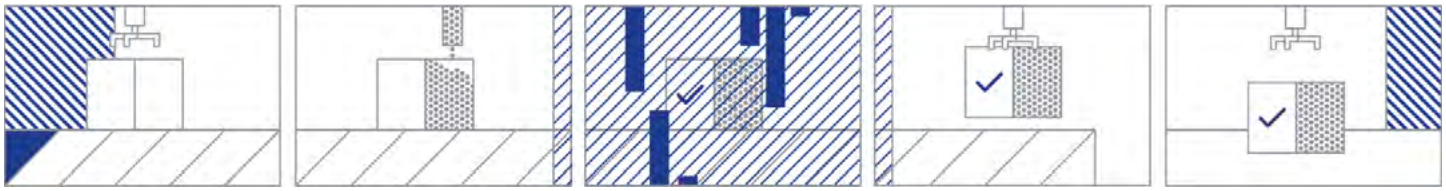
Packing for transport

SPECIAL FEATURES IN THE PROJECT

Now that the technical highlights of the machine have been described in detail, we would like to talk about a factor that should not be underestimated: The modularity of our machines. In this specific case, a capacity and type extension was carried out during the course of the project, and some of the housings were integrated into the plant only at a later date, which naturally necessitated sophisticated extensions. Thanks to good preparation and intensive coordination with our customer GF Casting Solutions, this was easy to implement thanks to the modularity of our concepts.

Facts

- Production in 1:1 mix of four different housing types with different processing times as well as assembly and test contents
- Leak testing using mass flow method
- Intelligent raw part feeding via buffers and storage systems



CONCLUSION

Normally, in this section of the reference projects, we list an overview of the various process steps, divided into leak testing, assembly technology, and automation. For this major project, however, the space should rather be used for a small conclusion including an appeal:
With this exciting project, we would like to demonstrate the high performance that modern special mechanical engineering is capable of. Every manager knows how demanding it is to coordinate all employees in such a way that everyone works as efficiently as possible and is sufficiently supplied with work and the work materials. At the same time, the work must be checked and, ideally, errors should be detected even before they happen. The comparison may sound a bit lame, but the software of this plant faces a similar challenge – and is doing its job really well so far. Intelligent warning mechanisms report possible errors even before they occur or provide extensive data for tracing problems that have already occurred. In this way, state-of-the-art automation is implemented with a entirely new level of process reliability, fully adapted to the wishes and requirements of our customer. And this can also be transferred to other industries, because the still untapped potential with regard to Industry 4.0 is still rather great almost everywhere. So have the courage to think in a completely new way for your next project...

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CONTACT

ARE YOU FACING SIMILAR CHALLENGES?

We will be happy to advise you on comparable projects and answer any questions you may have about our references.