# New multifunctional test chamber at IGOS

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Thanks to a new multifunctional test chamber, the Institute for Electroplating and Surface Treatments (IGOS), headquartered in Solingen, is now in a position also to test large assemblies for corrosion – fully automatically and without repositioning the workpieces. This represents a real boost to process capability and accuracy.

IGOS has expanded its testing equipment to include a universal testing chamber, which enables complete, uninterrupted corrosion testing in a single installation.

The substrates used in the automotive industry – steel, zinc coated steel and aluminium – must have a high level of resistance in order to prevent corrosion-related failures in automotive contexts. Independent material tests are designed to ensure this and simulate a range of weather conditions in the shortest possible time. However, despite standardised requirements, the test results of the numerous test laboratories vary considerably in terms of the depth of the test and the analytical service. In addition, the various corrosion and weathering tests are often carried out alternately one after the other in different test chambers, so that time-consuming repositioning of the components is necessary. However, such interruptions can negatively influence the test results. At IGOS, Institute for Electroplating and Surface Treatments in Solingen, this is now no longer required, with immediate effect: with its new corrosion test chamber, corrosion and environmental simulations can now be carried out fully automatically in the same chamber without having to reposition the devices under test. The size of the installation (chamber size: 2 $m^3$) and the versatile control system enable even more consistent simulation of natural corrosion processes.

Corrosion-related component failures can, in the most severe cases, cause a complete breakdown of the service brakes or other safety-related functions in vehicles, which results in manufacturers being repeatedly confronted with recalls due to potential defects. This is why appropriate material testing during development and vehicle construction is so crucial. "The framework of testing activities is defined by a large number of standards and regulations, which are, however, subject to continuous modification. Like the components themselves, the standards are also undergoing changes that the testing laboratories have to respond to in good time," explains Josef Andrek, Managing Director of IGOS. A few years ago, for example, the VDA cyclic corrosion test VDA 233-102, which specifies the assessment of components by means of a time-lapse test procedure, became mandatory. In this test, salt spray phases are combined with other climatic conditions in a defined cycle. In many laboratories, this test series is carried out in different chambers, which requires manual repositioning of the components. At IGOS, too, the components previously had to be moved between the climate chamber and a salt spray chamber three times a week for three hours. Manual interventions of

this kind in the test phase and the inevitable change of the test position may, in some circumstances, lead to a falsification of the results.

This uncertainty factor is avoided – especially for the VDA test – with the new combination test chamber in use at the IGOS institute, because it enables the complete process of corrosion testing in one machine. At the same time, this releases more capacities in the other chambers that would otherwise have been occupied for an examination process. The fully automated equipment enables the creation of reproducible corrosion profiles. These visualise the weak points in coatings or the corresponding vulnerability of the material without having to reposition the device under test during the test cycles.

**Salt spray, humidity, temperature and freezing phases in a single chamber**

With this new test chamber, a combination of salt spray, humidity, temperature and freezing phases is possible. The unit is operated completely automatically. By simulating the individual cycles alternately, the device under test is exposed to a change in weather conditions that corresponds to the real-life conditions in later operation, which allows the subsequent corrosion behaviour to be assessed more precisely. After this test, the quality of the coating can be assessed more efficiently and accurately through supplementary evaluations of deliberately applied markings such as scribed marks, cross-cut markings, scratch or stone-chip tests. To begin with, the component only needs to be positioned once and the desired test programme selected. Once the chamber door is closed, the unit performs all the cycles independently. The corresponding supply of process water and temperature is handled by high-quality heating and cooling circuits, which, in turn, are connected to a brine tank and various compressed air sources. Thanks to an installed climate module, tests can be carried out in a temperature range from -15 °C to +60 °C. "This functional extension is particularly necessary for cyclic corrosion tests in compliance with VDA 233-102, as this involves a cold phase at -15 °C," adds Andrek.

The interior of the chamber is lined with a special weather-resistant plastic and has a larger volume (BHD: 2 x 1 x 1 metres), so that test objects of different sizes and even complete assemblies can be subjected to the tests. In the choice of the control system, versatility was a key consideration: various test programmes are stored in the control cabinet, which can be operated via a convenient touch panel. The chamber has an integrated dedicated computer on which a program for operating the test chambers has been installed. This program can be used to configure new tests or modify existing ones. In addition, new test sequences pre-programmed by the manufacturer can be loaded from the memory. During a test, all the readings are automatically recorded and saved so that they can be easily transferred to a corresponding analysis report and archived later. A convenient test report ensures the traceability of each individual test cycle.

**IGOS is an officially approved test laboratory for type approvals**

The new test chamber is the latest addition to the comprehensive pool of equipment that the institute uses in its daily work. Thanks to the multifunctional chamber, other equipment is less frequently tied up for corrosion testing and can be used for other corrosion simulations at the same time. In addition to corrosion tests, supplementary chemical material and coating

analyses as well as various types of tests are carried out at IGOS within the framework of electroplating and painting technology. This is one of the reasons why IGOS is one of the few accredited laboratories that is approved by Mercedes-Benz as an official test laboratory for type approvals in accordance with the initial sample guidelines (WEB 2020$^{+}$) from a materials engineering viewpoint and is included in the list of V100 laboratories at Mercedes-Benz. "With the new test chamber, we now see ourselves even better equipped for the various challenges and testing scenarios that we encounter in vehicle construction as well as other areas," Andrek sums up.