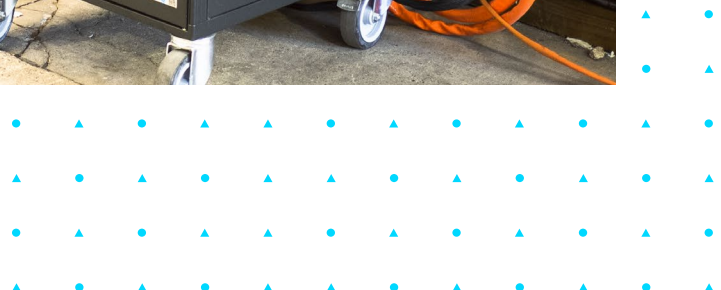
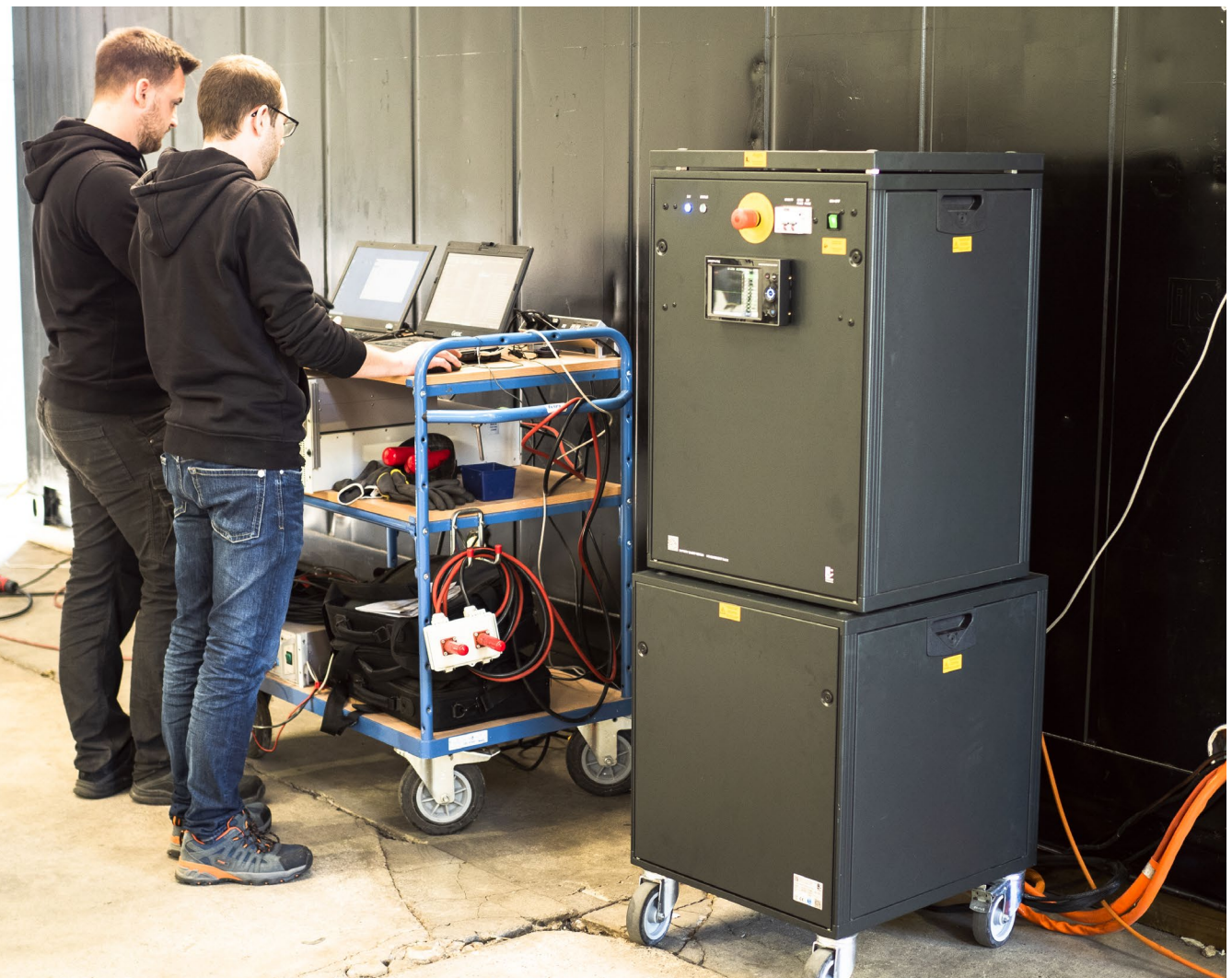


# UMLAUT

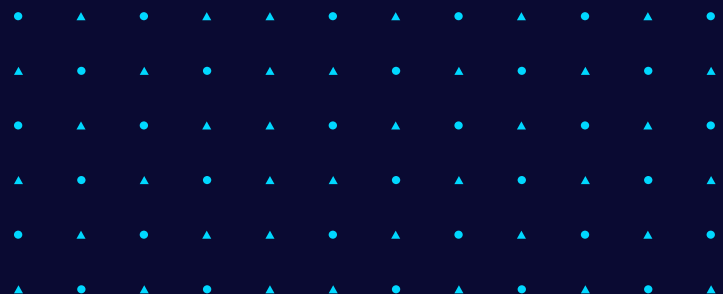
BATTERY SHORT CIRCUIT TESTER





**„The colleagues from  
SMART TESTSOLUTIONS  
always gave us the feeling  
that they understood what  
we needed. After all, it's  
always about delivering  
exactly the right thing with  
extremely high quality at  
the lowest possible price.  
The cooperation was  
excellent. “**

Dr. Christian Neidel,  
Senior Manager eMobility, umlaut



## THE CLIENT

<b>Country:</b>	Germany
<b>Field of activity:</b>	umlaut, part of Accenture, is a global, cross-industry, full-service company that provides technology and organisational consulting and engineering services to clients around the world.
<b>Employees:</b>	4,200 specialised experts and engineers in 20 companies at over 50 locations worldwide
<b>Website:</b>	<a href="http://www.umlaut.com">www.umlaut.com</a>

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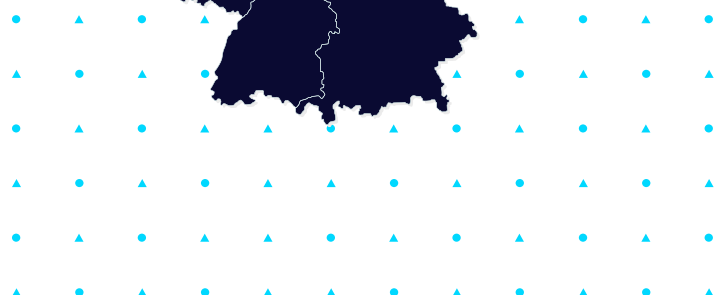
## THE CHALLENGE

umlaut had noticed that test capacities in the field of automotive batteries in Germany were limited - especially when it came to destructive tests. As a full-service provider that is itself involved in the development of batteries, the company therefore decided to set up its own area in Braunschweig for hardware tests on batteries, especially for testing battery safety devices. For this, umlaut needed a powerful short-circuit test system. Since a first customer enquiry was already on the table, only three months were available for the construction of the test stand.

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## THE SOLUTION

In close cooperation with SMART TESTSOLUTIONS, a test stand was developed that can connect external short circuits to a battery and record the behaviour of the safety devices by means of extensive measurement technology. umlaut had considered developing such a test stand itself. However, SMART's previous experience with the development of a very similar system spoke in its favour. This made it easier to keep to the tight time frame.



## THE CLIENT

umlaut, part of Accenture, is a global, cross-industry, full-service firm providing technology and organisational consulting and engineering services to clients around the world. Deep expertise, broad practical knowledge and interdisciplinary collaboration enable the company to add value, quality and focus to their clients' services and products.

United in a competent and agile collective of 20 consulting companies and engineering offices at over 50 locations around the world, 4,200 specialised experts and engineers provide innovative solutions and transformations for all industries and their various interfaces. At the location in Braunschweig, umlaut offers automotive and component manufacturers destructive tests on battery systems.

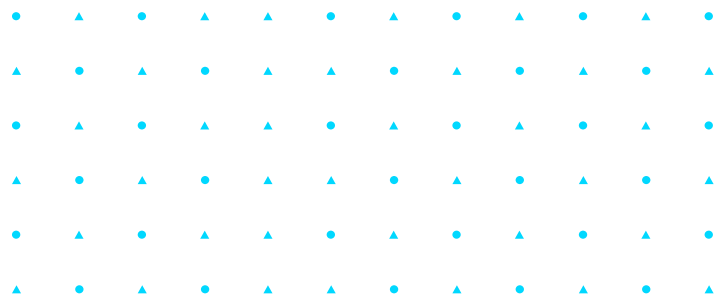


## THE CHALLENGE

Battery systems for electric vehicles are potentially dangerous. If a malfunction leads to a short circuit, this can lead to so-called „thermal runaway“. This is a chemical chain reaction that can no longer be stopped after a certain point. Fire or even explosion are the consequences. In order to avoid this and to be able to operate the energy storage systems safely, vehicle batteries are equipped with safety devices that interrupt the current flow in the system in the event of a short circuit and thus prevent the chain reaction.

The function of these safety elements must be comprehensively tested: Are the contactors and other fuses such as fusible and pyro fuses working? Does the battery system detect a malfunction and then shut down reliably? These questions arise again and again not only in the final product, but throughout the entire development process. Given the growing number of electric vehicles and different models, the number of battery variants is also increasing and with it the number of different safety elements. Each one has to be tested intensively.

The problem: test capacities are limited. „Especially when a test is needed at short notice during the development phase, it is often difficult to find appropriate test capacities. This is especially true for destructive tests,“ reports Dr. Christian Neidel, Senior Manager eMobility at umlaut in Braunschweig. umlaut therefore decided to build up test capacities itself. A first customer enquiry for testing battery safety devices had already been received. umlaut had only three months to set up a complete test stand for this purpose, which induces external short circuits and then measures the behaviour of the battery and the safety devices.



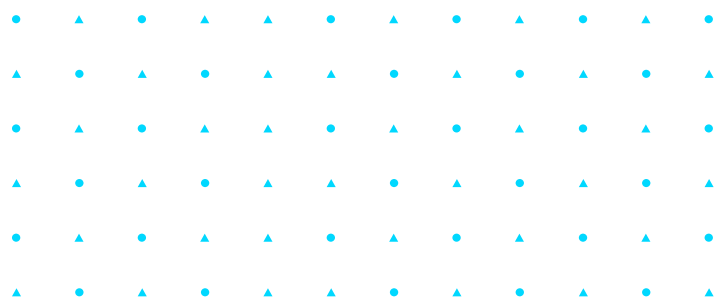
## THE SOLUTION

At first, umlaut thought about developing a corresponding test system themselves. However, in view of the time pressure, the company decided to commission SMART TESTSOLUTIONS with the development and construction. What spoke in SMART's favour was that we already had experience in setting up a short-circuit switch for a very similar application. „This gave us the good feeling that we would quickly have a test system available that would not have to be tested for a long time,“ says Sven Böttcher, Manager eMobility. umlaut chose an old warehouse as the test environment. During the tests, the test specimens are in locked containers, some of them even suspended above a pool of water, so that they can be quickly extinguished in an emergency. After all, we are talking about potentially dangerous tests.

The test system developed by SMART according to the requirements of the umlaut team is modular. The smaller cabinet contains the short-circuit switch, which can switch on the short-circuit. Placing it in a separate cabinet has the advantage that the connection paths to the test object can be kept short. It would also be possible to place the switch in the container. At present, however, this is not necessary. The total resistance of the test stand is less than 1 milliohm and with connecting cables and connectors still 2 to 3 milliohm. „This is a very good value that represents the values in a vehicle. So we are very close to the real conditions of a vehicle battery,“ says Böttcher. Nevertheless, the idea of separating measurement technology and short-circuit switch is well received by umlaut. „Tests are quite conceivable in which we will make use of the option to operate the measurement technology at a safe distance,“ says Neidel.

The measurement technology in the tester's larger cabinet includes 16 high-resolution analogue measurement channels and a data logger. The battery voltage, for example, is measured because it shows a characteristic curve in the event of a short circuit. „In this way, we can prove that it is a short circuit, as it can also occur in the vehicle, and that the test has run cleanly,“ says Böttcher. Other observable variables are the trigger signal for the pyrotechnic fuse and the level of the short-circuit current. The latter is measured in two ways: firstly with a Rogowski coil and secondly by means of a high-performance, very accurate measuring shunt. In addition to various other voltage values, the temperatures in the test object are also measured. The tester has a total of 10 temperature measurement channels with type K thermocouples.

After initial difficulties within the normal framework, the measuring system now works perfectly. However, the motor control of the short-circuit switch, a third-party component that is actually intended for other applications, is still causing problems. In the umlaut setting, this component does not work reliably. „SMART has recognised the problem and has already presented us with a solution, which they are now working on implementing. We didn't even ask for this, because the cause is not SMART's,“ Neidel is impressed. This is not the standard case. „The way SMART works with us, tries to understand what we need and responds to our needs, is very similar to the way we ourselves deal with our customers. You don't find that very often.“ Demand for testing capacity at umlaut is high, and a second short-circuit tester is already under discussion.



## CONCLUSION

„There are many suppliers where we could have got an off-the-shelf system. But that would have been significantly more expensive and still not as precisely tailored to our application. I thought it was great right from the start how SMART responded to our requirements and ideas. In addition, they brought in their own ideas and the end result is something to be proud of. By the way, visually too: the tester looks very smart.“

Dr. Christian Neidel, Senior Manager eMobility, umlaut

## ADVANTAGES AT A GLANCE

- ▶ Ready to use test system from a single source, precisely tailored to the planned applications. tailored to the planned applications
- ▶ High flexibility of the test stand through division into short-circuit switch and measuring rack, whereby the measuring rack is expandable
- ▶ Comparatively inexpensive test system with extremely high quality
- ▶ No time-consuming, lengthy trial phase required, as SMART Testsolutions already has experience with comparable systems

## PRODUCTS AND SERVICES SUPPLIED

- ▶ System development and customising of the components used according to the needs of umlaut
- ▶ Integration of external components, packaging
- ▶ System wiring harnesses with corresponding connectors

**BE SMARTER  
AND CONTACT US.**

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