STAR®

VEHICLE ELECTRONICS

# Rethinking mobility

*The automotive industry's motto for the next few years is "go safe, go green & get connected!" Our STAR experts have fully adopted this guiding principle and are pursuing it with creative ideas and innovative approaches. They develop new technologies for increased road traffic safety, they set further developments in electromobility in motion and develop holistic solutions to every problem in close collaboration with you. Our STAR experts quickly and successfully implement your complex technical projects.*

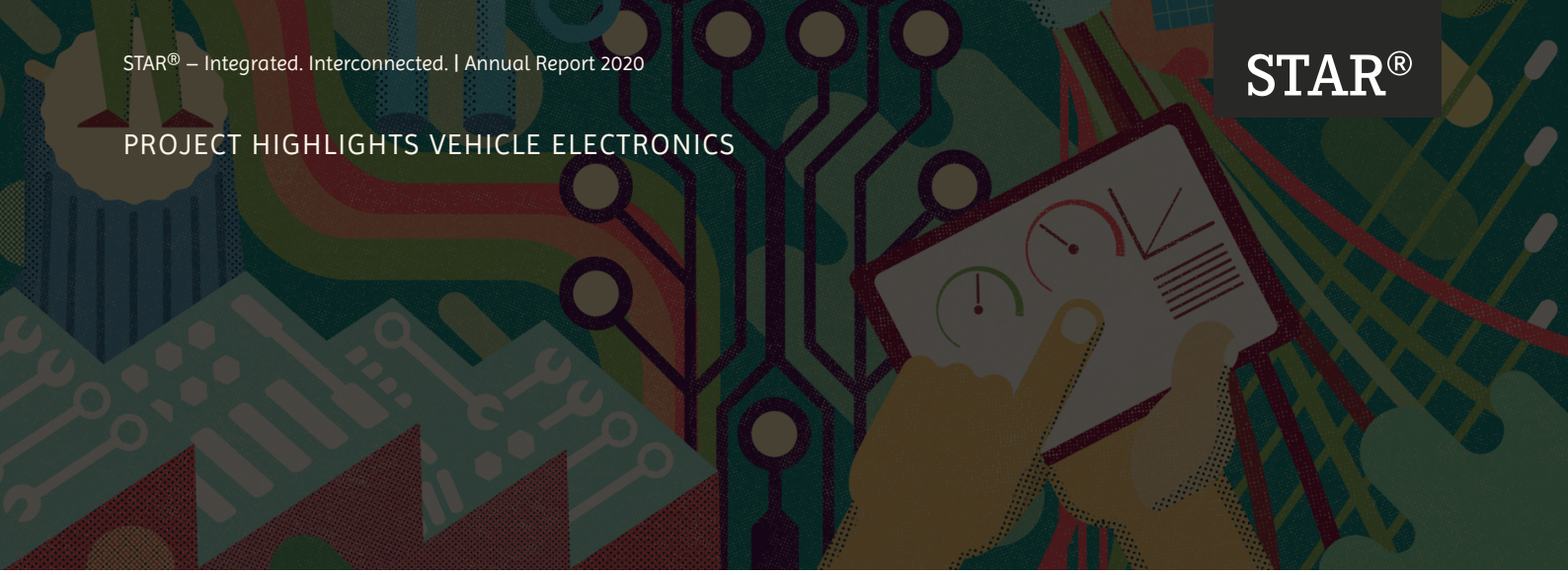
## Ideale vehicle connectivity with FlexConfig RBS

The future belongs to self-driving cars! However there are still a few steps to be taken. Vehicle connectivity, is an significant topic in this context. Our experts from the ELECTRONICS division know all there is to know about it. They manage to create solutions and keep refining them, make your ECU test as simple as possible for our customers and facilitate complex developments for vehicle electronics.

***The starting point.*** Owing to the increasing complexity of vehicle networks, more and more components within a vehicle are networked with one another. This constantly results in new performance requirements for safety, driver information and comfort. In addition to the in-vehicle applications, networking with external systems poses a further challenge.

***The goal.*** The main goal is the intelligent, self-driving automobile. Vehicles are already transmitting data to service providers through the Internet. This is why vehicle connectivity tools are needed which meet the most challenging requirements as well as the standards of measurement and simulation technology, and which are flexible and easy to use.

***The solution.*** Our experts support customers around the world with numerous FlexConfig RBS products. From gateways and bus interfaces for various bus systems to restbus simulation, signal manipulation, measurement data visualization and rapid prototyping. In 2020, our customers put their trust in the following products in particular:
***FlexDevice-L²*** is our high-end model from the FlexDevice family. The high-performance hardware solution with four integrated processors offers sufficient performance for current and future requirements. The compact hardware is modular thanks to exchangeable transceivers. Up to 30 channels can be implemented. In connection with FlexConfig RBS, a quick and easy implementation is guaranteed for every project. With ***FlexConfig RBS*** as powerful configuration software, our customers can create gateway configurations or restbus simulations for FlexDevice products easily, quickly and automatically with just a few clicks and without programming knowledge. FlexConfig RBS has been expanded to include a logging functionality so that our customers can avoid installing additional data loggers. The logging feature has been available to all customers since mid-2020. The ***FlexConfig Analyzer*** also grows together with FlexConfig RBS. Owing to a functional enhancement of the FlexConfig RBS configuration software, our customers can quickly and easily visualize bus data on a smartphone or tablet via WiFi. Various visualization elements such as graphs, speedometer elements, buttons, traffic lights, labels and much more are available for the display. This feature has been included in the standard delivery of FlexConfig RBS since late 2020. With ***FlexCard PCIe3*** and the ***FlexCard PXIe3***, an established product has been reinterpreted. The new hardware variants of the FlexDevice now features an integrated measurement solution. The new hardware enables our customers to integrate real-time restbus simulations, gateways and signal manipulations directly into their measurement environment. The complete calculation of the data is carried out on-board on the integrated Altera Cyclone processor (ARM Cortex-A9 Dual Core CPU). As a result, the main processor of the measurement system is not stressed and is fully available for other applications. In addition, both variants of the FlexCard can be used as an interface card to the connected bus systems. With its pluggable transceiver modules for 1000BASE-T1, 100BASE-T1, 100BASE-TX, CAN-FD, CAN-HS, FlexRay, LIN und SENT, it offers maximum flexibility.



PROJECT HIGHLIGHTS VEHICLE ELECTRONICS

## New Efficiency in sensor and actuator technology with the Flex Family

The number of different actuators and sensors is increasing with the constant expansion of electronics in vehicles. Our ELECTRONICS division supports the technical advancements in automotive technology with its service portfolio of sensor and actuator technology. And what does this achieve? This provides our customers with outstanding mobile and powerful signal generators.

***The starting point.*** More and more signals have to be measured and functions managed in vehicles. Many of these functions are integrated into control units. However, the future lies in the generation and simulation of electrical signals for the preceding sensors and actuators.

***The goal.*** Intelligent components are to be used to measure and change conditions directly at the point of origin. Simulators that influence and check the conditions in the test vehicle with different measured values are often used for this purpose.

***The solution.*** With the FlexGen product family, our experts developed powerful and mobile signal generators for our customers. These signal generators can generate, simulate or manipulate PWM, SENT and PWG signals or sensor data. FlexGen-M BDLC is the new product in the FlexGen product family. Based on the previous PMW generators and in coordination with the customer's requirements, FlexGen-M BDLC was developed by our ELECTRONICS experts. It is a PMW generator for controlling brushless DC motors in automotive components. The robust device features a three-phase sinusoidal field-oriented control but also supports the collection and processing of SENT position sensors. Owing to the modular and versatile platform, it is even possible to implement custom flow controls for special manufacturing processes or test procedures.

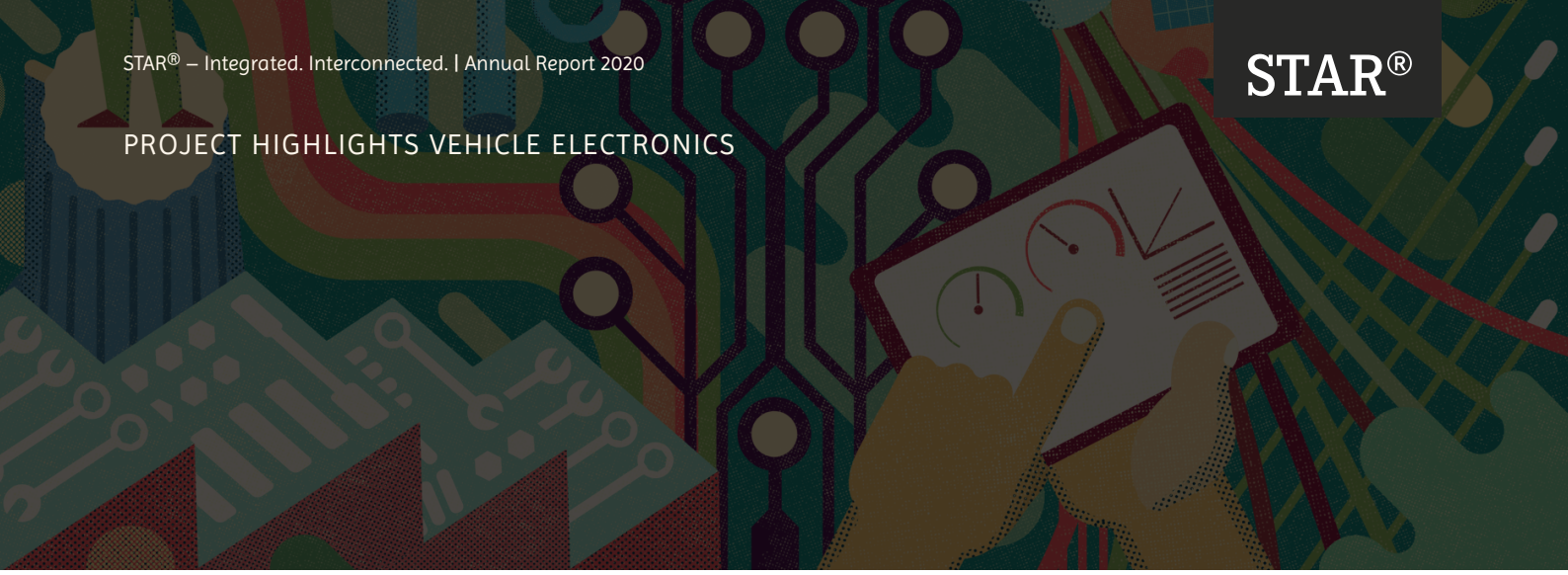
## Full throttle with 3D real-time displays

With us, digitalization is advancing rapidly! Our experts from the ENGINEERING division can not only develop, test and manufacture, but also execute 3D real-time representations and use them in augmented reality.

***The starting point.*** In the ENGINEERING division, our experts have an eye for trends. This time, they reinterpreted the world for an OEM from the automotive industry in the Stuttgart area and delivered innovative training media. The result is anything but ordinary documents. The automobile manufacturer now has real-time repair and training documents that are currently being used across the world via PC and could be available as an augmented reality application in the future.

***The goal.*** To this end, we develop workflows and prototypes which help enable a 3D real-time display of a wide variety of series and models.

***The solution.*** Conceptual and practical use by the STAR experts enables the development of the necessary end-to-end tool chain that makes the visionary goal possible. In this case, end-to-end means that there is a direct connection with intermediate stations. As early as August 2020, all workshops across the world were able to access the 3D real-time instruction media and use it right away.



PROJECT HIGHLIGHTS VEHICLE ELECTRONICS

## Working today to secure the future of tomorrow – cybersecurity in the automotive environment

Vehicle connectivity continues to advance, be it the mobile online services, flash over-the-air, CAR-to-X or even autonomous driving. Our experts from the ENGINEERING division are not only keeping pace, but they are also actively helping to shape this exciting development. They can thus already ensure that future driving will be safe and, for example, carried out without external intervention.

***The starting point.*** The more networked the vehicle, the greater the risk that vehicle data will be manipulated or that vehicles will simply be taken over. The increasing use of different technologies also means that there must be numerous interfaces. These greatly increase the risk of external interventions. Together with our customer, we developed a system landscape that is secure! To do this, our experts aligned all of the vehicle's systems including the back end with a focus on vehicle security.

***The goal.*** A simple cookie-cutter solution to this problem was not good enough. That's why our experts wanted to think through all individual cases thoroughly, examine special cases from different perspectives and precisely analyze each interface.

***The solution.*** After the conceptual design and development of the system landscape, the test phase followed quickly. For this project, a test environment was designed that scrutinizes the individual systems. For ultimate efficiency, our experts automated the tests to the greatest extent possible and thus were able to correct anomalies and errors at the earliest opportunity. Our ENGINEERING experts were able to shine in these diverse tasks relating to vehicle security owing to their up-to-the-minute expertise.

## Make new with the old – new rear axle drives in the same plant

There has been more tinkering and forging at the innovation forge of the STAR subsidiary atec innovation. What was the result? Not just an idea, but also a conversion – or was there any conversion at all? We'll gladly tell you all about it.

***The starting point.*** The experts at the STAR subsidiary atec innovation ensure an innovative and sophisticated plan and its implementation for the construction of new rear axle drives. They are busy at work at the manual assembly plant of the vehicle giant Mercedes-Benz. Thanks to a simple yet highly complex solution, the significantly larger variant HAG240 can now be easily installed in the existing line.

***The goal.*** The HAG240 is a new and important player in the plant, as the plan is to install it in S class vehicles as well as in special protection vehicles. To prevent a loss of efficiency in the process, it's important for the assembly of the new rear axle drives to fit perfectly into the existing operation.

***The solution.*** The bright minds of the innovation forge started with the question of whether the HAG240 could be installed in the existing line. They explored this exciting question through a professional feasibility study and were able to provide a positive answer with their expertise. Now it was time to make adjustments. Firstly, all the required new parts and tools were designed in 3D. They were then manufactured with the aid of precise manufacturing data and installed in the plant. After these steps had been successfully completed, it was time to put the new tools into operation and give the employees brief function inductions. The HAG240 are now assembled in large numbers with our tools in the existing production line – without any conversions thanks to the help of our experts.

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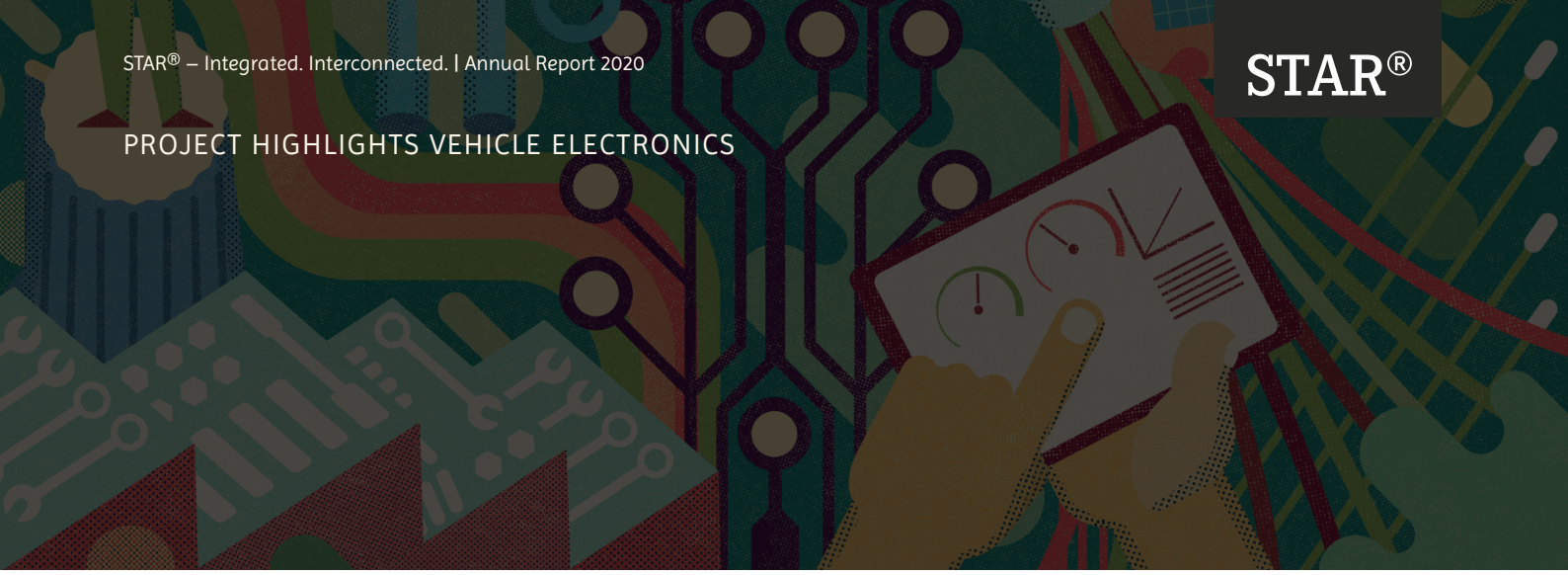

## Measurement technology to support electric vehicles

The future of driving is electric. It's no longer a matter of whether electromobility will come, but rather how quickly it will catch on. In compliance with strict safety standards,
our experts from the ELECTRONICS division provide support for energy measurement technology as well as test and inspection structures for e-mobility. In doing so, they actively advance progress.

***The starting point.*** The electrification of vehicles requires more and more high-performance electrical and electronic components. For test purposes, high-voltage components in test vehicles such as high-voltage batteries are equipped with numerous additional temperature sensors for temperature analysis.

***The goal.*** Before using the various temperature sensors, it must be ensured that they are fully functional, meet all HV safety requirements and can therefore be operated without posing a hazard. In the future, the checks need to be carried out more reliably and considerably more quickly than is possible for a worker to do manually.

***The solution.*** By developing and setting up an HV measurement point testing device for temperature sensors of type PT100 (16 channels) and thermocouples (32 channels), our customer can quickly test their built-in temperature sensors reliably and safely. The device tests the individual built-in temperature sensors automatically and without reconnecting to check for correct function, short circuit/cable break, lack of voltage and insulation resistance. The whole measurement process is automated. The measured values are then simply stored directly in a preconfigured Excel table.

## STARS carry out a driving experience study

A vehicle for the upper mid-size market is taking big steps into the future and our STAR experts will be there every step of the way. The focus is not only on emotive design and a high-quality interior, but also on innovative driver assistance systems. But how do assistance systems affect the driving experience? Our experts investigated this question via a study.

***The starting point.*** A psychological study will analyze how the intervention of assistance systems is experienced by passengers during a drive. However, the customer's specialist department consists of experts with a non-technical background.

***The goal.*** When carrying out the study, a highly technically demanding topic needs to be combined with ease of use to make the measurement technology usable for laypersons as well.

***The solution.*** By equipping a vehicle with measurement technology, cameras and microphones, the visible reactions as well as the vital data of the occupants were recorded while driving. The components were placed in such a way that they did not interfere with driving operations. An Android app developed by STAR was used to receive and analyze vital data from a sensor wristband via Bluetooth. The received data was sent to a computer via Wi-Fi which saved the data from all data sources synchronously. With another software developed by STAR, we made it possible for the customer to easily manage all measurement data. In the end, the modified vehicle was checked with positive results by Dekra for series approval.