

# NEWSLETTER

09/2019

## ADVANCED TECHNOLOGY

New Challenge for Test Benches  
driven by E-Mobility

Our target is to provide the customer with a tool that, despite its complex high-tech design, is cost-effective, robust and versatilely applicable for e-mobility.

## Greetings from GTSystem

The automotive industry faces major, fundamental technological challenges related to e-mobility. Our increasing environmental awareness and noticeable climate changes are forcing humanity to make every effort to rebalance its carbon footprint. In future, only a (partially) electrified powertrain will have an opportunity on the market. New players like TESLA, NIO and BYTON challenge the long-established manufacturers. At first the traditional OEMs seemed to fall behind in terms of electrification and battery research, so I feel that they are currently experiencing a reversal of the innovation pendulum in favor of Western engineering. By 2020 alone the VOLKSWAGEN GROUP is investing more than 30 billion euros in its E-Offensive. Here is the law of the large inertial mass, which at first wants to be accelerated.

GTSystem GmbH is fully committed to this change as system integrator. With over 40 employees in Germany and China, we are developing novel highly dynamic transmission test benches for electro mobility. The requirements for such test benches are

- Speeds > 20,000 rpm
- Power > 400 KW
- Environmental simulation from -50 °C - + 120 °C
- Battery simulation with currents > 1.000 A
- Worldwide certified power measurement with YOKOGAWA devices
- Very high control speed
- High realistic simulation capability
- Subcritical behavior / performance
- NVH capabilities
- Price-sensitive
- Easy adaptation of new tests and future drives
- Integration of shift robots and actuating elements

Furthermore, an End-of-Line (EoL) test bench designed for electro mobility is currently being developed. In this regard, the GTSystem is supported in a cooperation with the production line integration by the company Branscheid Industrie Automation



GmbH, which has great experience in the field of automation of production plants. Within a cycle time of less than 10 minutes all parameters of a DHT transmission including flashing of the software should be examined.

Thanks to the extensive experience of its employees, GTSystem has already delivered more than 70 test benches worldwide, of which 26 test benches alone have been delivered since 2016. Here, the customer benefits are that the partner company GETEC Getriebe Technik GmbH operates almost 15 test stands on behalf of the customer 24 hours a day, seven days a week, thus incorporating direct field experience into the know-how of the test stands. Millions of test kilometers result in a unique symbiosis of application and test bench concept, thus experience and a high degree of robustness and a high customer benefit.

The world's largest market for electro mobility and thus also for testing tools is undoubtedly China. The vast majority of new players in this market segment can be found here, especially since the promotion of this technology was included in the five-year plan of the Chinese government. Due to China's dependence on oil, the high levels of air pollution in megacities and the very complex thermodynamics of conventional combustion engines, China sees itself as an advantage in the research and development of electric vehicles.

Our target is to provide the customer with a tool that, despite its complex, technology leading high-tech design, is cost-effective, robust and versatile for e-mobility. With quality, high transparency and absolute on time delivery we would like to inspire you as our customers.

Best regards

*Dieter Apold*  
Dieter Apold

## NEW CHALLENGE FOR TEST BENCHES DRIVEN BY E-MOBILITY



Author: Mr. Peter Krämer  
Project Manager



As an integration specialist for test benches with many years of experience in testing vehicle powertrains, GTSYSTEM has always faced the new challenges on the market and has often set the course for new technologies.

GTSYSTEM test benches have already been in use for many years, enabling the smooth transition from the old world of conventional drives with internal combustion engines to hybrid systems with battery simulation technology.

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Electric mobility is expanding at a rapid pace. In 2018, the global electric car fleet has surpassed the 7.5 million mark. The forecast tripled to 2025. The People's Republic of China remains the largest electric car market in the world, followed by Europe and the United States. Norway is the world leader in terms of market share of electric cars.

New requirements due to the growing influence of e-mobility (like shown in Figure 2) present automotive manufacturers and suppliers with new challenges. Conventional and alternative vehicle technologies must become more and more efficient in the future.

Modern electric motors with rotation speeds up to 25,000 rpm can no longer be tested on conventional test benches. For this reason, GTSystem developed a high-end E-Mobility test bench to meet all the challenges of the future automotive industry.

Due to the very high drive speeds of the electrified drivetrains much higher demands are placed on the mechanical components of the test bench. In addition to detailed finite element calculations, the use of new materials is a prerequisite for a smooth test procedure.

The GTSystem E-Mobility test bench helps to analyze the electrical, mechanical, environment and acoustic properties of the electric motor.

GTSystem has developed cost efficient scalable and standardized E-Motor test bench configurations from 50 kW – 500 kW and up to 600 Nm. A highly dynamic synchronous dyno with extremely accurate speed control for highest testing requirements. Due to the close cooperation with the supplier GTSystem is able to adapt the dyno exactly to the customers test procedure.

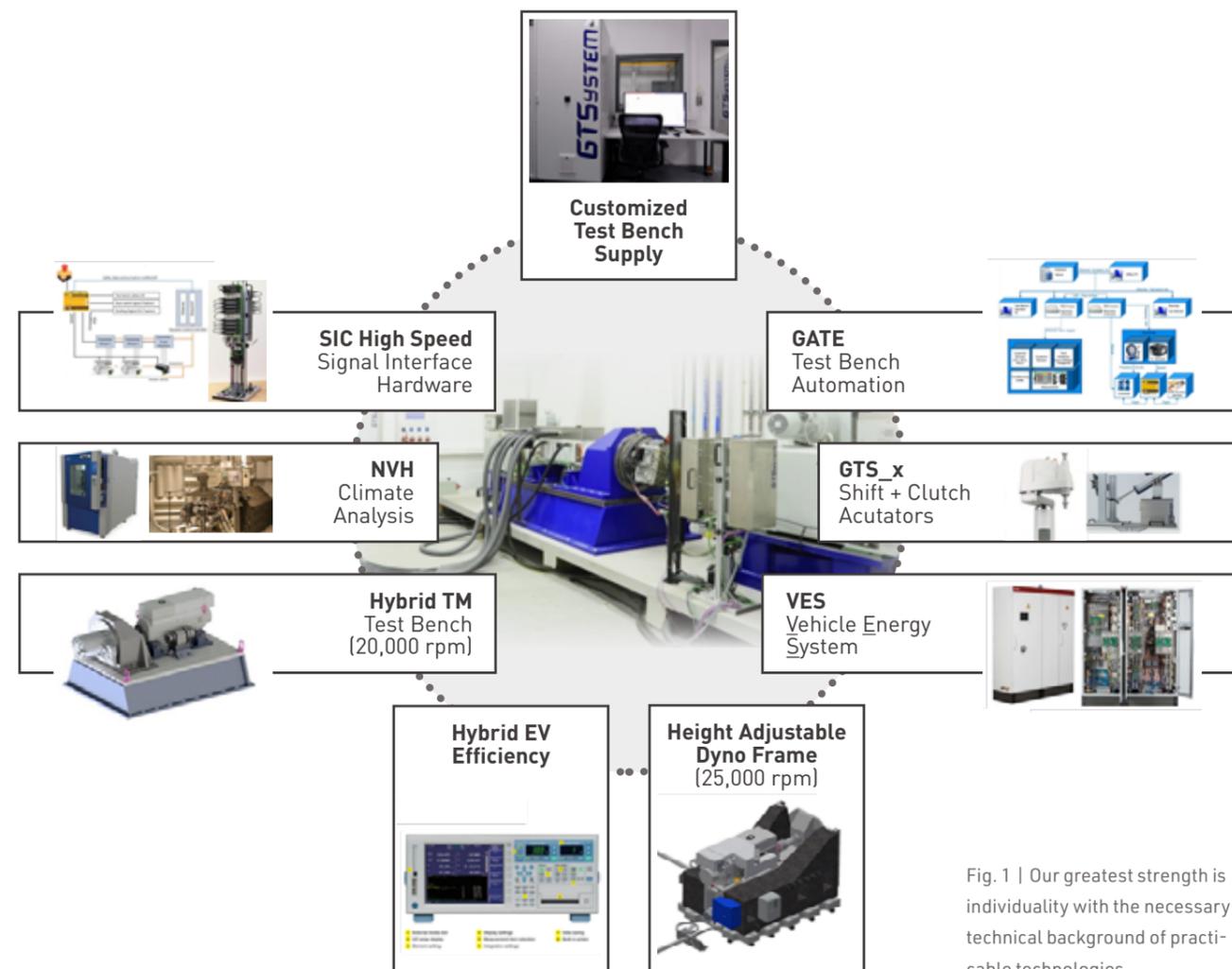


Fig. 1 | Our greatest strength is individuality with the necessary technical background of practicable technologies

Fig. 2 | Light Vehicle Production until 2025 (Source: Strategy Analytics October 2018)

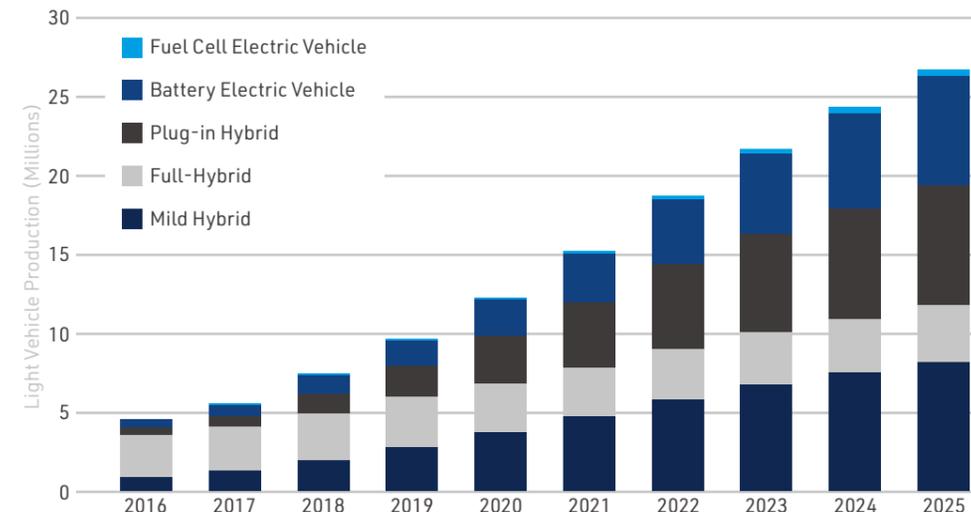


Fig. 3 | Universal GTSystem Hybrid & E-Mobility Test Bench



Fig. 5 | Flexible GTSYSTEM Hybrid & E-Mobility Powertrain Testing

## GTSYSTEM has decided for a unique concept with externally controllable switching frequency

In order to guarantee a low-vibration test operation up to 25,000 rpm on the test stand, special mechanical solutions were developed for the clamping frame of the test piece and the drive machine. New technologies have been used with support of specialized suppliers to implement the material damping requirements.

To control the drive machines, very high dynamic demands are needed on the converter technology. GTSYSTEM has decided for a unique concept with externally controllable switching frequency, which enables the operation of 16,000 rpm, 18,000 rpm and 20,000 rpm drive machines on one inverter type. This considerably simplifies the universal use of the test bench for the customer.

Typical applications for these test benches are thermal tests under various climatic conditions, efficiency tests, performance and endurance tests.

Besides the full environment condition simulation (-50°C up to 150°C) GTSYSTEM has integrated Sic Module as unique high precision battery simulation technology instead of IGBT technology up to 1000 V & 2000 A. This new technology increases the precision twice and reduces the cabinet space half. According the high voltage and current requirements GTSYSTEM has developed several energy boxes for safe connection with the device under test (DUT).

GTSYSTEM latest development to fulfill highest testing standards for hybrid and full electric powertrains with easy to handle flexibility is a height adjustable input dyno frame.

The new frame structure with high damping polymer concrete in combination with steel allows speeds up to 25.000 rpm. The maximum height adjustment of 160mm allows the easy setup of most of the e-mobility test parts on the market. The frame was extensively tested in GTSYSTEM Germany and the damping behavior was rated as first class.

Due to the unique mechanical design in combination with new materials, GTSYSTEM has applied for a patent for the height-adjustable test setup.

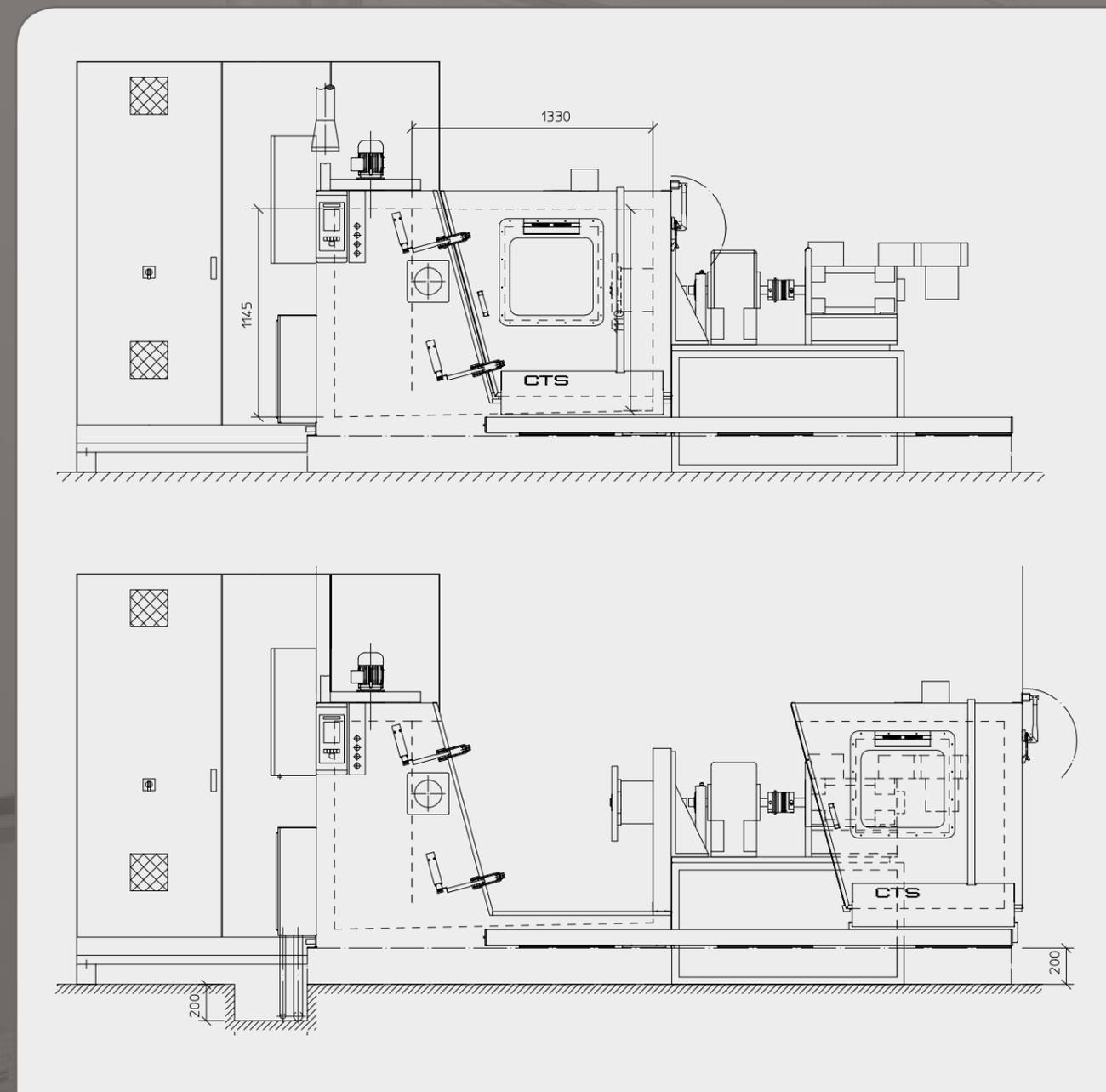


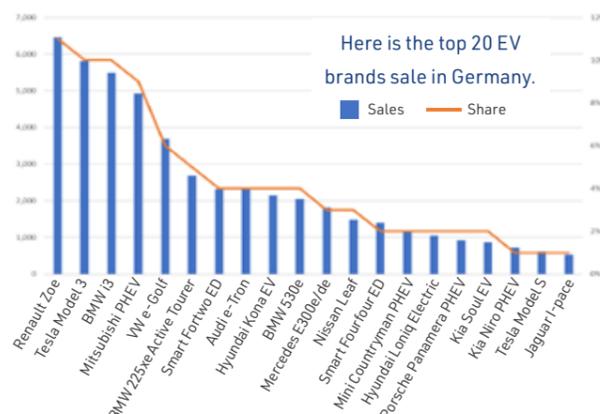
Fig. 4 | Example of a one-dyno e-mobility test bench with full integration of a climate chamber. (Source: CTS Germany)

### EV Sales in Germany 1-7, 2019

Report from Gasgoo, Data from EV Sales

According to the German electric vehicle sales data released on the EV Sales website, after the good results in the first half of the year, the number of electric vehicle registrations in Germany continued to climb in July, with 9,233 units sold, of which pure electric vehicle sales surged by 136% year-on-year. Sales of plug-in hybrid vehicles increased slightly by 6%. Last month, the German electric vehicle market accounted for 2.8% of all new car sales, of which the pure electric vehicle market share was 1.8%.

From January to July in 2019, the cumulative sales of EV in Germany is 56,817.



### Tesla mulls potential factory locations in Germany

From Wire reports

In its search for a potential factory location in Europe, Tesla examined areas in Germany's state of North Rhine-Westphalia, Rheinische Post reported on Sunday, citing unidentified people familiar with the topic.

First inspections have taken place, the paper said.

Tesla is also looking at the German state of Lower Saxony, its Economy Minister, Bernd Althusmann, said last week. In June, CEO Elon Musk called Germany „a leading choice for Europe“ in a reply to a tweet asking if it would be wise for Tesla to set up its first European gigafactory in the country.

„Perhaps on the German-French border makes sense, near the Benelux countries,“ Musk said.

North Rhine-Westphalia, Germany's most populous state, shares borders with the Netherlands and Belgium. Lower Saxony shares a border with the Netherlands.

Europe is projected to be the world's second-largest driver of electric cars in the next decade, trailing only China.

Tesla is racing against time as more established players wake up to the electric future. Customers can already choose between a growing number of battery-powered models from the likes of Mercedes-Benz, Jaguar and Audi.

Tesla spokespeople in Europe were not immediately available for comment.

Bloomberg and Reuters contributed to this report

### CHINA MULLS RELAXING CURBS ON AUTO SALES TO SPUR MARKET

From Reuters

China unveiled measures on Tuesday to help boost consumption, including the possible removal of restrictions on vehicle purchases, as growth in the world's second-biggest economy falters amid mounting U.S. trade pressures. The State Council, or cabinet, said in a statement that local governments that have restrictions on auto sales should explore gradually relaxing or removing those curbs, while they should also encourage the purchases of new energy vehicles.

European auto stocks rose on the news that Beijing was looking to loosen vehicle purchase restrictions.

China's economy stumbled more sharply than expected at the start of the third quarter, as Beijing's trade dispute with

the United States took a heavy toll on businesses and consumers. Second-quarter economic growth slowed to a near 30-year low.

The automobile sector, a pillar of industrial growth, has been a casualty of falling demand, with overall car sales down for a 13th consecutive month in July. Analysts expect more economic support measures in the coming months, including steps to boost domestic consumption.

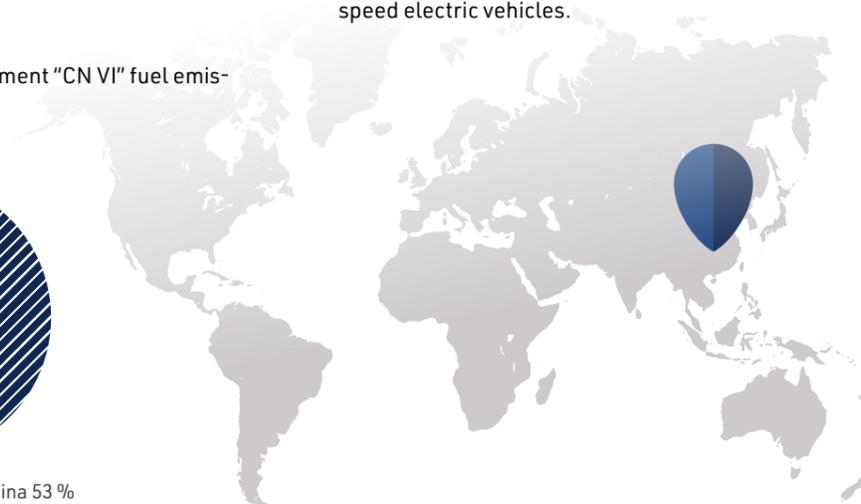
„China data weakness will likely be more visible in August and September, and policymakers will likely lean towards more intensive easing,“ said analysts at the Bank of America Merrill Lynch in a note on Monday.

### HOTSPOTS IN CHINA

- Tesla Model 3 is made in China at the end of 2019.
- China has 53% market share on new energy vehicles worldwide.
- In 2019 China's passenger car sales experienced negative growth, and sales volume decreased over the same period. From January to June, China's auto sales were 12.323 million units, and sales volume decreased 12.4% from the same period of the previous year.
- On July 1, 2019, China Implement "CN VI" fuel emission standard policy
- Guangdong, Beijing, Shanghai, Tianjin and other regions directly implemented the "National VI" emission standard.
- The Chinese government has issued a series of notices focusing on promoting the purchase and use of new energy vehicles. It is not allowed to restrict the purchase, driving of new energy vehicles by local government. Meanwhile local government should accelerate the elimination of high-emission vehicles and low-speed electric vehicles.



NEW ENERGY VEHICLE | China 53 %



# COMING EVENTS

## 2019 TESTING EXPO

Shanghai, China

At this year's Shanghai Automotive Test Expo, you can learn about our traditional test bench, you can also know the details of high-speed test benches and new energy technologies and capabilities for new energy testing. We will also showcase the new control actuators of GTS to ensure the reliability and safety in product testing.

**Time: 24.-26. 09. 2019**

HALL 1, SWECC, SHANGHAI, CHINA

Visit us at booth: 8083

# Testing Expo

CHINA 2019

AUTOMOTIVE

More information, please link:

<https://www.testing-expo.com/china/en/>

## 2020 TESTING EXPO

Stuttgart, Germany

GTSsystem will present in 2020 Tesint Expo Stuttgart with booth No. 1682+1582, Hall 10. More advanced technology will presented in our booth.

**Time: 16.-18. 06. 2020**

HALL 10, STUTTGART, GERMANY

Visit us at booth: 1682 and 1582

automotive  
**testing** expo 2020  
europe

More information, please link:

<https://www.testing-expo.com/europe/en/>

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