

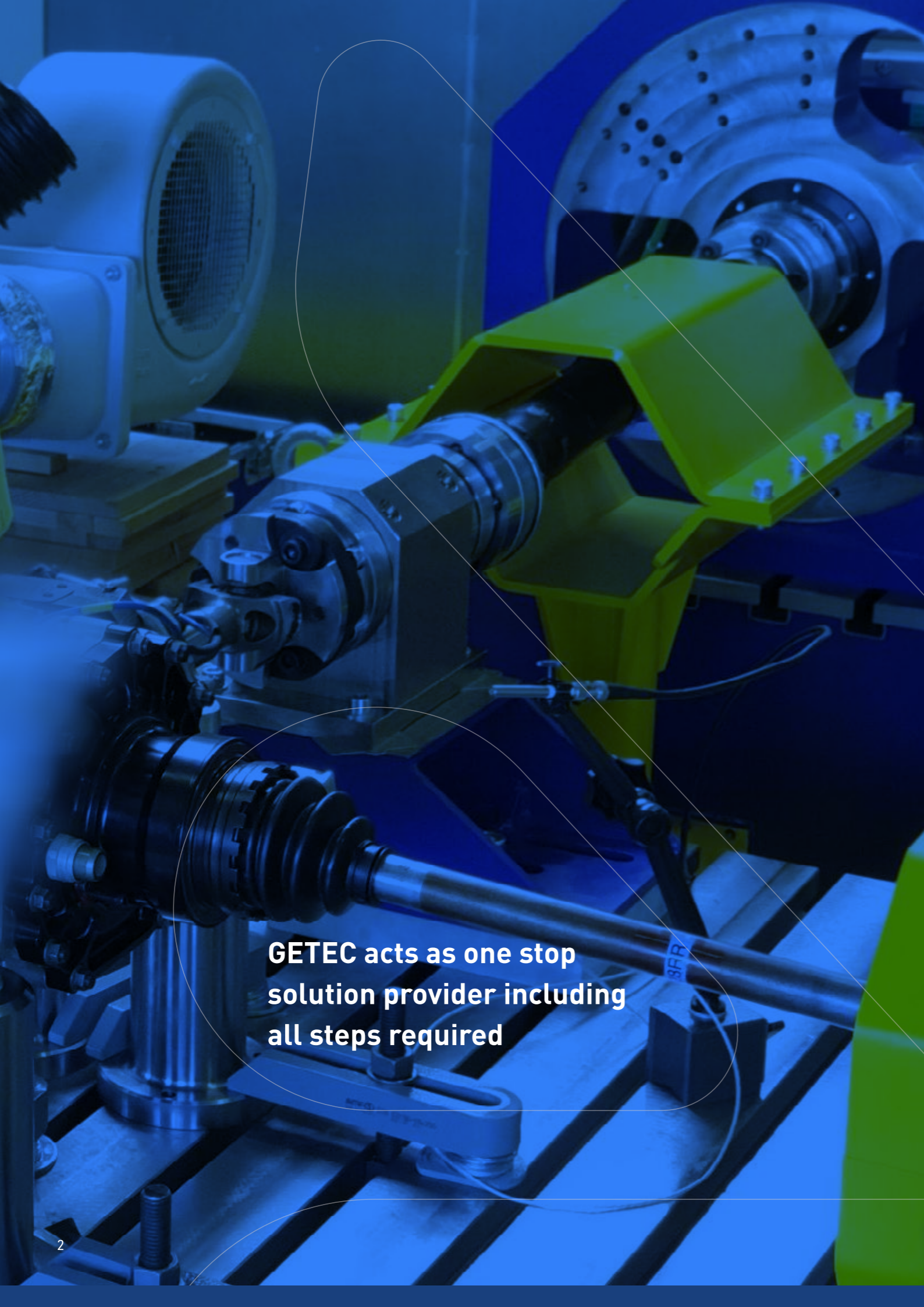
NEWSLETTER

English Version | 06/2022



DRIVE TESTING

on the road



**GETEC acts as one stop
solution provider including
all steps required**

Greeting Words

Author: Mr. Sven Steinwascher | CTO



Drive Testing in disruptive times

Since more than 2 years the Corona virus has dominated our private and business life. Now we are facing a new challenge – a war in front of our doorsteps. Global warming and related environmental protection measures are incubating the development of new powertrain solutions. All in all, difficult times for society and each of us personally.

Despite these challenges, GETEC has successfully further extended its service portfolio to road drive testing. GETEC acts as one stop solution provider including all steps required:

- ▶ planning of the test campaign,
- ▶ purchasing of the test vehicles,
- ▶ preparation of the vehicles,
- ▶ planning of route and drivers,
- ▶ executing of the test,
- ▶ regularly evaluation / check and
- ▶ final assessment including disassembly and measurement of the device under test for various attributes

To execute the drive testing in Europe and Asia GETEC generated professional driver pools which strictly follow our customers request for driving style, velocity and timing.

In Europe our team managed the main challenges caused by the significant increased energy costs and impacts due to Corona. In China GETEC coped with the hurdles caused by various lockdowns, restrictions and quarantined personal.

I am personally very proud of the dedication of our team to successfully prepare, execute and evaluate the vehicle on road testing in such disruptive times.

GETEC always offers solutions to our customers!

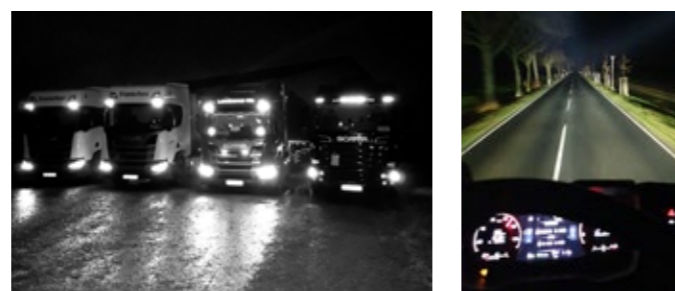
Best regards

Sven Steinwascher
CTO

VEHICLE TESTING ON THE ROAD



AUTHOR: Mr. Torsten Hempel
Calibration Engineer



Beside testing on the bench GETEC is focusing to perform testing on the real road. Therefore, GETEC established a pool of qualified test drivers. Real road testing is beneficial information for many different cases like benchmarking, durability test, performance test, road load data capture to generate a test bench cycle and many more. Typical vehicles applied vary from passenger cars to Heavy duty trucks.

Real road testing is necessary in the below situations:

- Develop new product from zero
- Optimize or test your product in case of issues or before SOP
- Verification before SOP or increase the confidence in the market

The testing is independent of any testbench capacity, it is possible to evaluate the complete vehicle and the measurements are representing the real usage on the road including different weather conditions, different driver types, different road profiles and conditions like rush hour, traffic jam, etc..

This testing has below obvious advantages:

- Quick to start the test with real environment compared with testbench
- Represent real load vs simulated load on testbench
- Test the complete system on the road
- Capture the real road data for use on testbench

In the following the preparation, test conduction up to the test evaluation and possible marketing activities will be introduced more detailed.

Preparation

A good preparation is essential for the success of the campaign. In the beginning the target of the test needs to be clarified. Based on this, relevant measurement signals, the route, the driver planning and project schedule can be fixed.

Fleet Test for vehicle testing

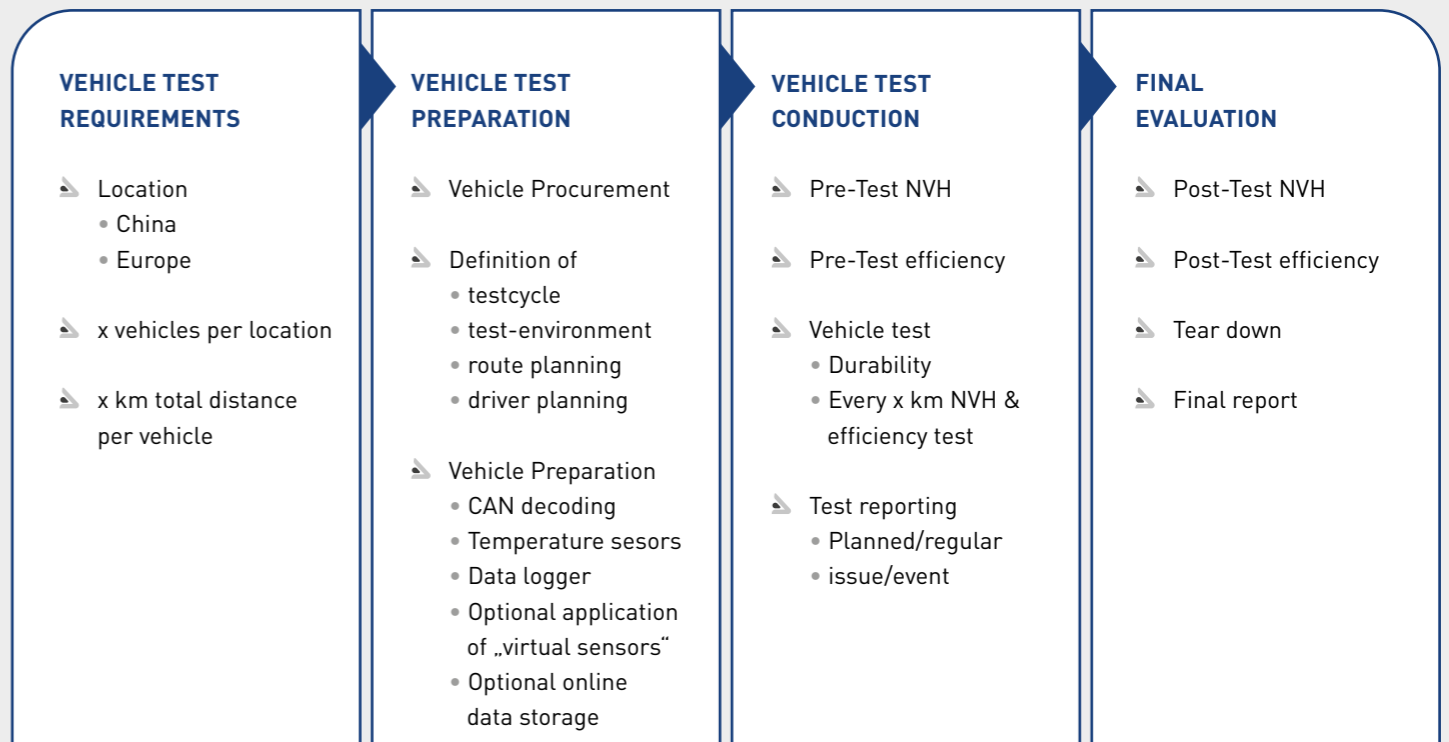


Fig. 1 | Vehicle Testing for different kinds of testing

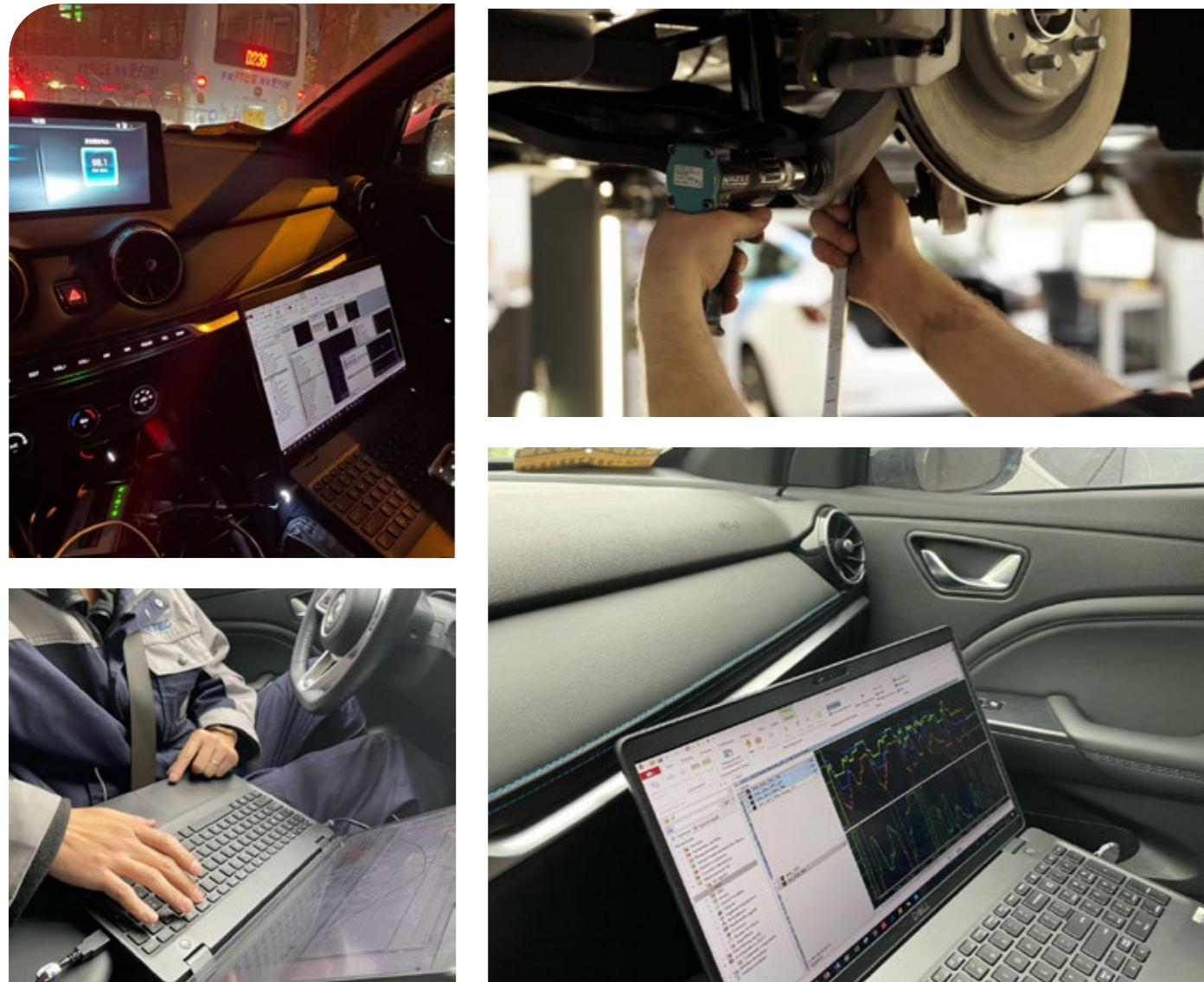


Fig. 2 | Preparation and check before Vehicle Testing

Measurement Signals

Typically, GPS position, vehicle speed and acceleration, driver requirements - such as accelerator pedal position, brake pedal and steering angle, and drivetrain data such as motor speed and torque are logged. For more specialized investigations, water and oil temperatures or oil viscosity can also be measured. With a decoding of the CAN bus or/and Flexray it is possible to capture the most signals directly from the vehicle. For the decoding, GETEC is using their own developed tool DECODEIT® for this activity. All the available signals (and if necessary additional sensors are installed) will be logged in a datalogger with a memory card, or - based on the requirements - all data can be stored online.

Route / Location

The definition of the route is mainly dependent on the purpose of the test. Winter tests are recommended to do in Sweden and Finland, for summer tests Spain with its "Sierra Nevada" is a famous place and for high altitude tests the Grossglockner is the most famous for Europe.

For investigations of consumption and economic drive strategy road types based on the WLTC profile are mainly chosen.

Especially for e-mobility testing it is important also to consider the public charging stations in case of long-distance rides.

Charging on public charging stations is beneficial if the strategy from Battery Management System (BMS) should also be analyzed. The vehicle recognizes from navigation system when and where the vehicle will be charged. Based on this information, the BMS will prepare the battery (heat it) to be in best condition for a fast charging. Beside public locations, testing on test tracks is necessary for some special maneuvers like hill launch, μ -low, μ -split, ESP, ABS, etc.

Driver planning

To cover a wide variance of driving styles, drivers of different ages and experience are selected. To ensure that the speed profile of the WLTC is adhered to, the drivers are given specifications regarding velocity and acceleration in addition to adherence to the official regulations like the German StVO. Sometimes traffic jams must be simulated on less frequented routes if there is not enough traffic on the route.

To reduce the potential influence of driving behavior on fuel consumption or energy consumption and lifetime, the driver is regularly rotated per vehicle as well the drivers are rotated in the different shifts like early, late, and night shift.

Logbook

All the information regarding driver, status of the vehicle, mileage, issues etc. are saved in a logbook. With this documentation it is possible to follow up the progress closely and for any abnormalities, the logbook can give a lot of beneficial additional information.

Case of emergency

Easy to forget but important. What will happen in case of any accident during the test campaign? This question needs to be considered. Can the vehicle be repaired, does the vehicle need to be replaced, will the relevant parts be replaced, and so on. A well-defined action plan should be defined together with the customer before starting the project.

Test conduction

The test conduction starts with a check if all relevant signals are captured well and for all signals the plausibility check must be done. Once these tests are passed, the test will strictly follow the program.



Fig. 3 | 1st Milestone of 100,000 km for Drive Testing from GETEC



A regular evaluation of the measurements is essential to see if the actual test campaign is following the targets like:

- Average speed
 - Maximum acceleration / deceleration
 - Consumption
 - Test route
- and many more.

At GETEC the evaluation is done automatically and allows at least a weekly review together with the customer. It is also possible to adjust the test program based on regular evaluation results. As well as the measurements must be checked, also the vehicles and the installed measurement equipment need to be checked regularly. Especially during winter period, the salt from the roads is aging the measurement devices extremely. For the vehicles itself, the maintenance schedule must be considered, and also the maintenance based on customers requirements.

Test evaluation

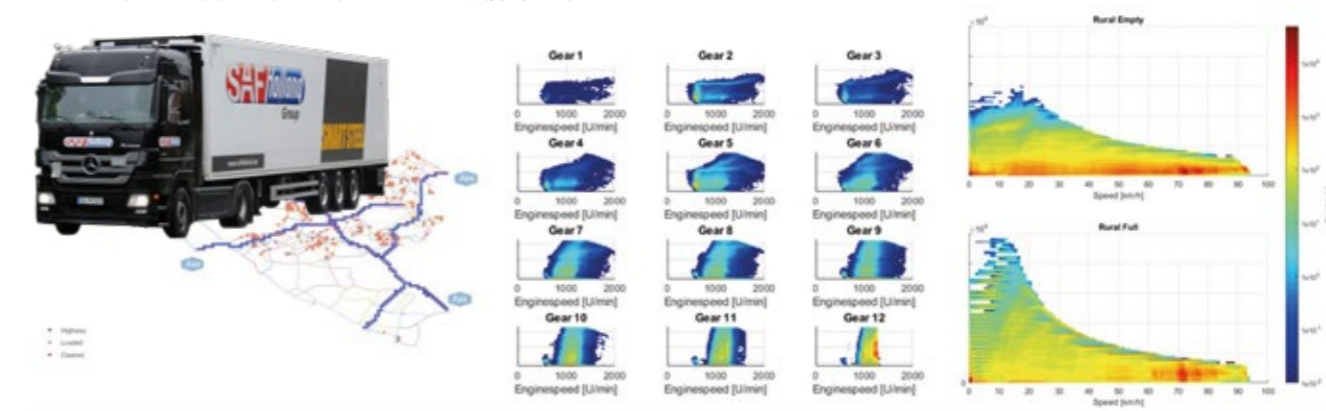
As mentioned above, the automated evaluation is frequently done during the test campaign. Interim reports and a final report for the analysis are showing the result of the tests and monitor any issues occurring during the campaign. Closed roads, extreme weather conditions, accidents, and so on. Especially for durability tests, a tear down of the used components including a tear down report gives a deep insight into the hardware and the impacts of the test.

Possible Marketing activities

It is also a good chance to do branding for customers during the testing in Germany or China. The decorated cars could be running in the city, on the highway and many public areas. It would promote or enhance the brand awareness of customer.

Meanwhile GETEC can also provide the service of the professional photo and video making. These photos and video can be used by customer for promotion on social medias, conference, or expo.

HEAVY DUTY TRUCK ROAD LOAD DATA ACQUISITION



DURABILITY TESTING ON TEST BENCH

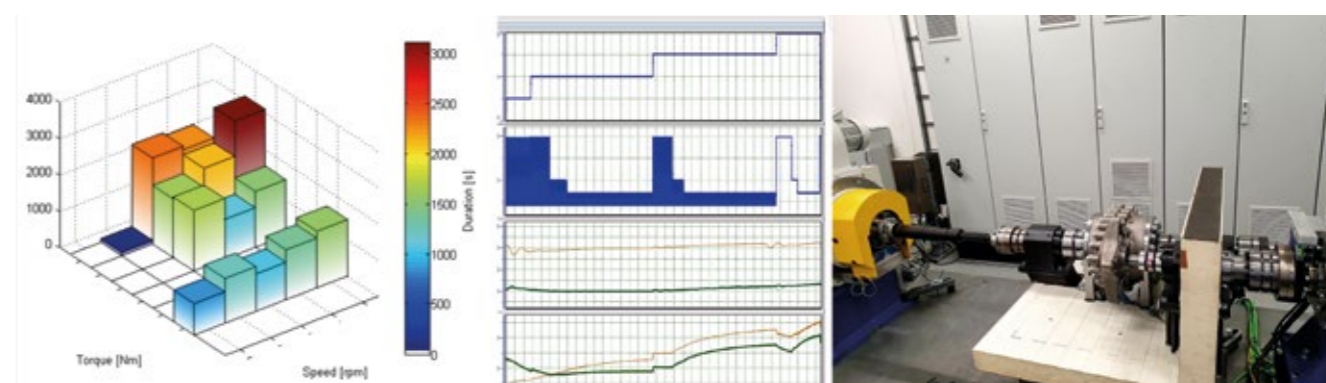


Fig. 4 | Data collection and measure from Drive Testing

Summary

Vehicle testing on the road allows to give information about the real road usage. Compare to testing on the bench it can start immediately without any long preparation, and it is independent from any testbench availability. As an Addon, Marketing activities are possible and easy to integrate. The data from the road is essential for:

- New product development,
- Product optimization,
- Lifetime verification,
- Test cycle generation, etc.

GETEC as engineering solution provider is successful testing thousands of kilometers on the real road, the test track and of course on our modern test benches.

GETEC Testing Capability extension for new energy

Due to the energy risk, electrification of auto trend is speeding up. New energy R&D also sharply increased. For meeting the increasing market, GETEC efficiently invested on the new testbench to extend our testing capability.

The new testbench can be available for the E-Motor Testing, LV123 / LV124, ECE R85, E-Axle Testing, Brake testing and so on. It is flexible for different set up/layout.

With our advanced techbench and our millions-of-km experience, our professional team can provide the satisfying testing solution to our customers.

THE TECHNICAL SPECIFICATION OF NEW BENCH:

Output Dynos

Max. Rotation Speed: 3000 rpm
 Torque: 3500 Nm
 Power: 220 kW

VES

Max. Power: 250 kW
 (500 kW in parallel mode)
 Max. Voltage: 1000 V
 Max. Current: 1000 A
 (2000 A in parallel mode)



GETEC reaches 1st mayor milestone of 100,000 km fleet test

Proudly our team reached the 20,000 km driving distance milestone after 35 days testing. 4 TESLA Model3 with measurement equipment are driven by GETEC Getriebe Technik GmbH experienced drivers.

This project is focusing on the evaluation of the durability, efficiency and NVH of the eAxle. Every single mileage is recorded and for all measurement data from each car the analysis is done daily. Our customer can also perform further analysis based on the raw data.



GETEC offers professional vehicle fleet testing including planning, preparation, execution and evaluation of the data in Europe and China.

All these activities will be strongly supported by our experts in benchmark, engineering, testing, and project management. GETEC offers you solutions to run your vehicle fleet project successfully!

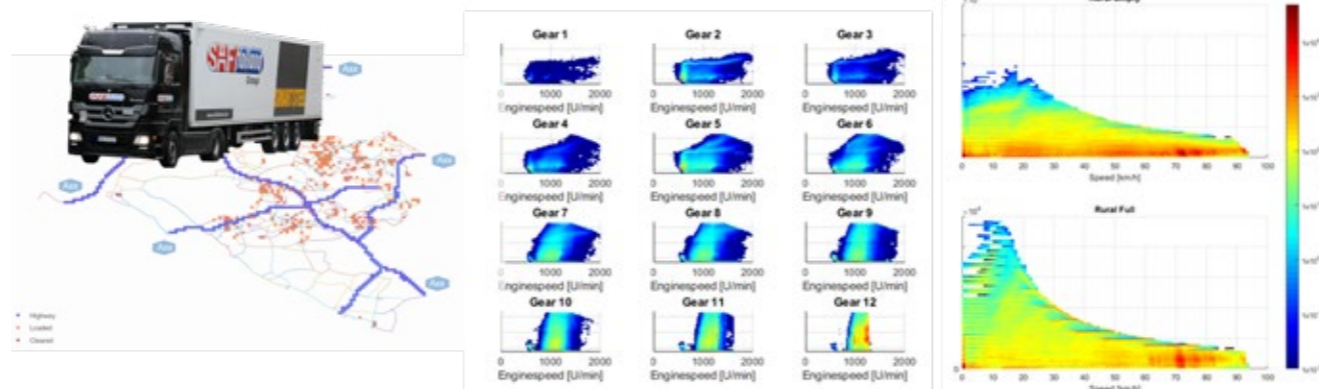
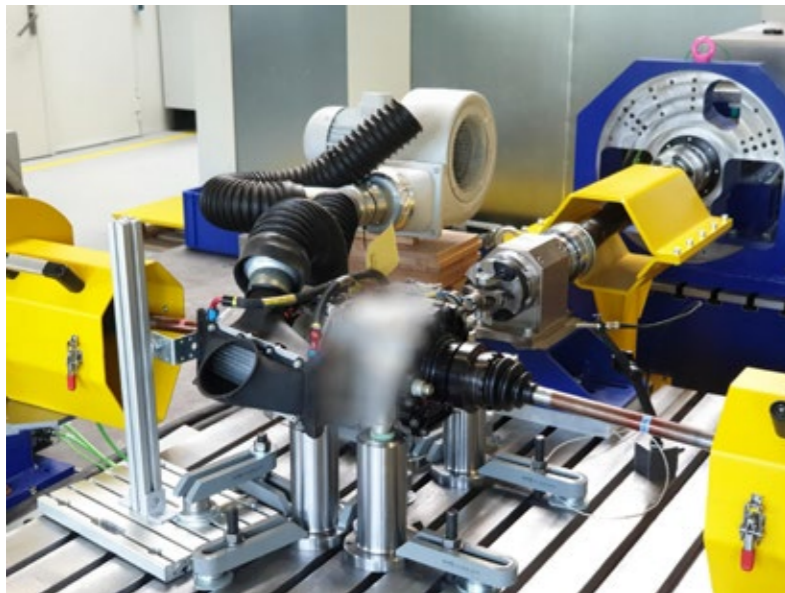
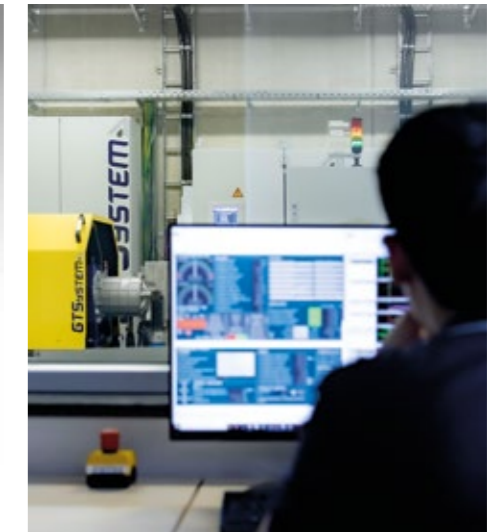
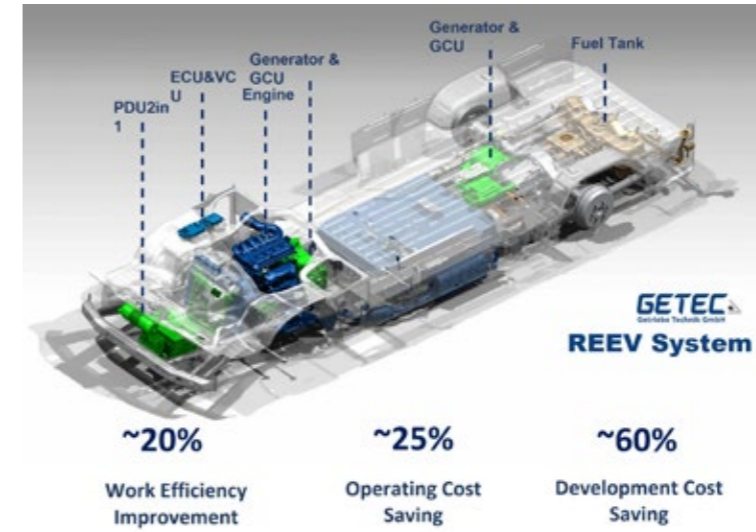
2021 Milestones GETEC

In the past year, we have completed 12 Million kilometres of testing for our customers, including bench endurance testing and functional testing, as well as vehicle testing. We have supported our customers to better realise the performance of their products and to be fully competitive in the market.

In terms of development and design, we have developed different applications for different customers, completed various benchmarking and carried out various design optimisations.

Thanks to the trust placed in us by our customers from all over the world, we have maintained a long and close relationship.

EVERY DAY A NEW CHALLENGE



Our international team allows us to support our customers in different countries. At the same time, we have the resources of a multinational team and geographical constraints are not a challenge for us.

By working together and using our resources in different locations, we are able to successfully complete our clients' tasks: from local support to cross-border support.

HOTSPOTS IN ASIA

1. In the first quarter of 2022, Chinese automobile production and sales reached 6.48 million and 6.51 million, up 2.0% and 0.2% year-on-year, respectively. The production and sales of new energy vehicles were 1.29 million and 1.26 million respectively, an increase of 1.4 times year-on-year, and the market penetration rate was 19.3%. From January to March, the production and sales of passenger vehicles were 5.49 million and 5.55 million, up 11.0% and 9.0% year-on-year respectively. The production and sales of commercial vehicles were 985,000 and 965,000, down 29.7% and 31.7% year-on-year..

Source: MIIT

2. On April 3, 2022, BYD officially announced the suspension of the production of fuel vehicles, becoming the first traditional auto company in the world to stop the production of fuel vehicles. According to the company's strategic development needs, BYD will stop the production of fuel vehicles from March 2022. In the future, we will devote ourselves to technological innovation, and adhere to the new development concept of „innovation“ and „green“ around the „double carbon“ strategic goal. Leading the automotive industry with new impetus for technological innovation.

Source: Sohu

3. According to GGII data, the installed capacity of PMSM in 2021 will account for as high as 94%; in 2021, the top five companies in domestic drive motor installations are BYD/ Tesla/Founder Motor/Ningbo Shuanglin/ Weiran Power, the installed capacity is 62/40/25/20/180,000 units, accounting for 18%/12%/7%/6%/5%. Benefiting from the rapid growth of new energy passenger vehicles, the motor performance has improved and the proportion of dual-motor models has increased.

Source: CAAM

4. Weichai Power New Energy Testing Center obtained the laboratory accreditation certificate issued by China National Accreditation Service for Conformity Assessment (CNAS), becoming the first laboratory in the industry to pass the testing and testing of hydrogen fuel cell and solid oxide fuel cell products at the same time. R&D and testing capabilities for the entire technology chain of batteries and solid oxide fuel cell products.

Source: Autohome

5. On April 18, the CATL EVOGO power exchange service was officially launched in Xiamen. It is expected that by the end of this year, the construction of 30 quick-change stations will be completed in Xiamen. EVOGO is an overall solution for combined power exchange. It realizes combined power exchange through Choco-SEB chocolate power exchange block, which solves the problems of mileage anxiety, inconvenient energy replenishment, and high purchase and use costs.

Source: Sina

6. Honda and GM are reportedly expanding their electric vehicle partnership with a range of future models that will be available in North America in 2027. According to reports, these new products will share a new global platform in the future, which will use GM's Ultium battery technology.

Source: 21CNEV

7. According to the latest data released by Kelly Blue Book, Tesla still accounted for 75% of the U.S. electric vehicle market in the first quarter of this year, of which Tesla Model Y and Model 3 were the two best-selling electric models in the United States during the same period.

Source: Gasgoo

8. Toyota plans to produce an average of about 800,000 vehicles per month in the second quarter of this year (April-June) due to a persistent shortage of automotive semiconductors. In April, Toyota's global production, including overseas production, is expected to decrease by 150,000 to 750,000 (250,000 in Japan and 500,000 overseas). The numbers provided to suppliers at the beginning of the year included the number of production cuts expected to resume, but Toyota lowered production due to the impact of semiconductor shortages. Compared with forecasts at the beginning of the year, the production cuts for May and June are reduced by 10% and 5%, respectively.

Source: CE.cn

9. On April 1, the U.S. government announced the latest fuel economy standards, which are stricter than those proposed in August 2021, and aim to further improve the fuel efficiency of gasoline-powered vehicles while driving the shift to electrification. NHTSA said the new standard calls for an 8 percent annual increase in fuel efficiency for passenger cars and light trucks in 2024-2025 and a 10 percent increase in 2026, which would result in a new car in the U.S. averaging 49 mpg in 2026. Fuel costs will be reduced by about \$192 billion by 2030.

Source: IFENG

10. SAIC Group Thailand, Great Wall Motor and Toyota Motor Thailand have each reportedly signed an agreement with the Thai government on electric vehicle incentives to promote the popularity of electric vehicles in the country. The incentives include tax breaks and subsidies to help lower the price of electric vehicles. At least five other OEMs are expected to join the program this year. Toyota currently holds about one-third of the Thai auto market and is the country's largest automaker.

Source: Gasgoo

COMING EVENTS

GETEC DRIVE TESTING SEMINAR

GETEC, Aldenhoven, Germany

Date: 30.06.2022

Time: 09:30-17:30

FREE ATTEND

NOTE: Limited Attendee (1st order, 1st get)

GETEC
Getriebe Technik GmbH

You can get more information from our website:
<https://www.getec-gmbh.com>

AUTOMOTIVE TESTING EXPO 2022

Messe Stuttgart, Germany

Date: 21.-23. 06. 2022

Booth No.: 1578, Hall 10

automotive
testing expo 2022
europe

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

AACHEN COLLOQUIUM GERMANY 2022

Eurogress Aachen, Germany

Testing the drive of tomorrow in the era of e-mobility

Speaker: GETEC | Mr. Joachim Trumpff

Date: 10.-12. 10. 2022 | Speech Time coming soon

31. AACHEN
COLLOQUIUM
SUSTAINABLE MOBILITY

<https://www.aachener-kolloquium.de/en/>

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Aldenhoven, Germany

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Sales Office

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