Press Release

Opening TÜV SÜD Centre for Mobility and Powertrains, Heimsheim 29 September 2020

TÜV SÜD doubles capacities for emissions testing

Heimsheim/Munich. WLTP, Euro 6 and 7, FTP75, US06: emission standards for vehicle approval are regulated by different legislation throughout the world. Because of this, manufacturers seeking global market access for new models, need to keep an eye on all parameters of importance for international requirements right from the development stage. The new, extended TÜV SÜD Centre for Mobility and Powertrains in Heimsheim and its 65 experts will support customers around the clock with emissions and range tests in accordance with virtually all international standards. Testing focuses in particular on hybrid-electric and fully electric powertrains for the focus markets of Europe, USA, China and Korea. The TÜV SÜD experts give an overview of which vehicles are tested using which test methods.

Recognition for conformity of production (COP) tests in China, cutting-edge laboratory equipment for US emission regulations, exact measurement procedures for hybrid-electric and fully electric vehicles: limits for exhaust emissions, fuel consumption, and thus CO_2 emissions have been constantly tightened around the globe. The Euro 7 emission standard, which is expected to be published this year and will apply in the EU, is a topical example of this development. Yet today, cars are international products, and markets in China and the US are important and economically critical sales markets for auto makers. All the more important, then, for OEMs to partner with a test organisation that offers all international test methods while being familiar with all approval procedures of international authorities right from the design and development phases and keeping a clear overview of them.

The increasingly strict requirements have prompted TÜV SÜD to make a major investment at its Heimsheim location, in the heartland of Germany's south-western region of Baden-Wuerttemberg. This is where 65 specialists will perform vehicle testing according to all widespread international regulations. Tests will be carried out on six test rigs in a three-shift operation – in other words, around the clock. Most tests will be development and endurance tests followed by CoP tests and certification tests. Pascal Mast, Manager Operations Automotive in Germany at TÜV SÜD, says, "The expanded laboratory equipment has enabled us to double our testing capacities here in Heimsheim and to perform

more than 25,000 tests per year in the future. This makes us the largest independent emission testing laboratory in Europe."

Emissions measurement – transparent and realistic

The global production of automobiles and the internationalisation of vehicle markets necessitate harmonised standards for exhaust emissions and fuel consumption to support the approval of new vehicle models. This was the objective of the 2007 UN Global Technical Regulation, which was aimed at facilitating global homologation. One of the outcomes was the Worldwide Harmonised Light Vehicle Test Procedure (WLTP), which has been introduced in stages since 2017. Since then, the categorisation of vehicles into three classes depending on their power-to-mass ratio (PMR) and the addition of higher speeds, longer test periods, dynamic driving profiles and vehicle-specific transmission shift points have ensured that vehicles are tested more realistically to reflect actual on-road use. The WLTP also includes on-road measurements given that some pollutant emissions, such as nitrogen oxides (NO_x) can only be measured under realistic driving conditions. For real driving emissions (RDE) tests, portable emission measurement systems (PEMS) are installed on the vehicle to measure emissions during real-life driving along a defined route.

Well prepared

Before the actual test, all vehicles have to undergo preconditioning. This ensures firstly that the vehicle is in a stable condition before the actual test as defined by the legal requirements of the country of approval, and secondly that test results will be reproducible. In the EU, emissions and fuel-consumption tests are currently performed according to the WLTP. Vehicle pre-conditioning also includes a soak time at constant temperature (23 degrees Celsius). "For our tests, climatic conditions in the hall need to be stable", explains the head of the laboratory, Romeo Ciubotaru. Testing is carried out on a roller dynamometer. To ensure test conditions are as realistic as possible, both vehicle axles are placed on rollers. For example, an average COP test including soak time takes around 36 hours. And on the topic of climatic conditions, the new test facilities cater to international requirements by allowing pre-conditioning at temperatures between + 40°C and -7°C.

A clean mix

Hybrid electric vehicles are becoming increasingly important, particularly in EU markets. There, plug-in hybrids – vehicles powered by a combustion engine plus an electric motor with a battery that can be charged externally – are turning more and more into an established form of powertrain technology. The method of achieving comparable measurement results for fuel consumption, combined consumption and range is complex and involves testing in two modes: charge-depleting (CD) and charge-sustaining (CS) mode. In CD mode, the Worldwide harmonized Light-duty vehicles Test Cycle (WLTC) is repeated until the battery has reached a defined minimum state of charge (SOC) level. Following a defined soak

time, the vehicle is then tested over one WLTC with an empty battery, i.e. in CS mode. The two test results are offset against each other to calculate total consumption and range. The weighting reflects the ratio between the total distance travelled and the distance powered by electricity. The calculation will also consider a utility factor, which depends on the vehicle's range in electric-only operation and represents the proportion of electric travel. This method of calculation enables comparison of different plug-in hybrid vehicles to be made, but also practice-focused comparison with conventional cars powered by combustion engines.

Fully electric

Testing of fully electric vehicles focuses on power consumption and range. In this case too, factors such as temperature, battery charging level and rolling resistance play an important role for data reproducibility and comparability. Again, for vehicle certification a fixed cycle has been defined by law. The procedure covers a test cycle including WLTCs and steady-speed driving to discharge and recharge the battery. "The outcome focuses on the range of the electric vehicle and the calculated energy consumption in relation to the distance covered", explains Ciubotaru.

Numerous special tests

Beyond the tests described above, the testing laboratory performs a host of special tests, including all tests required by international emission standards, such as endurance tests, idling tests and low-temperature tests. The experts even examine the effect of special engine oils to reduce fuel consumption. "Our facility can be cooled down to minus 18 degrees Celsius", explains Ciubotaru. Also included in the service portfolio are development tests carried out on catalytic converters, benchmark tests, application tests and an approval and registration service.

Among other details, global emission standards also require information about evaporative emissions. For this purpose hydrocarbon emissions are measured on petrol vehicles with hot and cold engines in a "sealed housing for evaporative determination" (SHED) test chamber – a special hermetically sealed garage for evaporation measurement. "Our modern test facilities enable us to provide expert technical support to automotive manufacturers on their way to curbing emissions even further in the future", says Ciubotaru.

One example of how TÜV SÜD supports its customers in gaining global market vehicle approval is the test organisation's collaboration with authorities in South Korea. For this purpose, TÜV SÜD and South Korea's state measurement institute, K-ECO (Korean Environment Cooperation), signed a far-reaching cooperation agreement as early as 2015. This makes TÜV SÜD the partner of European OEMs in accessing this important Asian market. "Regarding the sensitive topic of measuring the exhaust gases of EU vehicles, South Korea's authorities fully rely on TÜV SÜD's independent expertise. This

agreement takes our long-standing cooperation, characterised by fairness and mutual trust, to a new level, and ensures our impartial test reports inspire South Korean consumers to trust European cars", emphasises Pascal Mast.

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