MOLSHEIM
5/18/2022

BUGATTI CHIRON SUPER SPORT — PRODUCING 1,618 PS ON THE DYNAMOMETER

Bugatti tests the Chiron Super Sport on a new high-performance dynamometer.

Torque of 1,600 newton-meters, power output of 1,600 PS, and a top speed of 440 km/h — the Bugatti Chiron Super Sport[1] is the world's most powerful and fastest production hyper sports car. It has held the speed record for production vehicles since summer 2019, when it hit a speed of 304.773 mph (490.484 km/h) — a one-of-a-kind in automotive history and a technological masterpiece.
To continuously develop and optimize its production vehicles, Bugatti regularly puts them through their paces under extreme conditions. Only an especially high-performance all-wheel single-roller dynamometer will do when it comes to the technical support needed to check their power output and top speeds.

Here, each wheel runs on one large roller rather than between two small rollers. The advantage of this is that the wheel has only one touchpoint, as is the case on the road, so the wheel's rolling behavior is closer to that on the road. Wheel slip, flex, and loss of performance are reduced in comparison to a two-roller dynamometer. The tires therefore heat up less, thus allowing for higher speeds. Speeds of up to 400 km/h are possible — a speed level that the Chiron Super Sport effortlessly achieves. This is an extreme level, too — at a speed of 420 km/h, a tire is already revolving more than 50 times a second. This can exert forces on the tread that are approximately 4,000 times those of gravitational acceleration (g = 9.81 m/s2). This increases the valve weight alone from 18.3 to around 55 kilograms when traveling at full speed.

''On the all-wheel single-roller dynamometer, all the components can be tested under real driving conditions neutrally and comprehensibly. Driving resistance levels which are identical to those on the road are simulated,'' says Michael Gericke, engine developer at Bugatti. ''We can also reproduce the tests at any time of the year and no matter what the weather. This helps us in our permanent search for technical perfection,'' he says. In addition to performance checks, load simulations, and acceleration, emission readings are taken and fuel consumption measurement cycles are performed.

The dynamometer's dimensions are huge — a roller set weighs 3.5 tons and the rotating mass is around 720 kilograms — similar to a realistic vehicle weight. The rear axle roller can be hydraulically adapted to the wheelbase. With maximum braking power of 1,200 kW per roller, speeds of up to 480 km/h can be simulated — and the vehicle can still brake safely. With its curtailed top speed of 440 km/h, the Chiron Super Sport is the only production vehicle that can push the dynamometer to its limits.

The high-performance dynamometer was specially developed for top-speed vehicles like the Chiron Super Sport. It means the hyper sports car from Molsheim can unleash its full performance potential in a simulated environment for the first time.

The four-meter-tall blower featuring a rotor measuring 1.93 meters in diameter shifts 300,000 cubic meters of air an hour and generates an airstream of up to 230 km/h. The facility therefore simulates realistic airstreams even at very high speeds. The blower's airstream speed varies depending on the driving speed. As a bonus, the realistic airstream provides the engine with the cooling air it urgently needs, and the underbody cooling for the exhaust system, transmission, and differential works, too. Exhaust gas extraction integrated into the gates behind the vehicle extracts the underbody airstream. The air is transported outside via 12.5-meter-tall towers containing large fans.

A special fastening system was developed together with Bugatti to contain the immense power and strength of the Bugatti Chiron Super Sport. A frame with four individual adapter plates under the carbon monocoque fixes the hyper sports car securely to the dynamometer. 20 high-strength screws on the underbody attach the plates to the monocoque. Each of the plates is attached to the others with crisscrossing strong chains and is anchored to the hall floor. The chains can withstand tractive force of up to 24 tons. Special straps to the sides at the rear fix the hyper sports car in place so that the tires remain permanently in contact with the roller apex.

''This means we can guarantee free and, above all, safe running, even at full load and top speed,'' explains Michael Gericke. Two engineers sit in the vehicle during testing, accelerate the Bugatti Chiron Super Sport and adjusting the dynamometer to achieve the desired simulation. Torque

of 1,600 newton-meters, power output of 1,618 PS, and a top speed of 440 km/h demand complete attention at all times, even on a dynamometer.

Bugatti uncompromisingly designed the Chiron Super Sport for optimized aerodynamics to deliver a high top speed — without compromising luxury and comfort. From the front splitter to the rear diffuser, every centimeter of the bodywork is designed for top speed. In comparison to the Chiron, the Chiron Super Sport, which is the ultimate grand tourer, offers massive downthrust at top speed thanks to newly developed aerodynamic efficiency and what's known as a long tail. Bugatti also thoroughly overhauled the 8.0-liter W16 engine, increasing its power output to at least 1,600 PS. For more direct handling, especially at top speed, Bugatti developed the chassis anew — steering systems and dampers offer the feeling of a solid and tighter connection to the vehicle. Overall, the modifications resulted in greater power, more grip, and more direct handling, even at well above 400 km/h — all of which can now be checked and optimized on the dynamometer anytime.

The Chiron Super Sport is currently being handcrafted and delivered to the customers. Its base price is 3.2 million euros (net).

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[1] Chiron Super Sport: WLTP fuel consumption, l/100 km: low phase 40.3 / medium phase 22.2 / high phase 17.9 / extra high phase 17.1 / combined 21.5; CO2 emissions combined, g/km: 487; efficiency class: G