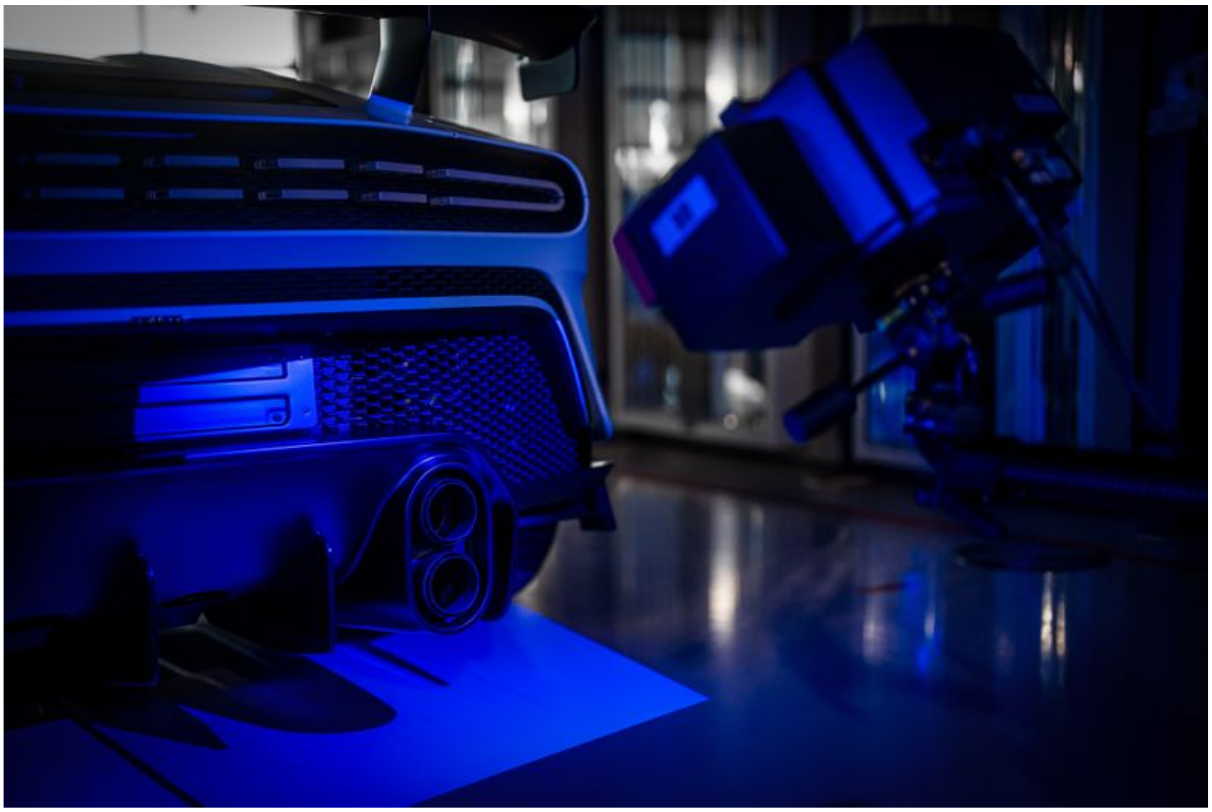
BUGATTI METROLOGY — A BALANCE BETWEEN PRECISION AND PERFECTION



Every hyper sports car from Bugatti is created with a commitment to absolute perfection. At the interface between production and quality, one specialist assures compliance with tolerances measured in the hundredths of millimeters to ensure a Bugatti hyper sports car performs at its very best, even when subjected to the extreme forces and speeds that it is uniquely capable of.

No two cars created by the French luxury brand are the same. Each Bugatti is bespoke to the customer's wishes and handcrafted via a unique, manufacturing process taking several months. ''All components must be technically and optically perfect in every respect. But, above all, the overall appearance of a Bugatti must be one of perfect harmony. The exterior and interior of each creation must possess a perfect balance between aesthetics, comfort and quality,'' explains Grégoire Haller-Meyer. He works as a metrologist at Bugatti and is responsible for the measurement and analysis of all components and their optimal placement on a Bugatti vehicle to ensure a perfect fit each time. He will also investigate components that do not precisely fulfil the technical and aesthetic tolerances demanded by Bugatti. ''For example, I have to find the reason why when the gap between two components deviates from our specified tolerances by just one millimeter. After all, this could possibly lead to undesirable noises at the high speeds reached by our hyper sports cars,'' he explains.
Metrology is a branch of physics which, amongst other things, relates to the scientific study of measurement, the correct implementation of dimensions and the various measuring instruments and methods that are required to undertake full measurement. In his work, Grégoire uses classic manual tools as well as high-precision, state-of-the-art 3D scanners with an accuracy of up to 0.005 millimeters. With the aid of the latest and highly complex software, in part from the aerospace industry, he generates precise data for the analysis of the quality, grade, tolerances and dimensions of components.

Whenever a component — whether extremely small or as large as a door panel — deviates in its construction or in its placement from the strictly defined measurements, Grégoire begins an intensive analysis of the root cause. It starts with analyzing the entire car and how it has been assembled to identify where the deviation comes from. ''As I'm in constant dialogue with the team in the Atelier, I can react immediately to even the tiniest deviations from the Bugatti norm,'' explains Grégoire. Indeed, he works in close collaboration with the engineers and specialist craftsmen from the Atelier to handle each individual case with a meticulous analytical approach of a master detective before delivering his final conclusions. On completion of the analysis, he discusses his findings with the Bugatti engineers who also work collaboratively with internal specialists or external suppliers to find a solution that may involve replacing or adapting a particular component. Grégoire will then subsequently ensure the deviation has been solved and won't occur again.

''The measurement of the various components and tolerances is, however, only a part of my job. Another part of my work concerns the analysis of data to guarantee and continuously improve our quality standards and to assure the absolute high-end finish of the hyper sports cars we create,'' says Grégoire. For dimensional analysis on this intricately detailed level, metrologists first require fundamental knowledge of geometrical and mathematical principles. In addition, they need an in-depth understanding of production procedures, assembly processes, craftsmanship in the luxury segment and materiality.

This level of effort and expertise in precise measurement is unique in the automotive industry, and applied to each Bugatti hyper sports car, whether it be a serial production model like the Chiron[1], a coachbuilding project such as the Centodieci[2] or a unique, one-off model like the La Voiture Noire[3].

Grégoire's role within Bugatti is just one part of the ongoing pursuit of perfection that the whole team in Molsheim applies to the development and production of its vehicles. In engineering, in design and in an ultimate dedication to craftsmanship, a Bugatti will always remain an incomparable piece of automotive history at the pinnacle of precision.

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[1] Chiron: WLTP fuel consumption, l/100 km: low phase 44.56 / medium phase 24.80 / high phase 21.29 / extra high phase 21.57 / combined 25.19; CO2 emissions combined, g/km: 571.64; efficiency class: G

[2] Centodieci: WLTP fuel consumption, l/100 km: low phase 40.31 / medium phase 22.15 / high phase 17.89 / extra high phase 17.12 / combined 21.47; CO2 emissions combined, g / km: NA; efficiency class: G

[3] La Voiture Noire: WLTP fuel consumption, l/100 km: low phase 43,33 / medium phase 22,15 / high phase 17,99 / extra high phase 18,28 / combined 22,32; CO2 emissions combined, g/km: 505,61; efficiency class: G