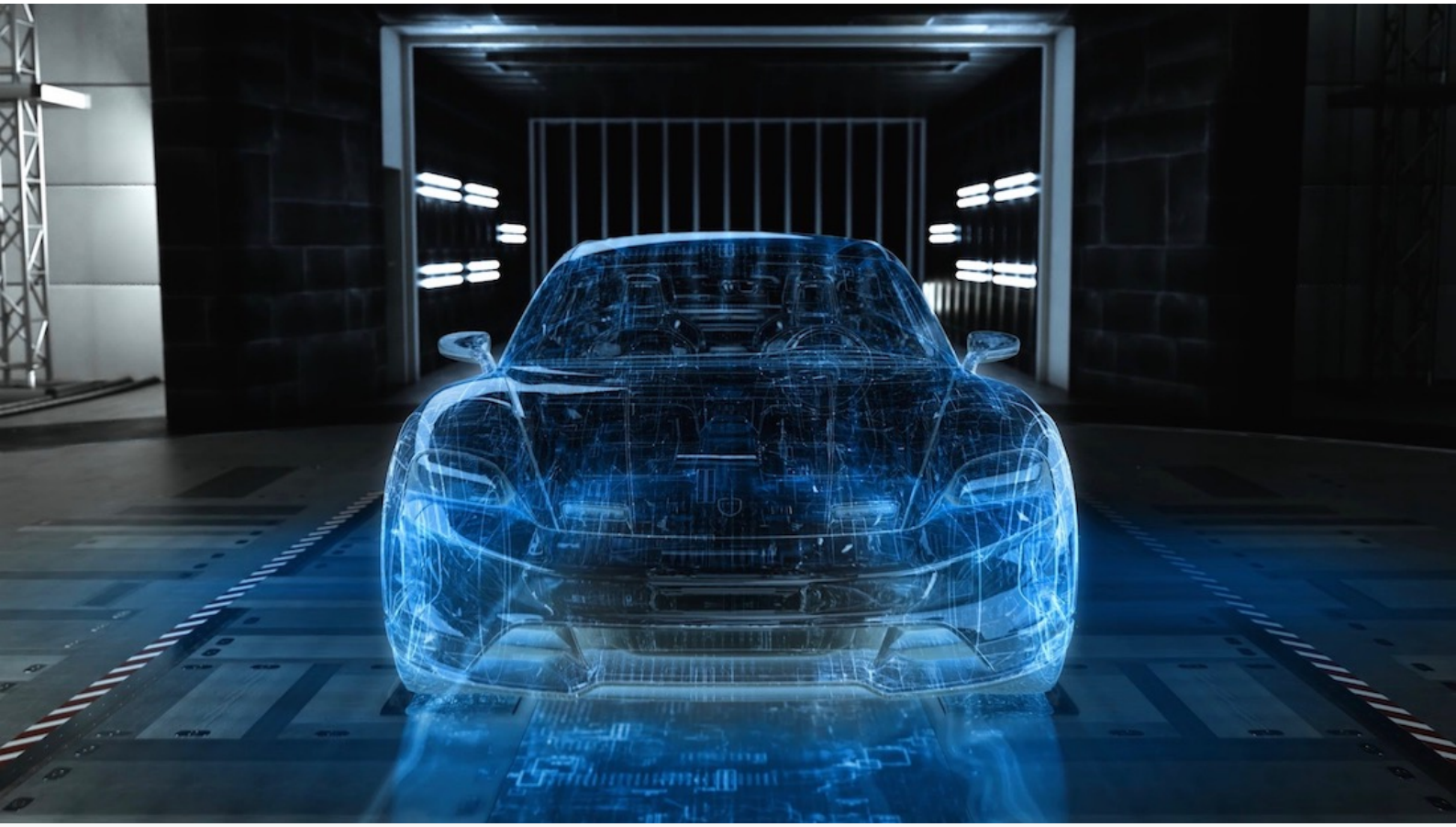


Digitalisation of vehicle development

15/02/2019 Historically, physical elements have been tested in prototype status. In future, it will be possible to instead digitally experience components and highly networked functions within the overall vehicle at Porsche. The Porsche Newsroom looks at a few examples.

“We want to use these methods to make it possible to experience complex vehicle functionalities in the virtual driver’s position in future,” comments Stefan Singer, Virtual Testing. Steffen Strebel, Testing and Validation, adds: “This hybrid approach enables the objective and reproducible testing of situations that are difficult to reproduce in real road traffic.”

The imminent age of electric vehicles brings with it many innovations in the hybrid development process. One example is thermal management, which ensures that the temperature of high-capacity batteries and electric drive systems remains within a defined window at all times. For example, the Taycan uses around 200 of the 15 million calculated hydraulic circuit wiring options – these are intensively simulated on the testbed in the “Flow Laboratory” in Weissach, by connecting real thermal

management systems with digital prototypes as well as real control devices. This also shortens the development required for standardisation of types in this respect – and reduces the number of real prototypes required.

"If we work in parallel on the connected system testbeds – known as the ThermoLab – we will also accelerate the development process," says Daniel Eichacker, Head of Thermal Management for V Engines, looking to the near future. "Then if we can exchange information – temperature, information, for instance – between the flow laboratory and the cooling circuit/conditioning, that's a real milestone for the thermal model of the overall vehicle."

"How often is the Sports mode button actually pressed? What driving mode is used most commonly? This kind of information, obtained through PDRM, will be integrated directly into the further improvement of our products," says Alexander Haug, who hopes that the vast majority of Taycan customers will choose to participate in the PDRM project. He emphasises that of course every customer can decide individually whether or not to contribute to data analysis; in fact they must actively confirm their consent inside the vehicle itself. He goes on to say that customer anonymity is always guaranteed: "Even with PDRM activated, we only see that a vehicle has been in a traffic jam for example, but not where and when."

The human model, on the other hand, intends to precisely replicate the entire human anatomy, with the result that THUMS are extremely well suited to kinematic studies that seek to demonstrate movement processes; for example, they help to assess active safety systems such as emergency brake assistants. Current THUMS models make it possible to evaluate injury risks, and as such are valuable in examining new accident scenarios that might arise from autonomous driving. "The human models are increasingly becoming the tool of choice in the development, assessment, and justification of future restraint systems," explains Keding. "They are also more and more prevalently included in ratings and legislation." This can be seen in the American NHTSA Legislation and European NCAP (New Car Assessment Programme) for example, which are both fuelling their further use.

Although the true-to-detail simulations enable the representation of greater diversity than physical crash test dummies, they cannot negate the fact that every person is different. Indeed the greatest challenge is in transferring the enormous bandwidth of biological features to human models – a task that requires significant resources, as each individual is different in terms of their flexibility, bone structure, and resulting interaction with restraint systems. "We have been engaging with human models since 2013, and are constantly driving development forward," comments Keding. "Specific components that go beyond traditional engineering will be necessary for further development – for example from the biomechanics and medicine sectors."

The next expansion stage in the digitised design process – known as the UX box – offers a link with

interactive media, enabling maximum realism and an extraordinary level of experience. The screens and touch-sensitive display areas in the detailed cockpit replica can be loaded with interactive content based on the operator's preference. To do this, designers use their smartphone or tablet to access their folder of newly created central graphics, for example, where all the animations and pictograms are stored. Then they can select various designs via smartphone, transfer them to a display in the UX box, and then view them one after the other, within seconds.

"The Xperience Engine forms the foundation for our UX boxes, integrates seamlessly with the visualisation, and can therefore be displayed via innovative digital presentation tools such as the VR glasses," Meissner reveals. Spanning multiple disciplines, the system created here combines the processes of visualisation with those of UX design. "We believe that one decisive advantage of digitalisation is being able to experience our products earlier, take a holistic approach to their design, and develop them more efficiently," explains Viktor Weizel, Visualisation Specialist, VR Presentations.

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