BMW
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Virtual trends: BMW and Epic Games celebrate long-standing technological partnership.

Use of the US software company's Unreal Engine generates key competitive advantages. Development of the BMW iX designed and implemented virtually right from the start.

Munich The use of innovative technologies and strategic partnerships provides a crucial competitive edge, especially in the digital age. The BMW Group is well aware of this fact – indeed as early as 2016, the company became the first automotive manufacturer worldwide to join forces with the computer games industry. Epic Games' Unreal Engine was coupled with virtual reality technology to create new and innovative development methods and tools that are now used in many design and work processes. This user experience development technology has already been presented to a wide general audience at CES 2019, where the BMW Vision iNEXT on display there at the time invited visitors to take a virtual test drive. Important elements of the new BMW iX's design evolution were thus realized from the outset with the game engine, which also played a decisive role in the planning for the new BMW i4 plant. Many BMW dealerships and branches already offer virtual vehicle inspections and test drives. Unreal Engine was also used for the launch of the new BMW iX in the #NEXTGen digital broadcast (link). Using Unreal Engine's virtual production tools, new technology that has primarily been used in Hollywood to date, the all-electric vehicle was presented in an innovative set-up called "The Cave".

From virtual to real vehicle

The possible uses of game technology and virtual reality applications are manifold in the automotive sector. The BMW Group, the first automotive company together with Epic Games to define and structure an enterprise licence for the industrial use of Unreal Engine, designed a self-developed mixed reality system. This is consistently used and expanded in vehicle development. The BMW iX is the first car that has been developed using the game engine we modified for our purposes. BMW's use of Unreal Engine is invaluable, especially in the strategic innovation fields. You can very quickly create 3D renderings, for example, that take account of light effects and light reflections on different materials, among other things. But most importantly, it allows the functional and user experience to be brought to life and implemented in real time at a very early development stage. These advantages led to the early development of the technology into a global platform.

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With its new Driving Simulation Centre in the Research and Innovation Centre, the BMW Group is setting standards (Link). Equipped with 14 simulators and usability laboratories over 11,400 m², it is the most modern and versatile simulation centre in the automotive industry. The company is thus providing its vehicle development and research teams with every opportunity to realistically test and simulate the product requirements of the future. Besides high-tech motion systems that respond immediately to every driving input, a visualisation of the virtual world that is as true-to-life as possible is essential for a realistic driving experience. Here, too, the BMW Group is relying on Unreal Engine from Epic Games.

Innovative and complex production planning

Just how flexible and diverse the possible applications of a game engine like this can be is demonstrated by its use in production planning for the new plant where the BMW i4 will be manufactured in future. With the aid of real-time 3D renderings, production steps and space requirements for items such as tools or spare parts can be precisely planned and designed. This virtual reality technology was already used in 2018 to configure the individual workstations for the upcoming production of the new BMW 3 Series. This meant that for the first time, it was possible to recreate a complete production facility in virtual reality, test new work and manufacturing processes in a realistic 3D environment and adapt them to actual requirements.

Try before you buy: how new technologies benefit customers

Car buyers also benefit from the use of game technology and virtual reality. The Emotion Virtual Experience (EVE) created by BMW, which is now available via 6,400 stations at more than 2400 BMW dealerships and branches worldwide, allows vehicles to be experienced first-hand in virtual reality. EVE provides customers with a photorealistic 3D representation of any BMW or MINI in every variant available across global markets, which can then be viewed on any display or with VR glasses down to the last detail. They can move around the vehicle and select colours and extra fittings in real time – not to mention open doors or the boot, look under the bonnet, and slide back the convertible roof. It is also possible to sit in the virtual vehicle and take a test drive, of course. Even lighting conditions and panorama sets can be simulated so that customers can view their future vehicle in the city, in the mountains, or on a racetrack. EVE, which bases its visualization on Unreal Engine from Epic Games, can be used to display more than 50 vehicle variants in total, including every trim level.

BMW #NEXTGen meets Hollywood

This autumn, Unreal Engine from Epic Games was also used for the launch of the new BMW iX and the MINI Vision Urbanout at the BMW #NEXTGen digital broadcast in spectacular surroundings – created with technologies that were originally developed for the production of a Sci-Fi TV series and since then has been used on several Hollywood feature films. "The Cave" is a virtual production film studio that allows you to place people and objects in various virtually created environment scenarios. As these are projected photorealistically and in real time on huge LED screens, not only is an incomparable three-dimensional effect created for the viewer, but the object itself is also appropriately illuminated through the use of the LEDs. Actors and objects really merge with their environment without any further post production. What is impressive about this innovative staging is that, thanks to camera and object tracking, the background always moves with the viewer. As a result, the background doesn't remain static and the perspective always appears natural and real, which provides an extra layer of realism for the viewer.

BMW, Epic Games and agency partners Elastique. & NSYNK pushed the technology to the max in an unseen way by adapting it from a movie- to a TV-production workflow, being able to switch between several cameras as well as adding an additional augmented reality (AR) layer. The AR-layer made it possible to stage the fully digital MINI Vision Urbanout as well as several digital props within the scene – with a perfect and playful illusion as the result.

"Very early on, BMW saw the possibilities of what Unreal Engine could offer in the automotive industry and devised some truly ingenious customizations that enable collaborative design, visualization, digital prototyping and virtual simulation of behind-the-wheel experiences," said Doug Wolff, Business Development Manager, Epic Games. "With the release of the BMW iX launch film, BMW went a step further to leverage the virtual production tools in Unreal Engine, deploying the same LED stage workflow in use by the most sophisticated Hollywood productions. This latest development is further evidence of how advanced BMW are in their multiple use-cases and platform design for game engine technology."

Thanks to the extremely successful and productive collaboration between the BMW Group and Epic Games, this will be further developed. The potential created by using game engine technology is not only huge, with efficiencies in so many areas, it also offers

comprehensive features that can be optimally and seamlessly integrated into various design and production processes. Unreal Engine is an important component of the VR/AR experience platform that, together with BMW game engine developers, makes the above-mentioned applications possible and opens up new ways of using the technology within the BMW Group.

Together with automated driving, the consistent expansion of networking as we move toward a digital and emission-free future is one of the core areas of activity used by the BMW Group to drive forward the transformation of the mobility industry as part of its strategy.

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The BMW Group

With its four brands BMW, MINI, Rolls-Royce and BMW Motorrad, the BMW Group is the world's leading premium manufacturer of automobiles and motorcycles and also provides premium financial and mobility services. The BMW Group production network comprises 31 production and assembly facilities in 15 countries; the company has a global sales network in more than 140 countries.

In 2019, the BMW Group sold over 2.5 million passenger vehicles and more than 175,000 motorcycles worldwide. The profit before tax in the financial year 2019 was € 7.118 billion on revenues amounting to € 104.210 billion. As of 31 December 2019, the BMW Group had a workforce of 126,016 employees.

The success of the BMW Group has always been based on long-term thinking and responsible action. The company has therefore established ecological and social sustainability throughout the value chain, comprehensive product responsibility and a clear commitment to conserving resources as an integral part of its strategy.

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