Bentley Motors: When heritage meets technology

By Nick Lerner

Bentley Motors benefits from Dassault Systèmes (DS) 3D manufacturing simulation tools to communicate and optimise designs for production of the new Mulsanne.

The recently launched Bentley Mulsanne is Bentley's all-new flagship grand tourer. DS PLM solutions including CATIA, ENOVIA, DELMIA and 3DVIA have been deployed to allow Bentley to exploit 3D visualisation and simulation techniques across the core product lifecycle processes.

The Mulsanne sets new standards in terms of comfort, effortless performance and hand-crafted refinement – the very qualities for which Bentley is renowned. It combines a completely re-engineered V8 engine with luxury features such as sustainable hardwood veneers and specially treated leather upholstery and trim. It takes nine weeks to build a Mulsanne during which time around 10,500 separate parts are brought together and assembled into a combination of luxury and performance that is unique in the motoring industry. In 1919, Bentley's founder W.O. Bentley had a vision of building "a good car, a fast car, the best in its class." Over 90 years later, Mulsanne's position at the pinnacle of the premium segment is a sign of Bentley's commitment to its founding principles.

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John Unsworth
CAD Strategy Manager, Bentley

MULSANNE STRAIGHT TO SUCCESS IG

Ian Swann, Bentley's Senior Virtual Assurance Engineer described how 3D technology is used to develop the Mulsanne: "We use DS manufacturing simulation tools to develop seamless introduction of new products. By modelling a total of 831 build operations across 30 stations, the complete build process was simulated in 3D. Using this simulation, a detailed assessment of the build process was then carried out and any potential build concerns were identified and then resolved much earlier in the design process."

9 weeks

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This methodology, facilitated with DELMIA, includes 3D reviews at regular 'virtual build' meetings where the power of 3D visualisation allows production build associates to make valuable contributions to the design process and influence the design based on their experience and specialist knowledge.

"Part load feasibility, clearance and tool access are crucial factors for optimised production and these are readily reviewed and assessed using DELMIA during these cross-functional meetings. Using 3D visualisation, any design or process changes can also be validated and optimised accordingly. Any potential problems can then be planned for and other complexities accurately assessed," continued Swann.

TOOLED UP

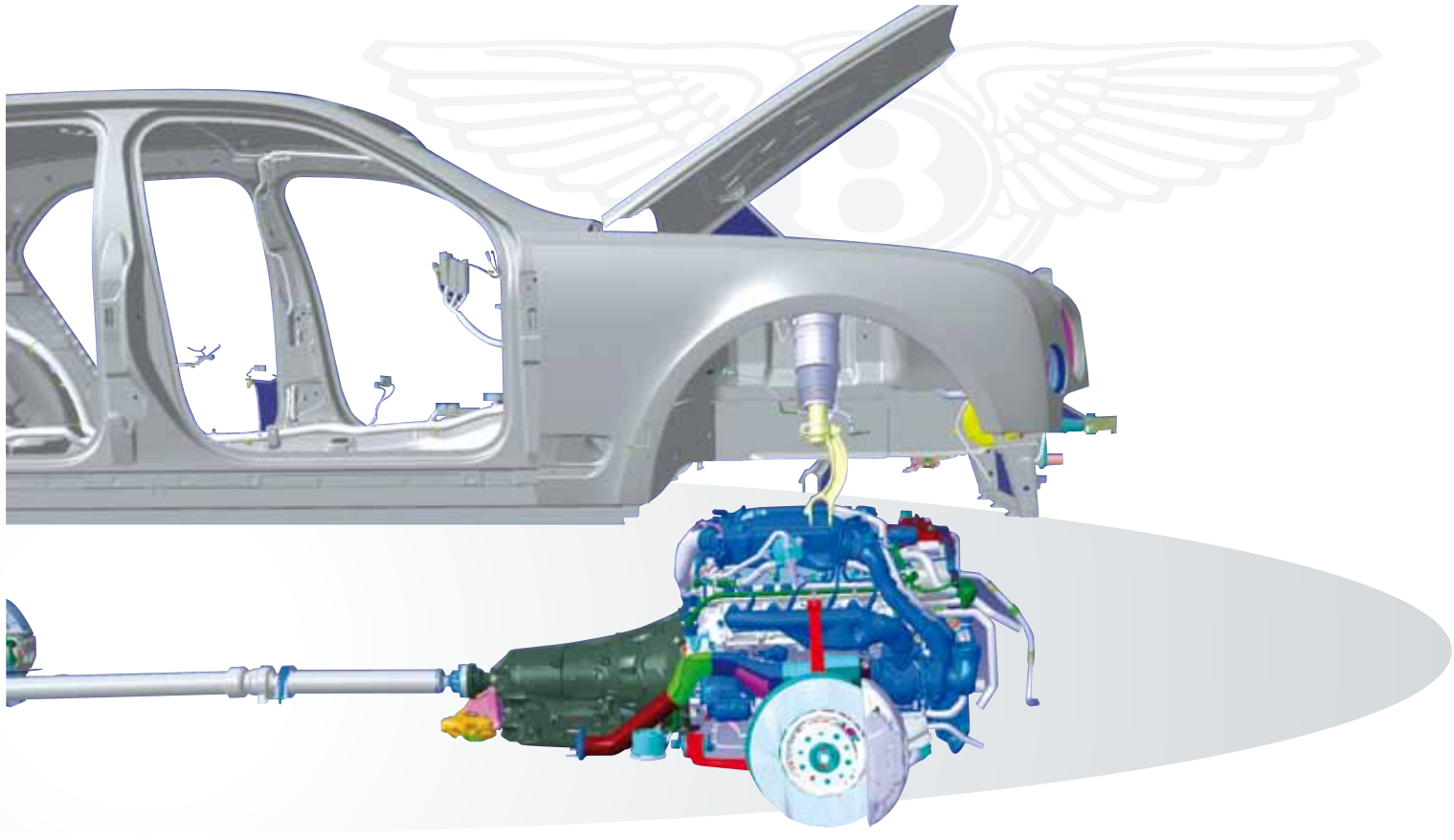
John Unsworth, CAD Strategy Manager at Bentley added: "DS PLM tools allow us to exploit improved working practices throughout the Bentley Product Lifecycle. For Bentley Mulsanne, we have been able to integrate production functions much earlier than previous projects, reducing risk, retaining knowledge and have enjoyed the considerable benefits of concurrent collaborative working."

"3D provides greater stakeholder cognition allowing extended input to design-and-production scenarios at the right point in time to make a difference. We are now able to integrate wider business departments in our quest to exploit digital data. Aftersales and Service teams for example now have concurrent access to our evolving 3D data allowing teams to construct technical illustrations in parallel with the design evolution process using 3DVIA Composer. This integration has saved considerable time and valuable resource, has improved cross-functional working and overall communication."

"The foundation stone for being able to exploit these technologies revolves around our ability to manage all of our data in one database. All data is managed in ENOVIA and all departments access this data concurrently. The same data is presented in DELMIA where Manufacturing associates can plan and simulate manufacturing build processes in parallel with design evolution. We have one set of data accessed by all departments from Styling, Concepts, Digital Design, Engineering and Manufacturing. No longer do we manage separate data silos across departments. All have the ability to access and author data from the ENOVIA database making informed decisions without the need for a data preparation exercise.

ACTION PLAN

"The methodology at Bentley is an example of PLM in action and our unique blend of PLM exploitation now encompasses a complete virtual build. With its technical complexity, use of both traditional and new composite materials and our exacting quality standards means that the Mulsanne is like no other car. Our Digital validation has helped us rectify many issues and concerns much earlier than would previously have been possible."



» “With DS technology, data comes to life. 3D is delivered across the enterprise in ways that bring the most benefit. 3D is being used to enhance our ability to plan and make decisions quickly and efficiently as we design and manufacture vehicles throughout all phases of the product lifecycle process.”

Unsworth continued: “Currently, we have around 260 active Design Engineers designing in the system and around 500 seats of DS PLM generally being used at Bentley. The PLM system was built upon a formal approach to strategy discovery, development and deployment. The method was designed to exploit 3D and furnish the needs of the Bentley business goals. Bentley understands PLM is a journey, it has made significant steps along the way but has an in-built desire to push further. It is planned to bring more people into the PLM eco-system at Bentley as 3D becomes simpler, easier and fun to exploit.”

LIGHT SPEED

The ability to innovate and retain design intent has been enhanced with the current methodology. Ian Swann gave an example: “The front headlamp design is an important feature for functional and styling reasons. We used DELMIA to assess assembly options within the given design envelope and worked closely with engineering and production to develop an optimised solution. A 3D simulation of this assembly process was then used to provide assurance that the build sequence was feasible.”

“Another interesting example is found in the doors where 204 parts must be efficiently assembled into each aluminum-skinned door assembly. DELMIA was used to define an optimised assembly sequence, which was shared with other departments including production associates, whose input was valuable in developing a final design that was optimised for both function and production. Part fit clearances, tool and hand access are crucial – without DS PLM solutions, we would not be able to verify processes in advance but with its use, we can not only verify but truly optimise the build process before any physical parts are available.”

The Mulsanne was entirely conceived, designed, developed and now produced in the integrated Bentley production facility at Crewe. The car incorporates Bentley heritage, advanced features and enviable performance characteristics, the assembly of which has been greatly assisted by the exemplary use of DS PLM.

For more information:
www.bentleymotors.com
www.3ds.com/ukisa