electric & hybrid
vehicle technology international

July 2023

IN THE LAMBORGHINI REVUELTO HYBRIDIZATION HAD JUST ONE KEY GUIDING PRINCIPLE – IMPROVED PERFORMANCE

POWER IS THE PRIORITY

TWO-WHEELED REVOLUTIONS
As the market for electric motorbikes becomes increasingly competitive, we look at the latest developments

REINVENTING THE WHEEL
Once a niche sector, new in-wheel and direct drive advancements mean this technology is finding wider applications

DREAM MACHINES
After ditching ICE-only in 2022, China's BYD is now fully focused on EVs. How will its new vehicles fare in Europe?

Reduce assumptions with system-level simulation

As electrification technology rapidly progresses, manufacturers face many new challenges. Embracing Dymola's abilities as a multi-physics and multi-domain simulation tool, equipped with vehicle system-level simulation libraries from Claytex, offers a viable solution

Suppliers of automotive companies face challenging business conditions in supporting their partners. Vehicles and technology are becoming ever more complicated and integrated, and consequently harder to develop. Uncertainty hangs over the traditional product development life cycle, as electrification technology rapidly progresses. Embracing Dymola's abilities as a multi-physics and multi-domain simulation tool, equipped with vehicle system-level simulation libraries from Claytex, offers the solution to these challenges.

A flexible approach and a degree of technological agnosticism have always been the hallmark of successful suppliers. Modern times demand so much flexibility however, that engineers at the core of the value adding process need multifunctional tools, capable of supporting a much wider range of technological domains than they traditionally have covered.

Such simulations are known as system-level simulations. Recreating the entire vehicle as a system the product being deployed within is the objective. Contrast this to other common forms of simulation where a component is modelled in isolation, with assumed boundary conditions. Rather than rely on assumptions, with system-level simulation a component's boundary conditions are computed with accuracy as the cumulative effects of the system are considered.

Incorporating representative boundary conditions, the quality of the detailed component level simulation improves. Knowledge that previously would have required costly and time-consuming physical prototype testing to acquire. Design of Experiments type studies using system level simulation can be used to generate accurate boundary conditions like loads, which can feed into detailed component specific studies, such as FEA.

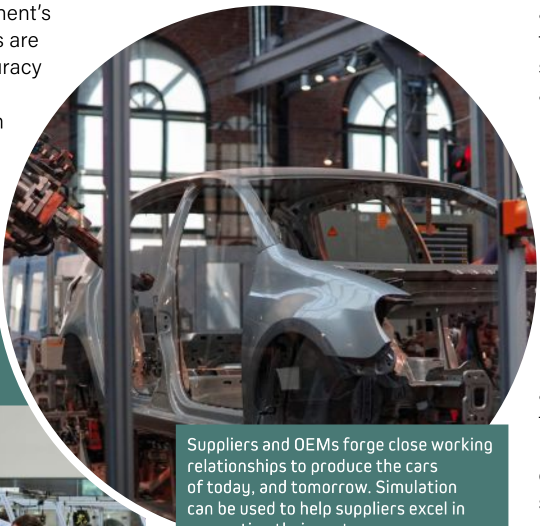
Engineers therefore need tools which place system simulation in their hands. Tools that enable them to conduct virtual simulations of testing process normally reserved for later development stages, as part of the initial design process. An extension of the 'right first time' production principle, a better understanding of the contextualised needs of the product earlier reduces the number of physical iterations required to fulfil a design specification. Prototype production and testing become validation exercises, rather than integral R&D processes.

Systematic adherence to a modular approach puts the user in full control of the systems level simulation model. All elements of the simulation represent real life components. Underpinning Dymola is the Modelica simulation language, key to supporting this component-oriented approach by virtue of being acausal. Engineers are liberated from the task of reformulating models to suit different boundary conditions and applications. Each Dymola model accurately emulates real life, recognizable to any engineer, not just the simulation specialist.

Democratization of simulation is the result. By having access to a library of easily configurable system models, design engineers can expedite development processes. Existing off-the-shelf products in a supplier's repertoire can be tested in a modified guise in the virtual world far quicker than relying on traditional processes. Moreover, the overarching experiment model a product is simulated within can be used in a predictive way, reducing reliance on authorized specifics about a vehicles design. Naturally, this enables hypothetical situations to be understood in detail before they arise. Developing products in anticipation of requirements is now much more achievable than before.

claytex.com

*See **electrichybridvehicletechnology.com/claytex** for more on simulation solutions from Claytex.*



Suppliers and OEMs forge close working relationships to produce the cars of today, and tomorrow. Simulation can be used to help suppliers excel in supporting their partners

Modern vehicles feature highly integrated systems, combining mechanical, electrical, software, fluid and thermal domains. Simulation tools used by Design Engineers need to support these requirements

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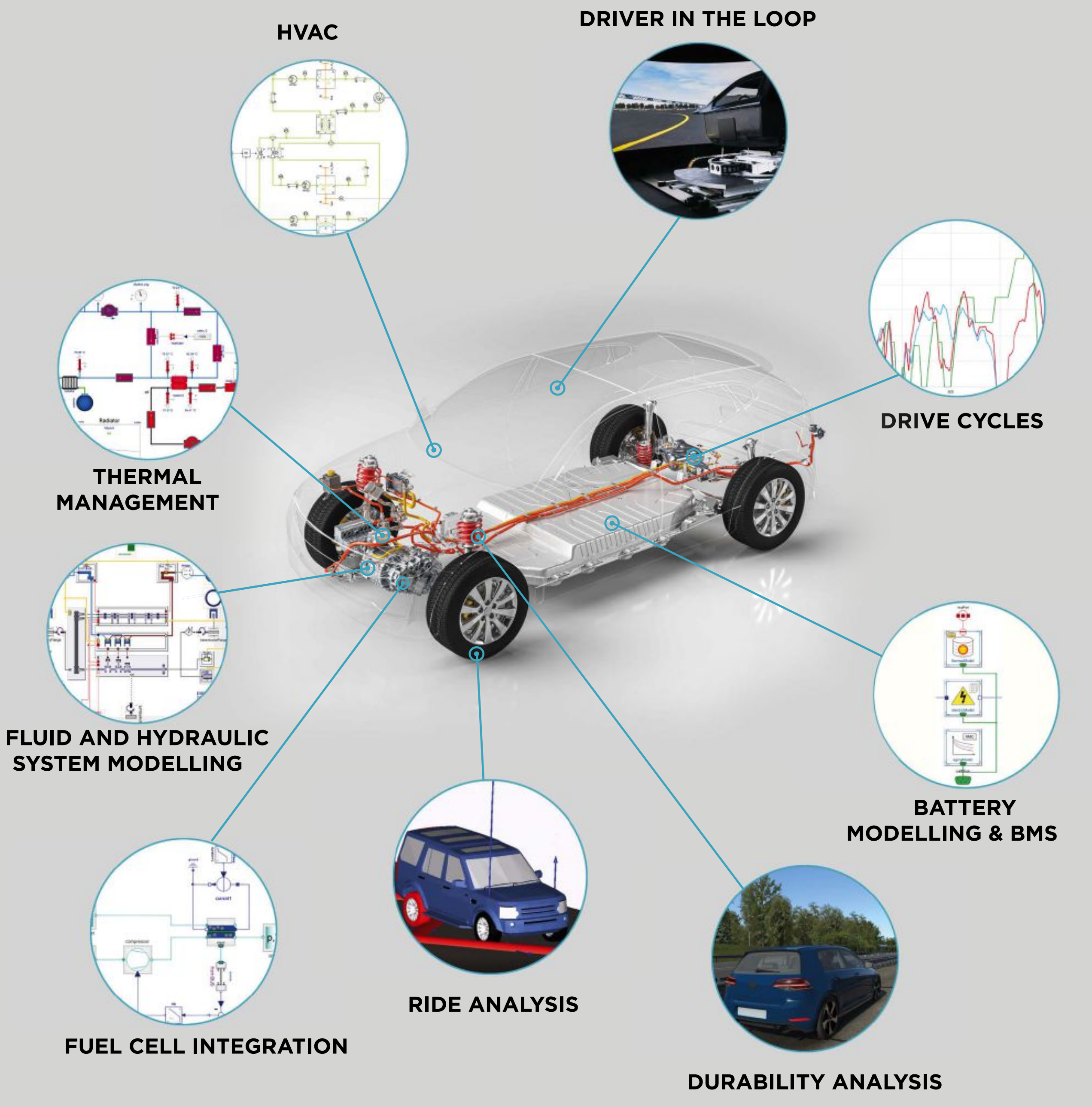
MULTI-DOMAIN MODELLING & SYSTEMS SIMULATION



OPTIMAL SOLUTION THROUGH SIMULATION

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