

# Standard Competitive edge

Managing director of Claytex **Mike Dempsey** discusses his company's expertise in modeling and simulation



Mike Dempsey

**B**ased in Royal Leamington Spa, Warwickshire, Claytex is an engineering consultancy that specializes in systems engineering. The company was established by its now managing director Mike Dempsey in 1998 and has since forged a strong reputation in the modeling and simulation of complex multi-domain systems using Dymola (a Dassault Systemes software package) and Modelica.

Although Claytex applies its expertise across the automotive, aviation and military sectors, the company is particularly active in motorsport and low carbon vehicles – applications where clients are often seeking modeling and simulation of innovative powertrains.

Dempsey explains that Claytex customers will typically use modeling and simulation throughout the design cycle. "With physical modeling even at the concept stage you can look at putting together a schematic architecture of the system to figure out exactly how the different parts need to work," he says. "As you move through the design cycle and get into more detail you can replace simple models with much higher-fidelity versions. You would apply modeling all the way through the validation cycle: a model can be made to run in real time to test the control systems are doing what they are

meant to be doing without having to have a physical vehicle present."

Like many companies within the LCV supply chain or support services area, Claytex has participated in collaborative development projects coordinated and funded by InnovateUK (the Government innovation agency formerly known as the Technology Strategy Board). To date, Claytex has been involved in two programmes: a battery research project with Jaguar Land Rover (JLR) and a real-time systems engineering project with Ford.

Working with JLR and the High Value Manufacturing Catapult at Warwick Manufacturing Group, Claytex has addressed a desire from industry to develop battery modeling capabilities to aid the development of future products in the hybrid and full-electric vehicle markets. The three-year project, which commenced in August 2014, will consider means to allow JLR to assess various battery technologies and the impact their interaction with the vehicle as a whole has on overall performance and efficiency.

Meanwhile, the collaborative project with Ford is around Model-based Real-time Systems Engineering (or 'MORSE'). Alongside powertrain specialist AVL,

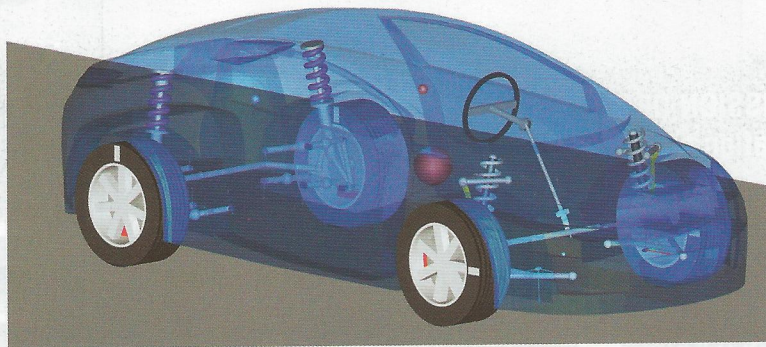
Claytex is exploring the development process of control systems using real-time Dymola and Modelica models.

Dempsey explains that he would like Claytex to be involved in further funded industry research partnerships. "We are certainly open-minded and looking at what competitions are there and where we could fit into a project and get something useful out of it," he says.

However, many of the projects organized by InnovateUK and other funding bodies are concerned with producing a demonstrator or similar piece of hardware. "A lot of the research projects are not necessarily focused on developing the tools and methods that would allow you to develop technologies faster and more easily," adds Dempsey. "Getting involved in the development is a matter of finding the right competitions."

According to Dempsey, the market in which Claytex operates is very competitive with several simulation tools available for customers to choose from. However, all the tools have certain strengths and weaknesses and, as such, Claytex's differentiating factor is the company's expertise in Dymola and Modelica.

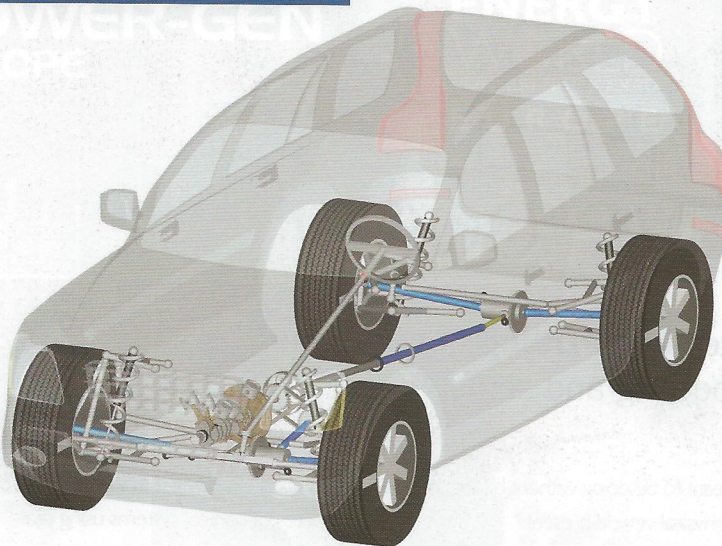
"Dymola is very focussed on physical systems modelling, providing good ways of building up a model of a physical



MultiBody vehicle dynamics model that can also be run in real-time as part of a DiL system



Full vehicle model including detailed engine, transmission, driveline and suspension for evaluating driveability



system in a convenient, intuitive way," explains Dempsey. "This means you can build the model as an engineer rather than having to be a mathematical expert to figure out how to get the best from the simulation."

In addition to the two ongoing InnovateUK projects discussed above, Claytex is overseeing an internal project looking at vehicle dynamics for road cars. It is hoped by Dempsey that the company will be able to transfer its experience in delivering real-time modelling for the niche, high-performance world of motorsport (Claytex having worked in Formula One, IndyCar, and Nascar) to a road car context. "We are investing ourselves and once development gets to a certain stage we will start to look for clients and ensure it does what they need and

delivers what they want," he adds.

Turning his attention specifically to the low carbon vehicle market, Dempsey says that it "seems to be accelerating". He continues: "There are a lot of interesting new projects that are coming through. Tesla is leading the way in full electric and BMW have done some great things with the i8 and i3. All of the manufacturers are doing more and more of this type of vehicle."

The increasingly significant activity of major automotive manufacturers in the LCV sector brings with it new business opportunities for Claytex. Since hybrid and electric vehicles require fundamentally different powertrains to conventional internal combustion engine cars, existing simulation tools are not necessarily optimized for application in LCV development. "Some

manufacturers are struggling with trying to use what we might term 'legacy tools' to develop something that is nothing like a conventional powertrain – this can cause headaches in trying to do simulations and predict how the powertrain will behave," comments Dempsey. "Other manufacturers have embraced the new way of doing things. For example, BMW is one of the biggest customers for Dymola – they use it for development of the 'i' cars because of its modeling capability."

As far as disruptive technology that might precipitate a step-change in the LCV sector is concerned, Dempsey identifies batteries as the key technology frontier. "Everyone is hoping for a big breakthrough on the batteries because that seems to be the element that makes it really difficult to get a good electric vehicle: the balance between the amount of energy you want to carry and the range the car has," he says. "Everyone is looking to the academics and the research institutes for that next step, but until that happens we can expect fairly incremental development in the sector."

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Dymola model diagram of a series hybrid

