

# Perfecting performance

A comprehensive suite of solutions that enables the modelling, simulation, and testing of a vehicle in a virtual environment

Claytex  
managing director  
Mike Dempsey



Digital simulation and modeling are playing an increasingly significant role in technology development in the automotive industry. The sophistication of such tools allow companies to work more and more in a virtual environment, eliminating some of the time and expense associated with building and testing physical prototypes whilst offering further flexibility to rapidly iterate designs.

Systems engineering consultancy Claytex is expert in the application of Dymola, the Dassault Systèmes simulation tool, for automotive and motorsport. The Warwickshire-based company offers customers a comprehensive suite of solutions that enable the modelling, simulation, and testing of a vehicle in a virtual environment.

Integration of  
vehicle dynamics  
models and rFpro



This year Claytex completed the development of a suite of libraries for Modelica (the modelling language behind Dymola). The 'Vehicle Systems Modelling and Analysis' libraries or VeSyMA, launched in May 2017, provide models for the simulation of conventional, hybrid and electric vehicles, as well as motorsport applications. VeSyMA offers a set of common vehicle templates with the flexibility to reconfigure subsystems to address any vehicle architecture concept.

VeSyMA is intended to help designers and engineers combine different aspects – engine, powertrain, suspensions and so forth – of a vehicle architecture. "This has typically been quite difficult to do," says Claytex managing director Mike Dempsey. "The completely integrated suite allows easy combination of different aspects. [The user is] building on an open platform, the basic architecture is defined using an open standard so we're easily able to extend it to encompass new ideas and new systems."

Claytex hopes that VeSyMA will attract new customers to Dymola whilst existing customers, Dempsey suggested, will be encouraged to migrate to the new platform over

the coming year. "We have been working on this for two years but it encompasses everything we have developed over the last ten years," says Dempsey. "VeSyMA is targeted at automotive OEMs and their suppliers doing passenger cars and motorsport."

VeSyMA will be distributed by Dassault Systèmes and, again, Dempsey hopes that the French software company's huge global network of customers will ensure that a host of new potential users will be introduced to Claytex's modelling libraries. As far as Claytex is concerned, the more customers using its platform the better – especially if OEMs and Tier Ones can integrate models from the supply chain in a common environment.

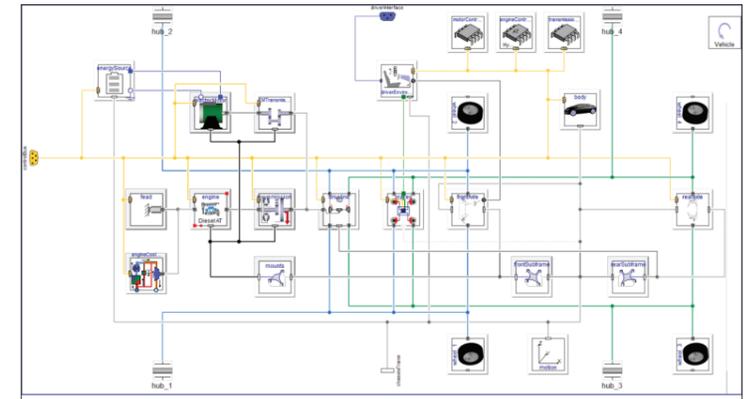
At this year's LCV Event, Claytex representatives will demonstrate the advantages of virtual testing options to the low carbon mobility community. As a reseller for driver-in-the-loop terrain simulation software rFpro, Claytex can – allied with its long-standing Dymola expertise – offer immersive virtual test environments that allow automotive developers to learn more, faster. "We are bringing together the driving simulator technology and the simulation capability that provides the physics of how the car responds to control inputs," comments Dempsey.

Dempsey explains that Claytex is facilitating trend towards use of virtual testing over physical testing – the target being zero prototyping. "That's been the dream for a long time

and we continue to work towards it," he adds. "We can do more and more virtual testing and are able to start doing it much earlier in the development programme."

A key advantage of virtual world simulation is it allows a design or engineering team to test an individual part or system in a whole vehicle context from an early stage in the process. "Before you even build the first prototype, which tends to be a mish mash of an existing car with some new bits hacked into it, you can start to experience the complete virtual vehicle using these technologies," says Dempsey. "You can make decisions before the build of the first prototype which means you can reduce the number of prototypes that you actually need to build. Ideally you would get that down to zero prototypes, but I think we are some way off that in reality."

Further down the development path, simulation and virtual testing can help to streamline the refinement of vehicle systems. "Say you want to assess different springs and damper combinations on a real physical car – to change those you need to put the car in the garage for a few hours for mechanics to be able to strip the car, replace the parts and send it out again," describes Dempsey. "In the meantime all the environmental factors have changed. Within simulation we can apply changes instantly and you can be re-testing under exactly the same simulated

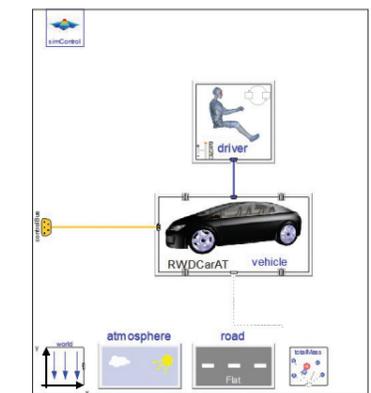


VeSyMA platform  
for the design and  
analysis of vehicle  
systems and  
components

conditions with no downtime, so you can assess many more options much quicker."

In Dempsey's opinion, the advent of autonomous vehicles will drive more and more virtual testing. "You need to prove that these vehicles are safe under every conceivable scenario; you need confidence that [an autonomous vehicle] has driven in every conceivable scenario and you are simply not going to achieve that with physical testing," he says. "Whereas if you have a virtual system, you can compress down environments so instead of needing to drive thousands of miles on the motorway you can use 100 virtual miles and you're going to experience all the different types of junction, road sign, road side feature and traffic scenario you can come up with. And you can do that repeatedly, so if you make a change to the control system you can repeat those tests and compare absolutely and objectively

how the vehicle performs."



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To meet this anticipated market demand, Claytex opened a US office in February 2017 and the consultancy plans to build its team and extend its offer through North America over the coming years. Whilst Claytex's focus is likely to remain on automotive (with an active niche in motorsport), the company is assessing opportunities in other transport sectors such as rail and marine.

"I think using Modelica with Dymola gives us a significant advantage because it is very powerful, very flexible and it's also open," summarizes Dempsey. "It lets the user see how things are done and how they can easily customize things to work with whatever new concept or idea they are coming up with."

Full motion driving  
simulator from  
Ansible Motion

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