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LCV 2022
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Test, develop and deploy

Steve Welch spoke to **Claytex** MD **Mike Dempsey** about the launch of their new brand **AVSandbox**

Mike Dempsey

Vehicle simulation is widely agreed to be the only way OEMs and suppliers can safely demonstrate that autonomous vehicle systems are ready for the road, and in the UK, the leader is Claytex. The company was acquired by TECHNIA, this year, and the business has recently launched a new brand, AVSandbox – its new test environment that will help develop, test and approve autonomous vehicles under the new EU regulations.

Claytex has built a global reputation for vehicle modelling and simulation testing, so why start a sub-brand? "A sandbox is where you can kind of go and play with your software, try it out, test new ideas," begins Claytex MD Mike Dempsey. "The name encapsulates all that we're doing: providing AV developers with a safe environment to test, simulate and experiment without risk. It's a place to push boundaries and to define them."

AVSandbox is built on solid foundations, using Claytex's expertise in DYMOLA to create, test and develop AV solutions. Specifically,

the new solution will enable vehicle manufacturers to work toward inherent safety by design for autonomous vehicles. As the technology matures and automation is introduced into more and more new cars, regulators need to catch up – and AVSandbox can help.

"There's no regulation in the UK that would allow an autonomous vehicle on the road," says Dempsey in a matter-of-fact way. "We're trying to get ahead of the game and become involved in discussions with those regulators. It's our job to know what they're thinking and working towards." As well as technological expertise, customers can tap into Claytex's contacts too.

The AVSandbox team has established close ties with government regulatory bodies, "We're working together to identify the standards which will shape international autonomous vehicle regulations," says Dempsey. Lobbying has become a dirty word on both sides of the channel, but Dempsey and his team aren't seeking to influence regulations but to understand them. "Through AVSandbox, we can help OEMs meet those requirements," he says.

So, how will this work? "We're focusing on developing high-fidelity

sensor models and creating more accurate digital twins of real-world locations so OEMs can validate their vehicles." The technology in AVSandbox has been tried and tested and is a core part of Claytex's offer. Simulation technology designed by the team has helped F1 cars and NASCAR teams to refine their designs. Claytex is also a core part of the D-RISK project team that has developed an "edge case" database which can provide the test scenarios for autonomous vehicles. They're putting together all these pieces within AVSandbox.

Traditionally, vehicles would go through a standard set of tests to prove they were safe for the roads. Autonomous cars will have to do the same, but virtually, explains Dempsey. The AVSandbox provides simulations of real-world locations, says Dempsey. "There are stretches of German autobahn and areas of Coventry City Centre. A huge range of automotive proving grounds is available inside this environment as digital twins."

The first – and arguably most important – challenge is to prove that the virtual proving grounds themselves are trustworthy, says Dempsey. Key to that is validating the virtual models. "We will want to be able to recreate things we can do in the real world, inside the simulation environment, to make sure that it does the same thing in both cases." Once this has been done, they can begin to introduce the almost infinite number of variables a driver could experience on the roads. "These are situations you can't recreate or don't want to recreate because they'd be too risky and pose a danger to life."

Dogs, ducks, and other drivers all pose threats, but the system could

Testing autonomous vehicles by deploying traffic and pedestrian models in virtual environment

also be used to understand how autonomous vehicles will respond when asked to make morally difficult decisions. An example is the oft-cited ethical dilemma an autonomous vehicle might face when careering out of control. "How well does the system do from a safety point of view? Suppose we start to put it into high-risk situations. Is it able to respond appropriately and not collide with things or perform a minimum risk manoeuvre inside these test environments to avoid collisions" Put simply, would it prioritise the safety of the driver or the pedestrian? While these situations are rare, regulators will want to see that they – and thousands (potentially millions) of other scenarios have been considered as part of autonomous vehicle design and development. As part of D-Risk, Claytex and partners have been crowdsourcing examples that, in some cases, would be impossible to make up. But, as any driver can attest, you must always expect the unexpected when you're behind the wheel.

It's evident that the investment in AVSandbox is significant, so Dempsey and his team must have established a customer base. So who is it for? "We're primarily catering for OEMs, start-ups and sensor developers," says Dempsey. "You have businesses working at the perception layer, helping systems identify what is around it in the world. Some suppliers are doing individual parts of an AV control system, but they need to be able to simulate and see what's happening." Claytex's industry pedigree means that OEMs will also be lining up to use AVSandbox. "These global leaders want to integrate what

they get from those sensor suppliers with all the bits of software that they might do themselves (or get from other suppliers) and perform system-level tests to make sure everything works."

The AVSandbox is a plug-in-and-play solution that can be integrated with an OEM or suppliers' systems. The team uses the open-source standard OpenSCENARIO for its simulations. There are several scenario databases on the market, and the team is working on being able to incorporate them all. "We're doing this because we don't think there will be just one that provides all the test cases you need for your autonomous vehicle," says Dempsey.

Each new customer is the start of a long-term relationship, says Dempsey. "The requirements of a supplier, start-up and OEM are going to evolve what they need as they progress their own project and so it is essential we stay engaged with them throughout the development journey."

Part of the reason the journey will be a long one is that autonomous vehicle regulation is still in development and will inevitably change. "We believe that what we offer through AVSandbox will allow people to meet those requirements and regulations as they

change and develop." Throughout the supply chain, there's a massive investment in testing to prove solutions are safe, all of it to reduce risk – to drivers and businesses. It's a complex and ever-changing area of regulation, Dempsey explains. "Within the UK, it's the operator, not the OEM, that becomes responsible for deciding a vehicle is safe in the intended environment that it's going to be used in," explains Dempsey. "This is going to be a fascinating twist on it," he says with a sense of understatement.

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