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Smith Electric Vehicles

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US commercial vehicle manufacturer Smith Electric Vehicles US (Smith Electric) has hired a UK company, StormMQ, to help it manage the vast amounts of telemetry data being collected from its fleet of electric-powered lorries.

Electric cars might still seem a bit of science fiction dream. Where do you 'plug them in'? And what do you do if you run out of power half way home, all because you decided to take an unexpected detour to visit your granddad? The lack of infrastructure and the attendant "range anxiety" are real inhibitors for the idea.

But in commercial delivery vehicles it's a different story altogether. We've been used to electric milk floats for years – and they work because they have a set route that they don't deviate from.

That predictability means commercial vehicles, particularly in high density urban areas, are a real potential market for electric power.

Smith Electric, which licenses its proprietary technology from Smith Electric Vehicles in the UK, recently won a US Department of Energy grant worth $32 million. This grant is towards a £64 million project to analyse the performance and potential of all-electric, zero emissions commercial vehicles. The US government is keen to explore this area, with its potential savings in oil use for the vast amounts of freight moved around the country.

A total of 510 vehicles will have been fitted with the telemetry kit by the end of 2011. The kit measures every 'change of state', in geographic position, current and average speed, voltage used, pedal position – and the temperature of every cell within the batteries powering the vehicle. With these measurements being taken 24 hours a day, there's around 27,500 pieces of information per second being passed back to Smith Electric's server array in Kansas – around a gigabyte of information each month.

Environmental conditions are also factored in and used in the analysis, as temperature and humidity will have a powerful influence on battery life and performance.

That rate of data transfer really pushes the boundaries of what's possible to manage, says Smith Electric chief technical officer Robin Mackie. Having heard of message queuing services being used to handle large amounts of data in other settings, particularly the financial industry, he began to investigate –and eventually began work with StormMQ.

StormMQ's cloud based message queuing system allows customers to manage highly complex data from multiple servers, balancing out the traffic so that it doesn't overload the system.

As StormMQ uses the AMQP (Advances Message Queuing Protocol) standard, Smith Electric was able to quickly integrate the cloud service with its vehicle telemetry systems from UK developer Sensor-Technik. "We went from an

idea to a fully working solution in just seven months," says Mark Wood, engineering manager at Sensor-Technik, "The StormMQ phase was actually towards the end and that took just three weeks".

As well as being involved in the project for the DOE, the vehicles are being used for real customers, who are "real advocates" of the technology, says Mackie.

StormMQ has also provided encryption services for the data, as these clients obviously have sensitive information streams that they don't want to be available to their competitors.

The data collected allows Smith Electric to do much more than feed information back to the government. It can provide a much better service to clients – technicians can spot issues before they become real problems, and proactively go to customers, with the right tools and spare parts, before the user even realises there's a problem.

The company can also focus on continuous improvement of the technology, which is of course a new one. If a part fails, the granularity of the data collected second by second, 24 hours a day, means Smith Electric can spot exactly what went wrong, and what led up to the problem. It then shares that diagnostic information with suppliers – in this new, developing industry, everyone is keen to learn as much as possible.

Data is transferred using standard, tested technologies - GPS and GPRS. "We could look at 4G etc, but I'm a great believer in sticking to the reliable and known," says Mackie. "UATTC – unique assembly of tried and tested components. This isn't a science experiment."

The current system is specced to allow Smith Electric to grow to up to 1000 vehicles, which it expects to do quickly. The telemetry system will be added to the full fleet, not just those in the DOE study

"It's easy to plan ahead, though," says StormMQ commercial director Ross Cooney. "It's not like a web service where you need massive scalability – it will grow incredibly predictably," he says.

And StormMQ's system makes that growth easy, says managing director Raph Cohn. "Because you can partition it up into little slices, you can add new machines incredibly easily."

Smith Electric has invested a lot of money in storage, too – the data is not discarded after collection, but kept for longer-term analysis. The reports produced for the DOE are kept for three months after collection, and different reports collected for internal and external customers will also be retained. While there is a degree of data rationalisation on a daily and monthly basis – up to 50 percent can be cut - the company still has high storage needs.

That data is all processed and stored in-house. With the steady growth plans of the company, it works out cheaper in the long term to keep it in the server array than to move to a cloud provider, says Cohn.

Mackie is full of praise for the way StormMQ has helped his company tackle this huge project. "To develop and run our own multi server messaging queue in-house would have been extremely expensive. We sought independent expert advice and the recommendation was that StormMQ was potentially the only platform that could meet our requirement and more importantly, we could evaluate it and deploy extremely quickly . And they were very quick – it was up and running in a few months. And they worked very well with all of our teams – with IT, with the service people, and the telemetry team too. "

This is StormMQ's first major customer. The company's next project is likely to be work with Inkspot, a commercial iteration of a single programme-funded research project, eScience Central, based at the University of Newcastle.

Inkspot provides secure hosting for specialised scientific content including data, software, workflows, publications, media, events and projects. Scientists can analyse their data, automate common tasks and share some or all of their work. The plan is to integrate StormMQ's message queuing into Inkspot, helping to process the enormous worksets that scientists will upload, and making the Inkspot service more scalable.