

ANALYSIS

Defence industry learns lessons from motorsport

In the enduring effort to procure the best land vehicles for the toughest operational theatres, the UK MoD's collaboration with the country's motorsport industry is gathering pace, writes Matthew Bell



The Lamborghini Murcielago LP670-4 Superverde uses heat-resistant exhaust coatings produced by Zircotec
Lamborghini; 1363724

(Inset) An exhaust manifold with Zircotec's heat-resistant coating. The company provides heat management products for the motorsport and defence industries
Zircotec; 1363725

As the UK increases its military presence in Afghanistan, the need for innovative land vehicle solutions for harsh environments is increasingly pressing.

Over the last four years the UK Ministry of Defence (MoD) has reached out to the country's motorsport industry in an effort to improve the equipment it procures and, in particular, to satisfy its urgent operational requirements (UORs).

"It's a grassroots-led activity, but it's well understood that there are benefits from it," said Colonel Nick Wills, team leader of the MoD's Defence Equipment & Support (DE&S) Protected Mobility Team, at a recent motorsport and defence industry event held in the UK. "Most of the vehicles that we've got [in Afghanistan] on operations at the moment have actually had some kind of input from the motorsports industry."

Col Wills continued: "At the moment [the joint activity is] being focused on individual [MoD] teams – mine and a couple of others – but I think there's scope for this to be wider. It needs something bigger than just focusing on individuals in the DE&S to take this forward."

The 'Lord Drayson effect'

The growing collaboration between the UK's motorsport and defence industries is due, in large part, to the 'Lord Drayson effect', said Col Wills, referring to the inspiring influence of the

former procurement minister who left the MoD in November 2007 to fulfil his ambition of taking part in the 24-hour Le Mans car race, returning to the department in June this year as its minister for strategic defence acquisition reform.

"I am very conscious that [Drayson's] a very powerful and motivational figure to make some activities like this work," said Col Wills. "He clearly had this really good understanding of the capability and capacity of the motorsports industry to really deliver timely and good engineering – excellent engineering – and he wanted to feed that across into the defence domain. Lord Drayson has an interest in this and is keeping his eye on it."

While there is certainly scope for motorsport expertise to transfer into marine and aerospace applications, it is in the acquisition of protected land vehicles for use in Afghanistan – especially those "at the heavy end of the protected vehicle market" – that Col Wills specialises and therefore his key priority is blast protection. His team looks set to spend around GBP750 million (USD1.2 billion) during 2009 and he expects to spend just under that amount in 2010.

"The real struggle is operating at 55 degrees [Celsius] in either mud, clay or very fine dust," said Col Wills. "We're operating right at the edge of the laws of physics, especially in terms of protection ... and that requires a number of solutions that generally have needed a bit of lateral thought."

The crossover of expertise between motorsport and defence often occurs in the development of specialist components and systems. A recent example centred on a contractor that was unable to provide sufficient cooling for electronics systems because the required technical capability was not part of its core business. Col Wills made contact with a motorsport company via the Motorsport Industry Association (MIA) that was able to devise a solution.

"We've had issues with vehicles where the traditional approach through traditional supply chains has simply not been able either to operate at the speed [required] or to answer the depth of questions that we needed answering," he said.

Lateral thinking

The approach of the motorsport industry is very much in tune with the demands of UORs, which apply tight timescales and require a quick turnaround of proposals and prototypes, according to Col Wills. "The standard way of [procuring equipment] isn't really cutting it," he said, "and so it requires people who think in a slightly different way and then come up with that solution quickly, rapidly prototype it, test it [and then] come back – and that's the sort of mindset that we really enjoy."

The colonel continued: "We tend to want a big prime to look after our projects. What it means is that they have a huge number of tier two and tier three suppliers that they can draw on, and when they're looking for a new supplier for something, what I want them to do is cast their spotlight into the MIA bubble of industry."

"There is a lot of acquisition going on and all the way through I don't want to just buy the same vehicle again," added Col Wills. "I want us to make sure that we can innovate and change stuff where we can. So there are always opportunities with those vehicles that are coming through to look for ways of doing things better."

Alcon Components, a manufacturer of brake and clutch systems, is an example of a UK company that has successfully deployed its motorsport expertise in the defence domain.

Founded in 1984 to supply brakes to Audi Sport for its rally programme, Alcon went on to provide components to teams in Formula 1, World Rally, NASCAR and Indy Car racing. Following diversification in the 1990s – when it worked with automotive companies to help engineer armoured limousines and "other special vehicle projects" – the company branched out into defence, focusing on the UK MoD's tactical vehicle fleet UORs.

In 2008 Alcon partnered with Ricardo Defence Systems and Technologies on the Land Rover Defender R-WMIK (Weapons Mount Installation Kit) upgrade programme. Alcon was charged with providing new brake callipers after it was discovered that the addition of armour protection, onboard power and payload enhancements had increased the adapted Land Rover's weight by a third, from 3.5 tonnes to 4.7 tonnes.

Ricardo asked Alcon in October 2008 to analyse

the requirements and put forward a solution. Before the end of the month Alcon's prototype and production solutions had been proposed and accepted. First supply was completed four weeks later, followed by the successful conclusion of on-vehicle prototype testing in January 2009. In March, eight weeks after receiving the purchase order, Alcon delivered the first batch of production callipers for the R-WMIK programme.

Alcon told *Jane's* that, as a direct result of efforts to improve collaboration between the motorsport and defence industries, it has secured three deals in the last 12 months. "That is what we would consider to be significant progress," said Alcon. "The motorsport-to-defence initiative has proved very worthwhile for Alcon and other motorsport companies."

Prodrive is another UK motorsport company exploiting crossover opportunities in defence, especially in the UOR field. Specialising in engine and transmission development, chassis enhancement, control systems, advanced composites and precision machining, Prodrive has run race and rally programmes over the last 24 years for the likes of Aston Martin, BMW, Ford, Honda and Porsche.

Prodrive has had "some interesting successes helping larger technology suppliers meet seemingly impossible deadlines", the company told *Jane's*. "The engineering programme management techniques developed by Prodrive to help it win in motorsport are quite similar to those required for successful delivery of UORs."

Zircotec, which produces heat barrier technologies for a variety of motorsport applications, has also found recent success in the defence arena by helping to reduce in-cab temperatures for some of the MoD's land vehicles. Its products include plasma-sprayed coatings – which protect components such as exhaust manifolds from the effects of heat, wear and corrosion – and flexible ceramic heat-shield materials.

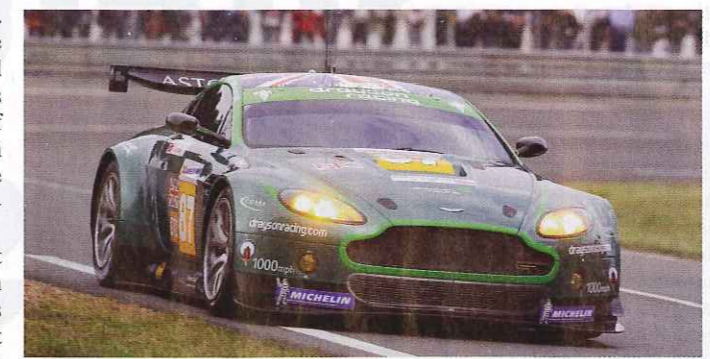
Improved blast protection

Col Wills' mission of the moment is to acquire land vehicles for Afghanistan with appropriate blast protection: a task that requires constant innovation to ensure the best solution in demanding conditions. The colonel highlighted the Mastiff 2 6x6 tactical vehicle and the problems posed by its constant need for in-theatre repairs.

"It's a great big V-hulled metal monster and it has very simple running gear: just leaf springs and beam axles," said Col Wills. "Mastiff 2 has only been [in Afghanistan] for a short while and one of them has been hit five times already."

He continued: "The ability to repair them gives us this dilemma: do you go for much more complex suspension designs that are inherently more complex to repair [and] where maybe the whole vehicle has to be written off? Or do you stick with the simple?"

Col Wills explained the MoD's approach: "We're looking at ways to more intelligently ensure that the vehicles that have been hit on a number of occasions are still going to step up to



Lord Drayson's Aston Martin Vantage GT2, built by Prodrive, racing at the Le Mans 24-hour race in June 2009
Prodrive; 1363739

the plate when we need that protection time and time again."

The MoD is also keen to utilise motorsport's "lateral thought" to review equipment proposals submitted by consortia and larger contractors, especially when it comes to UORs. "This is another area that we're starting to move into, to get people to give us some independent engineering advice on the solutions that we've been given," said Col Wills.

Despite some obvious successes in the cross-pollination of motorsport and defence, there may still be issues to resolve in overcoming established cultures and working methods.

According to Robert Mohacsi of MIRA – an independent vehicle systems consultancy that straddles the automotive, motorsport and defence industries – it can be difficult for an unknown company with innovative solutions to find its way into the MoD.

"Within the MoD I'd say that they're certainly much more open than they used to be," said Mohacsi during a joint motorsport-defence seminar in November. "They're more than happy to talk to you ... and they're very pleased to talk to you often ... but they are conservative. If you've got a good idea [but] you've got a whacky product they're not going to immediately buy it."

Mohacsi continued: "There are a lot of issues that they'll want to address first and because of that conservatism a lot of things are quite slow. In [motorsport] things happen within weeks. In the defence world, if you're on the wrong programme, things will happen in 20 to 30 years."

Mohacsi noted, however, that there could also be opportunities for motorsport companies to work with original equipment manufacturers

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(OEMs) in the defence field. "[OEMs] should be interested and they are being encouraged by the MoD to go and talk to organisations that have the technology and the expertise that the OEMs do not have – although they claim to have," he said.

Col Wills reinforced this approach, highlighting the recent willingness of BAE Systems to make the most of motorsport's capabilities when working to satisfy UORs.

Reliance on R&D

Chris Aylett, chief executive of the MIA, said the key to motorsport's expertise is its reliance on research and development (R&D), which enables it to survive in a highly competitive environment.

"There's hardly a motorsport member of our organisation that spends less than 30 per cent of sales [on R&D]; many spend more than 50 per cent of sales to re-invest in R&D," said Aylett. "The national engineering average is 3.2 per cent and the automotive industry is slightly ahead of that," he added.

"It's that R&D that keeps us innovative," said Aylett, "and we can only be innovative one week on another because you only win once and there's 29 other guys trying to innovate to beat you the next week. So it's a never-ending R&D process."

The MIA estimates that, of the GBP6 billion generated by motorsport each year in the UK, GBP3 billion derives from engineering. "We're in the engineering business. We provide high-performance engineering solutions. If anything [we're] rapid prototypers and R&D partners," said Aylett.

The MIA has recorded around 4,000 motorsport companies occupying a 200-square-mile (518 km²) 'crescent' in the area to the northwest of London, which Aylett estimated was "easily the world's greatest concentration of competitive engineering".

A shared engineering ethos and will to succeed has brought motorsport and defence together in recent years, but both industries will need to make a concerted effort to ensure that they continue to reap the benefits, according to Col Wills.

"It's about the engineers; it's about the people who really love the challenge," he said. "There are people that have real difficulties in the defence area, fighting the laws of physics, so there is a synergy that we should really try to harness."

Matthew Bell is a *Jane's Defence Industry Reporter*, based in London