Accelerating Defence Acquisition: What Defence Can Learn From the World of Motorsport

by **Gavin Ireland**

Gavin Ireland is a RUSI Research Associate and an award-winning motorsport photographer whose images can be viewed at www.sportscarportraits.co.uk . He looks at the world of motorsport and considers the lessons that it can teach the defence sector, particularly in terms of speed of design and development, as well as in the design of unmanned systems.

When former Minister for Defence Equipment and Support Lord Drayson left his government role to pursue a motor-racing career in America, some commentators viewed his chosen pursuit as an inherently frivolous sport. In doing so, they may have overlooked the potential for defence to draw on the expertise of one of Britain's most successful high-tech industries. Whilst it cannot be denied that the aims of defence and motorsport will always be separate – the provision of long-term military capability contrasts with the pursuit of speed for speed's sake – significant lessons can be learned on each side.

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Historically, the closest links have been with military aerospace, which fed expertise in aerodynamics and advanced materials into the early development of motor racing. These links have declined in recent years, with greater platform complexity resulting in an average development cycle up to 20 times that of a Formula One racing car. At the peak of motorsport technology, similar specialisation has coincided with unprecedented commercial success, enabling the top Formula One teams to invest in bespoke facilities and reducing their overlap with the defence sector.

However, in an increasing number of areas beyond aerospace and Formula One, recent developments have renewed the association between these industries. In defence, the quest for innovation, reduced cost and greatly reduced acquisition cycle time presents an opportunity for the motorsport industry to contribute its expertise whilst exploiting cutting-edge defence research. Motorsport, along with the wider automotive sector, has repeatedly been cited as a valid benchmark for defence innovation but is rarely explored in depth.[1] The commercial automotive sector has provided a valuable reference, including Toyota's 'Lean Manufacturing' techniques being applied in naval shipbuilding. Competitive motorsport has other benefits to offer – where the automotive industry is characterised by efficiency of production, motorsport drives agility, innovation and rapid technology development.

Technical Partnerships

For the rapid development of the Talisman Unmanned Underwater Vehicle (UUV), BAE Systems turned to the Lola Group, a company with a 50-year history of producing winning race cars for a number of series, notably including the Le Mans 24 Hours race, in which Lord Drayson aspires to compete.

Having established the basic layout and hull form of Talisman, BAE Systems contracted Lola to develop a revised composite structure for the hull of the UUV. BAE Systems' project manager Andy Tonge explains one simple advantage of working with Lola: *"Their deadlines are so short and aggressive it's almost unbelievable"*.

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BAE Systems reportedly contracted Lola on 21 December 2005 to produce a prototype composite hull. This was developed, manufactured and delivered less than three months later. Tonge continues,

"If we can do the same in the defence industry that's really giving us a technology and business boost. It's a culture change but it also brings in new technologies that people in the defence industry are not always aware of".[2]

BAE Systems also has an ongoing 'Technology Partnership' with McLaren Mercedes, the prominent British Formula One team. The 12-year relationship has seen a number of BAE Systems' technologies perfected for use on the McLaren race car, from early cooperation in aerodynamics to more recent work integrating sensors into the car's composite wing structures. Although BAE Systems' technologies have been implemented by McLaren, the benefit to BAE Systems' business – focused on marketing and studying "the speed of build and operations processes in Formula One" – is perhaps less evident, leading one to speculate as to

With the obvious exception of its payload, a modern racing car such as this Lola Le Mans prototype is technically similar to some unmanned systems [Gavin Ireland]

whether the partnership's full potential remains unfulfilled.

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Between 2005 and 2007, an innovative and mutually beneficial relationship was developed between science and technology firm QinetiQ and Williams F1, another British Formula One constructor. Having first entered motorsport with a Le Mans sports car team in 2004, QinetiQ sought to deepen its involvement in motorsport by entering Formula One. Following the lead of Ferrari and Shell, who have developed a partnership based as much on technical development as on branding, QinetiQ and Williams sought to extend the relationship beyond a simple sponsorship contract, pioneering the use of motorsport to commercialise defence-based research for wider automotive use. As McLaren have done with BAE Systems, Williams benefited from the application of cutting-edge defence technology, including QinetiQ's Blue Magus satellite tracking system. QinetiQ, exploiting their broader presence spanning defence, aerospace and security, were able to commercialise their military research in what remains a harsh and competitive operating environment. Sam Collins of leading industry journal Racecar Engineering comments,

"The link-up provided more benefit than anyone may yet realise. Projects like Blue Magus and adaptive, self-repairing composites could help define the future of both defence and motorsport applications".

Shared Requirements

Several years before its relationship with QinetiQ, Williams produced one of the most technically sophisticated Formula One cars ever built, the 1992 championship-winning FW-14B. This car, subsequently outlawed by changing technical regulations, dominated Formula One through technology such as active and hydro-pneumatic suspension and continuously variable transmission (CVT). At the time, Williams had no defence industry links, yet all of these technologies have since been developed by other organisations for military application – notably for Japan's new TK-X Main Battle

BAE Systems' Talisman UUV: the composite hull structure was developed by Lola, the racing car designers [BAE Systems and Lola Cars]

Tank (MBT) – showing the potential for motorsport to lead defence-relevant technology maturation.

The technical similarity of an advanced race car to many unmanned systems is striking and presents one of the most likely courses for future interaction between defence and motorsport companies. The US Navy recently contracted Northampton-based engine specialist Cosworth as part of the Ultra Endurance UAV heavy fuel engine technology development programme. Meanwhile, the composites division of the Lola Group is already contracted to support the UK Watchkeeper programme with tooling and initial build of the unmanned aerial vehicle (UAV). Motorsport also demands robust electronic and mechanical systems with reduced mass and increased functionality, an aim shared by the developers of unmanned systems. The harsh environment experienced in events like the Le Mans 24 Hours, with heat, dust and vibration all obstacles to be overcome, may serve as a useful testing ground for components destined for use in unmanned systems. Le Mans-based company SOURIAU can attest to this, being a supplier of electrical connectors to several Le Mans 24 Hour teams as well as many defence projects in Europe and North America.

The SME Connection

While BAE Systems and QinetiQ have engaged some of the most prominent companies in UK motorsport, The Motorsport Industry Association (MIA), a UK trade organisation, has recently sought to promote the technology of smaller motorsport-sector companies in the defence environment through the 'Motorsport to Defence' initiative, co-founded with Lord Drayson in 2007. The focus is on breaking down the bureaucratic barriers often encountered by Small-to-Medium Enterprises (SMEs) by promoting direct 'engineer-to-engineer' discussions with major defence contractors. Notable successes have seen MIA member, the NAR Group, deliver a cooling package for the Bulldog armoured vehicle to meet an Urgent Operational Requirement (UOR) and Newton Equipment adapt its Formula One refuelling technology to help maintain fuel purity for the Challenger MBT in dusty environments. Several MIA members are now pursuing options arising from the FRES programme and UORs, the latter being particularly suited to fast-paced motorsport-sector companies.

The Culture of Speed

Whilst companies like QinetiQ have seen potential for motorsport as a means of de-risking technology development, Lord Drayson, interviewed in his capacity as a driver for Drayson-Barwell Motorsport,[3] believes the value lies elsewhere:

"The advantage is the brilliance of the engineering, the speed and the get up and go. The difference with motorsport is that people make decisions quickly because they have to be there on Saturday to race. How is it that a Le Mans team can recognise it has a problem with its dampers and they can design, manufacture and fit a new set of dampers the next morning? If you want a new design of dampers for an armoured vehicle you are waiting years."

Asked how best to exploit Britain's motorsport technology, Drayson explains, *"I think the key is to give, delegate and subcontract projects to motorsport companies and to give them unreasonably short deadlines.*

The thing that is death in a motorsport company is a lot of time to do something. [We need] to be challenging them to come up with a solution with a very high intellectual engineering component in a very short timescale. That's really what defence needs; it can do it but is used to very long lead times."

The implication is that the lessons to be learned from motorsport are not merely technical, but commercial and cultural. This suggests that developing a lasting, valuable relationship between the defence and motorsport industries will require more than 'engineer-to-engineer' meetings, and must encourage involvement from beyond the technology and engineering communities in each industry. The R&D investment of many motorsport firms (up to 40% of turnover) is unlikely to be matched in defence, but there may be other benefits for defence companies in studying motorsport's business culture. Some of these lessons have already been identified,[4] and it would be interesting to measure their application to the defence environment.

Conclusion

In conclusion, it would be naïve to assume that the demands of defence and motorsport are directly comparable, particularly when defence commonly demands a platform design life of around 25 years, in contrast to perhaps four or five years for a Le Mans race car. Even so, further exposure to the fast-paced world of motorsport can only aid the culture change under way in defence acquisition and expose defence contractors to new sources of innovation and technology.

The passion and commitment that characterises people in motorsport occasionally leads some of them to attribute greater value to the industry and its influence than is actually the case. But recent progress has proven that mutually beneficial links exist, and serves to highlight the need for further open-minded analysis from within defence to determine where lessons can be exchanged. Acknowledging that he would "very much like to get back into defence", Lord Drayson's immersion in motorsport may yet help to sustain the association in future. Nonetheless, for motorsport to be dismissed in defence circles as merely the whim of a former minister would be a real loss to both industries. ■

NOTES

1 Ross Bradley, 'The Future of the UK Defence Industry', *RUSI Defence Systems,* October 2007, Volume 10, No. 2, pages 46–47

2 The Engineer, http://www.theengineer.co.uk/Articles/299583/Mine+busters.htm, posted 8 May 2007

3 Lord Drayson, interviewed by Gavin Ireland and Sam Collins at the Autosport International Show, 10 January 2008

4 Jenkins, M., Pasternak, K. and West, R., Performance at the Limit: Business Lessons from Formula One Motor Racing, Cambridge University Press, Cambridge, 2005.