New breed vehicles protect troops at ground zero

Australia was quick to develop a new type of protected mobility vehicle, the Bushmaster well suited to the realities of modern military intervention where frontlines are difficult to define amid scorched earth.

Project Bushranger's protected Infantry Mobility Vehicle (IMV) program grew out of work for the Australian Army's LAND 116 program to become something of a success story for local steel and Australian manufacturing innovation, creating a vehicle type built on a V-shaped undercarriage of ultra hard steel plate.

General Manager, Protected Mobility Systems, with the Project's lead contractor Thales Australia, **Dominic Groenewegen** said the local achievement has since helped spawn similar types of vehicles in the United States and elsewhere.

"After Project Bushranger and the Bushmaster vehicle, there is now a class of vehicles generically referred to as Mine Resistant Ambush Protected vehicles (MRAPs) after the huge American program," he said.

MRAP vehicles usually have 'V' shaped hulls to deflect away any explosive forces originating from below, protecting the vehicles and their passenger compartments.

Sloping armour design has been the mantra of tank manufacture since WWII but has been more widely adopted for lighter military vehicles over the past decade. Simply put, the design approach offers a better deflective surface and extenuates plate thickness when impacted at angles other than straight on.

"When Project Bushranger and the development of the Bushmaster vehicle first started, there was no class of vehicle like that in existence, it was something altogether new," Mr Groenewegen said.

"So in essence, Australian innovation contributed to creating a whole new international class of military vehicle, something not originally envisaged."

Phase One of Project LAND 116 in the mid 1990s called for the supply of conventional four-wheel drive vehicles with limited protection simply to provide troops with reliable mobility.

Phase Two during the late 1990s however called for protected mobility for Australian infantry units, especially mine blast protection.

According to Sales and Marketing Manager, **Michael Sampson** from ASI-member Bisalloy Steels who developed and supplied the steel plate, the Phase Two vehicle had to be capable of withstanding a variety of threats from mine blasts and small arms fire.

"The 'green feed' steel from BlueScope Steel is subsequently quenched and tempered to produce a grade of armour plate to the highest levels of performance," Mr Sampson said.

Since 1993, Bisalloy has produced over 3500 tonnes of steel for the Bushmaster program. The company is Australia's sole manufacturer of high hardness steel plate products for military applications.

Bisalloy's internationally recognised armour capability began in 1988 with an order for hull plates for the local construction of two FFG 7 guided missile frigates. It developed HY 80 steel plates in cooperation with (then) BHP Port Kembla and the Defence Science and Technology Organisation (DSTO) to a US specification that significantly out-performed the equivalent US manufactured steel plate.

In tests with high explosives, the Bisalloy HY 80 plate was stretched to the point where its thickness had reduced by 29.9 percent without fracturing. The specification called for only 16 percent deformation without fracture. Australia's four US-built FFG 7 frigates were subsequently retrofitted with the HY 80 plate. Bisalloy produced a total of approximately 1000 tonnes of steel for the FFG program.

It went on to supply the Collins Class submarine program with more than 8000 tonnes of hardened steel of excellent low-temperature impact properties, also developed with BHP and the DSTO. Their development work for the Bushmaster program encompassed determining metal properties solutions, appropriate cutting methods and validating welding processes/methods.

Governments in the US, India, the Middle East and Asia have since qualified Bisalloy's armour plate for use by their militaries and the company's exports now far exceed domestic orders. Bisalloy is also an invitee on international working groups and panels defining standards for the next generation of Ultra High Hardness steel for armour applications.

That acceptance has also been echoed in Thales Australia's order book on the Bushmaster program.

Thales inherited the work when it acquired Australian Defence Industries (ADI) in 2006 and the vehicles are manufactured at its plant in Bendigo, Victoria. Nearly 600 Bushmasters have already been delivered with on average one vehicle produced every 1.5 days.

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Sales of Bushmaster variants have exceeded 800, including exports to the Netherlands for their peacekeeping forces based in Afghanistan, thanks to responsive development and supply with the first order of 25 in 2007, recently extended to 86 for Dutch operations working in tandem to those serving and protecting the Australian Army personnel over there.

The vehicles were really purpose-built for just such a theatre of operations where the main threat forces encounter are mostly improvised explosive devices (IEDs) near roads and land mines.

As part of the contracts, Thales Australia also supports the vehicles during operations overseas. The vehicle prototypes underwent 250,000km of reliability tests.

Mr Groenewegen said part of the vehicle brief was to maximise use of 'off the shelf components' for easier maintenance in the field.

Thales Australia is currently developing another innovative vehicle, known the Hawkei.

The Hawkei concept is for a light armoured vehicle to vie for the Australian Army's LAND 121 Phase Four project, calling for 1300 new vehicles to replace their ageing four-wheel drives criticised for their lack of substantial soldier protection in conflicts like Iraq and Afghanistan.

Thales plans to deliver six production prototype vehicles to the ADF by the end of this year for trials in 2011. The company has also installed robotic welding to the Bendigo production line, currently in its final stage of commissioning.