

## Protect the Protector

Government must wake up to the urgent need of ballistic body armour for the armed forces

DILIP KUMAR MEKALA | NEW DELHI

THERE IS NOTHING MORE SHAMEFUL for the country than to send the armed forces and state police forces for counter-terrorism operations without adequate self-protection equipment. It is sad to see that no lessons have been learnt from past mistakes – in the recent terrorist attacks in Gurdaspur, many Punjab police personnel were forced to fight their opponents without bullet-proof jackets.

Interestingly, many Indian companies are offering state-of-the-art body armour for the Indian forces. In the last few years, many foreign companies have also shown their interest in the Indian market for ballistic armour technology. Some of them have even opened their test centres here with a commitment to support Indian forces in the future. However, the lack of interest from the government – both at centre and states – and the bureaucratic hurdles are hindering the armed forces to access these high-end technologies.

In 2011, DuPont, one of the global manufacturers with expertise in ballistic armour technology, has opened its test centre in Hyderabad. It is DuPont's first integrated ballistics facility in entire Asia Pacific region. The DuPont Knowledge Centre in Hyderabad hosts state-of-the-art integrated ballistics facility, with a ballistics testing range, a 600-tonne helmet press and stab testing equipment. "Indian defence and internal security forces have unique and challenging ballistics protection requirements. This new DuPont Ballistics facility in India will enable us to collaborate with our local customers and end-users and jointly develop appropriate ballistics solutions and applications for protective vests and helmets that can be tested under local conditions and against local ammunition using international standards, meeting the local requirements," said a technology expert from the company.

The facility will help DuPont develop and test solutions in the Indian environment and it not only reduce the time to market for products but also ensure that products can be made, tested, ver-



LIFE SAVERS MKU's body armour on display

ified and completed much quicker than before. At present the facility can test 9mm calibre rounds, future plans will expand this to a higher calibre.

The facility can also measure the back face trauma when a bullet is shot at a vest. However, the capability to test only 9 mm rounds at present would mean that the centre would be limited to testing armour vests for the police and paramilitary forces. The protection requirement for a police officer would be different from an army soldier's or a paramilitary soldier's.

Requirements of western militaries in Afghanistan and Iraq have tended towards a modular approach for body armour. The modular approach may be a useful option to ensure that the armour vest offers a basic level of protection that can be upgraded based on the threat level faced. For example, a police officer in an Indian city would typically need to have a vest capable of saving his/her life from a pistol round or a stab attack involving a sharp object. However, if there is a terrorist threat wherein automatic rifles are in the fray, then a modular armour vest could handle the threat at the time.

DuPont states that its facility will enable closer interaction with the buyers of such vests, which will enable them to correctly assess the threat levels they face and accordingly provide the specification for the required product. Since armour vests are expensive, there is also a need for the user to ensure that a solution is obtained that fully meets any current and potential threats.

One of the most noted trademarked products of DuPont worth a mention here is the Kevlar synthetic fibre. Kevlar fibre is used to make a variety of clothing, accessories, and equipment safe and cut resistant. It is lightweight, durable and extraordinarily strong and is best known for its use in ballistic and stab-resistant body armour. But it is also used on the ski slopes, the switchback trails, in demanding desert terrain, even the outer limits of space.

Kevlar fibre is also being used for new armoured vehicle programmes with Renault Trucks, Land Rover and Jaguar in France. Kevlar armouring systems consist of composite panels for side fittings and floors, with a varying number of layers being applied according to vehicle type and protection level. They help enhance the protection of floors and side fittings, especially against shards of explosives and ballistic attacks.

Kevlar claims to be five times stronger than steel at equal weight, thus provid-



**VEHICLE ARMOUR TECH**  
Nexter's VBCI provides very high level of protection against conventional munitions

ing astounding sturdiness combined with reliable and durable material performance. Kevlar armouring systems claims to be less cumbersome, easy-to-model, and adaptable to vehicle structure for simplified, quicker and thus, less costly installation. Kevlar fibre boasts high ballistic performance and can withstand extreme temperatures, remaining relatively lightweight without being too cumbersome. These properties are extremely important to help ensure protection while maintaining payload performance and vehicle mobility.

French company Nexter also claims to have some unique technologies in the vehicle armour business. For its armoured vehicle, VBCI, the company uses aluminium based armour technology. "VBCI is the only 8x8 on the market using this technology", Nexter boasted its uniqueness. "The use of aluminium for VBCI's cell combined with appliqué armour results in a global safety system which is unrivalled - as it is the only last generation fully combat proven solution", the company stated. The hull and the turret of the VBCI Nexter Systems are made by welded steel and aluminium that can offer a high degree of protection from small arms fire and artillery shell splinters. To increase the protection, the welded steel and aluminium alloy hull is fitted with spall liners and add-on titanium armour plate to protect against anti-tank weapons. Structurally, VBCI provides a very high level of protection against conventional munitions. It is also designed to resist high intensity IED

blasts to the maximum.

According to Nexter, the production system at place emphasises on the highest quality standards. Hull welded by robots, X-ray controls guarantee that every single vehicle going to service complies with the demands of their customers. "The Nexter production process is recognised as one of the most efficient and demanding. The internal know-how is also demonstrated with unique Blast resistant type seat which contributes to the protection performance to reduce and avoid injuries".

For India's Arjun Mark-II battle tank, Defence Research and Development Organisation (DRDO) has developed an Explosive Reactive Armour (ERA) for additional protection of the tank and its crew. ERA is add-on armour designed to offer additional protection to tanks against shaped charge warheads of modern anti-tank guided missiles (ATGMs). The DRDO said that it has developed expertise in this vital technology and has a large database of various designs of ERA. Responding to user requirements of providing additional protection to tank, DRDO has developed the ERA system, which claims to effectively reduce the penetration of Milan 2 shaped charge warhead to the extent of 70 per cent.

The ERA developed by DRDO is a sandwich of explosive and metal plates. The panels of ERA are assembled in metallic containers. When the jet of a shaped charge warhead hits ERA panel, explosive in it detonates. As a result, the

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plates are accelerated and start moving outward in normal direction. The moving plates and the detonators render the jet ineffective which loses its penetration capability. Based on RDX, a special type of sheet explosive has also been developed for ERA. This sheet explosive is waterproof. It is not cap sensitive and also quite insensitive to friction, impact and heat. However, it gets initiated by a shaped-charge jet.

Indian company MKU has achieved a significant amount of success in the last few years, bagging some of the major global customers. In India, however, the company has little business compared to that of its global business. It is unfortunate that the company has not been recognised within the country, despite a unanimous call for the indigenous solutions.

MKU has introduced the new sixth generation ballistic protection technology named Ammoflex - 6 and Polyshield - 6 with a reduced weight and thickness of personal body armour by 40 per cent. This reduction not only increases the agility and speed of the soldiers but also greatly reduces stress and enhances endurance. A personal ballistic vest manufactured using sixth generation Ammoflex 6 technology weighs around

1.5 kilograms. An armour insert for Rifle protection made using Polyshield 6 technology weighs less than 850g.

According to Neeraj Gupta, managing director, "This reduction in weight and bulk will be a boon to the soldier as he would be better equipped to carry additional ammunition, batteries, rations or mission critical gear without increasing burden or related stress." MKU claims that it has always been at the forefront of technology and has been striving to develop newer, lighter and more flexible ballistic protection solutions for the modern soldier. The technical team working at MKU in Germany and India has developed Ammoflex-6 and Polyshield-6 technologies after rigorous R&D and trials. Body armour made using Ammoflex-6 and Polyshield-6 offers excellent multi-hit protection at lowest possible weights. They provide the soldier with unrestricted movement, flexibility and comfort. Such solutions are ideal for Special Forces which need to carry out quick and fast missions in unforeseen and often difficult scenarios.

MKU has been involved in the development of Modulare Schutz Technik, a unique German engineered patented attachment system for integrating armour protection on-board aircrafts without

having to make any structural changes in the platform. This coupled with the latest Generation 6 armour technology, introduced recently, provides the ideal solution for much needed armouring of air platforms. MKU has also provided Indian Navy and coast guard with armour protection for many of their naval assets, including the latest range of 80 FICs being inducted into service by the Indian Navy. "Globally, we have worked on a number of naval platforms ranging from small RIBs, Patrol Boats and FICs to large OPVs, Mega Yachts and Frigates. This experience gained from working on such diverse range of vessels gives us the edge to be able to provide the required solutions even for the Indian Navy and Coast Guard", said Gupta.

In 2014, MKU was awarded a contract for 40,000 body armour by the Republic of Ecuador for upgrading the protection of its police force. MKU had participated in a global tender in Ecuador for the contract. The body armour selected by the ministry of interior, Ecuador had gone through extensive tests and field trials before being selected. MKU's body armour is tested and certified by the National Institute of Justice (NIJ), USA. This is the single largest export order received by an Indian company for body armour.

**TRAVEL SAFE** For Arjun Mark-II, DRDO has developed Explosive Reactive Armour (ERA) for additional protection of tank and its crew



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**SAFETY FIRST** Security personnel in Kashmir in bullet-proof jackets

While awarding the contract, Ecuador minister of interior Jose Serrano Salgado congratulated MKU on winning the contract and stated that, "MKU was selected on the basis of meeting all specifications and requirements as per the global tender." He added that this decision was extremely important as the country likes to take the best decision for their people and police. "The lives of our police are the lives of our people." Speaking on the occasion of the signing ceremony of the contract, Manoj Gupta, chairman, MKU stated, "MKU is extremely proud to receive this order. India is looked upon primarily as an importer of defence and security equipment. Orders like this will help in putting India on the export map of world class defence and security technology". He added, "It was about 15 years ago that India had imported body armour for Kargil. It makes everyone at MKU very proud that today we have achieved the technological excellence to export these from India".

MKU claims that till date it has provided protection to over 1.5 million soldiers through its products. It has, in its estimates, 1000 plus solutions covering more than 100 types of ballistic threats. It is a registered supplier to NATO since 1993 and has manufacturing facilities in India and Germany. Its products are used by more than 230 forces in over 100 countries worldwide including the UN and BAAINBw.

MKU has several innovative products in the protection and surveillance space. It offers body armour, ballistic helmets, armour inserts, ballistic shields, bomb blankets and demining suits for personnel. It also offers end to end solutions in armouring of aircraft, naval vessels and land vehicles. It is in the process of setting up a state-of-the-art plant for manufacture of sophisticated night vision devices in India. Instavest from MKU is a one of its kind patented quick release ballistic jacket which can be divested by the wearer in one single action in a fraction of a second and can be re-assembled again very quickly for wearing again. It has also developed and promoted the technology for manufacturing Boltfree helmets which are based on the 'no-drill concept', this technology provides uniform protection to the soldiers across the entire shell and also protects him from injuries due to secondary fragments.

## Future Technology

The Defence Advanced Research Projects Agency (DARPA) is aiming to come up with a design for future combat vehicles that relies less on the armour and more on technological solutions to improve mobility and survivability of the vehicles.

For the past 100 years of mechanised warfare, protection for ground-based armoured fighting vehicles and their occupants has boiled down almost

exclusively to a simple equation: More armour equals more protection. Weapons' ability to penetrate armour, however, has advanced faster than armour's ability to withstand penetration. As a result, achieving even incremental improvements in crew survivability has required significant increases in vehicle mass and cost. The trends in the combat platforms point towards expensive and heavy platforms with less mobility and they have limited soldiers' ability to rapidly deploy and manoeuvre in theatre and accomplish their missions in varied and evolving threat environments. Moreover, larger vehicles are limited to roads, require more logistical support and are more expensive to design, develop, field and replace. The US military is now at a point where — considering tactical mobility, strategic mobility, survivability and cost — innovative and disruptive solutions are necessary to ensure the operational viability of the next generation of armoured fighting vehicles.

DARPA has created the Ground X-Vehicle Technology (GXV-T) programme to help overcome these challenges and disrupt the current trends in mechanised warfare. GXV-T seeks to investigate revolutionary ground-vehicle technologies that would simultaneously improve the mobility and survivability of vehicles through means other than adding more armour, including avoiding detection, engagement and hits by adversaries. This improved mobility and war-fighting capability would enable future US ground forces to more efficiently and cost-effectively tackle varied and unpredictable combat situations.

"GXV-T's goal is not just to improve or replace one particular vehicle — it's about breaking the 'more armour' paradigm and revolutionising protection for all armoured fighting vehicles," said Kevin Massey DARPA programme manager. "Inspired by how X-plane programmes have improved aircraft capabilities over the past 60 years, we plan to pursue ground-breaking fundamental research and development to help make future armoured fighting vehicles significantly more mobile, effective, safe and affordable."

DARPA aims to develop GXV-T technologies by 2017. The GXV-T programme plans to pursue research, development, design and testing and evaluation of major subsystem capabilities in multiple technology areas with the goal of integrating these capabilities into future ground X-vehicle demonstrators. ||