

# PERMALI



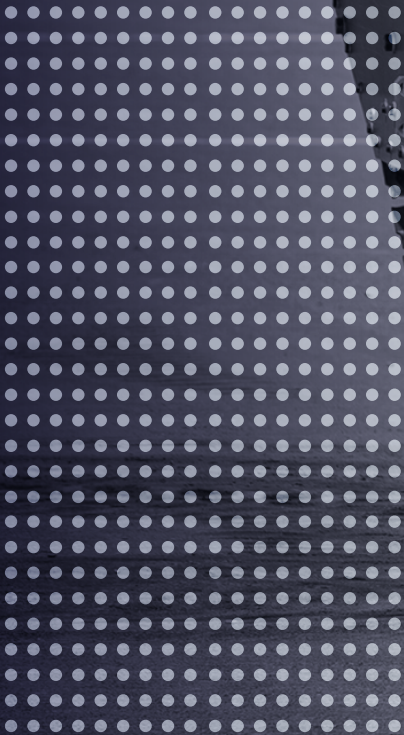
Part of the  
Diamorph Group

# COMPOSITE SOLUTIONS FOR DEFENCE

PROVIDING SOLUTIONS  
FOR LAND, NAVAL AND AIR  
DEFENCE APPLICATIONS.

Protection. Performance. Precision.

TC 53 AB



# PERMALI

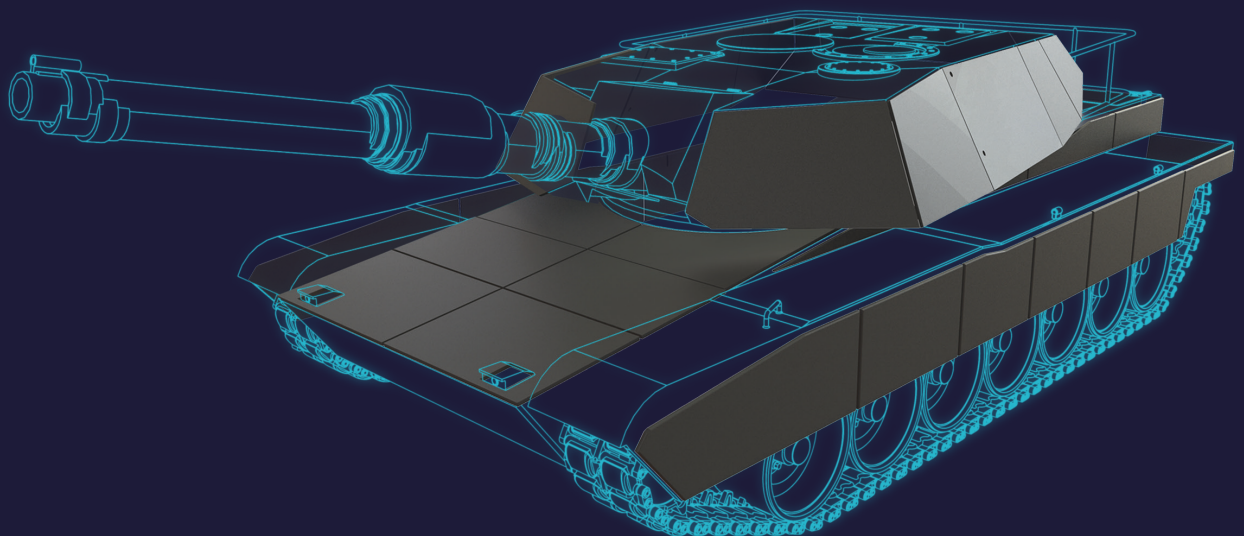
## APPLIQUÉ ARMOUR

LIGHTWEIGHT ADD-ON ARMOUR FOR  
ENHANCED BALLISTIC PROTECTION



Permali's appliqué armour is designed to be fitted to light or heavy military vehicles to enhance protection from ballistic threats up to STANAG Level 4. In many cases it is used on AFVs where the existing vehicle hull does not offer sufficient protection.

Permali's appliqué armour systems can be retrofitted to existing vehicles or supplied for new build vehicles at the design stage.



## KEY BENEFITS



### CLASS-LEADING BALLISTIC PROTECTION

Up to STANAG 4569 Level 4 - small arms up to 14.5mm (AP), artillery and IED fragments. Exceptional multi-hit protection.



### IMPROVED ENVIRONMENTAL PROTECTION

Thermal and acoustic insulation. Fire retardancy. Corrosion resistance. Chemical resistance.



### OPTIMISED LIGHT WEIGHTING

STANAG 4569 Level 3 7.62mm (AP) areal density as low as 54.5kg/m<sup>2</sup>. Wide range of materials available to optimise cost, weight and ballistic performance (including Polyethylenes (UHMWPE), Glasses, Ceramics, Aramids, Metallics and Coatings).



### FULLY VEHICLE INTEGRATED

Designed in response to platform analysis to maximise protection against the prevalent threat of recent war fighting and peacekeeping operations. Designed for easy installation and manufactured to precise tolerances.

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Permali combines its ballistic grade Permaglass<sup>®</sup> laminate products with either ceramic or hardened metallic materials to form high performance appliqué armour solutions. Ballistic protection levels range from small arms to heavy machine guns as required. Permali's appliqué armour also offers proven resistance to shock and vibration as well as excellent ballistic performance at extreme temperatures.

Specialty prepreg fibre reinforcement and thermoplastic materials used by Permali for Permaglass<sup>®</sup> composite armour include:

- Ballistic grade UHMWPE fibres, including DSM Dyneema<sup>®</sup> and Honeywell Spectra Shield<sup>®</sup>
- Kevlar<sup>®</sup> and Twaron<sup>®</sup> aramid fibres
- Woven and non-woven S2 and E glass fibre fabrics
- Alumina, Silicon carbide and Boron carbide ballistic grade ceramics
- Chemical resistant Tufshield<sup>®</sup> elastomeric PU coating

The company has a long-established global reputation as an innovative designer and manufacturer of lightweight anti-ballistic and blast resistant advanced composite fibre reinforced (FRP) materials and fabricated appliqué armour systems.

# PERMALI

## SPALL LINER

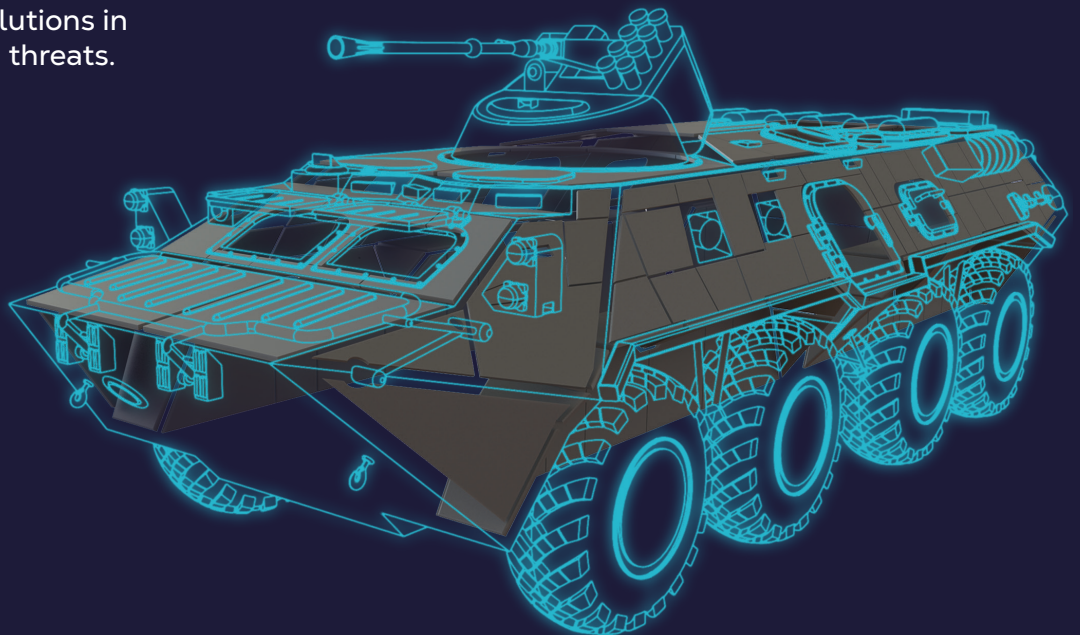
### INTERNAL BALLISTIC FRAGMENT AND BLAST PROTECTION



Bespoke ballistic solutions specially designed and optimised to provide ultimate over match protection for your vehicle platform.

The function of a spall liner is to prevent metal fragmentation spalling injuries to the occupants of military armoured vehicles from land mines/IEDs or attack by an opponent with superior fire power.

Permali have provided battle proven spall lining solutions and continue to develop innovative solutions in response to emerging threats.



## KEY BENEFITS



### ENHANCED SURVIVABILITY

Increased protection against metal fragmentation spalling injuries to the occupants of military armoured vehicles from land mines/IEDS or attack by an opponent with superior firepower.



### COST EFFECTIVENESS

Cost savings of 29% over off the shelf grades. Recent Permali innovation providing enhanced protection at a lower cost per square metre.



### OPTIMISED LIGHTWEIGHTING

A range of battle proven material solutions allow for lightweight designs while maintaining highest protection levels.



### EASY TO INSTALL

Carefully designed for easy installation and manufactured to precise tolerances.



### ENVIRONMENTAL RESISTANCE

Optional EMI/RFI protection. NBC clean down chemical resistance. Thermal and acoustic insulation. Fire resistance.



### MATERIAL OPTIONS

Polyethylenes (UHMWPE), Aramids, Glasses, Coatings.

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Manufactured using advanced composite materials, Permali's Permaglass® spall lining grades are proven to significantly reduce the amount of spall debris entering an armoured vehicle, minimising serious injury to military personnel and helping to prevent fatal casualties. Permali manufactures bespoke sheet and moulded components with a range of areal densities which are specifically designed to fit the vehicle interior maximising the area of coverage providing optimal survivability.

Lightweight Permaglass® composite sandwich design panels are also produced for spall liners and armour systems with high pressure laminated UHMWPE cores.

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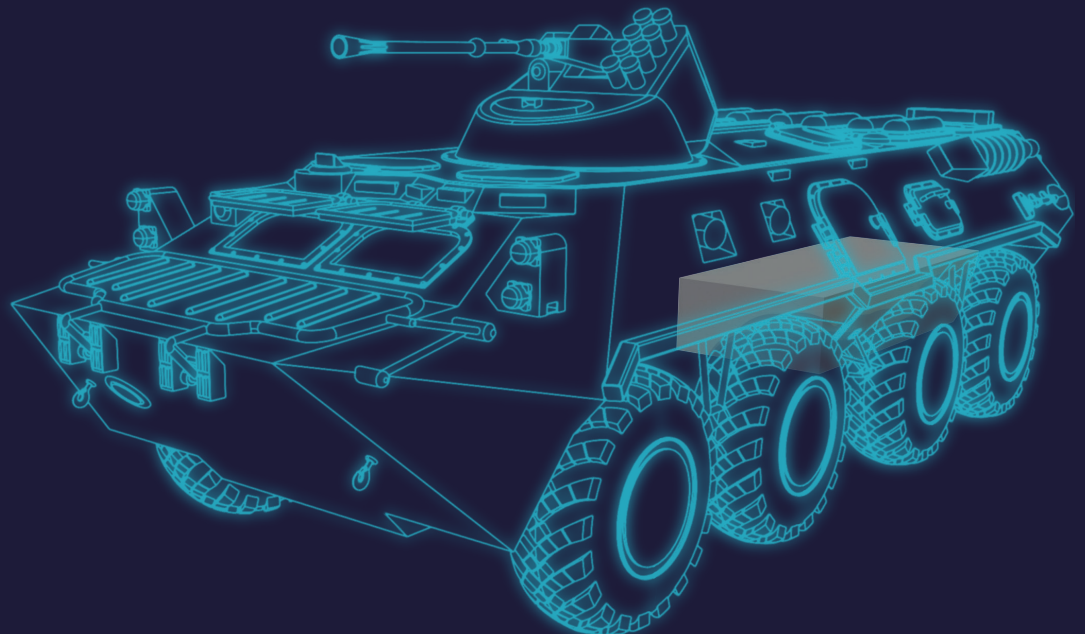
## BATTLEJACKET®

PROTECTIVE COATING TECHNOLOGY  
FOR FUEL TANKS AND TANKERS



Ballistic damage to vehicle fuel tanks can cause catastrophic fires and explosions or immobilise vehicles due to fuel loss.

BattleJacket® is an advanced spray-on protective polymer technology that immediately seals and heals a punctured fuel tank when pierced by a bullet or projectile, preventing fuel loss and explosion, providing the ultimate protection to mission critical assets.



## KEY BENEFITS



### FUEL LEAK PREVENTION

Unique healing polymer technology automatically seals penetrations on impact.



### EASY TO APPLY

Sprayed on like a paint and bonds strongly to all metallic and plastic surfaces. CARC paint compliant.



### ENHANCED ENVIRONMENTAL RESISTANCE

Improved protection for the tank against temperature (-50°C to 150°C), corrosion, abrasion, and impact.



### INCREASED STRUCTURAL INTEGRITY

High durability external coating withstanding high pressures up to 150 psi.



### OIL POLLUTION PREVENTION

Title 40 Section 112 compliant.

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BattleJacket® is a battle proven technology with nearly 20 years of service history in military applications. Developed for the US armed forces for the protection of land based vehicles against explosions and fires due to ballistic damage to fuel tanks and tankers, by High Impact Technology, LLC. This advanced polymer coating is a unique 3 layer spray on system that can be applied easily to complex geometries and can coat the surfaces of all fuel tank materials.

This unique, patented, fire protective urethane polymer coating has been so successful it's applications have been extended to protect other structures and products such as fuel cells, holding tanks, pipelines, railcars, with the list continuing to grow.

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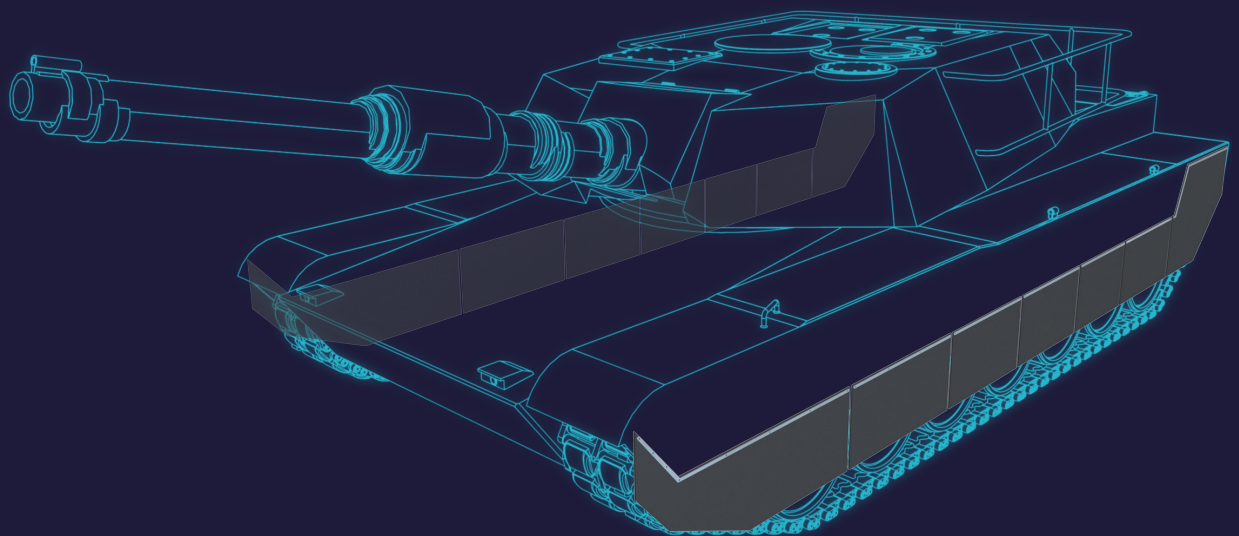
## DUST SKIRTS

### SIGNATURE REDUCTION TECHNOLOGY



Dust skirts are a modular, retrofittable system, based on a new tough rubber composite material.

The addition of dust skirts will aid in the reduction of abrasive dust related engine problems, which is a major issue in hot, dry theatres of operation. Permal's dust skirts offer both radar and visual signature reductions.



## KEY BENEFITS



### REDUCED ENGINE SEIZURES FROM DUST INTAKE

Limiting the impact of dust related engine problems, a major issue in hot, dry environments.



### REDUCED RADAR SIGNATURE FROM DUST CLOUDS

Helping support stealth of AFVs by managing the shape and size of the dust clouds.



### HIGH STRENGTH AND DURABILITY

Rugged material selection to balance performance between weight, strength and flexibility.



### ENVIRONMENTAL RESISTANCE

Fire resistant, EMI / RFI shielding, Ozone and UV resistant, Chemical and corrosion resistant.



### EASY TO INSTALL

Tailored designs for simple vehicle integration. Fixing mechanisms quick to release and re-attach.

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Permali's dust skirts are designed to provide the optimum balance between stiffness and flexibility from a synthetic fire-retardant rubber composite designed for Armoured Fighting Vehicles (AFVs). The system ensures the operational risks caused by sand and dust are mitigated; Permali's dust skirts can also be applied to wheeled AFVs.

Fitting Permali's dust skirts decreases the volume of sand and dust which is thrown into the air and potentially drawn into the engine through the air inlet. Permali's dust skirt system is provided with easy application 'bolt-on' brackets that will fit the majority of AFVs and these brackets are available in either metallic or composite material.



## STARTING A NEW PROJECT? LET'S TALK.



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