MAJOR

Maintenance, Joining, and Repair innovation in multidomain defence

Cascade Funding Call# 1 Awardee

MJR1-220

Project Acronym: SHIELD

Project Title: Smart Hybrid structures based on reversible InterfacEs for multi - materiaL Defence platforms

Abstract

The SHIELD project addresses the European defence sector's need for lightweight, high-performance, and sustainable structures for modern land platforms. Focusing on the rugged bonding of vehicle armor modules, the project leverages multi-material design and innovative joining techniques to enable the rapid fabrication and assembly of complex systems. At the heart of SHIELD is an innovative "reinforced amorphous bonding concept" designed for high strength carbon-fiber-reinforced thermoplastic composite structures. This approach relies on a multi-layer architecture based on a semi-crystalline polymer core that is sandwiched between amorphous outer layers. Because these outer layers soften at lower temperatures than the core, localized heating can be used to join or separate components without damaging their structural integrity of the component.

This breakthrough eliminates the need for traditional adhesives or mechanical fasteners. Instead, it creates highly durable, reversible interfaces capable of withstanding vibration, ballistic shock, and environmental contamination. Crucially, this "re-melting" capability allows for rapid field repairs and the easy replacement of damaged armor modules, significantly extending the lifecycle of defence platforms.

To bring this vision to life, SHIELD enable also the possibility to produce automated, out-of-autoclave (OoA) processes for the single-stage manufacturing of complex structures, fully integrated with monitoring and quality assurance tools.

SHIELD introduces a paradigm shift in how resilient defence assets are designed, assembled, and repaired. By combining a smart, one-stage production process with reversible thermoplastic interfaces, the project promises reduced cycle times, better repeatability, and superior structural performance. Expected outcomes include validated joint demonstrators and automated production modules ready for industrial scale-up.

Co-funded by the European Union

Funded by the European Union under GA no 101167891 - MaJoR. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or the European Defence Agency. Neither the European Union nor the granting authority can be held responsible for them.

EUROPEAN DEFENCE AGENCY

Company description

THETIS S.r.l., founded in 2023, is an innovative startup at the intersection of advanced research, industrial expertise, and high-level managerial experience in complex operational environments. The company builds on a strong background in European research initiatives and specialization in composite materials and industrial systems. This multidisciplinary foundation enables THETIS to integrate scientific knowledge, engineering skills, and strategic vision, transforming research results into cutting-edge solutions aligned with European defence priorities. Focusing on defence and security, THETIS develops high-performance materials, smart structures, and resilient systems designed to maximize survivability and operational effectiveness in extreme conditions. Central to this is a proprietary additive manufacturing platform capable of producing CFRTP components in a single step. By eliminating autoclave processing, this Out-of-Autoclave (OoA) production route ensures efficiency, scalability, and adaptability while maintaining the stringent reliability required for defence applications under harsh mechanical and environmental loads. By bridging research, development, and deployment, THETIS strengthens European technological sovereignty and strategic autonomy. The company actively fosters cross-border collaboration and supports integration within the European Defence Technological and Industrial Base (EDTIB), accelerating innovation uptake.
Through this approach, THETIS positions itself as a key enabler of next-generation defence capabilities. By advancing advanced technologies, the company reinforces competitiveness, resilience, and innovation capacity across the European defence sector, delivering high-performance solutions that address both current and emerging operational needs.

Key facts

Company	THETIS S.r.l.
Country	Italy
Topic	Innovative Joining Technologies & Automated Processes for Multi-Material Defence Structures
Start date	01/09/2026
End date	28/02/2027
Budget/ Grant	EUR 60.000,00

Contact

Contact @major - project.eu

Co-funded by the European Union

Funded by the European Union under GA no 101167891 - MaJoR. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or the European Defence Agency. Neither the European Union nor the granting authority can be held responsible for them.