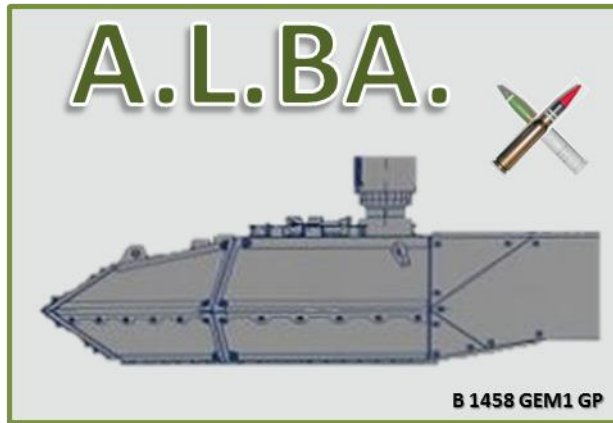


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ALBA

Publishable Executive Summary

ADVANCED LIGHT BALLISTIC PROTECTIONS

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EDA Cat B project n° B-1458-GEM1-GP



1 Introduction

This document summarizes the activities and results of the project ALBA - Advanced Light Ballistic Protections carried out by the consortium by and between LEONARDO S.p.a. (SDI), Vojenský výzkumný ústav, s. p. (VVU) and BOGGES, spol. s r.o. (BOG).

This project was managed and funded by Italy and Czech Republic in the frame of the Project n° B-1458-GEM1-GP of the European Defence Agency. It was hosted in the CapTech Materials & Structures.

2 Acronyms

AA	Aluminium Alloy
AEP	Allied Engineering Publication
AoA	Add-on Armour
HBW	Brinell Hardness
MA	Main Area
STANAG	Standardization Agreement (NATO)
SWA	Structural Weak Areas

3 Objectives

The objectives of the project are the development of Advanced Light BALLISTIC protections at level K6 (STANAG 4569) to be applied to medium and light armoured vehicles with:

- good costs-performance ratio;
- reduction of the weight and the manufacturing costs of the multi-layered (composite) protection solutions;
- improved ballistic performance (increased multi-hit performance) compared to the current level K6 ballistic protections. Increase of the penetration resistance at the corners and edges constraints, in order to increase the covered area and to reduce risks in weak areas.

4 Project organization

Entity	Country	Point of contact
LEONARDO (leading entity)	Italy	Alessio Bassano, alessio.bassano@leonardo.com
Vojenský výzkumný ústav, s. p.	Czech Republic	Jan Krestan, krestan@vvubrno.cz
BOGGES, spol. s r.o.	Czech Republic	Jiří Kratochvíl, jiri.kratochvil@bogges.cz

5 Project Results

Study and development of Advanced Light Ballistic (ALBA) protections for two combat fighting vehicle designs/mock-ups:

- ALBA turret mock-up: having inside the consortium the Original Equipment Manufacturer the design has been inspired by existing solutions using the angles

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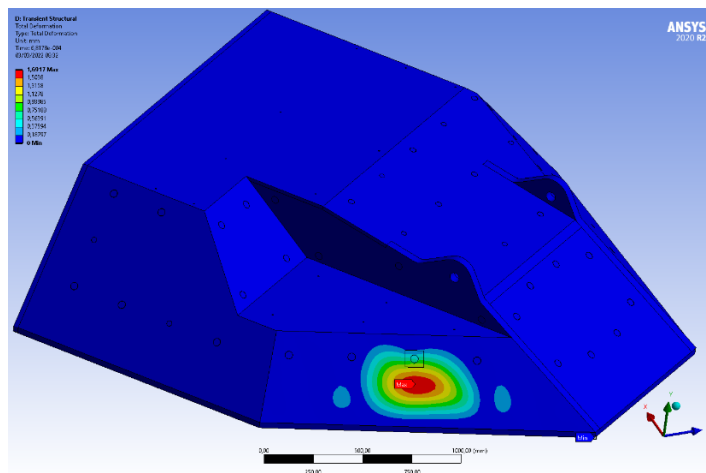
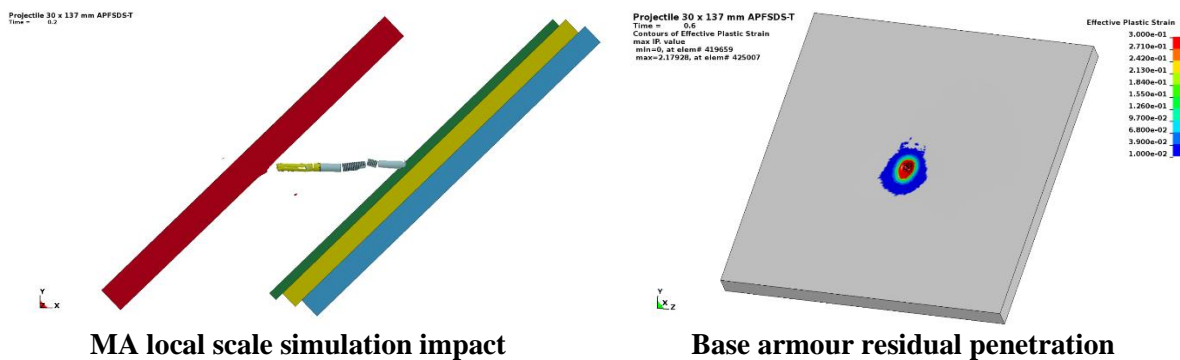
evolving from the solutions in-service (*exemplary in service turret mock-up*) with Aluminium Alloy base armour (24 ÷ 35 mm of AA5059-H136 grade);

- ALBA vehicle mock-up: considering that the companies are not Design Authorities for the neither Czech nor Italian in service vehicles, the design has been inspired by the actual development trend for the medium class platforms (*future combat fighting vehicle mock-up*) with Steel base armour (25 ÷ 30 mm of 440 HBW Steel).

The protection solutions are designed and optimized by the interaction and tuning activity between the numerical simulations and the ballistic tests on representative engineered targets.

The outputs of the numerical model were compared with the results of the ballistic tests of the MA and SWA of the armour systems.

The final numerical simulations of the demonstrator confirmed the validity and the accuracy of the numerical model developed.



Global scale simulation of the complete mock-up

The final Advanced Light Ballistic protections were built and installed on a real turret mock-up and vehicle representative panel and tested according to Level K6 of AEP-55 Volume 1 and STANAG 4569.

The ballistic protections were able to withstand multiple shot impacts in the MAs and single shot impacts in SWAs. Totally of 32 shots were fired in the final demonstration test.



ALBA demonstrator after ballistic tests

6 Conclusions

ALBA project has demonstrated the capability to produce AoA armour solutions able to defeat both 30mm and FSP threats of Level K6 STANAG 4569. Even if the budget limitations of the project did not allow to assess the complete NATO qualification process of AEP-55 Volume 1 for ALBA Turret and Vehicle mock-up, the results were very satisfactory.

The developed solutions are affordable, steel-based, easily assembled and mounted on existing turret/vehicles, and ready to use in the modern battlefield (start TRL 4 - final TRL 8). The developed numerical model allows to adapt/scale with high confidence levels the Advanced Light Ballistic protection solutions to other turret and vehicular platforms.