

ADDITIVE MANUFACTURING TECHNIQUES FOR ENERGETIC MATERIALS: NEW OPPORTUNITIES FOR DEFENSE APPLICATIONS

The AMTEM project aims at researching and developing additive manufacturing techniques that can be used for novel warhead/propulsion geometries and assist in rapid prototyping of objects, promoting lower production costs for short series. These developments are required in order to improve current military capabilities through the extension of weapons range, ammunition precision and by developing adaptive and scalable warheads.

In order to reach these objectives, the project will address a number of technological challenges, including: changes in energetic material processing; the maintenance of safety within an additive manufacturing environment; the development of novel energetic material formulations and finally, the characterisation and understanding of new mechanical and physical properties (effect of processing conditions on printed object quality). Additive manufacturing processes are constantly improving and may become a disruptive technology to conventional energetic material manufacturing processes. In particular, hybrid processes including the development of new, advanced materials and increasing integration of multifunctionalities into a single object (combination of conventional and AM processes) will likely contribute to an elevated role of the EU in this field.

Objectives

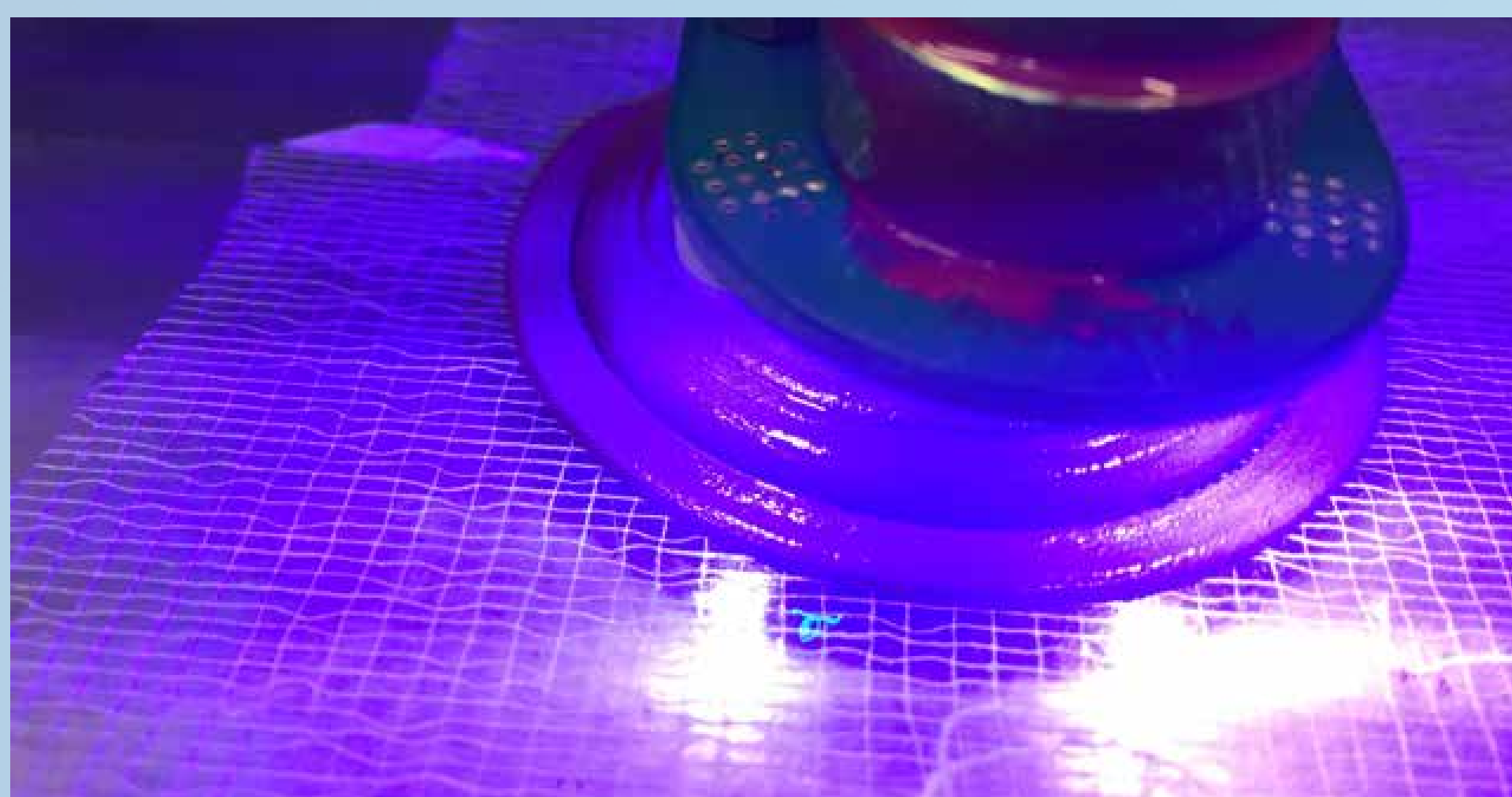
AMTEM started in 2019 and will conclude in 2023 with expected results in: warheads, miniaturization and new production techniques that will strengthen the European knowledgebase and Industrial base.

Work Strands

The project will:

- define requirements for new production techniques and raw materials
- review R&D on energetic materials and additive manufacturing techniques
- identify most promising applications for each potential category (gun propellants, warheads, rocket motors and other energetic materials) and their benefits
- select and develop materials (inert and energetic) as well as additive manufacturing processes
- print and evaluate test charges
- highlight pros and cons of the tested techniques as well as benefits for the stakeholders

Other contributing project: RECBALL (in preparation) will improve interior ballistic calculation methods to reflect new design possibilities for grain propellant with complex shapes, resulting from additive manufacturing techniques



Way Ahead

AMTEM, depending on the results, could be followed-up by a second EDA Cat.B project "AMTEM II" which aim would be to scale up the outcomes of the AMTEM project from low TRL to demonstrators.

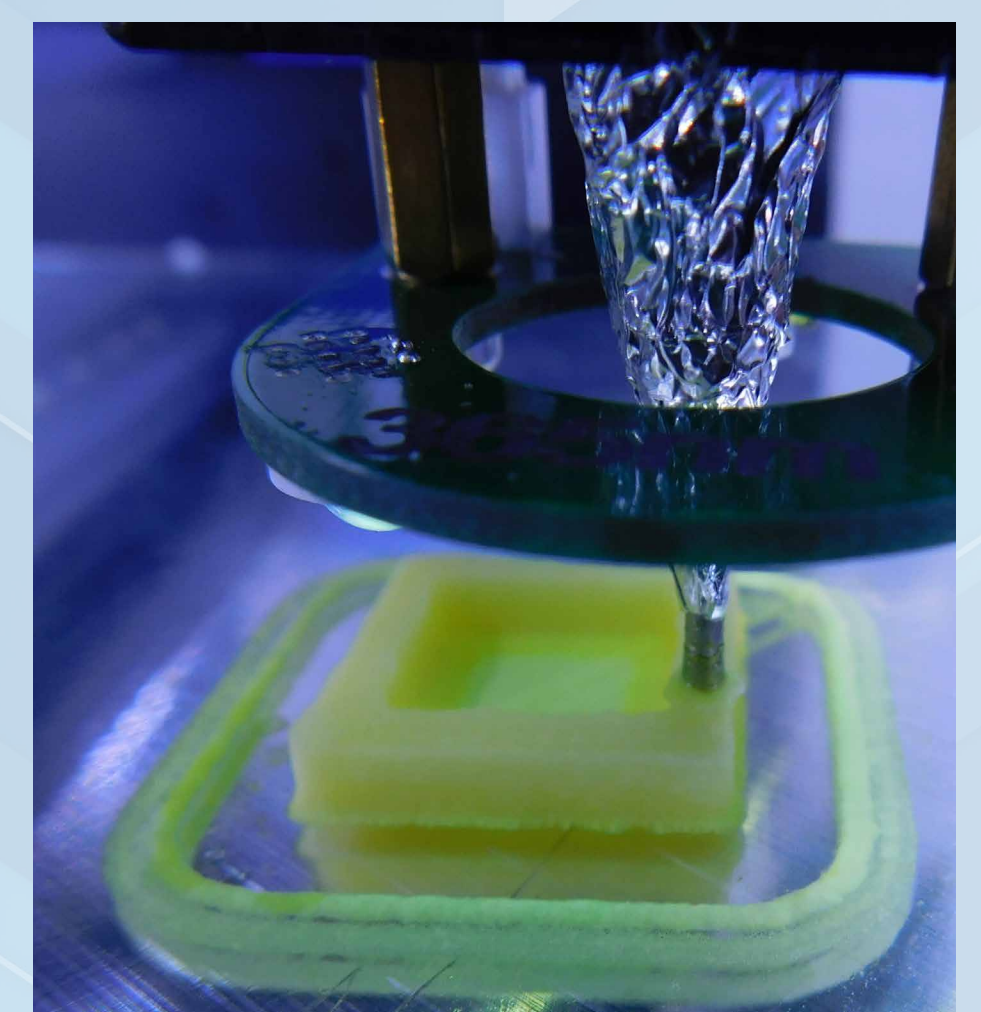
Over the time, European industry expects to own the capability to 3D-print energetics sub-systems for ammunition.

Finally, European militaries will benefit from:

- New types of solid rocket propellants grain, explosives/warheads and gun propellants charges
- Maximised effects on targets, extended weapons range and development of more precise effects
- Strengthened European competitiveness

Link to TBBs

- OSRA TBB 14 - High Performance Gun Launch and Missile Propulsion
- OSRA TBB 21 - New production technologies for munitions components



Participating Members



Consortia/Organization



Contact

João Abreu CapTech Missiles and Munitions Moderator
joao.abreu@eda.europa.eu

EDA Activities

www.eda.europa.eu/what-we-do/all-activities