EUROPEAN DEFENCE AGENCY

Fact sheet

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Incubation Forum for Circular Economy in European Defence (IF CEED)

Project idea

Recycling / Re-Use / Recovery of High Value Fibres from Soldier Personal Protective Equipment

Context

Soldier Personal Protective Equipment (S-PPE) consisting of body armour and helmets is widely used in military application. The embedded value in S-PPE is very high and consists of woven and unidirectional Aramid and UHMWPE fabrics in consolidated and non-consolidated state partly combined with ceramics. The typical lifetime is only about 10 years and results in huge amounts of discarded material every year with annual increasing numbers. This makes S-PPE an attractive business case for circularity.

Due to safety and security reasons, S-PPE is currently discarded, which results in the loss of valuable materials and equipment which may still be fit for use.

To avoid disposal, not only recycling technologies have to be improved but new (bio) materials, eco-design for easy disassembling, superior repair technologies and adapted control methods have to be taken into account. Due to S-PPE'S confidential status new or improved recycling channels should be considered. Furthermore, detailed life cycle assessments need to be performed to identify room for improvement.

Objectives

The objective of this project idea is to study recycling/re-using/recovering of high-performance fibre materials and other high-value materials from S-PPE as well as residues during different stages of production and testing, resulting in better circularity of the

materials and leading to significant reduction of waste to be disposed.

The specific objectives are the following:

- Identify the dimension/scope of the problem and define circularity targets along the whole supply chain.
- Define new recycling strategies for the S-PPE, including recycling, disassembling technologies and identify best practices for eco-design.
- Find new market applications for the recycled materials within and beyond the defence sector.
- Extend the lifespan of S-PPE by using improved non-destructive testing technologies.
- Perform a Life Cycle Assessment along the whole supply chain.

Lessons learnt from these objectives can be exploited and transferred to armor applications beyond body armor as well as to further military and civilian applications.

Methodology

Some of the methods applied:

- Studies to quantify the amount of generated waste and potential for recovery and recycling.
- Research on new methods to recycle existing materials including new/improved mechanical and chemical processes.
- Research of improved non-destructive test methods as a basis to foster reuse and/or repair.
- Identification of new market applications for obtained recycled materials beyond military application.

Stakeholders

- Entities engaged in the IF CEED Project Circle “Circular Materials Textiles”.
- Ministries of Defence (including procurement offices), industry, Research-and-Technology Organisations

Timeline

The foreseen project duration is 36 months.

Expected Outcome

- Criteria for circular management of S-PPE and green procurement.
- Disassembling and recycling technologies S-PPE
- Production of high-performance fibres out of recycling material.
- Eco-design solutions for S-PPE.
- Life-Cycle Assessment along the entire technology chain (cradle-to-cradle).
- Prototyping and verification of S-PPE with improved circularity.

Operational benefits

- Reduction of waste and associated costs.
- Extension of lifetime of S-PPE.
- Enhancing interoperability by elaborating and determine common standards.

Budget & funding

Type of project: collaborative project.

Budget: EUR 7 500 000 to 10 000 000