Research Programme: Multidisciplinary research-development-innovation in the field of textiles and leather in the vanguard of current societal challenges (TEX-PEL-CHALANGE 2026).

Contracting: The National Research and Development Institute for Textiles and Leather

Objective: Advanced functional materials for health, protection and quality of life improvement.

Smart/Public Policy Specialization Domain and Subdomains: Domain nr. 5 - Advanced Functional Materials Subdomain nr. 5.2 Smart composite materials Subdomain 5.4 – Conductive textile materials.

Type of research – development activity, innovation and demonstration: industrial research, experimental development.

Project title: *Intelligent equipment to ensure the survival of combatants in operational conditions (IRHEM).*

Nowadays, textile materials with a protective role must ensure the body's defense against many threats and fulfil various functional requirements. In particular, textile products designed for military applications require durability, resistance to ballistic threats (Fig.1) and environmental conditions (eg ultraviolet (UV) light, moisture, fire, heat and wind), comfort etc. These materials must provide camouflage (Fig.2) in various ambient conditions at a wide range of wavelengths in the electromagnetic spectrum such as the near-infrared (NIR) region (750–1200 nm) and far infrared (FIR) (3–5 and 8–14 μm).

Fig.1. Ballistic protection

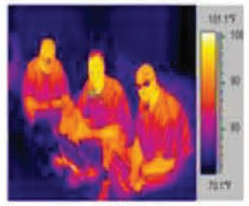

Fig.2. IR camouflage

Fig.3. Conductive yarns

Project goal: the design, development and validation of a smart, innovative demonstration model as protective equipment consisting of an IR camouflage suit and an undergarment with conductive (Fig.3) and antibacterial properties, equipped with an autonomous system of primary hemostasis, intended for protection and the survival of combatants.

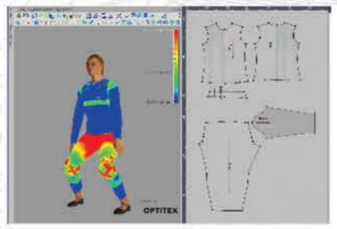

Fig.4. Virtual experimental model

Targets:

- Scientific substantiation of the technological solutions for creating textile structures with conductive and antibacterial properties using hybrid yarns and/or active substances;
- Obtaining the demonstrative functional model of smart equipment;
- Validation of the level of physical-mechanical, antibacterial and biocompatibility performance of the demonstrative functional model and the elaboration of the technical product specification.

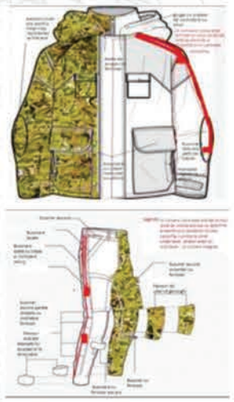

Fig.5. MF design

Results:

Technological solutions for creating textile structures with conductive and antibacterial characteristics; IR camouflage textile structures with reflection degree <50%; CAD design solutions of the components of the smart equipment modules (camouflage/IR shielding suit); undergarment module with antibacterial properties; automatic primary hemostasis system; theoretical/virtual models (Fig.4); experimental models of sub-systems for checking the condition of conductive elastic fabric and active air pumping; functional models of camouflage/IR shielding suit (Fig.5); functional demonstrative model of intelligent equipment. The equipment will be tested in order to evaluate the performance level of IR shielding/camouflage, conductivity; antimicrobial and biocompatibility properties, and Skin Irritation.

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Ministry of Research, Innovation and Digitalization

ROMANIA

THE TECHNOLOGIC AND BUSINESS INCUBATOR ITA TEXCONF

ITA TEXCONF is an entity in the infrastructure of innovation and technological transfer without legal personality, established within INCDTP based on HG 406/2003, accredited for the textile – clothing field and re-accredited in 2020, Certificate no. 118/2020, issued by the Ministry of Education and Research

Insights from incubated company SC Xtreme Equipament SRL

ITA TEXCONF is part of the National Network for Innovation and Technology Transfer ReNITT and acts for the sustainable economic and social development of the textile sector, by ensuring access to technological performance, developing the innovative environment, introducing quality systems and developing human resources.

The incubator is involved in specific actions of collaboration with all 5 existing clusters in the textile field, of which it is part as an active member: Romanian Textile Concept Cluster – RTxC, ASTRICO NE, Traditions Manufacture Future, Transilvania Textile & Fashion Cluster and Fashion Future Cluster.

Services:

- Services of sustaining textile-clothing SME competitiveness within the competitional background of the market economy;
- Services aiming at creating partnerships and financing drawing in within the projects;
- Services aiming at the product, equipment, innovation technology promoting in the field of textile-clothing, as part of scientific events (fairs, symposiums, conferences, etc.);
- Mediating contracts of technology transfer/manufacturing of products, experimental models, prototypes and specific applications for technical textile, personal protective equipment, invasive and non-invasive medical devices, special-purpose items, etc .;
- Mediating contracts in the field of investigating the textile material and product properties, within the RENAR accredited INCDTP laboratories.

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