

Development of a cost-effective moisture and thermal barrier layer for protective clothes based on an innovative combination of warp-knitted textiles and polymer coatings, introducing new standards which will prevent low quality imports and increase competition of European SMEs



COOP-CT-2004-508191 "SAFE&COOL"

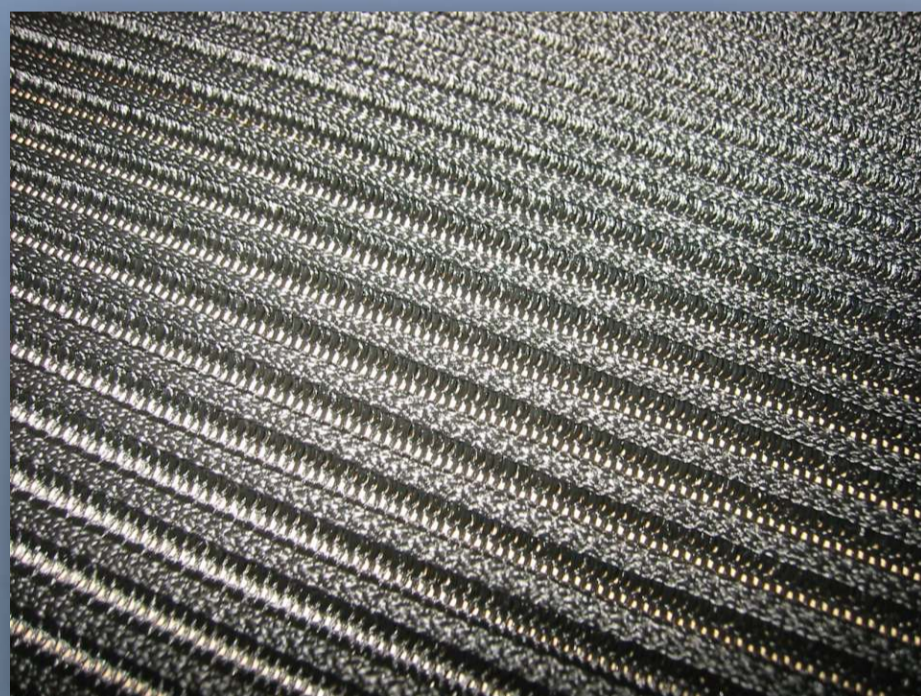
The project objective is to develop a thermal and moisture management layer based on a 3D warp-knitted flameproof fabric coated with a water absorbing polymer to be easily and cost effectively integrated in current protective clothing manufacturing and maintenance practices, fully compliant with EU directive 89/656/EEC and 89/686/EEC and standards UNI EN 470-1 and UNI EN 531

The 3D textile structure of the Safe&Cool textile layer is intended for replacing the interliner and moisture barrier in the classical three-layered protective clothing. The materials employed for its development are hydrophobic thermal comfort fibres and hydrophilic fibres (creating suction channels to transport the moisture away from the skin).

A cooling system consisting of liquid circulation through tubing inserted in the cavities available within the 3D structure will reproduce blood vessels for heat removal. The 3D spacer fabric will also facilitate convective effects due to its singular structure comprising vertical and diagonal spacer yarns, thus enhancing the cooling effect to the whole body surface. Water binding polymer will be added as a coating, or in the form of a powder dispersed inside the fabric thickness, with the purpose of absorbing and binding the excess of moisture migrating through the semi-permeable membrane if the temperature is maintained below the threshold controlled through the cooling system. In case of sudden temperature increase, due for example to a burn flashover or to fire approach and crossing, if the cooling system is not sufficient to remove enough heat from the body, the polymer will release the sweat accumulated, reproducing the human natural sweating process through evaporative cooling. This effect is expected to greatly increase the capability for the worker to perform safely his task in dangerous environment.

The direct application for the SAFE&COOL system is in protective clothing. Other promising applications have been identified in active-wear as well as in transportation interiors. Based on an extensive desk study and patent search, there are at least four different elements of innovation in the overall SAFE&COOL concept, consisting in breakthrough application in the protective garment factory:

- the overall Safe&Cool concept as novel combination of the 3D textile structure and its polymer coating for which all the SME partners will benefit from;
- the 3D textile structure including its novel design, specifically conceived to increase thermal insulation and moisture absorption through built-in suction channel through the use of proprietary fibres;
- the novel deposition process for the polymer coating onto a textile surface, or the polymer dispersion inside the fabric thickness;
- the use of the 3D warp-knitted structure to integrate the tubing of the cooling circuits without any joint or sewing, simply by introducing the tubes through the channels built in the textile layer thickness.



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SIXTH FRAMEWORK PROGRAMME

PARTNER	COUNTRY	ROLE IN THE SUPPLY CHAIN
GETINO ROSINI	Italy	3D warp-knitted textiles producer
MTS	Italy	Textile coatings
GRAPIL	Poland	Protective clothing manufacturers and service providers
TACCONI	Italy	Protective clothing manufacturers and service providers
Jé-bé INTERNATIONAL TEXTILES	Belgium	Producer of hydrophobic and comfort fibres
TIRSO	Italy	Producers of hydrophilic flame-proof and -retardant Fibres
TAPS	Poland	Transport Seat Producer
D'APPOLONIA	Italy	RTD performer, Coordinator
GZE	Italy	RTD Performer
CIOP-PIB	Poland	RTD Performer

