IRTEX - DEVELOPMENT OF TEXTILE-BASED INFRA-RED RADIATION BARRIERS FOR THERMAL CONDITIONING OF ROOMS.

TIMING	FEB 2014 - JAN 2015
CURRENT STATE	COMPLETED
FUNDING	CDTI / EEA GRANTS PROGRAMME
PROGRAMME	FINANCIAL MECHANISM OF THE EUROPEAN ECONOMIC AREA 2009-2014 (EEA). CALL 2013

1. PROJECT NEEDS

The project was focused on the development of light fabrics for sun and infra-red (IR) protection, in order to improve thermal conditioning of rooms. This requirement, also combined with lighter fabrics than fabrics available in the market was the main need to be covered. The results are sustained by experimental trials and evaluations of the technical properties.

The objective was the development of technical fabrics with IR-reflecting properties and FR behavior, through the research on ceramic-based or metallic-based micro/nanoparticles. The impact produced with the project will benefit end-users when the industrialization/commercialization of the results (fabrics) will be produced.

2. OBJECTIVES.

Fabrics destined to thermal/light conditioning (like curtains, roller blinds, panels…) are usually not offering technical properties combined with an adequate thermal comfort performance (only blackout fabrics can be considered as an exception; however, this kind of fabric is totally opaque and doesn't allow external view through it). Safety performance -like flame retardancy- must also be taken into account. Following this issues, IRTEX project lead by FRANCISCO JOVER S.A. aimed for the development of technical fabrics (for curtains/roller blinds) with IR-reflecting properties and flame retardancy behaviour, through the research on ceramic-based or metallic-based micro/nanoparticles with IR-reflecting performance. These additives (included in a yarn-like format or in a finish-like format) allow the fabric to control temperature of the room where is allocated; this effect of IR shielding and reflective performance will allow not only the thermal conditioning of the room but also the decreasing of power consumption of HVACs (heating, ventilation, and air conditioning) which refrigerates the room environment when necessary.

It's possible to combine yarns from different functionalities and textile compositions, and also adapting the weaving process in order to develop several combinations of multilayer fabric structures (including 3D shapes, developing IR-reflective layers combined with visible light-

scattering layers) that can be finished with tailor-made formulations that include IR additives as an ingredient of the finishing recipe. Thermo-reflective properties can be quantified but also energy savings and environmental impact of micro/nanoparticles and IR-reflective additives can be studied.

3. RESULTS.

The main outcomes reached were the know-how on ceramic-based raw materials (yarns, additives) and also the knowledge generated in terms of yarn processing (weaving) and textile finishing. Also the achievement of thermo-reflective properties was one the outcomes reached.

Main output delivered was fabric sample made of IR-reflective textile materials. Not only one pathway for development of these fabrics was explored, but some options were investigated.

Process	Material	IR* reflective level
Weaving	IR yarns	> 40%
Weaving + padding	IR yarns + finishing products	> 50%
Weaving + coating	IR yarns + additives	> 80%
Coating	Additives	> 70%

Measurements were done in a wavelength range from 300 to 2500 nm, using a spectrophotometer Perkin Elmer mod. Lambda 950. Value that is show is referred to IR range (800 - 2500 nm).

Evaluation of the thermal barrier effect of different technical combinations of fabric + finishing applied shown that the optimal combination (fabric coated by knife on cylinder technique) allows a reduction of the temperature up to 20ºC (from the external side to the internal side of the fabric) after more than 30 minutes of incident radiation.