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Space Technology Found in your Wardrobe

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You may have space in your wardrobe

European Space Agency – Whether you find yourself in the icy wastes of Antarctica or caught in the midst of a scorching hot fire, you could stay safe and comfortable in either extreme – provided you are dressed in the right clothes.

Technologies first developed to protect astronauts and satellites against the extreme conditions found in space are increasingly of use in the design and manufacture of everyday clothing.

Textile spin-offs from the space industry will be highlighted by the ESA Technology Transfer Programme (TTP) at this year's Techtex international trade fair to be held in Frankfurt from 8 to 10 April.

From minus 50°C to over a 100 km per hour

Assisted by ESA, Italian company Corpo Nove has manufactured a lightweight jacket called 'Absolute Zero' that keeps its wearer comfortably warm at up to minus 50°C.

The jacket has been successfully tested during Antarctic expeditions; it relies on a three-mm thick layer of a super-insulating material called Aerogel.

Sometimes called 'frozen smoke' this translucent silica-based substance is 98% air and was used to insulate the 1997 Mars Pathfinder lander from the ultra-low temperatures of the Martian night.

At the other extreme, thermally regulated 'cool suit' overalls, worn by McLaren racing mechanics, keep the wearer safe against fire as well as maintaining a comfortable working temperature in extremely hot conditions.

New pitstop cooling system of West McLaren Mercedes

Constructed by Italian fashion manufacturer Karada Italia with Hugo Boss designer Mauro Taliani, the overalls are inlaid with 50 metres of 2 mm-diameter plastic tubing for cooling, a technique originally developed by Canadian company Med-Eng for ESA spacesuits.

Spacewalking astronauts require complex thermal control systems in their suits because of the large temperature differential between light and shadow in the vacuum of space.

Another contributor to ESA's spacesuit design is Spanish company Zodiac. It has its own battery-powered 'cool suit' undergarment, currently being considered by the London police force to be worn beneath heavy bulletproof vests.



Absolute Zero is a jacket developed to protect against harsh environmental conditions. It is based on Aerogel, the best insulating material in the world. Aerogel was used to insulate space probes sent to Mars. It is the only material that can insulate down to minus 50°C and melts at 3000°C. It is also the lightest solid in the world and in its purest form can float on air.
 Credits: Corpo Nove

Other jackets have been designed by Corpo Nove, aimed at ordinary urban dwellers wishing to keep their fashionable cool.

Dampening shoes take the strain from running

Space-derived technology can guard against more than just temperature extremes: ESA is working with one shoe manufacturer on a sole which changes its stiffness depending on the type of ground it encounters, dampening impacts received by the wearer's foot.

The sole works using a new class of smart material called magneto-rheological (MR) fluids.

Intensively studied in orbit for their vibration-dampening potential, MR fluids can be switched from solid to liquid and back again, through the application of a magnetic field.

A prototype shoe has been developed which has MR fluids in compartments inside its sole in conjunction with an adjustable magnetic field so the stiffness can be manipulated to match the roughness of the ground underfoot.

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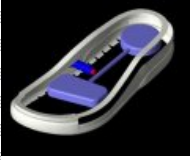
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A cooling system derived from the astronauts' suit ensures comfort in fire-proof suits. Credits: Courtesy West McLaren Mercedes



Latest research in optimising the performance of sport shoes is underway at ESA and a shoe manufacturer. The shoe's sole changes its stiffness depending on the type of ground it encounters to dampen the impact on the wearer's foot. Credits: Corpo Nove

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