RISE TO THE CHALLENGE: SPACE TEXTILES



COPYRIGHT WTP

Couture in Orbit, a project organised by the European Space Agency, tapped into the skills of students from some of Europe's top fashion colleges to generate clothing designs inspired by space exploration.

The future of fashion

Five European fashion schools, a host of sponsors offering their most up-to-date fabrics and technologies and the backing of the European Space Agency (ESA) - that was the recipe for Couture in Orbit, an international design project encouraging the development of everyday fashion using the knowledge and experience gained from space exploration.

A college from each country with an active ESA astronaut was selected to take part in the project and the theme on which to base their designs was inspired by the work of their country's astronaut during his or her mission to the International Space Station (ISS). In the case of the École supérieure des arts et techniques de la mode (ESMOD) in Paris, the students may have had a slight disadvantage because French astronaut, Thomas Pesquet, while still serving as an inspiration, has yet to begin his mission; he is set to lift off in November 2016.

Armed with innovative functional textiles and state of the art technologies, the sky was the limit for the young designers from institutions in Paris,

The "tourist in space" design from students at the Politecnico di Milano institute was inspired by space satellites and had patterns made from conductive ink.

Politecnico di Milano



ESA Human Spaceflight Communication Programme Officer, Rosita Suenson, coordinated the project and visited students at the participating colleges to check on their progress.

Couture in Orbit

London, Milan, Copenhagen and Berlin. Nevertheless, the ESA stressed that the garments and accessories that they designed must be of some practical use. ESA human spaceflight communication programme officer, Rosita Suenson, who coordinated the project, urged them to avoid "Star Wars of Star Trek style clothes or gimmicks" and instead focus on developing garments that "were actually wearable".

Project brief

Ms Suenson has told *WSA* that the aim was to incorporate "high-tech innovation" into designs that were "desirable and practical". Describing the project as "a good opportunity to do something different", she was delighted by how much the students were inspired by the technical materials that they received and praised them for the impressive work they produced.

She emphasises the importance of encouraging the two-way movement of ideas and innovations between the space and fashion industries. The project gave the space industry the opportunity to learn something from current innovations in fashion, and future fashion ideas will likewise be inspired by the technology that is driving modern-day space exploration.

The sponsors recruited by the ESA were effusive in their praise of the project. Haymo Strubel, director for apparel at functional materials developer Sympatex Technologies, said it was a "pleasure" to be part of the project because "sponsoring new talents" is an "integral part" of the company's ethos. It offered students of ESMOD Berlin and London's Ravensbourne college the chance to work with samples of its absorbent materials.

US textile company Bionic Yarn offered samples of a fabric it developed from recycled plastic water bottles. Tyson Toussant, who co-founded the company, said he "jumped at the chance" to be involved because the project "reflects Bionic Yarn's ethos". Another of the technical sponsors to offer their expertise, performance fabric manufacturer Technical Absorbents, added that Couture in Orbit had been "a fantastic project to be part of".

The associate dean of fashion at Ravensbourne (the UK college that took part), Caroline Gilbey, said her students "were delighted with the quality of fabrics that they got to work with". She added that the fact that many of them were also sustainable was a bonus.

The presentation

On May 25, two years after the idea was first conceived, the final results of the Couture in Orbit project were presented at a gala event held in London's Science Museum. A total of 30 designs were modelled on the event's catwalk with the attendance of representatives from many of the project's technical and fabric sponsors as well as the students and staff from the participating institutions. There was even a special message direct from the ISS from UK astronaut Major Tim Peake, whose research and work during his time in space were the inspiration for designs from students at Ravensbourne.

Rosita Suenson describes the evening as "a great success" and says she was pleased by the positive reactions of those in attendance.

The majority of the ideas presented in London were "speculative designs" due to the limited technical and scientific expertise of the students involved but some were completely functional prototypes. The lack of a competitive element to the project didn't stop the students from committing significant time and energy to creating designs that they were proud to display in front of their peers and sponsors.

COPYRIGHT WTP

The designs

Although each school had a theme to guide them, they were given licence to interpret it relatively freely. Some colleges also gave their students a looser brief in terms of the materials that they could use. ESMOD Paris students were restricted to materials supplied by the sponsors but Ravensbourne allowed its students to use materials that they sourced themselves, offering them the chance to add a further layer of innovation and creative thinking to the design process. *WSA* has picked out some of the most promising ideas on show.

Fashion Design Akademiet - Copenhagen

A visit from Danish ESA astronaut Andreas Mogensen was a huge motivation for students at Fashion Design Akademiet Copenhagen, according to owner, Lis Fornæs. "A lot of questions were asked about what it was like to stay up there in space, and various practical queries," she said. It was a useful resource for the academy to draw on because its theme was "everyday commuting in space".

Masouda Nouri, a Fashion Design Akademiet student, used strips of electroactive polymers (EAP) from Danish start-up Leap Technology in her design. These rubber-like strips, dubbed "artificial muscles" by the company can be used to measure stretch to within a tenth of a millimetre. The material has already been used on the ISS by Italian astronaut Samantha Cristoforetti, who was the astronaut partner for the participating institute in Milan. She wore a stretch sensor made from EAP on her neck to measure blood flow from the brain to her heart. It was labelled the "Drain Brain" experiment and aimed to study the effect of microgravity on the brain.

When an electric voltage is run through the EAP strips, they act in the same way as muscles and can be used to measure strain on different areas of the body. Ms Nouri's design used EAP strips to detect excess strain on key areas like the elbow, knee, spine and hip. It was targeted at those who do "hard physical work" or who have had severe muscle damage and cannot risk overloading a particular area of their body. The data from the strips would be transmitted to a device where it could be collected and analysed by bespoke software. The wearer could then work on adopting a healthier posture to correct the overload.

"For the fashion clothing of the future it will be possible to measure people's posture - how wearers walk, run or sit - to improve their health," says Leap Technology co-founder, Rahimullah Sarban.

Politecnico di Milano - Milan

Students at technical university Politecnico di Milano worked with D'Appolonia and eXtreme Materials, partners in the research of textile processing technology, to add patterns made from conductive ink to their "tourist in space" design. It was inspired by the mechanics of orbital satellites and included a series of flexible pieces that can adapt their style and shape. This allows the wearer to adapt the outfit, making it suitable to wear in a variety of settings. Moreover, the flexibility of the garment means it can be stored more easily and is simpler to transport.

The addition of the metallic ink made "tourist in space" one of the most potentially useful designs presented in London. The ink acts as a printable antenna, which can be used to establish the GPS position of the wearer. The ESA has already explored this technology and a patent is pending for it. The space applications are clear. The high likelihood of further planetary exploration would make the ability to track an astronaut's location in this way extremely useful. Back on earth it could help track people in remote locations.

"We've been the go-between, with the students on one side and the industry on another," says Andrea Maria Ferrari, engineering manager for D'Appolonia. "We wanted to encourage the students to come up with apparently crazy applications - to stay as crazy as possible - while we are the ones with our feet on the ground."

ESMOD Paris

Several students at ESMOD Paris included tracking devices from Dutch company Johan Sports in their designs. These small pods, which have already been used to monitor the performances of professional football, hockey and rugby players in Germany and the Netherlands, are able to track location, speed, distance, acceleration and orientation.

"For us the difference from other projects was that we got to work with technical fabrics and new technologies," says Cristina Labat, a modelling teacher at ESMOD Paris.

The tracker is based on the technology used in satellite navigation. The data collected can be stored online then analysed as a way to improve athletic performance. In future space



ESMOD Berlin student Sarah Grepl incorporated a range of features in her design including cooling technology and solar cells.

Barry McDonald/ Science Museum

COPYRIGHT WTP



Strips of "artificial muscle" from Danish start-up Leap Technology can be seen on this design from Masouda Nouri, a student at Copenhagen's Fashion Design Akademiet.

Barry McDonald/ Science Museum

exploration, it would allow a mission control crew on Earth to monitor the health status of an astronaut who is millions of miles away on a mission to the moon or another planet.

The product from Johan Sports is a prime example of how space technology can be adapted for use on earth. The ESMOD Paris students envisioned it being used to track the vital statistics of the wearer, allowing the health of an ill or elderly person to be monitored. They hypothesised that the data monitored by the device could be extended to include temperature and blood pressure. It could even monitor external factors, such as air pressure or ground vibration, to give advance notice of impending natural disasters like hurricanes or avalanches.

Ravensbourne – London

Students from Ravensbourne college made ample use of technical materials from their sponsors. Farid Bin Karim was one student who used the recycled plastic fabric from Bionic Yarn, adding thermochromic and photochromic pigments to the material as part of a skirt design. The pigments react to temperature changes and UV radiation and change colour.

Staying true to their British roots, they also made use of a super absorbent fibre (or SAF) from UK-based company Technical Absorbents, which can be blended with different fibres to produce a variety of super-absorbent materials. The SAF was used by Katrina Benina in her design for a backpack. She pointed to the lightweight and absorbent properties of the material as her reason for using it. The soft water-resistant surface of the backpack makes it suitable for use in heavy rain conditions and she took inspiration from the interior of conventional space rockets for the backpack's padding.

As mentioned, Ravensbourne allowed its students to supply its own materials to develop ideas and encouraged them to use unconventional materials if possible. One who chose to do so was Zoe Burt. Her outfit included a belt made from PVC sheeting and a 3D printed buckle using biodegradable polylactide (PLA) filament, sourced from UK material and technology supplier Faberdashery.

ESMOD Berlin

The students at ESMOD Berlin were asked to base their designs around earth observation and climate change, two of the focuses of German astronaut Dr Alexander Gerst during his mission to the ISS in 2014. A key sponsor for the students of the college was US-based company 37.5, which has developed fabrics that capture and release moisture vapour to optimise body temperature.

The material responds to the thermal needs of the body, making the microclimate between skins and garment more comfortable by cooling when the wearer is too hot and retaining heat

Many students at ESMOD Paris used tracking pods developed by Dutch company Johan Sports in their designs.

Johan Sports



COPYRIGHT WTP



3D-motion tracking technology developer Xsens offered students at ESMOD Berlin the chance to work with its MVN Biomech suit.

Xsens

when a drop in body temperature is detected. The students had access to 37.5's library of fabrics and they were free to choose which ones to use.

Philippe Ara, design teacher for concept and collection development at the college, said the materials available were "very inspirational", adding that "fashion schools do not usually get access" to such "high-level textiles that are being developed for space".

ESMOD Berlin student Sarah Grepl used fabrics from 37.5 in an outfit designed to protect the wearer in extreme environments, such as those experienced in space or in remote areas on earth. As well as helping to regulate the wearer's body temperature, the design also incorporated solar panels based on samples of solar sails provided by the ESA.

Dr Gregory Haggquist, founder of 37.5,

COPYRIGHT WTP



labelled the project a "huge success" because he believes that "any time you can have cross-pollination between different areas, especially art and science, unique and creative things happen". So as not to influence the creative process of the students, Dr Haggquist said the company chose not to make them aware of the previous commercial uses of the fabrics, for example under the company's previous name, Cocona.

Jiamin Yu used technology from another sponsor in her design for a "survival suit". 3D-motion tracking technology developer Xsens allowed ESMOD Berlin students to work with its MVN Biomech suit, a full bodysuit with sensors to monitor the key functions of the body. Ms Yu's conceptual design incorporated the ideas behind the suit. Sensors would monitor vital organs such as the heart or lungs and the data would be fed back to integrated smartphone technology able to alert the wearer if any adverse readings are detected.

Forward thinking

Couture in Orbit was a real eye-opener for all those involved. For the students, who had little or no technical expertise prior to the project, it gave them the opportunity to expand their skillset and consider ideas that they had never considered before. Cristina Labat, from ESMOD Paris, said working on the project "was interesting and enriching to the students" and that it gave them some insight into what the future of fashion would look like.

The project allowed the technical sponsors to broaden their own horizons and learn from the students, who offered new ideas on how to use their fabrics and technologies. In the case of Johan Sports, it opened up the potential of a whole new market for their product in the fashion industry.

Professor Annalisa Dominoni from Politecnico di Milano said the project "was a great challenge for us because we explored fashion in the age of technology". This allowed her students to be "more conscious of the transformation that technology brings". She believes space innovations will have a strong influence on how people behave in the future and this will no doubt extend to how designers design and consumers consume.

The last word is for Rosita Suenson. She is hopeful that some of the designs presented in London, whether conceptual or not, could be introduced into the space industry in the future. Likewise, she says that "in future, fashion designers will have to embrace technology". *WSA* has seen evidence that this is already the case and there is no doubt that it will be so to an even greater extent in the future.

COPYRIGHT WTP

