BMW GROUP

Corporate Communications

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Pushing material boundaries.

BMW and Massachusetts Institute of Technology Self-Assembly Lab collaborate to design the first printed inflatable material.

Munich. The BMW Design Department in collaboration with MIT's (Massachusetts Institute of Technology) Self-Assembly Laboratory have successfully developed printed inflatable material technologies that self-transform, adapt and morph from one state to another. This visionary commission is showcased at the V&A and for the first time on display during their exhibition The Future Starts Here, which explores the power of design in shaping the world of tomorrow.

The BMW Design Department and MIT's Self-Assembly Laboratory have started their cross-disciplinary study two years back with the mutual ambition to push the boundaries of material technologies. BMW's forward thinking concepts of future interiors that can interact and adapt seamlessly were the starting point of an in depth exploration by MIT's Self-Assembly Laboratory. This collaboration resulted in the first example of a fully printed inflatable that can be customized to any size or shape. The silicone printed object can change shape depending on the amount of air pressure in the system. The pneumatic controls in the system allow the printed structure to transform into a variety of shapes, functions or stiffness characteristics.

"The outcome of this collaboration manifests that a new material future is imminent", says Martina Starke, head of BMW Brand Vision and BMW Brand Design at BMW Group. Together with the Self-Assembly Laboratory at MIT, Starke was eager to move away from our current understanding of car interiors as the forces reshaping the nature of transportation are eventually shifting toward a kind of vehicle that defies conventions like front and back seats. „There is no need to lock the car of the future into any particular shape. Interiors could even take on malleable, modular uses", she explains further. This is why the study is fully focusing on technological dimensions and material properties at this stage.

After testing various directions on how a visionary interior could take shape, the experts at the Self-Assembly Lab achieved a breakthrough when they managed to liquid print air and water-tight inflatable geometries, like customized printable balloons. With this technology they can produce complex channels and pockets that self-transform. Skylar Tibbits, founder of the Self-Assembly Lab explains: „We then brought together a number of recent technologies such as Rapid Liquid Printing and techniques from soft robotics to achieve this adaptive

material structure. In the past, scenarios like these have often required error-prone and complex electromechanical devices or complex moulding/tooling to produce inflatables. Now we're able to print complex inflatable structures with custom actuation and tuneable stiffness."

On display at the V&A is a three dimensional object which is highly dynamic, morphing its form and function. This meter-scale object exhibits robotic-like transformation from a pneumatic system with seven independent chambers to create different movement patterns. „This adaptive material technology points towards a future of transformable surfaces for adaptive human comfort, cushioning and impact performance", says Martina Starke.

The Future Starts Here brings together ground-breaking technologies and designs currently in development in studios and laboratories around the world. Drawing upon international research, and working closely with a range of companies, universities, practitioners and advisors, the exhibition explores over 100 projects shaping the world of tomorrow. „We are proud to be one of the contributors to show our achievements", concludes Martina Starke, „The 'Liquid Printed Pneumatics' project is a perfect example for a fruitful cross-disciplinary collaboration we'll see more and more over the coming years, especially at BMW."

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The BMW Group

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In 2017, the BMW Group sold over 2,463,500 passenger vehicles and more than 164,000 motorcycles worldwide. The profit before tax in the financial year 2017 was € 10.655 billion on revenues amounting to € 98.678 billion. As of 31 December 2017, the BMW Group had a workforce of 129,932 employees.

The success of the BMW Group has always been based on long-term thinking and responsible action. The company has therefore established ecological and social sustainability throughout the value chain, comprehensive product responsibility and a clear commitment to conserving resources as an integral part of its strategy.

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