SmartWrap Pavilion

James Timberlake KieranTimberlake Associates

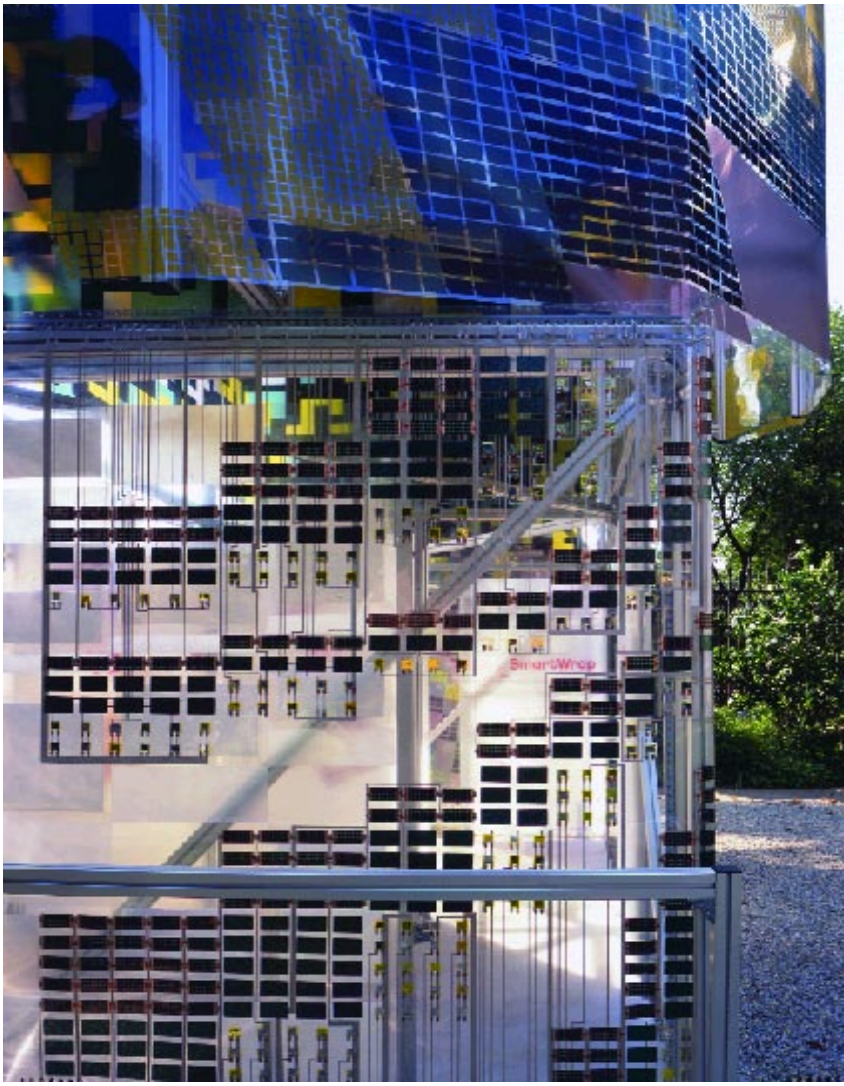
The combination of new materials and digital design has a transformative potential, providing building products and architecture tailored specifically to the clients' needs and site requirements. This is the essence of the architecture of mass costumisation or personalised production. How can one demonstrate this physically when in essence the product is significantly ahead of current production capabilities? This was the dilemma faced by architects James Timberlake and Stephen Kieran of KieranTimberlake Associates, when asked to design a pavilion for the Cooper-Hewitt National Design Museum in the autumn of 2003. Their response is the SmartWrap Pavilion. The SmartWrap concept will deliver shelter, climate control, lighting, information display and power with a printed and layered polymer composite. The aluminium-framed pavilion is clad in a printed skin based on a combination of polyester and its derivative polyethylene terephthalate (PET), which was developed with DuPont. The pavilion was designed using a single project model, and all the aluminium extrusions of the frame were barcoded. This coding defined their structural and construction properties. This enabled an automated manufacturing bill of materials

to be produced and facilitated the placement of components on site.

The fully developed SmartWrap will incorporate phase-change materials to mimic thermal mass and act as thermal regulators. Phase-change materials can store five to 14 times more heat per volume than naturally occurring latent heat stores such as water, masonry or rock. Lighting and information displays are delivered by organic light-emitting diodes (OLED), which are thin, flexible and self-emissive. The OLEDs were developed with DuPont Displays. Shelter is provided by the PET film, which is colourless and transparent. Entrapped pockets of aerogel, supplied by Aspen Aerogels, provide thermal resistance. This layered assembly achieves the thermal resistance of an insulated 400mm concrete-block cavity wall at approximately 1/100th of the weight. Noting the major power blackout recently experienced in North America, including New York, it is reassuring to note that SmartWrap also incorporates organic photovoltaic cells to generate electricity.

The museum's exhibitions curator, Matilda McQuaid, stated that the pavilion 'is intended as a kind of provocation to designers and architects'. She also noted that SmartWrap should be available commercially within five to 10 years. The main pavilion is printed with a mass customisable pattern, which represents the proposed layered assembly.

A 2.4m2 panel next to the pavilion demonstrates the working components of SmartWrap. Although this is currently a future product, it demonstrates a highly integrated use of nanotechnology, which can be tailored for specific site conditions and a wide range of building typologies.



Detail of SmartWrap Installation, Cooper-Hewitt National Design Museum, New York, 2003

SmartWrap Pavilion, General View, Cooper-Hewitt National Design Museum, New York, 2003

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Industrial collaborators
DuPont, Skanska (US)
ILC Dover
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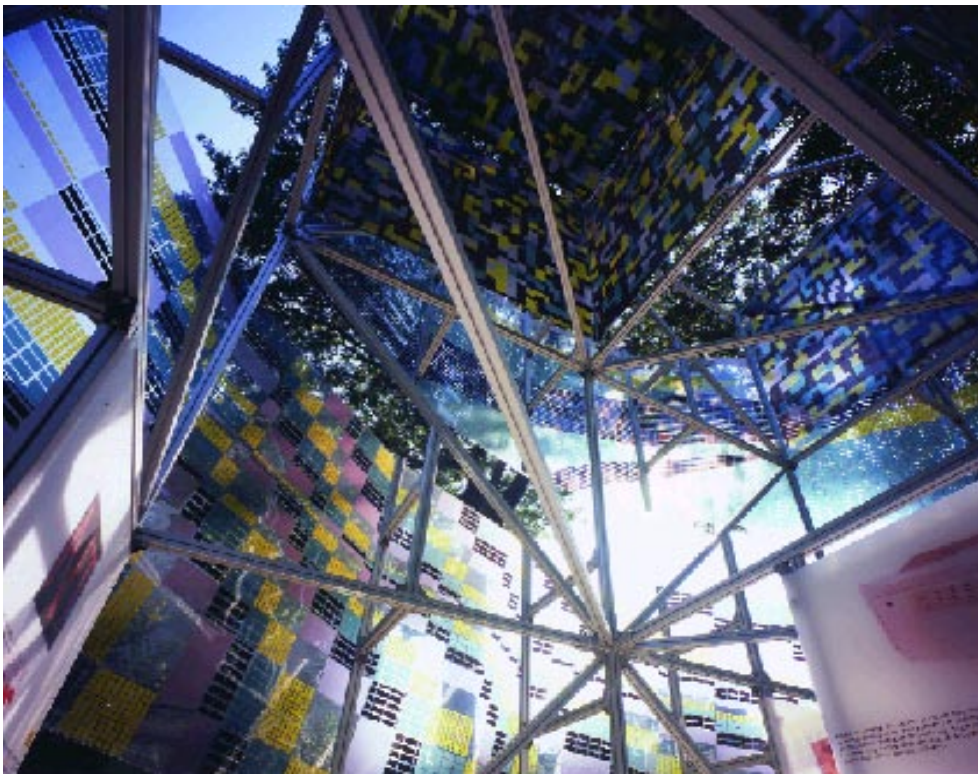
James Timberlake received his Bachelor's degree from the University of Detroit, with honors, and his Master of Architecture from the University of Pennsylvania, with honors. He is a recipient of the Rome Prize, American Academy in Rome, 1982-83. A registered architect in Pennsylvania, New Jersey, New York, Delaware, Maryland, Virginia, Vermont and Washington D.C., and an NCARB member, he is also an adjunct faculty member of the University of Pennsylvania's School of Design and a visiting professor at the University of Michigan. In addition, he has served as Eero Saarinen Distinguished Professor of Design at Yale University with Mr. Kieran, and has taught at several universities including Princeton University and the University of Texas at Austin. Along with his partner, he is an inaugural recipient of the AIA College of Fellows' Benjamin Latrobe Fellowship for architectural design research.



SmartWrap Pavilion, Interior view