Hy-Fi
Zero carbon emissions compostable structure, New York, NY, USA

Summary and appraisal by the jury

Hy-Fi is a cluster of circular towers formed using reflective bricks, designed for and commissioned by the MoMA PS1 Young Architects Program for construction in New York City. The structure uses recent advances in biotechnology combined with cutting-edge computation and engineering to create new building materials that are almost 100% grown and compostable—a new paradigm for design and manufacturing. Beyond the use of technological innovations, the tower assembly ultimately touches the senses, while challenging perceptual expectations through unexpected relationships of patterns, color, and light.

The jury applauds the investigatory nature of the project, both in terms of its objective to research innovative construction materials and its architectural potential. Specifically valued is the idea to test the possibility of creating a structure that is made of a biodegradable substance. The organic bricks, made of a combination of corn stalks and fungal organisms, are carbon free and produce almost no waste at the end of the building’s lifecycle. Most interesting is the “low tech/tech” approach of the project, which offers great promise for applications at a larger scale. The design’s architectural expression appears to defy the force of gravity through a play of light effects and mesmerizing colors.

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Project data

Context: Materials, products and construction technologies
Client: MoMA PS1
Background: Research and development
Planned start: July 2013

Sustainability concept

If the twentieth century was the “Century of Physics,” then the twenty-first century is the “Century of Biology.” The reflective bricks are produced through custom-forming of a new daylighting mirror film invented by 3M. In collaboration with 3M, novel uses for this material have been developed. The reflective bricks are used as growing trays for the organic bricks, and then incorporated into the final construction before being shipped back to 3M for use in further research.

The structure inverts the logic of load-bearing brick construction and creates a gravity-defying effect. Instead of being thick and dense at the bottom, it is thin and porous at the bottom. The structure is calibrated to create a cool micro-climate in the summer by drawing in cool air at the bottom and pushing out hot air at the top. The structure creates mesmerizing light effects on its interior walls through reflected caustic patterns (refracted rays of sunlight). The structure offers a familiar-yet-completely-new experience for summer music events. It is a new vision for society’s approach to architecture and construction materials and its architectural potential. The structure offers a new paradigm for design and manufacturing, with almost zero waste, zero embodied energy, and zero carbon emissions. It is a compostable structure that offers shade, color, light, views, and a future-oriented experience that is refreshing, thought-provoking, and full of wonder and optimism.

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Image 1: A captivating experience for summer music events.
Image 2: The new structure built in the courtyard of MoMA PS1 Young Architects Program from June until September 2014 is in contrast with New York City’s typical brick buildings in Queens and the steel-and-glass buildings in Manhattan.
Image 3: Organic brick made of corn stalks and mushroom roots.
Image 4: A gravity-defying effect with lightweight brick construction.
Image 5: Branching circular towers.
Image 6: Temporarily diverting the natural carbon cycle to make a building, color, and light

Image 7: Production cycle involving no waste and no energy.
Image 8: A tall occupiable structure as a test of this new building material.

Image 9: A low tech/high tech melting pot of waste and energy.
Image 10: Natural dye creates a structure with natural white on the outside and warm red on the inside.