CASE STUDY

RESIDENTIAL

3D-printed Habitat for Humanity homes

Newport News, VA, USA

Project **Information**

Project category: Residential

Years of construction: 2022-2023

Years of MAPEI involvement: 2022-2023

MAPEI coordinators: Fabrizio De Rossi and Rankin Jays

Project owners: Habitat for Humanity and private homeowners

General contractor: Alquist 3D

Surface-preparation contractor: Alquist 3D

Photographer: Steven Day

Project size: The homes are 1,200 square feet (111 m²) each. Each home features three bedrooms and two bathrooms.

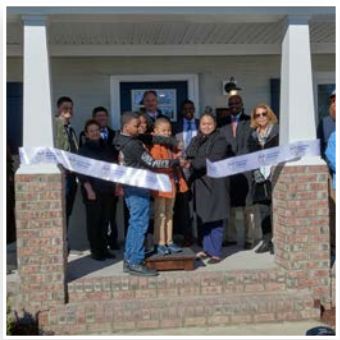
Project **Overview**

In Newport News, where the need for affordable housing is pronounced, Habitat for Humanity embarked on a mission to revolutionize the construction landscape. The collaboration between the charity, MAPEI and Black Buffalo 3D Corporation aimed to leverage 3D-printing technology to build homes that are not only cost-effective but also environmentally sustainable. With a vision to address the housing crisis, the project sought to provide families with comfortable, durable and energy-efficient homes.

Products Used

Elastocolor*® *Paint

Planitop*® *3D



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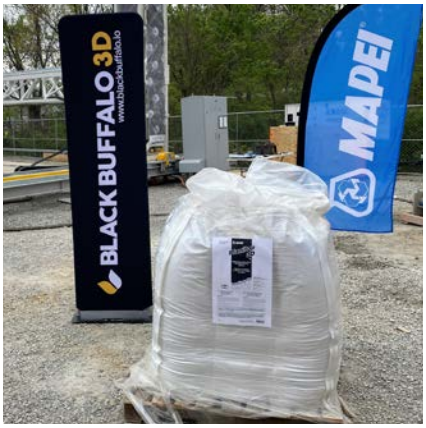
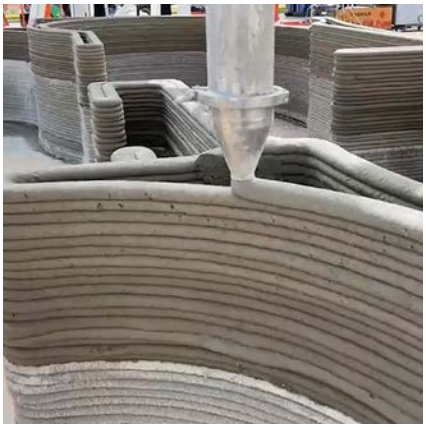
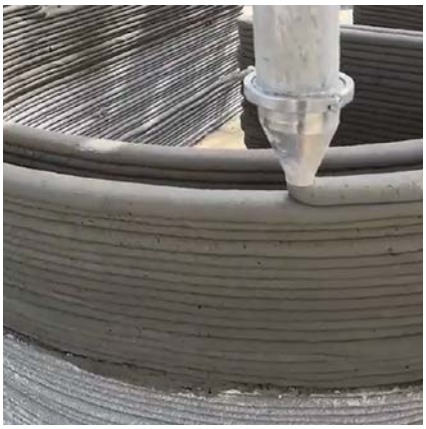






Revolutionizing affordable housing with 3D-printed homes

In a groundbreaking collaboration, MAPEI, a global leader in construction solutions, partnered with Habitat for Humanity and Black Buffalo 3D Corporation to pioneer a transformative approach to affordable housing.

Two homes in Newport News, VA, stand as testaments to innovation and sustainability through being constructed using cutting-edge 3D-printing technology and MAPEI's *Planitop 3D* mortar/ink. These 1,200-square-foot (111-m^2) homes, each boasting three bedrooms and two baths, exemplify a new era in sustainable, cost-effective housing solutions.

3D-printing technology – *Planitop 3D* leads the way

The key to this groundbreaking project lies in the use of 3D-printing technology. Traditional construction methods often come with high costs, extended timelines and environmental impacts. In contrast, 3D printing enables the layer-by-layer construction of structures, reducing waste and construction time significantly.

MAPEI's *Planitop 3D* mortar/ink, specifically designed for 3D-printing applications, played a pivotal role in the success of this project. *Planitop 3D* is an innovative material that is designed for use in 3D-printing construction applications. Comprising a blend of high-performance materials, it offers exceptional durability, structural integrity and workability.

The mortar/ink's adaptability to 3D-printing technology ensures precise layering, resulting in sturdy and well-constructed homes. Further, *Planitop 3D* is the only 3D mortar/ink to comply with the International Code Council Evaluation Service's (ICC-ES) standards for structural walls, ICC-ES AC509.

To add an extra layer of protection and aesthetic appeal to the homes, both structures were coated with MAPEI's custom-colored *Elastocolor Paint*. This premium coating not only enhances the durability and weather resistance of the exterior surfaces, but also allows for a personalized and visually striking finish.

Sustainability and cost efficiency

One of the primary advantages of 3D-printing technology is its inherent sustainability. The layer-by-layer approach minimizes material waste, making this technology an eco-friendly alternative to traditional construction methods. Additionally, the reduced construction time translates to lower labor costs, contributing to the overall affordability of the homes.

The construction of the Habitat for Humanity homes in Newport News unfolded seamlessly, showcasing the efficiency of 3D-printing technology. The *Planitop 3D* mortar/ink was loaded into Black Buffalo's NEXCON 3D printer, which meticulously followed the digital blueprint to create the layers of each structure. This automated process significantly accelerated the construction timeline, allowing the crew from Alquist 3D and volunteers from Habitat for Humanity to complete the two homes in record time.

Revolutionizing affordable housing with 3D-printed homes

The completion of the 3D-printed homes in Newport News marks a significant milestone for affordable-housing initiatives. The Habitat for Humanity project, powered by MAPEI's cutting-edge technology, demonstrates that quality, sustainability and affordability can coexist in the realm of construction. Families in need now have access to homes that are not only cost-effective but also environmentally conscious, creating a positive ripple effect in the community.

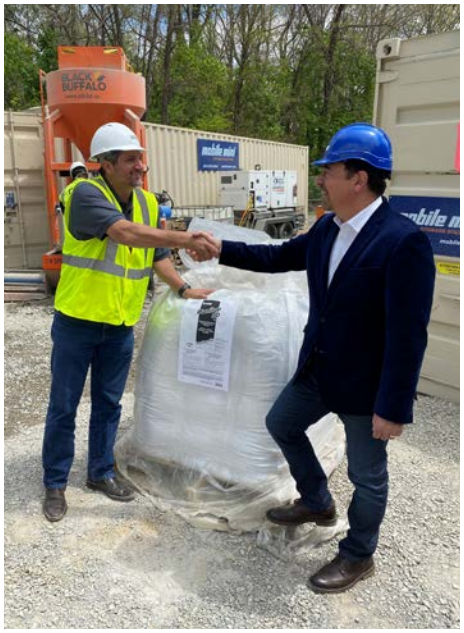
Beyond affordability and sustainability, the 3D-printed homes showcase a thoughtful and energy-efficient design. The homes are equipped with modern features that enhance energy conservation, including energy-efficient windows, insulation and HVAC systems. These features not only reduce the environmental impact but also minimize long-term energy costs for the homeowners.

Learning for the future

The Newport News project serves as a blueprint for the future of affordable housing. As technology continues to advance, 3D printing holds immense potential for transforming the construction industry. MAPEI's *Planitop 3D* mortar/ink, with its proven success in this project, is poised to become a cornerstone in the evolution of construction materials, paving the way for more sustainable and cost-effective housing solutions.

The success of the Newport News project also underscores the importance of collaboration between industry leaders and nonprofit organizations to address critical societal issues. Habitat for Humanity and MAPEI's joint commitment to innovation and community welfare sets a precedent for future partnerships in the construction sector.

The 3D-printed homes in Newport News stand as beacons of hope and progress, showcasing the transformative power of technology and collaboration in addressing pressing societal challenges. With MAPEI's *Planitop 3D* mortar/ink leading the way, these homes not only



provide shelter to families in need but also symbolize a shift toward a more sustainable and affordable future in the realm of construction.

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