PRODUCTINNOVATION

10 HOUSES 3D PRINTED IN 10 WEEKS ON THE LARGEST 3D PRINTING PROJECT SITE TO DATE

Holcim's 14Trees beats other 3D printing companies in the race to create affordable housing.

From Oct. 2022 to Jan. 2023, 14Trees 3D printed 10 houses in Kilifi, Kenya, averaging one house per week:

- 6 three-bedrooms (76 m^2 / 836 ft^2) and 4 two-bedrooms (56 m^2 / 616 ft^2) houses have been 3D printed so far, making Mvule Gardens in Kilifi the largest 3D printed project to date.
- No other completed 3D construction printing project is currently larger than that, in the US or elsewhere.
- The fastest time to print one house in the Mvule Gardens project was 18 hours.
- No other 3D construction printing project has matched 14Trees productivity, in the US or elsewhere.

For a long time, 3D construction printing has been seen as a possible solution to the escalating affordable housing crisis. Proponents of the technology claim, that when 3D printing projects in construction are carried out at scale, the advantages of the technology become clear. Evidence of that claim has been lacking, but recent developments actually provide credibility to the statement.

14Trees is a joint venture company between the cement and concrete giant Holcim and British International Investment dedicated to accelerating the provision of affordable housing in Africa. The joint venture is behind the first 3D printed houses in Africa and the first 3D printed schools in the world. 14Trees announced some of the initial results of their efforts to 3D print up to 52 houses in Kilifi, Kenya, using a single BOD2 printer from COBOD. The BOD2 is the world's best-selling construction 3D printer. Following the start in October 2022, 14Trees completed the 3D printing of the walls of 10 houses in January 2023 after just 10 weeks using only one printer.

In addition, the project's sustainability profile also attained an EDGE Advanced sustainable design certification by IFC, the World Bank's development finance institution, which recognizes resource-efficient buildings with the potential to be zero-carbon. It is the first time a 3D printed housing project has attained this certification.

14Trees intends to get the full benefit of the large-scale project by experimenting and innovating as the project progresses. During the next phases which consist of 10-15 houses each, several innovations will be included that will allow future tenants to design their homes and move away from the standardized 3D printed approach to one which fully leverages the technology's customization possibilities.

The cost of construction is also an area of focus. With each phase, 14Trees is aiming at lowering construction costs further such that the build cost is 20% lower than standard houses. Using Holcim's proprietary 3D printing materials, TectorPrint, made at a local plant, has already meant a significant reduction in costs.

Visit COBOD.com for more information.

ALUMOGRIT® CAST ALUMINUM NOSINGS PROVIDE LONG LASTING ANTI-SLIP PROTECTION EVEN IN CORROSIVE ENVIRONMENTS

Wooster Products features AlumoGrit® cast aluminum nosings with abrasive grit integrally cast into the surface for long lasting anti-slip protection. These durable nosings are well suited for rough use, in indoor or outdoor installations, in new construction or existing structures. They are highly resistant to corrosive environments, making them ideal for facilities where harsh chemicals are often used.

Available in 3-inch, 4-inch, and 6-inch widths, and lengths to 8 ½ feet, with cross-hatching and fluting that is clean and well defined. Each section is shot blasted prior to shipment with concealed anchors. AlumoGrit® abrasive cast aluminum nosings provide years of slip-resistant service life and are ideal for use in parking garages, exterior stairs, in wastewater treatment plants, chemical processing facilities, and other locations where harsh chemicals are often used.

Wooster Products is the industry leader in anti-slip stair treads and walkway products. Long respected for quality and innovation, their products include cast aluminum (Alumogrit®) cast iron (Ferrogrit®), extruded aluminum (Spectra, Supergrit®, Stairmaster®, and Flexmaster®), pressure sensitive adhesive tape/deck covering (Flex-Tred®), and coatings (WP-70, Walk-A-Sured®, and Safe-Stride®), as well as photoluminescent (glow-in-the-dark) nosings and treads (NITEGLOW®). For additional information visit www.WoosterProducts.com

HOW TO MITIGATE CORROSION IN PRECAST CONCRETE

Precast concrete is a high-quality building material with countless uses: for bridges, parking ramps, light poles, culverts, prefab houses, tanks, and much more. Because precast concrete is made and cured in a controlled environment, it has a low risk of corrosion vs. cast-in-place concrete. That is . . . until cracking occurs, as can often happen during transportation. Once cracks form, corrosives can enter and additional freeze-thaw cracking can occur, leading to long-term corrosion damage. Fortunately, Cortec® MCI® is an easy way to arrest corrosion and extend service life at any stage in the precast concrete lifespan.

MCI® for Precast Concrete Repair

Sometimes, corrosion has already gone so far that precast concrete elements must be repaired. MCI® Technical Sales and Product Manager, Ash Hasania, found this to be the case when he encountered a client with deteriorating concrete light poles that were more vulnerable to corrosion because of old, poor quality concrete cast in a slender design. MCI®-2023 was used to re-passivate rusted rebars. MCI® Mini Grenades were added to the ready-mix for the new concrete patches. Once the concrete cured, surfaces were treated with MCI®-2020 and MCI®-2018 for additional corrosion protection. Going forward, the customer began adding MCI®– 2005 to the light poles during casting.

To learn more visit https://www.cortecmci.com/

MCI® PRODUCTS FOR HISTORICAL RESTORATION

Two priorities exist when restoring historical structures that have deteriorated from corrosion: (1) Mitigate corrosion to extend service life and minimize future repairs. (2) Do so without changing the appearance of the structure. This is especially difficult with historical concrete structures, as the addition of new materials could alter the color or texture of the concrete. Fortunately, Cortec® MCI® products have proven to be excellent resources for both maintaining and repairing heritage structures.

One of the most difficult parts of a historical concrete repair can be matching new repair mortars or concrete mixes to the old surface where patching is needed. Sometimes this requires highly specialized historical or decorative concrete mixes. MCI® Mini Grenades can be added directly to these specialty mixes to introduce Migrating Corrosion Inhibitors to the repair. These concrete corrosion inhibitors have been successfully used in historical preservation jobs to extend service life without changing the color or look of the final repairs. They may also discourage the progression of the ring anode effect in areas adjacent to the repair by migrating and evening out the corrosion potential between existing concrete and repaired areas.

Rebar and Concrete Surface Prep

Rebar rust is typically the leading cause of concrete deterioration, and good surface prep is therefore integral to a successful repair. Traditionally this involves labor-intensive sandblasting and cleaning of the rusted rebar to white metal. CorrVerter® MCI® Rust Primer offers a convenient alternative to treat and passivate rusted rebars.

A single component, fast drying water based primer, CorrVerter® MCI® can be applied to layers of tight rust, converting it into a hydrophobic passive layer. This method reduces labor and makes re-rusting less likely in the near future.

Another important aspect of surface prep is making sure the concrete is clean. For example, concrete contaminated with oils or greases can be cleaned with MCI®-2061 or MCI®-2062. These cleaners contain microorganisms for extended cleaning power. Left overnight, the microorganisms degrade and digest greasy substances within the concrete. They also continue to provide residual cleaning even after the surface has been rinsed off.

For more information visit https://www.cortecmci.com.

MCI® SURFACE APPLIED CORROSION INHIBITORS: A RECOGNIZED INDUSTRY STANDARD

ICRI Guideline No. 510.2-2019: *Guide for Use of Penetrating Surface Applied Corrosion Inhibitors for Corrosion Mitigation of Reinforced Concrete Structures* is the culmination of years of expert collaboration among members† of the International Concrete Repair Institute (ICRI). This groundbreaking standard was published in 2019 and defines SACIs as corrosion inhibitors that penetrate through concrete and directly inhibit corrosion on the surface of the metal reinforcement, thus excluding chemistries that act as pore blockers only. It covers known technologies on the market at the time of publication and offers tips on surface prep, application, and detection/assessment.

Cortec® MCIs and the ICRI Standard

Cortec's MCI® SACI chemistries fall under the ICRI descriptions of ambiodic (mixed) inhibitors. They include MCI®-2018, MCI®-2019, MCI®-2020, and MCI®-2021, to name a few. The best SACI to use for a particular product varies from application to application. Factors such as environmental conditions, budget parameters, and the application of water protection products all figure into the decision-making. For example, those in search of the MCI® SACI with the highest concentration of corrosion inhibitors may opt for MCI®-2020. Those looking for convenient two-in-one corrosion protection and water repellency may select MCI®-2018, which combines Migrating Corrosion Inhibitors with a 100% silane water repellent. MCI®-2019, containing Migrating Corrosion Inhibitors and a 40% silane water repellent, may be preferred by those seeking to stay within a more limited budget. When tested according to the U.S. Bureau of Reclamation M-82 Protocol (one of the few existing test methods for SACIs), these three surface treatments* showed a significant reduction of corrosion and cracking in the presence of high chloride exposure.

For more information visit https://www.cortecmci.com.

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Email your 150-200 word news to editor@icri.org. Content for the May/June 2023 issue is due by April 1, 2023, and content for the July/August 2023 issue is due by June 1, 2023. One (1) high resolution product photo may be included. ICRI reserves the right to edit all submissions.