

## Double Duty

Written by: Katie Kuehner-Hebert

### DIGITAL TWINNING TECHNOLOGY STREAMLINES COLLABORATION BETWEEN CONTRACTORS AND CLIENTS

A new day, a new technological feat: digital twin. What does it mean and how can it impact your construction project?

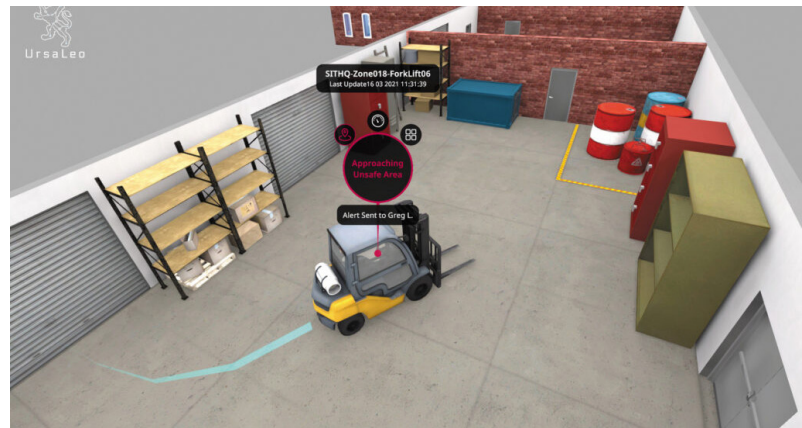
The new technology is certainly taking off across industries: the global digital twin market size in 2020 was valued at \$3.1 billion and is expected to grow 58% (company annual growth rate) to \$48.2 billion by 2026, according to ResearchAndMarkets.com.

But just what is a digital twin?

It means different things for different purposes, but fundamentally, it's a digital representation of an object in the real world, in real time, in a database, says John Burton, co-founder and CEO of UrsaLeo in San Francisco.

“Say we have a three-dimensional model of a construction site, like a computer model,” Burton says. “We then combine that with data, such as workers’ locations, safety status – capturing the data in real time to improve safety on the jobsite. We can also use the technical drawings of a building’s various systems, and we cycle through various models to see how they are being completed in real time.”

The digital twin can also aid in collaboration with other entities on the project to resolve any problems on-site, he says. Combining a 3D model with technical drawings and real time data enhances collaboration more so than showing someone a 2D picture of an object on an iPad.



“Our photorealistic 3D model of a construction site looks very much like the real thing, so there’s very little learning curve – our solution is as intuitive as using a smartphone,” Burton says. “If you can open a web browser, you can use this.”

Digital twin technology is also valuable for ongoing maintenance after a facility has been built, he says.

“When an end customer is considering multiple bids for a construction project, offering them 3D models combined with data can give you an edge,” Burton says. “In the future, if you don’t have that capability, you could be at a disadvantage.”

UrsaLeo built a digital twin model of the corporate headquarters of Volpatt Construction, a member of the Master Builders Association of Western Pennsylvania, that it used as a test environment, says Raymond Volpatt Jr., president of the Pittsburgh-based company.

“We installed sensors to track environmental data such as

humidity, temperature and air quality,” Volpatt says. “We are also using the technology to monitor the safety of personnel within the office by monitoring their locations via Bluetooth beacons installed on their phones. This is a test to monitor the location of workers on construction projects and to enhance the safety on jobsites.”

The contractor is now going to launch this technology on an upcoming hospital construction project to be able to collaborate more effectively and efficiently with the design team and owner, as well as to aid in the eventual operations and maintenance of the facility.

UrsaLeo is a 3D model that was built in gaming technology, which is much less costly than other collaboration technologies because the model can be hosted in the cloud, he says. Moreover, because the model lives in the cloud, construction project managers, architects, and owners can access it from pretty much anywhere, including on their smartphones.

“This alleviates drive times from their offices to jobsites – and in the construction industry, time is money,” says his brother, Michael Volpatt. He is CMO of a subsidiary company, ShareInTech, which will be distributing the digital twin technology developed in conjunction with UrsaLeo to others in the construction industry.

In September, the solution will also have augmented reality capabilities, Michael Volpatt says. Someone can hold up their smartphone or tablet to a piece of equipment or wall to showcase what is inside and further enhance collaboration.

“Ultimately, digital twin technology will change the relationship between contractors and owners – extending the relationship beyond pre-construction and construction to post-construction,” he says. “Providing models to owners can help them integrate into building management systems, like the solutions offered by Honeywell or Siemens.”

Twins enable contractors to see what’s happening on a jobsite at any one point in time, tracking delivery of materials and installation while also enhancing jobsite safety by tracking movement to check whether they are encroaching onto unsafe conditions, says Robert Bray, senior director and general manager, Autodesk Tandem, a digital twin platform offered by

Autodesk Inc., an AGC capstone supporter, based in Mill Valley, California.

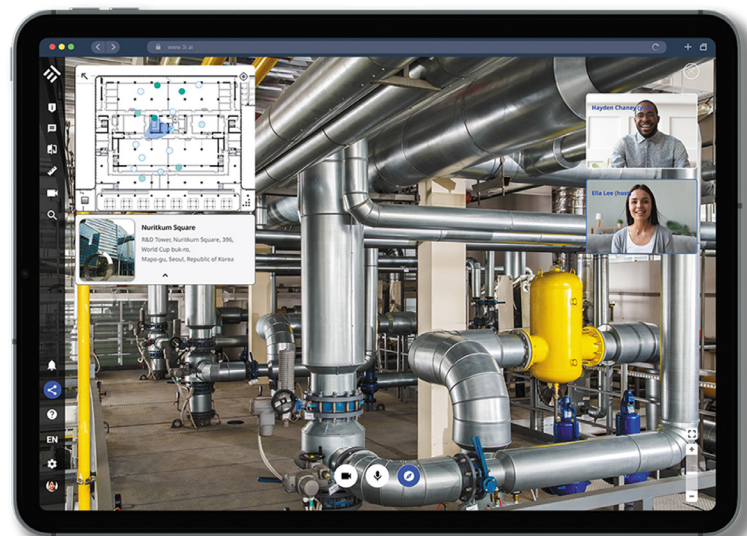
Twins are also used in the design phase, as simulation is key to understanding how different characteristics might be impacting the design, Bray says. Twins can also be beneficial to post-construction in the operations of a facility, and it can improve designs of future projects, including how to lower a facility’s carbon emissions.

“The application is very familiar, but the harder learning curve is more cultural – you really need to understand the types of data you need to get in order to get a certain set of outcomes,” he says. “It’s more about understanding the life cycle of a facility, who is contributing to that and codifying that process.”

Contractors should look to expand their business opportunities by leveraging the data within the twin platform, Bray says.

“They can deliver a digital replica of the facility to the owner, which is more valuable than a stack of analog documents on a hard drive,” he says. “Secondly, they can offer to manage the maintenance of the facility on behalf of the owner, leveraging the twin platform.”

Digital twins are going to be a “game-changer” for facility operations and maintenance – though the digital twin can start long before a facility is constructed, says Brian Melton, chief technologist at Black & Veatch in Kansas City, a member of the Kansas Contractors Association.



“A company creating a digital twin during the design phase can turn over access to the client,” Melton says. “It’s a new handover product that aggregates data, connects project artifacts and provides simplified access when compared to traditional handover consisting of thousands of disconnected electronic file formats and PDF documents. They can hand over the digital twin like they’re handing over the keys to the car so the client can start driving.”

Digital twins that include a modern BIM approach are going to provide a new way to connect design and construction data to facility operations, he says. One of the best features of an intelligent 3D model is its ability to visualize complex information in a simplified way.

“Imagine using the spatial 3D model to visualize performance data and maintenance records for assets within a facility,” Melton says. “This will provide the operators and maintenance resources at a facility a new way to collaborate and communicate.”

Clients are being inundated with new types of design and construction data, such as electronic BIM files, and they’re left wondering how to use that information once it’s delivered, he says. Often resources within the clients’ organization may not have the specialized software required to work with these types of files or don’t have training on these applications to leverage the data in the most effective way. A digital twin with a modern BIM approach can help simplify the access to this information via a simple web browser, not requiring specialized software or much formal training.

A digital twin is beneficial when there are a limited number of experts who can physically travel to every site – utilizing a digital twin allows them to do their work remotely and collaborate better with onsite and remote staff, says Naresh Parshotam, head of Beamo for 3i, headquartered in Seoul, South Korea. Parshotam is based in the firm’s San Jose office.

“Capturing the image in the field is easy – our tripods are custom-designed and can be set up in two minutes,” Parshotam says. “Alternatively, workers can place the camera on their helmet and walk around the jobsite, cameras can be placed on cranes, or some companies utilize robot dogs, especially to climb up and down uneven terrain. Our solution automatically stitches together all the images around the jobsite so that the

digital twin is enterprise ready in minutes.”


Digital twin technology can be used to remotely inspect the completion of punch lists, whether the work is being completed on schedule and, if necessary, determining whether work in one trade needs to be rescheduled because another trade may be delayed, and it even provides side-by-side comparisons to monitor work progress, he says.

“With current tools, inspectors or on-site managers are taking 2D pictures, uploading them, and sharing them in spreadsheets or documents,” Parshotam says. “But the problem is that they are capturing selective pictures that miss the surrounding details, whereas a 3D digital twin provides a holistic, contextual picture that is critical in understanding the surroundings that a 2D picture cannot provide.”

Beamo’s solution is “very simple and intuitive” to use in a browser and even a smartphone or a tablet, he says. Companies can also securely share digital twins through password-protected links to captures, as well as just portions of information, which significantly improves collaboration with off-site workers or other companies.

Raghi Iyengar, president of ViZZ and Manufacton in Boston, says that digital twin technology provides a centralized informational hub and real-time connectivity, “empowering teams to manage and update building plans more intelligently.” The technology effectively stores files and information in a simulated environment for quick analysis across teams, “offering genuine value for today’s market.”

“Digital twin technology that exists in an easy-to-use software will far outperform other collaborative tools currently being used in the industry,” Iyengar says. “With the AI and simulation capabilities of some digital twin technologies, design and construction teams are effectively armed with data, insights and visibility that makes it simple to collaborate and make decisions based on easily accessible insights.”

“This technology allows the industry to treat buildings as products instead of one-time projects, better equipping teams to make construction projects faster, cheaper, better and greener,” he says. 



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## About the Article

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