

Five Digital Twin Examples Show Industry Adapting to the 21st Century

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SPENDING ON DIGITAL TWIN SOLUTIONS IS SET TO REACH \$89 BILLION BY 2028. THESE FIVE DIGITAL TWIN EXAMPLES EXPLAIN WHY.

How do you manage, maintain, or make repairs to systems when they aren't within easy reach? It's a problem that's bedeviled engineers for nearly a century. Now, technology has an answer: the digital twin.

As the name suggests, digital twins are virtual representations of physical assets—a living, breathing replica of a complex system, product, or built structure created by integrating models made in the design process with data from embedded real-world sensors and systems. More than just a model, a digital twin mirrors the actual performance of the real thing in real time.

The result bridges the physical and digital, illuminating how a component, a space, or even a whole portfolio of properties is performing. With a digital twin, you can not only see when a building's escalator has jammed but also know exactly which component might need to be replaced, map the best alternate route for occupants, and predict whether a redesign might be necessary. The level of insights range from how individual products function under different stresses to how entire distributed systems interoperate.

Five Ways Digital Twins Are Changing the World



During the pandemic, remote working, building closures, and social distancing have turned the ability to monitor and manage systems from afar into a sort of superpower. At the same time, digital twin technology has also become more user-friendly and accessible. It's no wonder that a study by Grand View Research predicts spending on digital-twin solutions will reach \$89 billion by 2028, pushed onward by a compound annual growth rate of 42.7%.

These five great examples show that 2020 was probably the start of the digital twin decade.

1. PROTECTING CITIES FROM FLASH FLOODS

When climate change triggers "once a century" extreme weather every season, what should cities do? Legacy municipal water infrastructure isn't equipped to handle a steady onslaught of downpours and blizzards. Replacing old water plants, tanks, reservoirs, and pipes takes years—even decades.



At [Veolia Water Technologies](#), digital twins are helping to create new ways to prepare cities for the unexpected. Together with predictive analytics, they're helping to improve flood modeling, make drainage design more sustainable, and optimize resources. This enables water utilities to improve how they manage the municipal water estate. They can optimize current resources while building new plants with resilient wastewater measures and weather defenses in mind.

2. SOLVING HONG KONG'S NEW AIRPORT PUZZLE

To prepare for future demand and strengthen its status as a global aviation center, Hong Kong airport is in the midst of a major overhaul. But adding space and runway capacity to an airport isn't exactly straightforward. You can't just shut down terminals or ask people to wait while you make preparations and start the build. The complexities of the project have made BIM (Building Information Modeling) essential for the



engineers at project lead [Leighton Asia](#), enabling each phase to progress on schedule with minimal disruption to normal airport operations.

Now, the team intends to transform its work into a full-fledged digital twin—including real-time performance data—once the project is built. It's an innovation that has resulted in a mindset shift within the project team: Members now think of the information they collect onsite as data that can be analyzed and then used to assess the feasibility of their work, even after the airport has been constructed.



3. MAKING DEMOLITION WASTE INTO CONSTRUCTION MATERIAL

Taking old building materials and recycling them for reuse can be an expensive and time-consuming process. The construction industry has made impressive strides in recycling building materials like steel, but transforming the rest of what's left over from an old building into something useful is a lot harder. Even a small building contains a cornucopia of components and materials. Extracting them and deciding which can be reused is a big job. Listing and measuring everything is only the beginning. Each bit has to be assessed for things such as toxicity and carbon dioxide footprint. Sometimes, straight disposal is the only option.

Such a big job makes it hard for architects and construction firms to turn green ambitions into reality. Now, a new service from Sweden's [White Arkitekter](#) is using BIM data to help the

industry leap an important hurdle on the way to the circular economy. The company's ReCapture service catalogs building components and assesses their reuse potential using drones and laser scanning, which can then facilitate the development of a digital twin.

4. PRODUCING PAPER SUSTAINABLY


Using digital tools to make more paper may seem counterintuitive, but for household items such as paper towels and toilet paper, it's the only way to go. At the start of the pandemic, a mix of panic buying and the need to keep surfaces wiped down pushed paper production into overdrive. For paper manufacturers and the machinery companies that kit out their factories, digital twins have become an essential tool in meeting the surging demand for household paper products.

At specialist machinery manufacturer [ANDRITZ](#), digital twins enable the company to create better production-line machines that optimize the paper production process, conserving resources and anticipating production and supply-chain issues before they occur.



5. MANAGING SWITZERLAND'S TALLEST BUILDING

The [Roche](#) pharmaceuticals company headquarters dominates the skyline of Basel, Switzerland. Its triangular twin towers feature a tapering "staircase" design and reach 584 and 673 feet into the sky, respectively. Tower 1 is already open, and Tower 2 is scheduled to open its doors in May 2022. Throughout the project, digital models have been a vital tool for collaboration, linking the client, architect, general contractor, construction companies, and other contractors around a single source of detailed project information.

The architects and engineers at Swiss firm [Herzog & de Meuron](#) found it easier to win over all the projects stakeholders to new ideas and suggestions thanks to the ability to give everyone a virtual tour of the building's digital model, even during construction. Once construction is complete, the building's digital twin can be used for tasks such as predictive maintenance. The elevators are equipped with sensors, so if the system notices an irregularity, it initiates a test. The live data in the virtual model can also be used to monitor energy and drinking-water consumption. 



About the Author

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About the Article

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Photo Captions/Credits:

Photo 1 - Digital twins are virtual representations of physical assets—a living, breathing replica of a complex system, product, or built structure.

Photo 2 - Digital twins are helping Veolia Water Technologies improve flood modeling.

Photo 3 - An evening view of Hong Kong International Airport.

Photo 4 - Rendering of a White Arkitekter project in Germany. The firm used its new ReCapture service on the project to better assess material reuse potential. Courtesy of White Arkitekter.

Photo 5 - A fully automated ANDRITZ tissue production line for high-quality paper. Courtesy of Dániel Végel.

Photo 6 - Once Roche Tower 2 is built, its digital twin could be used for tasks such as predictive maintenance. Courtesy of Beat Ernst.

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