



Bootcamps in Greece with Augmented Reality Technologies

SYLLABUS: What is 3D digital twin technology



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1 What is 3D digital twin technology

Digital twins are an exceptional way of capturing and sharing spaces in immersive 3D and can move the needle across many industry use cases.

1.1 How to create a digital twin

From cameras to capabilities, discover everything you need to begin capturing, editing, and sharing in 3D.

1.1.1 Capture your space

Digital twins can be created with a variety of cameras, including the phone in your pocket. From there, compatible 360 cameras deliver smoother, more accurate results, followed by the Leica BLK360 or Matterport Pro Series for advanced precision and scanning capabilities of both indoor and outdoor spaces. Alternately, our certified capture technicians are available in 700+ cities to capture and deliver your digital twin within 48 hours of booking.

1.1.2 Edit and document

Matterport digital twins allow for easy and accurate documentation with measurements, tags, notes, and customizable tours. Editing tools such as blur and trim allow you to adjust for clarity and security. Plus, Matterport integrates seamlessly with existing software—from SketchUp to Revit, AutoCAD, and other BIM software—without the need for time-consuming conversions.

1.1.3 Share and collaborate

Easily shareable across real estate and travel sites, digital twins are an essential promotional tool for driving increases in leasing, sales, and bookings. For operational use cases such as facilities management, digital twins eliminate the need for unnecessary travel, allowing teams to

collaborate and coordinate more efficiently without ever having to set foot on site.

1.2 Why use a digital twin?

Digital twins are an exceptional way of capturing and sharing spaces in immersive 3D and can move the needle across many industries use cases. With the launch of the Matterport mobile app, we welcomed many new members to the Matterport community and into a world where immersive 3D spaces can be created by anyone, anywhere—simply using the phone they own.

Industry 4.0: How Digital Twin Tech is Changing Industrial Production. See the different applications and benefits of digital twins in the digital transformation of factories and Industry 4.0.

1.3 Five benefits of digital twins for real estate & how to make them

Learn how to create digital twins for your residential and commercial real estate properties to amplify your marketing efforts and shorten the sales cycle.

Digital Twins in Construction: Benefits, Challenges & Tips. Understand the benefits of using digital twins in construction projects, from increasing efficiencies to giving stakeholders more insight into progress and milestones.

1.4 Bringing digital twins to life with Cortex AI

At the heart of Matterport's digital twin software is Cortex AI, a deep learning neural network that automates many of the 3D customization steps.



1.4.1 Powering precision

Trained in millions of real-world spaces, Matterport's Cortex AI takes all the visual and spatial data captured from your scan and turns it into an incredibly accurate and immersive 3D digital twin.

1.4.2 Simplicity through automation

Cortex AI automates many steps in the model creation process, including blurring faces as needed, choosing the best images from your scans, creating accurate measurements, and identifying different objects.

Once you've finished scanning, Cortex AI allows you to sit back and wait for your completed 3D model to be rendered.

1.5 3D digital twin technology FAQs

1.5.1 What is a Space?

A Space is a digital twin (3D model) of any real-world building or property. You can scan any property from a single bedroom apartment to a football stadium and upload it to the Matterport platform to create a dimensionally accurate digital twin of the property.

1.5.2 What is the difference between an Active and Archived Space?

An Active Space is the fully immersive 3D digital twin or model of a physical space or property you can view, edit, publish, and share.

Each of our Plans allows for a certain number of Active Spaces.

Active Spaces that you no longer need can be archived. Archived Spaces do not count towards your Plan's Active Space Limit. You cannot view, edit, share or transfer an Archived Space. You can archive an Active Space and reactivate or unarchive a Space at any time.

1.5.3 What happens when I reach my Active Space Limit?

You can continue using your existing Active Spaces when you reach your Active Space Limit (ASL). All administrators will receive an email that they are at the Active Space Limit (ASL) for their account. They'll also see a notification in the UI inside their Matterport

You can continue to scan as much as you want with the Matterport App and your smartphone or tablet. However, any new Spaces you upload to your account will be in a pending state, which means they can't be viewed, transferred, or restored to the Matterport app. To resolve the issue, you have two options:

- (1) Upgrade to a subscription with more Active Spaces. Your Active Space Limit will increase immediately.
- (2) Archive or delete existing Spaces until you are below the limit.

1.5.4 What can I do with a Matterport Free Subscription?

The Free Plan is the best way to try out and learn more about the Matterport platform. The Free Plan gives you 1 Active Space, 2 users, and access to extensive editing tools. You can capture with any supported 360 camera or with your iOS or Android device.

1.5.5 Learn more about - Matterport for Mobile

You can create and edit 3D models of any Space, take accurate measurements, add tags, label objects and rooms, and get auto generated content (instant gallery, video clips, and guided tour highlights). You can share Spaces captured using a smartphone with others and on Matterport Discover.

2 Software Development

2.1 Unlock the full potential of digital twins

Access and try our developer tools by creating a free Matterport account and generating keys and tokens in your account settings.

2.1.1 SDKs

<https://matterport.github.io/showcase-sdk/>

2.1.2 APIs

Access tools that customize and enhance existing capabilities. Integrate with web applications, execute actions to control Showcase (WebGL 3D player), and more.

Save time by integrating Matterport into your every-day workflows and systems. Access, modify, and take control of data by connecting to back-end dataset.

<https://api.matterport.com/model/docs/reference>

2.1.3 Experiment with Labs

Matterport Labs is our place for rapidly prototyping new ideas. It is a playground for our developers to share and explore the possibilities of our platform

<https://labs.matterport.com/#/>

3 Industry 4.0: Guide to Smart Manufacturing with Digital Twin Technology

In manufacturing, safety and consistency are always top focus. From machinery performance to factory floor workflow, teams are always looking for ways to [optimize their manufacturing process](#) and improve efficiency.

The use of digital twin technology offers massive advantages to teams in the manufacturing sector looking to take the performance and safety of their operators to the next level. As photorealistic models of the plant or site, digital twins are a crucial resource that can help streamline the training, asset tracking, and space planning in the manufacturing process.

In this article, we'll explore how the versatile functionality of these [3D models](#) is helping teams overcome challenges and drive value in the manufacturing industry.

3.1 What is a digital twin in manufacturing?

In manufacturing, a digital twin is a virtual replica of a physical product, machine, or workspace. It uses data from sensors and IoT devices to match the real-world object's state and behavior. The digital twin model helps simulate, analyze, and improve the physical counterpart. It also allows for training, planning, and virtual tours without the risks or interruptions associated with the physical environment.

Digital twins are utilized in manufacturing throughout the entire product lifecycle, from new product design and prototyping to production, operation, and maintenance. These immersive digital representations offer real-time views of manufacturing spaces that facilitate informed decision-making and improve production processes.

3.2 Industry 4.0: How digital twins and smart technology are transforming manufacturing

At the dawn of the 19th century, steam power and mechanization led to the first industrial revolution. Two centuries later, we find ourselves in the midst of Industry 4.0 — a digital transformation that integrates digital twin modeling, [augmented reality](#), the Internet of Things (IoT), and machine learning to enhance manufacturing productivity and automation of many key processes.

According to a 2022 survey from tech advisory firm ISG, 69% of respondents from the manufacturing sector say they have smart technology initiatives in place. And nearly two-thirds of respondents say that they're embracing smart manufacturing in hopes of reducing costs.

With Matterport, teams have access to a visual digital twin that models a physical space at one moment in time. But when integrated with IoT sensors, your digital twins can go to the next level, offering real-time data and powerful insights into your manufacturing operations. Together, these cutting-edge technologies help companies optimize safety and automate manufacturing processes.

3.3 Five examples of how digital twins are used in manufacturing

Digital twins are helping the [manufacturing industry](#) work faster and smarter. Digital twins can also help optimize factory floor configurations, decrease downtime, and give you a deeper understanding of the physical assets that you manage. Here are the top five [examples of digital twin](#) benefits in manufacturing:

- Immersive, low-risk training
- Dimensionally accurate [space planning](#)

- Intuitively locating maintenance and repair documentation
- Global site visits and inspections without travel
- Welcoming tours and guests virtually

3.3.1 New hire training

- **Challenge:** Hiring new operators and getting them trained up for safe, proactive work is a big investment. Training in a classroom can lack the contextual relevance of some safety or skills material, while training on-site at a factory or plant floor can limit opportunities to ask questions or review areas due to active operations and noise.
- **Solution:** Digital twins enable operators to immersively explore and experience their new work environment, without any physical risk or potential disruption to operations. They can navigate the virtual representation and complete linked [AR training](#) information while gaining a deeper understanding of the physical environment in which they'll apply their skills.

3.3.2 Space planning

- **Challenge:** As new machinery, workflow changes, and other operational needs shift space use, planning your changes with basic [floor plans](#), schematics, and photos can leave opportunity for error or miscommunication.
- **Solution:** With a dimensionally accurate, photorealistic view of your manufacturing facility, it's easier than ever to map out the placement of assets, building projects, and compliance with crucial [OSHA](#) regulations like smoke detectors, fire extinguishers, and AEDs to ensure a safe workplace. Digital twins enable collaboration with links and tags for other users to document and view the information they need to help make decisions.

3.3.3 Maintenance and repairs

- **Challenge:** You never know when a machine is going to break down. An unexpected repair can slow your process down and lead to a loss in revenue.
- **Solution:** Linking asset repair detail, manuals, and other needed documentation directly to each asset in your digital twin makes locating and planning repair swift and intuitive for anyone to locate. Digital twins integrated with IoT-connected devices can offer predictive maintenance insights on top of the physical context — so you can clearly scope and plan repairs.

3.3.4 Remote site visits

- **Challenge:** In the global footprint of many organizations, knowledge transfer across locations is key. But it can be hard to ensure teams are communicating efficiently and with up-to-date information.
- **Solution:** Sending a digital twin of the factory floor to key stakeholders provides alignment across your organization. And instead of costly travel, and carrying around paperwork or photos, decision-makers can simply use their mobile devices to view virtual models of a production line and the full context of the space around it.

3.3.5 Tours and guests

- **Challenge:** You want to welcome the folks who are engaged and invested in your operations. However, balancing on-site visits and walkthroughs with the potential distraction, disruption, and risk is important.
- **Solution:** With an immersive [3D digital twin](#), guests, and service providers can experience the virtual environment on any device,

including [using VR](#), without ever actually entering the facility. This creates a true-to-life experience for them, without the need to plan for visitors in the production area.

3.4 Create digital twins to streamline manufacturing processes with Matterport

Teams across the manufacturing sector are turning to Matterport to help them create dimensionally accurate 3D digital twins. Here are a few ways Matterport is helping manufacturing companies transform outcomes:

- **CRB is a versatile facilities management firm that [worked with Matterport](#) to create [3D scans](#) of manufacturing spaces.** Being able to offer these photorealistic models to clients reduced site visits by one-third and sped up the project planning process by as much as three weeks.
- **The facilities management consultants at JFC & Associates [partnered with Matterport](#) to give their clients photorealistic models of their assets.** With greater asset visibility, their clients were able to improve decision-making and situational awareness.
- **Electronics product manufacturer SEACOMP [joined forces with Matterport](#) to scan digital twins of their offices and offer clients [virtual walkthroughs](#).** This enhancement effort reduced travel costs by \$250,000 per year while also improving the quality of workplace training.
- **UK-based water utilities firm Northumbrian Water [partnered with Matterport](#) to integrate digital scans into their existing [building information modeling \(BIM\) system](#).** They managed to bring 3D assets into a 2D legacy platform, reducing site visits and enabling more [informed asset management](#).

[Contact us](#) to learn more about how Matterport's all-in-one platform can facilitate the [digital transformation of your manufacturing processes](#) and turn the space into immersive digital twin models.

Want to learn more? [Discover](#) how teams are already using Matterport to work smarter and faster. And [take a tour](#) through the exciting world of digital twins to understand how this immersive digital technology is powering smart manufacturing.

3.5 Digital twin in manufacturing FAQs

3.5.1 What is the correlation between digital twins and AI?

Digital twins and [artificial intelligence \(AI\)](#) are closely related technologies that often work hand-in-hand to enhance various industries, including manufacturing. Digital twins provide a rich source of real-world data, while AI leverages this data to drive visualizations, insights, predictions, and automation. The integration of these technologies leads to more intelligent and efficient manufacturing processes, higher product quality, and modern operations.

3.5.2 Which industries use digital twins?

Besides manufacturing, digital twin technology is used in residential and commercial real estate, AEC (architecture, engineering, and construction), healthcare, entertainment, and tourism, as well as retail.

3.5.3 How do digital twins drive value for the manufacturing industry?

Digital twins drive value in the manufacturing industry by enabling more opportunities for different stakeholders to collaborate virtually. Some examples use cases for digital twins in manufacturing include:

- optimizing factory floor configurations with dimensionally accurate space planning



- decreasing downtime with virtual site visits and inspections
- providing comprehensive documentation of physical assets

4 Benefits of digital twins for real estate

Over the past few decades, the competitive world of real estate has undergone a digital transformation. Real estate professionals are leveraging technology to find clients, nurture relationships, and close deals. Digital twins, or virtual 3D models of physical space, are one of the more cutting-edge tools being used to amplify property marketing and shorten the sales cycle.

In this article, we'll explore the many use cases for digital twins in real estate, as well as the benefits they offer. Then we'll show you how to get started with digital twins in just a few steps — so that you too can reap the rewards of 3D virtual models.

4.1 What is a digital twin for real estate?

A [digital twin](#) is an immersive 3D model of a physical space. Across residential and commercial real estate, teams are making the most of easy-to-use [digital twin features](#) to streamline lead generation, collaborate smoothly, and work more efficiently. All-in-one platforms like Matterport have made it easier than ever to get started creating your own digital twins for property marketing.

Digital twin technology has found a natural home in the real estate industry. Residential agents are using virtual models to promote listings and more easily find motivated buyers. Meanwhile, [digital twins for commercial real estate](#) are helping firms digitally scan their entire global portfolio of properties, facilitating best practices on both property marketing and management sides of the business.

4.2 What can a digital twin tell you about a property?

Digital twins are changing how real estate agents showcase properties, enabling prospective buyers or lessees to view spaces anywhere, at any time. For instance, if a property is inaccessible due to construction or



remote location, real estate agents simply share a link to a digital twin to let clients explore the space from the comfort of their own home.

In fact, digital twins enable prospects to explore properties on an even deeper level, revealing details that might not be evident during a quick in-person tour. Here are a few of the things digital twins can tell you about space:

4.2.1 Interior and exterior layout

With a digital scan of the entire space or property, you can zoom out to [Dollhouse View](#) to see how all the rooms are arranged, then zoom in to take a virtual walkthrough of the space. You might rotate 360 degrees to take in the whole room, then use arrows to navigate down the hall and into the rest of the built environment. The listing agent can embed notes and tags throughout the virtual model, giving you deeper insights into appliance brands, room occupancies, or amenities. You can also [measure](#) walls or anything inside a digital twin with just a few clicks.

4.2.2 Heating, ventilation & HVAC

Heating and ventilation systems are complex to diagnose and maintain. Due to this, downtime can also be costly. That's why digital twins help you get a deeper view of a property's HVAC system. Digital twins also integrate with internet of things (IoT) sensors and other smart building tech to send you essential data about system performance — and even alert you when a system needs repairs.

4.2.3 Accessibility

Brokers and clients may want to evaluate accessibility of a property for sale or lease, be it commercial or residential real estate. Virtual replicas help realtors show prospects how they might navigate a space while using a wheelchair. You can also study the property for ramp access and elevators to make sure it's ADA-compliant.

4.2.4 Energy efficiency

Sustainability is top of mind for buyers and lessees in the real estate industry. Integrating your digital scans with sensor data can deliver you important metrics about energy consumption and greenhouse gas (GHG) emissions of a building. Advanced integrations help you even run simulations to see how certain renovations and upgrades could impact a property's carbon footprint.

4.2.5 Future plans

In the development space, agents and brokers are typically working with spaces that are still under construction. Matterport digital twins allow for insight into all stages of the development lifecycle by creating [BIM files](#) that can then be integrated with external modeling software to show you architects' design models at any stage of the collaboration process and keep stakeholders updated on progress.

4.3 Six benefits of digital twins for real estate

From brokers to property managers, many real estate stakeholders use digital twins in real estate to [market and manage properties](#). Here are six key benefits of embracing digital twins in real estate:

4.3.1 Improve customer experience

Buying or leasing a property is always a big investment to consider, whether it is for residential or commercial purposes. Fortunately, [digital twins improve the property buying and leasing experience](#) by giving you a resource that prospects can return to at any time. Think of it as a [24/7 virtual open house](#). Missed the pattern on the kitchen backsplash? Just click the link to the [virtual tour](#) your agent sent you and you'll be right back in that kitchen, zooming in on details.

4.3.2 Reduce operating costs

Sellers and brokerage firms can spend thousands of dollars staging properties. [Recent data](#) shows that the typical cost of staging a 2,000-square-foot space is \$2,000-\$4,000 a month. With virtual staging capabilities that come with a digital twin, you can reduce costs associated with physical staging and spend less time and money arranging multiple open houses. Because digital twins provide 24/7 virtual tour access and deep levels of detail about the space, they can also help you sell or lease your property more quickly, while reducing travel costs to and from the site — which means fewer resources being poured into drawn-out sales and leasing cycles.

4.3.3 Easily promote properties

Digital twins can accelerate the real estate sales process if included in your residential and [commercial marketing mix](#). Instead of spending time and resources on repeated open houses or in-person walkthroughs, sellers use digital twins to promote their properties in an immersive, user-friendly way. According to data from Matterport, buyers are 95% more likely to call about properties that have a virtual tour. This is because prospects can get the info they need from a digital twin without interacting with a broker. Equipped with this information, prospects will be more likely to buy or lease a property when they do call for more information.

4.3.4 Gather valuable data to operate and optimize your property

As a photorealistic, virtual representation of a real-world physical space, digital twins offer a wealth of visual and spatial data. Real estate investors and facilities managers appreciate having this “living record” of a property — when integrated with smart building technology, digital twins can monitor data across the property lifecycle and offer useful real-time data and notifications about predictive maintenance.



4.3.5 Streamline property operations

Digital twins simplify key property operations tasks in commercial real estate. With Matterport, operations professionals have 24/7 remote access to spaces, which means they no longer need to make repeated trips to take measurements, manage inventory, and conduct inspections. Digital twins also act as an immersive 24/7 virtual training space, where employees can learn [logistics and how to navigate complex facilities](#).

4.3.6 Align key decision-makers

It takes a village to sell or lease a property. Throughout the process, you need clear communication channels between buyers, sellers, brokers, building owners, construction teams, facility management professionals, and so on. For a major property deal, it's useful to have a digital twin as a central source of truth throughout the process and the ability to collaborate virtually with notes.

4.4 How to create digital twins for real estate

Ready to take your real estate workflow to the next level? There are two ways that you can easily do this depending on the scale of your property:

- Hire a professional scanning service
- Do-it-yourself using 360 cameras

4.4.1 Hire a professional service

[Matterport Capture Services](#) can create scans for you. Our highly trained Certified Technicians can help you [build and launch digital twins](#) in as fast as 48 hours — so that you can spend less time scanning and more time marketing or managing your property.

Capture Services is available in hundreds of cities around the world and designed for teams of all sizes. No property is too large or complex for our

experts, who have years of experience helping teams get up and running with digital twin technology.

4.4.2 Create digital twins using cameras

1. **Choose a camera:** Matterport offers a diverse array of 360 [cameras](#) to scan your space. It's also easy to create a [virtual tour](#) with just the phone in your pocket.

2. **Choose a tripod and mount your camera.** Matterport can work with [many different types of tripods](#) — just note that your tripod must be able to support up to 11 pounds. Matterport's Axis motorized tripod is designed to fit your smartphone and help you work with speed and precision.

3. **Prepare the area you want to scan.** Remember you're making a first impression to potential buyers or lessees, so make sure the space looks clean and ready to show off. An important point to note is that the scanning process happens in one take. This is why it is key to have everything in place before starting!

4. **Put yourself in the visitor's shoes for a minute.** How would you navigate the space? Get a sense of the path one might take through a room and plan your scan accordingly. For instance, you might decide ahead of time you're going to walk through the foyer into the main hallway of your apartment listing, then move into the kitchen for a [full scan of the room](#).

5. **Connect your camera to your mobile device.** Your camera will need to communicate with the Matterport Capture App as you scan. On your mobile device, go to Settings > Wifi and look for the camera's serial number as a network option. Once there's a blue checkmark next to your camera's serial number, your devices are communicating and you can now start scanning.

6. **Scan the room:** Using the path you determined in step 4, place your camera in the first position and start scanning, ensuring you have proper



alignment as you go. (Keep in mind: If you're scanning through doorways, do two scans: one just outside the doorway and one just inside the doorway. Doorways call for careful scanning from different vantage points in order to capture a seamless view).

4.5 What next?

Once your scans are complete, you can have 24/7 access to digital twins of your properties. Sharing your digital twins with teammates and customers is simple. With just a few clicks, you can:

- [Invite team members to view and edit your model](#)
- [Create a URL of your model and share it with the public](#)
- [Share your space on social media](#)

After your scan is uploaded, you can add enriching detail through notes and measurements. With guided tours and tags, you can turn your scans into rich customer experiences. Then [edit and blur elements within your digital twin](#) as needed to protect privacy and make it customer-ready.

4.6 What we do for our customers

Teams across the real estate industry are realizing the power of Matterport's easy-to-use all-in-one platform, packed with [forward-thinking features](#). Here are a few examples of Matterport's virtual models in action:

- **Commercial real estate giant Cushman and Wakefield [partnered with Matterport](#) to create digital scans of over 1,000 properties in the span of just a year.** With useful digital scans at their disposal, they were able to enhance customer service and yield cost savings.
- **International real estate agency ERA Singapore [partnered with Matterport](#) to streamline the creation of 3D virtual property tours.** Thanks to the partnership, this leading proptech firm helped agents extend their reach and connect with clients faster.

- **Australian real estate company Little Hinges [worked with Matterport](#) to become Australia’s largest virtual property tour provider.** Thanks to this innovative digital twin technology, their firm sped up time-to-lease by 50% and drove 20% month-over-month growth.

Want to learn more about how digital twins can transform your real estate business? [Contact us today](#) to see how creating 3D virtual models can help you rise to the top in this competitive industry.

4.7 Digital twin for real estate FAQs

4.7.1 What is a digital twin of a property?

A digital twin is a photorealistic, immersive virtual representation of a physical space, through which viewers can navigate as if they were visiting the property in person. Teams can create digital twins using 3D cameras, then quickly edit and share them.

4.7.2 What is an example of a digital twin in real estate?

In real estate, teams have found a variety of valuable use cases for digital twins. Most notably, they’re using digital twins to create 3D virtual tours, which allow potential buyers and lessees to experience a space on an immersive level.

4.7.3 How is a digital twin different from a 3D model of a property?

Digital twins are like 3D models, but more interactive and detailed. Digital twins are photorealistic and leverage notes, tags, and measurements to lend viewers additional insight into space. Digital twins can also integrate with IoT sensors to give you real-time data about a property.

5 Benefits, Use Cases & Best Practices for Using Digital Twins in the Construction Industry

The use of digital twin technology – which creates a digital representation of the physical world – is becoming a key differentiator for firms in the [AEC industry](#). In the wake of the COVID-19 lockdown, contractors face increasing demand for new facilities with sophisticated designs to accommodate retrofit requirements supporting a hybrid workforce. Digital twins can help throughout the planning, budget, design, and construction phases.

Construction is a complex sector with a variety of different stakeholders, including architects, engineers, contractors, building owners, [owner's representatives](#) and municipalities. *Digital twins enable all of these groups to manage and share data, breaking down silos and improving data-driven decision-making across physical and departmental divides.* Indeed, [Forrester Research reports](#) that 55% of global software technology decision-makers are already adopting digital twins, applying them to everything from design to maintenance.

5.1 What is a digital twin in construction?

[Digital twins](#) in construction refer to interactive virtual representations of physical buildings or infrastructure projects. These virtual replicas are created using advanced simulation models and integrate real-time data from various sources, such as sensors, BIM models, and other IoT devices. As such, digital twins provide insights into the construction process, improve decision-making, and optimize performance throughout the project's lifecycle.

Digital twins are virtual models that give project teams immersive access to critical building intelligence in real time, which allows them to realize benefits in several key areas:

- Faster and easier collaboration among project stakeholders
- Increased productivity
- More efficient workflows between contractors and trades
- Reduction of issues and RFI's

By [incorporating digital twins into the BIM \(Building Information Modelling\) process, contractors and AE firms](#) can address many of the most pressing challenges in the industry, including low productivity, profitability, performance, and high error and accident rates. *Digital twins in construction can also help firms reduce their virtual design and construction costs and, potentially, win more bids.*

5.2 How digital twins work

Digital twins are created using a range of technologies, including 3D laser scanners, sensors, cameras, and other [Internet-of-things \(IoT\)](#) devices. There are three main stages involved in creating a digital twin for a construction project:

5.2.1 Capture

First, digital twins can be **captured** with a variety of digital cameras, including the phone in your pocket. Using the Matterport app on your mobile device is an easy and affordable way to get started. Alternatively, you could use a number of compatible [360 pano-cameras](#) to generate digital twins. And for jobs that require absolute precision, the [Matterport Pro Series camera](#) offers advanced scanning capabilities for both indoor and outdoor spaces.

5.2.2 Edit, document, and tag building assets

Use **editing** tools such as Blur and Tim to *adjust your digital twin for clarity and security purposes*. This enables easy and accurate visualizations of physical spaces, with measurements and customizable areas.



Next, MatterTags and notes can be placed on the model to fortify real-time data associated with specific assets that would be valuable in a handover package to an owner. For example, MSDS, warranty, and install PDFs can be uploaded and attached to a note placed on an air handler or other mechanical systems.

5.2.3 Share and collaborate

You can **share** digital twin models with remote teams and offices, reducing the need for in-person site visits, cutting down on travel expenses, and supporting more environmentally friendly business practices in AEC. This also allows far-flung teams to collaborate and coordinate more efficiently with accessible technology.

5.3 Seven benefits of digital twins in construction

Offering a high degree of interoperability and automation, digital twins have the potential to revolutionize several aspects of the construction business. We will cover a few of the main benefits of digital twins in construction in this section.

5.3.1 Improved construction resource management

The use of digital twins can improve the procurement process and ease supply chain holdups, *fostering harmonization between the current progress and future deliverables and helping construction firms better allocate resources and physical assets.*

5.3.2 Easier communication with stakeholders

With Matterport software, project managers can export point cloud, OBJ files, high-resolution [floor plans](#), and reflective ceiling plan views into 3ds Max, ReCap, Revit, and many others. This means stakeholders at every stage of the construction process can stay up-to-date on the latest advancements and red-flag any immediate concerns.

5.3.3 Better informed decision-making and planning

Digital twins are a *proactive* planning tool, allowing clients or building owners to provide feedback before the jackhammering begins or the sheetrock is installed. Engineers can also perform more extensive assessments for items like duct locations and utility placements, while architects can anticipate aesthetic concerns, such as paint color or lighting layouts. The use of digital twins in construction empowers the improvement of design risk assessments and condition surveys, effectively enabling collaborators to shift away from PDF reports and photos by providing an immersive view to more effectively understand site conditions and potential issues.

5.3.4 Automated construction progress monitoring

Documenting progress is critical for any new construction project, and digital twins provide a way for managers to keep tabs on projects from afar. General contractors and building owners require documentation to verify construction is progressing in line with standards and according to design. [Good documentation](#) also reduces errors and the need for re-work. Comprehensive progress monitoring helps facilitate a successful end-of-project handoff from the construction team to [facilities management](#).

5.3.5 More accurate assumptions and predictions

Managers can get faster and more accurate subcontractor estimates by eliminating the need for site visits while still providing a comprehensive overview of the built environment. They can also create virtual punch lists by annotating the [3D model](#) with notes, links, photos, and videos.

5.3.6 Easier construction safety monitoring

[Remote virtual inspections](#) allow project managers to oversee safety procedures better. Also, *digital twins enrich construction documentation with accurate, virtual measurements of hard-to-reach or dangerous*

environments, meaning employees don't have to take unnecessary risks while on-site.

5.3.7 Robust handover deliverables for owners

Contractors who are using Matterport to collect existing conditions throughout the progress of a project and are then fortifying the model with embedded data tied to [MEP systems](#)—provide their owners with a digital handover package that allows them to manage the building on day 1.

5.4 Challenges of creating a digital twin for construction projects

To effectively deploy digital twins, some construction firms might have to overcome long-standing challenges in the industry. In this section, we will talk about the main challenges to be mindful of when implementing digital twins in construction.

5.4.1 Lack of contractual awareness

Understanding the nuances of a contract is a fundamental aspect of any construction project, and the incorporation of new technology, like digital twins, can significantly alter the process. But by keeping a record of the project's scope and the client's key drivers, *digital twins can aid in ensuring the requirements of a building contract are upheld and understood by all parties.*

5.4.2 Lack of data understanding

Many construction firms experience challenges when trying to harness data effectively. They struggle with a lack of capabilities to derive insights, employ disparate data management systems between IT and OT, and cannot access data in real time or on tight deadlines. One of Matterport's advantages is its easy integration with other data streams.

5.4.3 The move to BIM

Even now, many construction firms use 2D design technology for critical building projects. Leveraging a BIM model tied to a virtual design and construction process requires more complex 3D modeling technology and new skill sets within a firm.

5.4.4 No structure or defined SOPs

Some construction projects lack processes around data exchange and issue resolution, which makes the introduction of digital twins another hurdle for stakeholders to overcome. *But by creating a single source of truth, digital twins make sure everyone – from contractors to inspectors to clients – is on the same page throughout a project’s lifecycle.*

5.4.5 Financial limitations

With so many budgetary demands to juggle, construction firms may be initially reluctant to spend on digital transformation. But the substantial cost savings as a result of reducing re-work, increasing effective collaboration, and minimizing travel expenses more than justify the investment.

5.5 Digital twin examples in construction

Many prominent architecture and construction firms have used digital twins to fundamentally change the way they approach projects. Here are a few stories from leading construction companies about how they realized the benefits of digital twins to improve their workflows.

5.5.1 Corgan realizes construction ROI with Matterport 3D Digital Twin of LAX

When Corgan – a leading architecture and design firm – began working on a \$1.6B [construction project at the Los Angeles International Airport \(LAX\)](#), managers integrated digital twin technology into the construction workflow to *optimize performance and productivity.*

Using the [Matterport Pro2 camera](#), Corgan documented key milestones, created virtual punch lists, and shared 3D [digital twins](#) with owners, contractors, and facility managers.

Digital twin technology also helped Corgan overcome one of the largest challenges in the design phase of a new construction project: *capturing the existing site conditions*. The initial stage of the LAX project was a utility tunnel spanning 18,000 square feet. Corgan completed 50 scans in about an hour, and project teams have reduced that time by 50% since then using Matterport's fast capture capability.

5.5.2 Takenaka uses Matterport Digital Twins for remote inspections and effective collaboration

In 2017, Takenaka Corporation became one of the [first Japanese firms to adopt Matterport's digital twin technology](#) in the construction industry. By capturing digital twins of construction and mechanical, electrical, and plumbing (MEP) projects throughout a building lifecycle, *project teams are able to collaborate more effectively at every stage of the construction process*.



Initially, Takenaka used conventional 3D laser scanners to capture spaces digitally. However, this digitalization required a lot of processing time for

scanned data. It also required engineers to conduct site surveys and capture these costly scans. With Matterport's digital twin technology, Takenaka was able to streamline the project management process in several ways:

- Reducing the time to produce 360-degree photographs by 90%
- Saving thousands of dollars per scan by eliminating the need to use expensive laser scanners
- Cutting travel and labor costs through remote surveying and inspections

5.5.3 Swinerton uses Matterport Digital Twins to keep projects moving forward

During the COVID-19 lockdown, Swinerton – a San Francisco-based construction firm – had to ensure construction progress remained transparent to clients, even as social distancing limited access to physical assets and construction sites.

Using the Matterport Pro2 camera, [Swinerton produced](#) highly detailed 3D scans of a 20,000-square-foot space in a few hours. *The scans were sent to clients, architects, engineers, and sub-consultants who could virtually navigate the space and suggest changes in real time.* The use of digital twins enabled Swinerton to keep projects on track in a variety of ways:

- Reducing client travel time by 100 percent
- Cutting MEP and architect travel time by 50 percent
- Eliminating four weeks of potential project delays
- Saving clients thousands of dollars by preventing costly errors and re-work

5.6 Four tips for implementing digital twin technology in the next project

Looking for the most bang for your buck from digital twins in construction? Here are a few tips to get started:

5.6.1 Familiarize yourself with rules and regulations

Before using digital twins on a construction site, firms need to ensure they're being *compliant with local laws and regulations*. However, digital twins should allow contractors to accelerate the approval and permitting process, and generate testable plans more quickly.

5.6.2 Invest in new staff training programs

Historically, the construction industry has been slow to adopt new technology. It may be necessary for firms to *introduce new training programs to reskill workers in the knowledge* they'll need to get the most out of digital twins. Special sessions on cybersecurity may also be required for employees tasked with safeguarding proprietary information.

5.6.3 Build a digital twin architectural roadmap

Having a strategic blueprint in place that outlines how digital twins will help achieve the project's aims is a good way to make sure all stakeholders are on the same page. These architectural roadmaps can serve as a reference point throughout the project lifecycle, helping teams stay on task and align on goals.

5.6.4 Integrate relevant technologies

Matterport digital twins integrate seamlessly with existing programs such as SketchUp, Revit, AutoCAD, and other commonly used design software BIM. Construction managers can export their point cloud and easily share it within Revit or other BIM tools, and they can generate OBJ files and point clouds for as-builts and construction documentation.

5.7 Matterport helps you build a solid base for the next construction project

[Matterport's 3D data platform](#) is a powerful and effective way to document and collaborate on the construction process of a physical building or property. With a compatible camera, you can create a digital model of small or large spaces with a level of detail that is close to being *actually* on-site. These models are delivered in a navigable, photo-realistic view that uses patented computer vision and artificial intelligence technologies known as [Cortex AI](#).

The Matterport digital twin platform also lets you export additional file formats into other third-party software into other platforms easily, saving you significant amounts of manual work and time.

With Matterport, you can:

- Document and communicate key milestones quickly and effectively
- Eliminate travel time by sharing and annotating in the model
- Perform remote quality checks, measure while off-site, and reduce in-person visits by capturing all data the first time

Check out Matterport's website for more info

For more information on how a digital twin can help streamline your projects, improve documentation and collaboration, and reduce design and construction costs, visit Matterport's website: <https://matterport.com/industries/architects-engineering-construction>

5.8 Digital twins in construction FAQs

5.8.1 How are construction businesses using digital twin technology?

Construction firms use digital twins to reduce their footprint on job sites, enhance safety and monitoring procedures, speed up workflow processes, increase automation, improve asset management, and give stakeholders the information they need to empower effective documentation and collaboration on a project.

5.8.2 How do you get started using a digital twin solution for a construction project?

You can introduce digital twin creation at any point in your construction project, even if it's already begun or nearly complete, to make the remaining stages more efficient. For any property of any size, [Matterport Capture Service](#) professionals are ready to create digital twins for you in 700+ cities around the world. After your appointment, your digital twins will be ready for you to start using in as fast as 24-48 hours.

5.8.3 What is the future potential of digital twins in the construction industry?

The future of digital twins in construction is promising. Advancements in technologies like [Artificial Intelligence](#), machine learning, and increased connectivity will further enhance the capabilities of digital twins, making them even more integral to the construction and management of infrastructure projects.

6 What is a Digital Twin & How This Technology Benefits Your Business

Ask a book lover why they read, and you might hear the famous George R.R. Martin quote: “A reader lives a thousand lives before he dies. The man who never reads lives only one.” Stories have the power to capture countless experiences and bring them to life in a single mind.

Now, imagine if you could capture not just stories, but the full scope of physical processes, systems, and structures—not just one, but hundreds—all at once and at scale.

That’s the promise of digital twin technology. It creates virtual replicas of real-world operations, letting us observe, analyze, and optimize them in ways that were once impossible. Yet, despite its potential, the concept of digital twins is still widely unknown to many.

So, let’s break down what digital twins are and explore how they can drive value for businesses across all industries.

6.1 What is a digital twin?

In simple terms, a digital twin is an accurate, virtual replica of a physical object, space, system, person, or process from the real world. It’s meant to help companies simulate, test, validate, and maintain different behaviors or results and, in turn, make (present and future) decisions more confidently—without the physical costs or risks involved.

6.2 The history—and story—behind digital twins

The idea of a “digital twin” [emerged in 2002](#) when Dr. Michael Grieves, now known as the father of digital twins, introduced it at the University of Michigan as part of his vision for product lifecycle management (PLM).

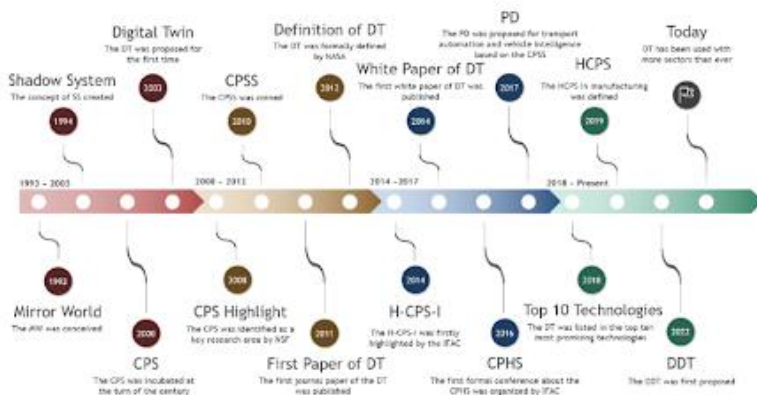
His model outlined a real-world system with a virtual counterpart, creating a “twin” relationship between them. This design allowed information to

flow both ways, so every physical system had a digital mirror or reflection that held all its details—essentially, a twin in virtual space.

Grieves designed his model to track and manage a product’s entire lifecycle. And at each stage, the digital twin facilitated data exchange, meaning insights from the real world constantly informed the virtual model and vice versa.

Initially, he referred to this as the "mirrored spaces model" and later the "information mirroring model." However, in 2011, the term “digital twin” took hold, mostly because of the emphasis on the twin-like connection between physical and virtual spaces.

But Grieves wasn’t the only one to think along these lines.



History of digital twin technology Source: [Tennessee Technological University](https://www.tennessee.edu/technology/digital-twin/)

In 1991, [David Gelernter introduced a similar idea](#) called “mirror worlds,” where software models mimic reality using data from the physical world.

And decades earlier, [NASA had actually used](#) a twin model to help save Apollo 13. After an oxygen tank exploded early in the 1970 mission, engineers on Earth needed a way to solve the life-threatening issues faced

by astronauts nearly 200,000 miles away. They used a “living model” of the spacecraft to simulate solutions, ultimately turning a dire situation into one of history’s most famous rescue missions.

That said, Grieves’ model laid the groundwork for linking physical systems with digital simulations in real time.

Today, digital twins are a cornerstone in product lifecycle management and beyond, helping industries like real estate, architecture, engineering, and construction (AEC), manufacturing, transportation, aerospace, healthcare, and more.

6.3 What are the different types of digital twins?

Even after decades of innovation, [there isn’t a single universal definition of digital twins](#). Across fields—whether healthcare, supply chains, or manufacturing—digital twins typically adapt to meet the unique demands of each industry.

In short, the “type” of digital twin depends on the use case or application.

For instance, in manufacturing, digital twins are often used to track a product’s lifecycle, from design and production to maintenance. And in healthcare, digital twins might function as “digital patients” that monitor health and model treatment outcomes.

Similarly, a digital twin in warehousing may be used to boost transparency and analyze processes or even in production to monitor equipment and ensure quality. However, despite these differences, digital twins share common features, like real-time updates and continuous data flow between the physical and digital versions.

To keep things simple, we’ll turn to [McKinsey](#), which states digital twins come in four main types:

6.3.1 Product twins

A **product twin** digitally represents a product throughout its lifecycle with real-time data—from the initial design and engineering phases to when it’s in use. This means you get an active view of a product’s status like it’s right in front of you. For example, [Tesla uses digital twins](#) of their cars to test performance in real time, predict maintenance needs, and even troubleshoot issues remotely.

6.3.2 Infrastructure twins

Infrastructure twins model whole systems of connected assets—like a city’s transportation network, utility grids, airports, or even smart cities. Typically, they integrate data from multiple sources to give you a detailed view of infrastructure performance, which makes it easier to identify areas for improvement and optimize operations.

6.3.3 Data twins

Data twins are digital models that replicate real-world data streams to give you live insights instantly. These models continuously pull data from sources like sensors or databases to mirror specific conditions or activities.

For example, think of your weather app as a data twin; it’s a digital replica of atmospheric conditions, as it pulls in real-time data from satellites and ground stations to provide accurate forecasts.

6.4 Digital twins for the as-built world

Digital twins for the as-built world significantly advance how we capture, model, and use information about physical structures and infrastructure.

Specifically, an as-built digital twin is a digital replica of a physical asset that shows its actual and current state at any point that it is captured—not just the original design or blueprint. It reflects the real-world condition of an asset as it stands today.



There are a few notable factors that define digital twins for the as-built world:

- They are super accurate virtual representations, i.e., they record exact visual details like dimensions, materials, and other features that often differ from the original plans.
- They can integrate data from various sources, including sensors, cameras, and other digital tools, to create a comprehensive virtual model.
- Unlike traditional as-built drawings, as-built digital twins are captured and recaptured to reflect any changes to the asset over time, much like updated street scans by Google Earth.

6.5 Where Matterport comes in

At Matterport, we're experts in digital twins for the as-built world.

Our digital twins offer an accurate [3D model](#) of your asset or space with all its internal components—giving you a powerful way to document and manage real-world processes.

With a compatible camera, you can create high-detail digital models of spaces, whether it's a single office or a large construction site, that feels almost as if you're on-site. These photo-realistic, fully navigable models are powered by our patented [Cortex AI](#), which combines computer vision with artificial intelligence to capture spaces with clarity and accuracy.

And our models are used across industries—be it [real estate](#), [construction](#), [manufacturing](#), [travel](#) and [hospitality](#), [insurance](#), or [government](#).

For instance, real estate teams see the value of our all-in-one platform across both residential and commercial properties. Residential agents use digital twins to showcase listings and attract motivated buyers. On the other hand, commercial real estate firms lean on our models to scan their

entire portfolios to optimize property marketing and asset management processes.

Put simply, our digital twin technology makes it easier than ever to collaborate, generate leads, cut costs, and work more efficiently.

6.5.1 Systems twins

Systems twins represent the interactions between physical and digital processes. These help manage things like warehouse operations or optimize supply chains by capturing the interplay of each part of the system. [Amazon uses digital twin technology](#) to improve its warehouse operations.

6.6 What are the benefits of digital twins for the built world?

As we've covered, digital twins have endless applications, some of which are still being discovered. So far, the built world has seen significant gains from our models.

Below, we've covered some of the benefits:

6.6.1 Give a photorealistic virtual tour of any space

Our digital twin can be used to give anyone a true-to-life virtual walk-through of any space. For instance, in real estate or other industries, clients can explore a property or location in detail from anywhere —without ever stepping inside.

Take [Jones Lang LaSalle](#) (JLL), a global leader in commercial real estate, for instance. When COVID-19 hit, in-person property tours came to a halt, and JLL needed a way to keep deals moving remotely. Our digital twin technology helped them switch to virtual tours, cutting the need for physical visits.



And the results spoke for themselves: **JLL sped up transaction times by 85%, saw zero-touch deals, plus saved on costs and CO2 emissions with fewer site visits.**

6.6.2 Make remote collaboration easier for everyone

With digital twins, it's much simpler for teams to work together no matter where they are, even if it's across countries. Whether you're in real estate, construction, or facilities management, your team can access the same up-to-date model, add comments, and point out areas that need attention. For example, [ID Plans](#), a leader in commercial real estate services, needed a better way to document properties and keep property management and leasing teams aligned. With our digital twins, it was easy for stakeholders to access a shared, interactive model for planning and inspection.

It was clear early on that Matterport is the best technology to produce digital twins and fully immersive 3D virtual tours," says CPO of ID Plans, Jordan Hearin. "In evaluating the best technology, we went through a series of complicated projects and unique scenarios, and Matterport did a fantastic job."

And this didn't just speed up leasing and sales; it also improved communication across teams and shortened project planning timelines by up to 30%.

6.6.3 Boost cost-efficiency on projects

With digital twins, you can keep projects on track and stick to the budget by planning—and pivoting—more thoughtfully.

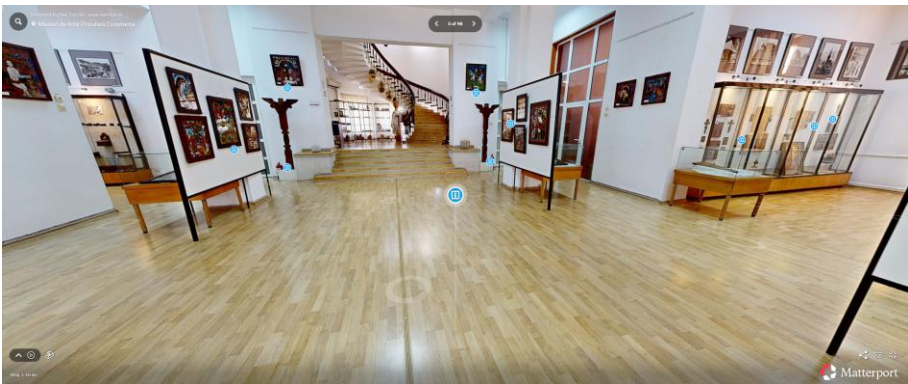
This means you can catch design or construction issues in AEC early and reduce rework. Similarly, real estate teams that manage renovations can optimize resources and avoid unexpected extra costs. Put simply, you can work smarter with the information right at hand.

Case in point: When [Cushman & Wakefield](#) needed a better way to list and rent commercial properties across their huge global portfolio, they turned

to our digital twins. With [Matterport Capture Services](#), they digitized over 1,000 properties across 21 countries—all in less than 12 months. As a result, they 53% in costs by reducing travel and speeding up the time it took to get properties on the market.

6.6.4 Preserve historical or heritage buildings carefully

Digital twins are particularly useful when it comes to preserving heritage buildings—they capture the property in startlingly accurate detail, preserving finishes, architectural, and structural details exactly as they are.



The Museum of Folk Art ([Muzeul de Artă Populară](#)), Romani

Essentially, this works as a digital record and gives conservators a reliable way to test their restoration ideas virtually, i.e., explore potential impacts *without* physically altering the actual structure.

Plus, digital twins can layer in historical data, documenting past changes and restorations. Together, these features create a rich, interactive record of the building's full history and evolution, all in one place.

6.7 The *bright* future of digital twins

The potential of digital twins in the built world is just starting to unfold.



The way we see it, as this technology evolves, its use will extend beyond individual buildings to encompass entire cities and industrial networks. And with real-time data from internet of things (IoT) sensors, AI analytics, and machine learning, this technology can—and will—deliver insights into everything from performance optimization to predictive maintenance.

Most importantly, as digital twins become more accessible and widely adopted, it could reshape urban environments to be smarter, more sustainable, and resilient for the future.

7 What Is Digital Twin & BIM? Use Cases Explained

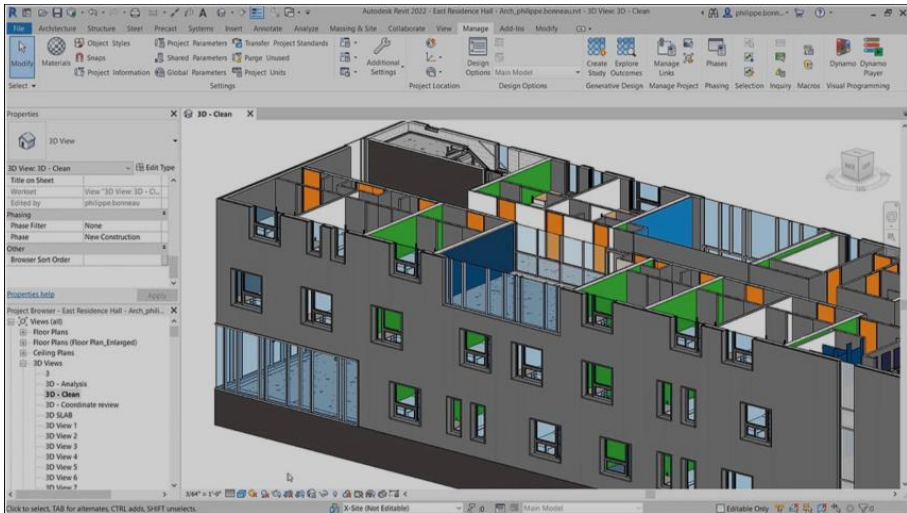
7.1 Learn how digital twins help construction and design teams work even smarter and faster

For decades now, building information modeling (BIM) has been a valuable process for construction and design teams. 3D models are digital representations of physical space, which are helpful for planning and executing building projects. In recent years, digital twins — which are immersive 3D models of physical space (based on the as-built conditions)— have emerged to help teams work even smarter and faster.

While similar on the surface, BIM models and digital twins have some key differences. As we'll explore in this article, these are two complementary technologies that can help architecture, engineering, and construction (AEC) teams across the building lifecycle — from initial planning to quality control in AEC and ongoing facilities management. Even in manufacturing, digital twin technology is breaking ground. Already Matterport is helping brands integrate the BIM process and digital twins to reshape the world of a smart building.

7.2 What is building information modeling (BIM)?

Building information modeling (BIM) is the holistic process of creating, optimizing, and managing information for a built asset from schematic design through operations. Central to the BIM process is the use of 3D models represented by the core disciplines of architectural, structural, civil/infrastructure, mechanical, electrical, and plumbing trades. These 3D models from tools like Revit, Navisworks, and Tekla are used in a wide range of industries with many different use cases but are especially central to architecture, engineering, and construction industry workflows.



Tools like Revit create dimensionally accurate detail that can be aligned to construction project coordinates to give stakeholders a central source of truth throughout the building's life cycle. This enables more structured and streamlined project management practices from the design phase to the construction phase and onto operations.

While 3D Modeling tools have been around since the mid-2000s, the technology continues to evolve. The latest versions of the software leverage [artificial intelligence](#) to automatically create more functional data models that can integrate with the Internet of Things (IoT) devices to expose even broader application opportunities.

7.3 What is digital twin technology?

Digital twins are virtual replicas of real-world physical assets. Digital twin technology offers immersive, photorealistic 3D exploration of space that empowers collaboration between different stakeholders. This data-driven process helps teams monitor physical objects, make informed decisions, and create more efficient workflows.



Thanks to a diverse range of [digital twins use cases](#), they are powering a digital transformation in a wide range of industries, such as construction, manufacturing, real estate, retail, and many more. They're even powering smart cities and helping teams solve urgent supply chain difficulties. As machine learning and automation continue to strengthen digital models, this powerful technology should help even more teams navigate the project lifecycle.

7.4 What is the difference between digital twins and BIM?

Both digital twins and BIM models are digital representations of physical spaces. The main difference between the two is that BIM 3D models are used for visualizing the design and construction of an asset, while a digital twin enables virtual interaction with that asset.

More precisely, the key differences to keep in mind when talking about digital twins and BIM:

- BIM models created in software like Revit represent the design intent of a building, helping to visualize the desired physical

characteristics and dependencies. By themselves, the 3D models tied to a BIM process do not automatically track and represent the as-built changes over time.

- Digital twins offer a photorealistic virtual rendering of physical space and can be scanned again and again over time to track how that space might change. This helps teams track milestones and gain a deep understanding of a project's life cycle.
- Digital twins integrate with IoT sensors and other digital solutions. As you use these technologies to access real-time data about your building system, digital twins act as a visual replica that accurately captures that system's physical characteristics.

Put simply, BIM modeling software can help you design and construct a building, while digital twin technology can help you maintain and operate that building. For instance, you might use BIM modeling software to plan out where you will place a building's HVAC system. Once you've built that, you'll then use digital twins to monitor the HVAC system's function over its life cycle.

7.5 Using digital twin and BIM across the project lifecycle

Architecture, engineering, and construction teams need a clear understanding of the built environment as they tackle major projects. Here's how teams can [use digital twin and BIM software](#) to power better decision-making and collaboration across the project lifecycle:

7.5.1 Building and designing with BIM

- **Planning:** In the planning phase of a project, conceptual design software gives teams a virtual space to brainstorm, sketch out provisional ideas, and share these ideas with teammates.

- **Design:** If a building's structure or dimensions need to be changed, BIM 3D models make it easy to edit building designs and solve important engineering problems.
- **Execution:** Once it comes time to break ground on a new building, BIM 3D models give teams an overview of its constructibility. The model is a handy resource as they work to turn their virtual model into a built reality.

7.5.2 Managing and operating with digital twins

- **Model:** [Digital twins of construction processes](#) can serve as a model of your ongoing progress. As more benchmarks are completed, digital twins are updated via either recurring scans of the space or documentation like digital notes and tags so that teams always have a deep understanding of the project.
- **Simulate:** Whether you're using a professional-grade camera or the phone in your pocket, digital twins give you a photorealistic rendering of your physical space. Sharing these immersive digital twins with stakeholders can help them simulate what it might be like to move through that space.
- **Manage:** With a clear view of your building, digital twins make it easy to keep up with ongoing facility management. And thanks to immersive BIM 3D models, you can virtually "visit" a space, which cuts down on costly and time-intensive site visits.

7.6 Benefits of digital twin and BIM integration

Even on their own, digital technology and 3D design software are powerful tools for teams that are designing and managing physical spaces. But when you bring them together, you can unlock powerful end-to-end control across the project life cycle. Integrating digital twin models and BIM models helps you.

- Cut down on the time it takes to gather measurements and allocate resources,
- Quickly integrate digital scans into your company's existing toolbelt,
- Operate from one central source of information — which boosts productivity, alignment, and collaboration,
- Reduce the travel costs and lag time that comes with frequent on-site visits,
- Have a visualization of your building not just at the planning phase *but across its whole lifecycle.*

7.7 Integrating BIM and digital twins with Matterport

Smart building requires technology that is packed with real-time dynamic insights. Digital twins can be that link that brings real-time data to your BIM project— helping you work faster and smarter. Here are a few examples that explain how Matterport can help you integrate digital twins with popular 3D design software:

- [**Integrate with Autodesk BIM 360:**](#) San Francisco construction firm Swinerton [integrated their BIM 360 software with digital twins from Matterport](#) to give clients a chance to virtually walk through in-progress buildings. During the walkthrough, clients could flag areas that needed a second look or annotate as needed. These virtual tours improved collaboration and minimized travel costs.
- [**Harness the power of Matterport BIM files:**](#) Canadian engineering firm HH Angus [used BIM files in Matterport](#) to give their team a shared space for collaboration during a complex mechanical engineering project. They used a digital replica to take measurements, annotate, and share progress with the client.

- **[Place Matterport 3D models right into Autodesk Recap and Revit:](#)** London-based architecture firm Arup [integrated Matterport BIM files with their existing Revit software](#) to speed up the planning phase for their projects. This easy integration enabled them to skip the lengthy data-gathering process and create a 3D model with the click of a button.
- **[Import models from Matterport directly into AutoCAD:](#)** KUOP Design needed a way to easily visualize their complex multi-story architectural projects. Owner David Kuoppomaki [brought digital twins into AutoCAD](#) to speed up the drafting process. With detailed, dimensionally accurate digital models, he was able to cut down on-site visits in the drafting phase of a project.

7.8 Digital Twins vs. BIM FAQs

7.8.1 How does BIM data fit into your digital twin?

Digital twins can help bring your static BIM data to life. A 3D model that you were using during the construction phase of a project can be scanned again as frequently as needed to track progress (e.g., weekly or even daily) to keep your team informed across the project's life cycle.

7.8.2 Is a digital twin a 3D model?

A digital twin is an immersive, photorealistic 3D model of a physical asset. Digital twins can be captured quickly using even the phone in your pocket — and can then be edited and shared with your team to improve decision-making and collaboration.

7.8.3 Why is BIM needed in the AEC industry?

Designing and constructing a building is a complex process with a variety of stakeholders. Leveraging BIM methodologies and 3D models gives you valuable visual data about a building's requirements that span from design to construction and onto the operations phase. Leveraging data in this



format is invaluable to disparate teams as they collaborate and work together on a project.

8 How to Create a Digital Twin of a Building (+ Tool to Build Accurate Virtual Replicas)

Digital twin technology is finding powerful use cases across industries. In the manufacturing and AEC (architecture, engineering, and construction) sectors, [digital twins of buildings](#) give teams a deeper understanding of their physical space across its lifecycle — from initial designs to construction progress, then ongoing use and maintenance.

In this article, we'll explore how teams can get started creating digital twins — and how [a trusted partner like Matterport](#) can simplify the process. With Matterport in their corner, teams across AEC and manufacturing industries are empowered to capture, edit and share photorealistic [3D scans of AEC projects](#) and collaborate using these virtual replicas of their properties.



8.1 What is a digital twin of a building?

A digital twin of a building is an immersive 3D virtual replica of a physical property. At the most basic step, Matterport digital twins are generated from photos by AI to render dimensionally accurate, navigable virtual



models. The term digital twin is very broad though, and can also refer to highly integrated IoT and systems data that offer real-time and even predictive modeling based on the information plumbed into them.

Examples include sensor data like temperature or moisture, RFID data like employee foot traffic and badge entry, and geolocation tracking of vehicles or supplies. Ideally, the two are used in harmony so that the people running businesses and making decisions can see the integrated system information they need, in the context of the physical space it's measuring to make well-informed and fast decisions.

Digital twin technology has found applications in a variety of industries and use cases. From real estate to facilities management, [digital twins in manufacturing](#) and businesses of all shapes and sizes are unlocking the power of virtual 3D models, keeping them informed across the building lifecycle.

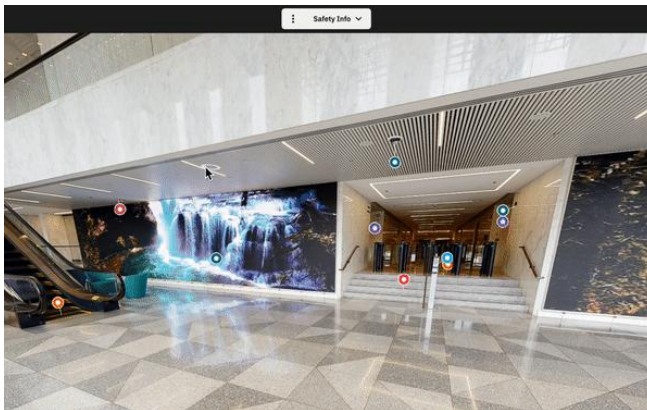
But capturing the built environment is particularly useful for AEC and manufacturing teams who want to quickly understand and communicate spatial information, often at factories or job sites across the state or country. Fortunately, platforms like Matterport make it easy to create your initial digital twins.

8.2 Benefits of creating a digital twin

The future of smart building starts with 3D digital twins. Whether you're looking to install a new HVAC system or update your building to align with new sustainability standards, digital twins that integrate the visual space with live system data give your team the immersive, photorealistic view needed to improve collaboration and decision-making.

Here are a few benefits that manufacturing and AEC teams will enjoy when they embrace the power of the visual digital twin before system integration is even included.

- **Streamlined project management:** Teams are able to get started with projects faster and complete them on a faster timeline and meet projected milestones with help from a shareable, dimensionally accurate, digitized model of their physical environment.
- **Reduced site visits:** With a 3D digital replica of your building on hand, you won't need to frequently visit your property to keep up with construction project progress or space planning.
- **Easier communication with clients or operators:** Digital twins promote connectivity between project stakeholders and speed up Manufacturing workforce training and communication. For instance, if you want to show your client the latest milestone in your renovation project, all you have to do is send them a recently created digital twin of the updated property. Industrial operators can access a digital twin on their manufacturing floor tablet for immediate reference about an area.
- **Increased sustainability:** Energy efficiency isn't just good for the planet — it's also cost-effective. Digital twins enable property and project tours without the need for travel or commutes.



8.3 How to build digital twins in 3 steps

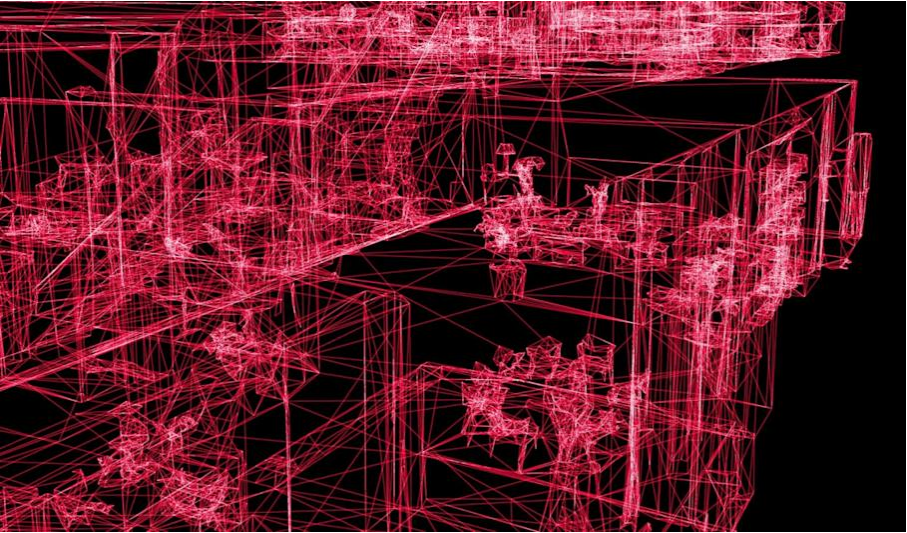
Building a digital twin involves creating a virtual replica of a physical object or system, connected through real-time data streams. It is commonly done in 3 steps:

- Define the purpose and scope of the digital twin and gather real-world data from IoT sensors and devices. To do so, choose the appropriate modeling approach and use simulation and analytics to replicate the behavior of the physical entity.
- Implement real-time data integration to keep the digital twin synchronized with its counterpart. Create a user interface for visualization and interaction, ensuring security and privacy measures are in place to protect the data.
- Continuously improve and update the digital twin as the physical system evolves, and explore integration possibilities with other relevant systems to enhance its capabilities.

9 Bringing digital twins to life with Cortex AI

9.1 Simplifying 3D capture with Cortex AI

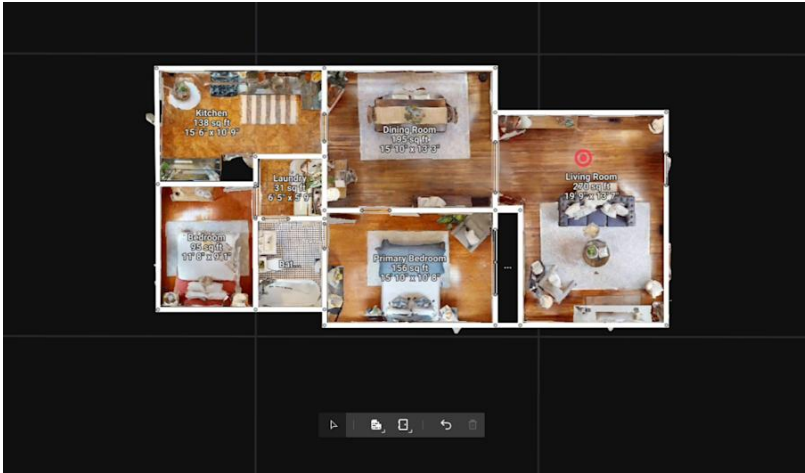
More than a decade ago, Matterport made it easy for anyone to create a 3D digital twin for buildings and spaces. Our industry-first solution, Cortex AI, is powered by AI and fully automated, allowing us to create thousands of digital twins daily without human intervention. The technology behind Cortex combines computer vision, advanced image processing, and deep learning neural network to create 3D spatial data from a wide variety of capture devices. Cortex's dynamic 3D reconstruction is facilitated by ground truth data and real-time spatial alignment algorithms in the Matterport [Capture App](#), enabling the dimensionally-accurate production of 3D environments. Optimized against Matterport's vast spatial data library, this allows for consistent results across varying spaces and environments. Advanced image processing ensures professional-grade image quality, handling adjustments such as color correction, high dynamic range tone mapping, and more. This makes the 3D capture process as straightforward as pressing a button, allowing users to capture virtually any environment with ease. And with the power of computer vision, Cortex can automatically calculate measurements, create 2D high-definition photos, enforce privacy protection, recognize objects, and so much more.



9.2 Property Intelligence, powerful data on demand

Tens of billions of square feet have been digitally captured with Matterport. By turning buildings and spaces into digital twins, Matterport unlocks [unparalleled property insights for companies and individuals](#) to better design, build, promote, and manage their most valuable assets. It all begins with automation—the most powerful and direct way to save you time and money. Matterport Property Intelligence is a new collection of AI-powered features, representing years of advancements in data science to automatically surface detailed information about a property— from automatically calculating square footage of a space, to determining ceiling height and wall dimensions— all data of which is exportable to MLS systems and other analytics and data-enabled software platforms and services. The depth and variety of our spatial data library reflects our cutting-edge technology and widespread adoption across industries, making it a valuable resource across various sectors, including real estate, architecture, engineering, construction, facility management, and more.

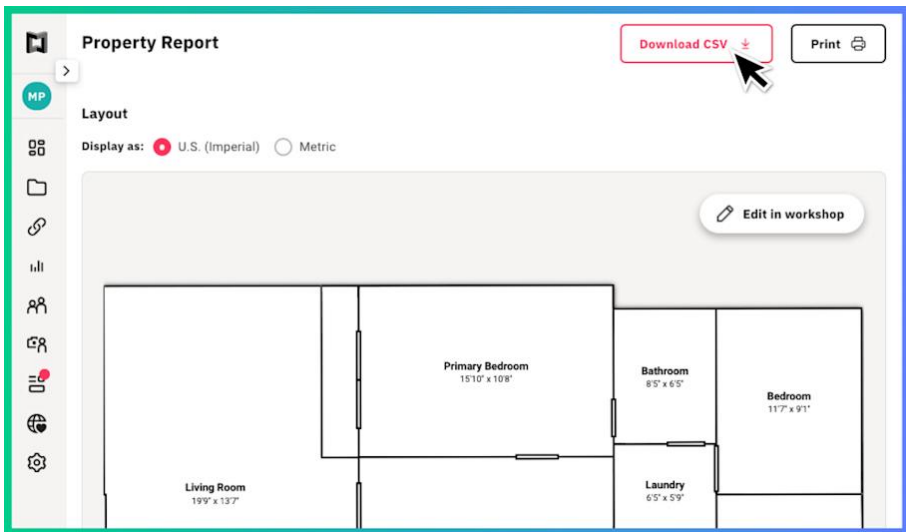
From spatial computing, to the metaverse, to redesigning your living room, Matterport digital twins are the best way to manage and reimagine any physical space. [Log into your Matterport account today](#) to experience the power of Property Intelligence today.



9.3 The future of digital twins, from insights to generative AI

As the industry's leading digital twin platform for the built world, we continue to make our platform smarter to make it easier for our customers to quickly get vital property data in their hands without the need to routinely access their physical buildings and spaces. Our technology was built with AI embedded from the start, and we continue to innovate, bringing the latest in AI-powered automation to our customers. From [automated measurement and property layouts](#) today, to [new design concepts, operational layouts, and other space planning projects](#) tomorrow, Matterport will continue to improve operating efficiency and the decision making process in the property sector. Modernize your business to save time and money. Move from pen, paper and photographs to Matterport, your fully-immersive digital copilot for all property projects. Make smarter,

faster decisions with on demand insights pulled directly from your digital twin data. Know that your data is secure and your teams are empowered to collaborate with internal and external stakeholders from anywhere in the world. Trust the data the first time, every time. From precise measurements of your space to object location and identification, rely on Matterport to complete your project with confidence. Behind every successful project is a Matterport digital twin.



9.4 Looking Towards the Future - Project Genesis

When it comes to reimagining a space, we are especially excited to talk about the future, today. Matterport has become synonymous with digitizing and documenting physical spaces exactly as they exist. Incorporating Matterport's decade of machine learning and AI experience with the power of new generative AI tools, Matterport is bringing new design and furnishing ideas to life at the click of a button through [Project Genesis](#)— starting with the ability to defurnish any space, instantly.



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Whether you want to see a space as it was without any furniture, declutter the space of non-furniture items, or erase objects one at a time—Matterport’s Project Genesis will provide several easy to use tools allowing anyone to begin reimagining spaces with the touch of a button.

Defurnishing is just the beginning, with more features incorporating generative AI across our digital twin platform coming soon to automatically enhance the design, layout, and utility of a property with Matterport. Since our inception as a pioneering spatial data company we have reinvented the virtual tour, while innovating continuously—adding countless breakthrough features, functionality, and 3D capture magic to each and every digital twin. We're thrilled to pioneer the next generation of digital twins, packed with fresh insights, automations, integrations, and plugins to help our customers market, manage, and reimagine their properties

10 Software Development Kit

10.1 Introduction

The Matterport 3D Showcase SDK is a JavaScript library for third-party developers to integrate Matterport with their web applications. Developers can deeply customize the 3D Showcase experience and build entire applications off of Matterport, enabling many exciting new use cases.

The SDK comes in a few varieties; see below for picking the one that best suits your needs.

10.2 SDK for Embeds

With this SDK, developers can

- Execute actions to control 3D Showcase from their web app. For example, the user clicks a button on a webpage and moves to a specific location in the Matterport Space.
- Listen to events from 3D Showcase and respond in their web app. For example, play a sound or voiceover when the user goes to a certain location in the Matterport Space.

[SDK for Embeds](#)

10.3 SDK Bundle

This SDK is an extension of the SDK for Embeds and provides a framework for deep third-party integration with Matterport models. You get direct access to the 3D engine, renderer, scene graph and more.

[SDK Bundle](#)

10.4 WebComponent (Beta)

The WebComponent is an isolated distribution of the SDK Bundle that encapsulates the Showcase Player within a single DOM element.



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[WebComponent](#)

Learn more about [Developer Tools and Pricing](#)