

Digitization and Connected Construction

Volume Six: Augmented and Mixed Reality in Construction —
Transforming Workflows with Trimble Connect



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Introduction

Augmented and mixed reality have become groundbreaking technologies in the architecture, engineering and construction (AEC) world. Find out how Trimble Connect products, available from BuildingPoint, are revolutionizing the industry by avoiding costly rework and change orders, enhancing communication, and making stakeholder collaboration more effective.

What is Connect AR?

Augmented Reality (AR) in the construction industry is a viewing technology. It overlays a 1:1 scale version of your building information model (BIM) onto the real-world environment using a tablet or smartphone.

Trimble's Connect AR solution replaces conventional mobile model viewing or printing out hardcopy paper plans. Onsite access to your 3D BIM streamlines AEC tasks such as pre-construction coordination, installation verification and post-construction quality assurance.



Connect AR is compatible with most iOS and Android devices. Via Trimble Connect, it also supports a wide range of common BIM formats, including Revit, IFC, SketchUp, DWG, TRB, and, of course, Tekla.

Connect AR offers a range of features that simplify construction processes. Your teams can use QR code markers on the job site to precisely calibrate your BIM for viewing. Field crews can compare models with their real-world counterparts using the software's transparency, cross section, and fishbowl views. Working with Connect AR, teams can capture and share augmented reality views to identify and discuss issues needing attention.

They can then seamlessly integrate with Trimble Connect, enabling efficient model sharing and team collaboration among project stakeholders.

Case Study – Miron Construction

Miron Construction is a leading general contractor that uses Connect AR for installation verification.

“It is easy to set up on the front end and has paid off exponentially in the field because it works like it is supposed to work,” Sam Jian, a virtual construction specialist at Miron said. By overlaying 3D models onto real world construction environments, Miron’s teams identify and address issues in real time, preventing costly mistakes.



“The intriguing thing is we can validate these processes very easily when we overlay the model,” Kacie Hokanson, another Miron virtual construction specialist explained. “We can see the pipes lined up in the model with what is actually being assembled in the field. Prior to having this tool, we didn’t have a way to convey this visually to our contractors.”

Connect AR BIM Format and Device Support

Connect AR is compatible with a range of BIM formats, including IFC (2x3), IFC ZIP, IFC XML, DWG, TRB, SKP, RVT and Tekla.

In addition, Trimble is currently beta-testing a **NavisWorks** integration incorporating the common NWC and NWD formats. Although the beta application is achieving a high success rate, Tekla can’t guarantee perfect rendering or complete properties for all NavisWorks models using the beta version. The final version will address these issues.

Connect AR operates on both iOS and Android devices, with accessibility across over 400 compatible devices. You can refer to Google’s list to verify that your preferred Android device is supported: <https://developers.google.com/ar/devices>.



Connect MR

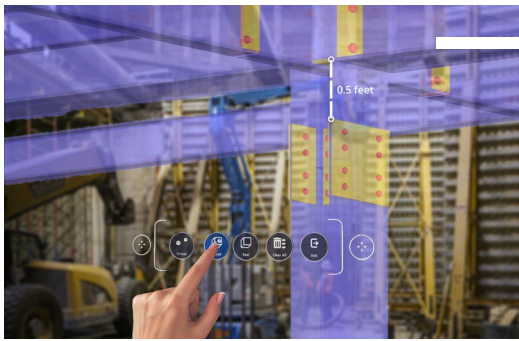
Although people sometimes use the terms Virtual Reality (VR), Augmented Reality (AR), and Mixed reality (MR) interchangeably, it’s important to understand the distinctions between them. Virtual reality involves the use of immersive headsets to present an isolated simulation for applications like training, gaming and entertainment.

Augmented Reality, like Connect AR, overlays digital information onto a view of the real-world environment using a mobile device like a smartphone or tablet. Mixed reality provides a more seamless blend of virtual and real-world elements using headset tools like the Microsoft HoloLens.

Trimble's Connect MR product goes beyond its augmented reality solutions. Connect MR merges the user's views of the digital BIM with the real-world physical environment using a headset.

Connect MR is a collaboration incorporating the Trimble XR10 safety-approved hardhat with Microsoft's HoloLens2 hardware to provide a fully immersive experience. In outdoor or brightly lit environments, Trimble's new HoloTint product improves visibility by enhancing the contrast between the environment and the holograms.

The Connect MR integration uses Trimble Connect, the standard, common data environment for all Trimble solutions.



Connect MR Solutions

The AEC industry has traditionally faced a number of barriers to implementing digital technology in the field. These have included increased project complexity, varying levels of computer proficiency onsite, coordinating diverse stakeholders, clashes, rework and lack of version control on plans and drawings.

Connect MR overlays the most up-to-date BIM version onto the HoloLens headset using a 1:1 scale. This enables field staff to identify issues more quickly and intuitively before clashes and rework become costly issues.

Making the BIM accessible onsite democratizes project data, making it accessible to workers of all backgrounds and skill levels. This improved teamwork reduces clashes and rework by enabling office staff and specialists to provide onsite crews with real time remote support.

Connect MR helps diverse project stakeholders communicate more effectively, managing everyone's expectations.

Use Cases

Architects can use Connect MR to enhance design reviews and gain stakeholder buy-in. General contractors apply Connect MR to streamline model coordination, pre-construction training, and installation verification.

Connect MR helps pre-fabricators benefit from guided assembly and remote communication. Subcontractors use Connect MR to optimize reconstruction, installation, and verification workflows.

Stakeholders at all levels can join Microsoft Teams meetings facilitated by field staff using the XR10. This promotes real-time collaboration between office staff and on-site teams. Connect MR provides seamless integration with the standard Microsoft Windows and Office environments, reducing the need for site visits.

FieldLink MR

FieldLink MR combines the visual context provided by the XR10 with the precision of Trimble's total stations. Its intuitive navigation system enhances efficiency in layout workflows, allowing users to see exactly where their points are located and intuitively navigate to them. This provides survey crews with a comprehensive view of the entire construction site, reducing training requirements and ensuring a smooth layout experience for your workforce.

Product Bundles

The **Trimble Connect AR Bundle** includes data management, model collaboration and augmented reality capabilities. It provides Trimble Connect Business and Trimble Connect AR for iOS or Android.

To take advantage of mixed reality technology, your company can opt for the **Trimble Connect AR and MR Bundle**. This is the complete package providing data management, model collaboration, augmented reality, and hands-free mixed reality. The Trimble Connect MR bundle includes Trimble Connect Business Premium, Trimble Connect AR for iOS or Android, and the XR10 headset with HoloLens.



The Trimble Difference

The fundamental advantage of Trimble's augmented and mixed reality solutions for construction is the enhanced communication and stakeholder collaboration they facilitate. Detecting clashes earlier, and addressing them in real time, avoids confusion, delay and costly rework.

Whether your business is an architectural practice, an engineering firm, a pre-fabricator, a general contractor or a sub-contractor, BuildingPoint is committed to a building information modeling process that all stakeholders can use at any phase of the design, build and operate lifecycle of any structure.

BuildingPoint Can Help

To learn more about how the Trimble Connect solutions we offer can help your business deliver construction projects more accurately, contact BuildingPoint today. Our team can help you get the most productivity and profitability out of all our BIM products—from set up to constructible solutions, training and implementation.



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