



# Arden Engineering Constructors HVAC Mechanical Systems Project

USE TRIMBLE TX6 SCANNER & REALWORKS OFFICE



Arden Engineering Constructors captures accurate as-built conditions for HVAC Mechanical Systems Project with Trimble® TX6 Scanner and RealWorks® Office

Mechanical services and HVAC contractor gains a competitive edge and improves spatial data collection speed and accuracy

## Solution

TX6 3D laser scanner  
Trimble RealWorks office software

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# profile

The family of Arden Building Companies comprises of four businesses that deliver a breadth of services in construction and design. Arden Engineering Constructors is the mechanical construction arm and it employs a skilled team of pipe fitters, engineers, and CAD/BIM designers who can take on any mechanical construction project in nearly every industry from biotech and pharmaceutical to healthcare and hospitality. The company's mechanical construction services include design, fabrication and installation of mechanical HVAC systems.



Location  
PAWTUCKET,  
Rhode Island, USA

## BUSINESS CHALLENGE:

In the mid-2000s during the economic downturn, new construction slowed substantially, and renovation-oriented projects increased. In this environment, Arden Engineering Constructors began to look for innovative alternatives to the manual collection of spatial data for adding to and refurbishing HVAC and mechanical systems. To modernize this process and better support customers, the company adopted Trimble laser scanning including Trimble's RealWorks office software for processing of point cloud data.

## SOLUTION:

TX6 3D scanner along with RealWorks office software

## RESULTS:

Almost 90% labor savings in field work – Biopharmaceutical scan took one field worker about 4 hours vs. approximately 32-man hours (2 field workers taking manual measurements for 2 days)

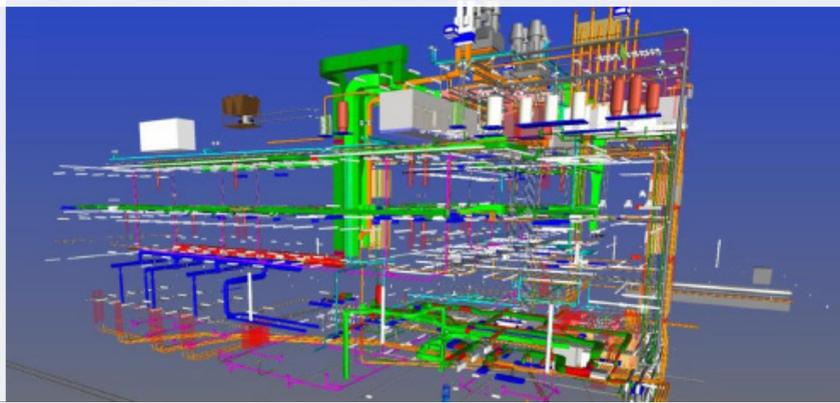
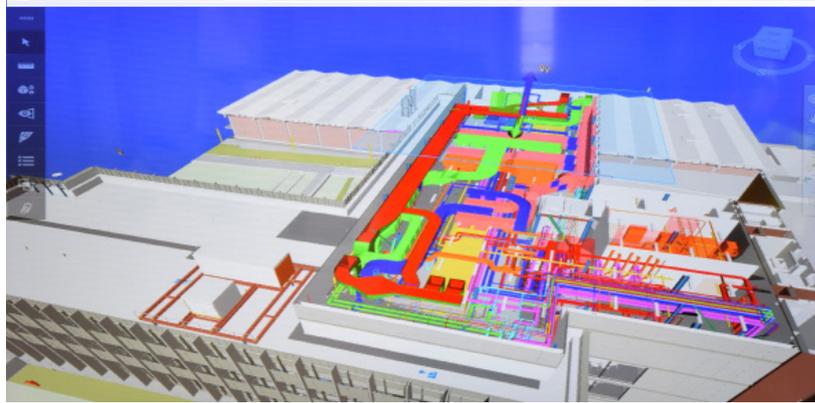
Improved scanning speed and accuracy – Each high-resolution scan took about 7 minutes- with resolutions of 80m on most surfaces and 120m with optional upgrade

Accelerated ROI – Estimated investment payback of the TX6 scanner after about 4 projects- with increased speed and accuracy of gathering as-built preconstruction data

Earning additional work phases – Created 3D pre-construction as-built data, advancing project forward and helping to earn phase 2 work for biopharma mechanical construction bid

What started in 1954 by Irwin Arden as local mechanical and general contracting company has grown today into a multi-faceted group of companies that together comprise the Arden Building Companies family. Arden Engineering Constructors is located in Pawtucket, RI and specializes in the design, installation, and maintenance of mechanical HVAC, plumbing, and electrical systems. Arden Engineering Constructors has an in-house prefabrication shop, 50 full-time office employees, and over 125 union craft personnel and recently became the largest mechanical contractor in Rhode Island.

Several years ago, Bill Cameron, BIM Manager for Arden Engineering Constructors, recalls that the company began to see a substantial uptick in the number of RFPs for Mechanical, Electrical, Plumbing (MEP), and HVAC systems renovation and retrofit jobs, as opposed to new construction projects. As a first step, typically this type of work requires getting an accurate picture of pre-construction conditions. For every pipe and duct in a HVAC system, for example, there are numerous hangers, sleeves and other components that are positioned precisely within the structure to support it. The purpose of the as-built model is to gather precise measurements for all relevant MEP elements of the building, to determine the current condition and the impact of the re-designed system. The conventional method for generating as-builts for MEP systems is to measure and record all components across the building site by hand. Looking to modernize this process, Arden Engineering Constructors began to look at 3D scanners and point cloud modeling alternatives.



## Retrofitting a biopharma medical suite

Already a loyal user of Trimble technology, including Trimble PipeDesigner 3D and SysQue® for Revit MEP, the team adopted the Trimble TX5 laser scanner and later the TX6 scanner along with RealWorks office software. They chose the Trimble TX6 3D laser scanner because it provided the speed, quality and range to make in-field data collection fast and efficient. They also opted for Trimble RealWorks office software to create 3D deliverables.

Since the adoption of the 3D laser scanner, Arden Engineering Constructors uses laser scanning when collecting as-built data. Recently the company was hired for a new and retrofit project for a small biopharmaceutical facility located in Cambridge, MA. The scope of the project included HVAC, controls, balancing and fabrication work and the addition of a roof mezzanine. Phase 1 of project included setting up temporary boiler and chiller plant to service the XXX,000-square-foot facility. It also included all remodeled and installed duct work for the existing area and addition to support the next phase of the project. Phase 2 of the project included integration of the chill water plant, new chillers and new chilling towers.

## As-built assessment: 3D scanning of HVAC and duct work

Cameron recalls that completing an accurate as-built assessment of the project was essential to ensure that retrofitting of additional MEP systems would not clash and they'd be installation-ready. Arden Engineering Constructors used the Trimble TX6 3D laser scanner to gather the precise 3D location of surfaces, HVAC components, objects and duct work. Scans were conducted outside and indoors with scanning speeds of 500k pts/sec and a scanning range of 80m standard. Cameron explains each scan took approximately 7 minutes. In total, XX scans were taken of the interior space and XX scans outside, over a four-hour period. During each scan, the scanner collected millions of data points, also called a point cloud.

“One of biggest benefits of the TX6 scanner is the high-speed scanning and consistent accuracy,” said Cameron. “We estimated it would have taken about 4 days or 32-man hours to complete an as-built assessment manually. With the Trimble scanner, we had access to high quality data fast and we were able to quickly capture clean data even in bright sunlight. We scanned this project as sort of a favor to the contractor on site, so they didn't have to put it out to bid. That saved them approximately \$10,000 and helped us secure future phases of the project.”



## From point cloud to modeled 3D components

After the scan, the data was then exported into Trimble RealWorks software to register, analyze, model and create 3D deliverables. After registering the data, the RealWorks software essentially segments the cloud into bite-sized pieces, which is easier for CAD modeling software to digest.

Using RealWorks, they modeled the point cloud's specific MEP components and exported these solid objects to the 3D design package, Autodesk Revit, for finish detailing activities. The point cloud essentially served as a starting point for MEP system detailing efforts and was used to determine the project design impacts on the existing structure. Once the laser scan of point cloud data was converted, they also used Trimble SysQue, an add-on software for Autodesk Revit, to inject greater intelligence into the 3D BIM model. With Trimble SysQue, Arden Engineering Constructors was able to include real-world content in the design, including detailing, fabrication, manufacturing, and installation specifications. Once the model was viewed in Revit, it was then exported to Navisworks. Navisworks created a snapshot of the project including models, the scene's environment, viewpoints and redlines and measurements, for coordination among trades.

“After we scanned the building, we forwarded that information on to the construction manager on the project,” said Cameron. “The point cloud from the scanner and RealWorks gave us a clear and accurate picture of what we were looking at for phase 2 of the project. We also liked that the point cloud data from the scan folded seamlessly into our Revit, SysQue and Navisworks workflow.”

## A step ahead

Cameron believes Trimble scanning technology along with the ability to convert point clouds into modeled 3D components, helps set Arden Engineering Constructors apart as a leading HVAC and MEP services contractor. The team can tackle complex projects for customers and offer comprehensive and innovative solutions that save time and money and meet the industry's highest quality standards.

“We see the industry trending towards relationships, more than pure dollars and cents,” said Cameron. “Customers want to know that we can provide complete MEP services including balancing how our scope of work on a project impacts all other trades and the project's overall cost. Trimble's 3D scanner and software helps us do this and it fits into our BIM workflow. It's just one more reason why we're positioned much better to help customers in MEP and mechanical services space because we're thinking big picture.”

Bill Cameron,  
BIM Manager for Arden Engineering Constructors



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