COMPANY

Worcester Air Conditioning, LLC

LOCATION

Ashland, Massachusetts, United States

PRODUCT

Autodesk® Fabrication CADmep™
Autodesk® Fabrication CAMduct™
Autodesk® Point Layout

BIM for a perfect fit

Worcester Air helps major university expand as it increases productivity and accuracy with an end-to-end BIM process

From coordination and layout to manufacturing and installation, we saw a degree of precision that would've taken more than twice as long to achieve just a few years ago.

—**Jim Morgan**
President
Worcester Air

Image courtesy of Worcester Air

Introduction

Founded more than 50 years ago, Worcester Air Conditioning details, fabricates, and installs ductwork for commercial customers across New England. The company's commitment to quality has earned it the trust of clients in sectors with demanding needs, including life sciences, healthcare, and education. As part of its effort to deliver effective systems at a competitive cost, Worcester Air turned to Building Information Modeling (BIM) more than a decade ago. BIM lets the company detail, coordinate, and manufacture using intelligent, 3D models.

To support the extension of BIM to the job site, Worcester Air recently adopted Autodesk® Point Layout software. Worcester Air's work on a new building at a large educational facility highlights the end-to-end BIM workflow. "We modeled the project in Autodesk® Fabrication CADmep™ software, manufactured it with Autodesk® Fabrication CAMduct™ software, and used Point Layout to add electronic hanger points to the model," says Rick Hillson, chief planner for Worcester Air. "Our total station robots take those points into the field. We're laying out projects three times faster, and supporting quality by using BIM to reduce the risk of on-site errors."

The challenge

The new five-story, 100,000-square-foot building will provide the educational facility with much needed additional space for classes, study, and training programs. Built with connections to existing buildings, the new addition presented the Worcester Air team with challenging space constraints. The ductwork had to fit into unusually tight spaces between the floors and integrate with systems in an existing building. Plus, other mechanical, engineering, and plumbing (MEP) firms on the project needed room for their pipes and equipment.

"Today's buildings require complex air handling systems," says Jim Morgan, president of Worcester Air. "This project was challenging because the design led to a few areas where systems had to be routed unusually close together. Precision was essential—with coordination, manufacturing, and installation. Prior to BIM, we would have had to coordinate with multiple daylong meetings, assume some rework in the field, and install points manually. Everything was slower, and the risk of costly errors was higher."

AUTODESK.

Worcester Air lays out more accurate points three times faster

The solution

Worcester Air's BIM-based process on the project began when the project engineer and general contractor provided 2D drawings of the design. The Worcester Air team used the architectural and structural drawings as a background for its work. Using Fabrication CADmep software, they modeled the duct system, taking care to avoid structural elements. As they worked, they referred to Autodesk® Navisworks® Simulate software, which aggregates the designs of the MEP contractors on the project into a single model. This helps them to spot and prevent conflicts.

Worcester Air provided its models to the other MEP contractors on the project after its team placed the ducts and hangers into the Fabrication CADmep model. The electrical and plumbing contractors created their models, and the combined teams coordinated their models at regular intervals. Then Worcester Air opened its Fabrication CADmep file in Point Layout software to add duct hanger points. The team used Fabrication CAMduct software to help drive the manufacturing process in the Worcester Air factory from the Fabrication CADmep model.

"When you work in 3D, there's less room for misinterpretation across the contractor drafting teams," explains Hillson. "What we see in the models more accurately reflects what the pipe fitters and electrical installers see. It's what gets fabricated in the shop, and shipped to the job site. You install equipment based on exact points. That's given us confidence to prefabricate larger portions of the duct in the shop, which has time and safety advantages."

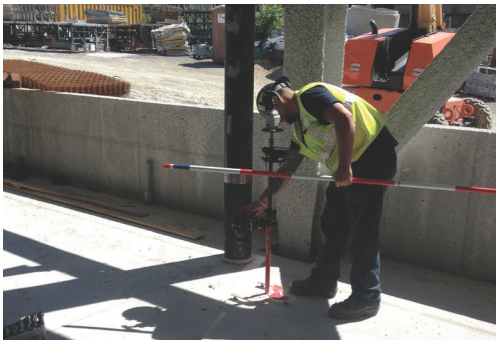

Image courtesy of Worcester Air

900 points in three days

Prior to using Point Layout software, the Worcester Air team generated layouts of hanger points in the office and took them into the field to install using manual measuring tools. It took a two-person team about a day to lay out about 100 points. With approximately 900 hanger points to lay out per floor, each floor would have taken about nine days. In contrast, Point Layout software automatically generated all the hanger points in the model. Worcester Air reviewed and refined the points, and loaded them into a compatible total station robot. The field team then shot all the points with laser-guided precision in less than three days per floor.

"On a clear floor, we can shoot about 300 points in a day, and that's what we did on this project," says Corey Delahunty, the detailer with Worcester Air who laid out the points. "The general contractor provides the control points, and it only takes about 30 minutes to set up the robot once you have good controls. Dragging a ladder around and measuring manually took three times as long. Many of the other contractors used similar technology, so the points went in more accurately and quickly for the whole job."

Room for all

Worcester Air has found that BIM transforms the coordination process. On the project, the engineers and MEP contractors scheduled regular online meetings to review clashes identified using Navisworks Simulate software. They agreed on resolutions and made many of the required revisions in Fabrication CADmep in real time. When it came time to install material in the field, the major difficult space questions had already been resolved in the office.

"Everything went in pretty much as planned, and without a model-based process, there could have been more conflicts in the field," says Hillson. "For instance, under the emergency generators we had to install two smaller ducts instead of one larger duct. A larger duct wouldn't have fit. We had to have pinpoint accuracy for the duct hangers, otherwise there wouldn't have been room for the pipefitters to place their materials."

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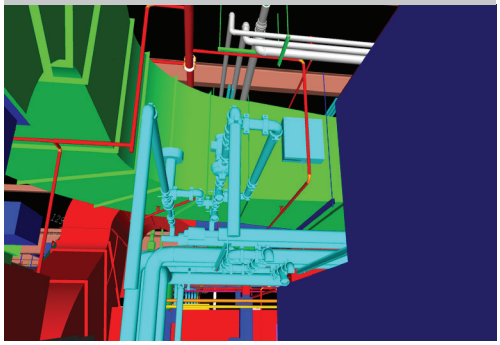

Image courtesy of Worcester Air

The result

Since adopting an end-to-end BIM process, Worcester Air has seen an increase in productivity and a reduction in the risk of rework. According to Morgan, the recent educational project illustrates this: "From coordination and layout to manufacturing and installation, we saw a degree of precision that would have taken more than twice as long to achieve just a few years ago. Detailing and layout go faster with Fabrication CADmep and Point Layout. We are able to rely on precise prefabrication with Fabrication CAMduct. It's hard to say any job is 100 percent perfect, but I think we're seeing 99 percent of equipment going in as planned on projects like this one."

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