

KlingStubbins  
Tocci Building Companies  
RB Woodcraft

Customer Success Story

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For architects, the best thing about integrated project delivery is that it increases our ability to take risks. We can put anything out on the table and get instant feedback from the owner and the contractor. That helps us make some really sound decisions very quickly.

—Chris Leary  
Principal and Project Director  
KlingStubbins

# Take more risks—reap the rewards.

## A New England commercial interiors project breaks new ground with integrated project delivery.



Customer Briefing Center, millwork fabrication. © Jeff Goldberg/Esto.

### Project Summary

Design technology company Autodesk recently expanded its presence in New England with a new headquarters for its Architecture, Engineering, and Construction (AEC) Solutions Division. Located in Waltham, Massachusetts, the LEED-CI Platinum certified facility accommodates staff expansion and offers additional space for meeting with customers, the press, and the community. Right from the start, Autodesk viewed this project as an opportunity to implement several new trends in the building industry, including integrated project delivery (IPD), sustainable design, digital design-to-fabrication, and the technical process underpinning all of them—building information modeling (BIM). “We felt strongly that it was important to use these methodologies because we advocate their use to millions of customers around the world,” says Phil Bernstein, FAIA, vice president, Industry Strategy and Relations of the AEC Solutions Division at Autodesk. Throughout the project, the team relied on multiple Autodesk BIM solutions integrated with the Autodesk® Revit® platform.

### The Team

For help completing this groundbreaking IPD project—the first of its kind in New England—Autodesk turned to architectural firm KlingStubbins and construction manager Tocci Building Companies. Both firms are local and have a proven history of successfully employing both the BIM process and fast-track collaborative project delivery methods. They also have the necessary training and hands-on experience that enabled them to tackle the project’s ambitious LEED Platinum sustainable design goal.

“Our firms are very savvy about BIM,” says Scott Simpson, principal and senior director at KlingStubbins. “Because we both have a lot of experience with it, we were able to approach Autodesk with a common strategy for the project.” Once the project began, the two firms invited input from subcontractors, as well as a group of Autodesk employees, who regularly collaborated in the design review process through participation in an internal building advisory team.

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# Using integrated project delivery and BIM, the owner, architect, and builder all share decisions and responsibility.

## The Challenge

After a careful search for an appropriate site, Autodesk selected a 61,000-square-foot speculative office building near Boston at 1560 Trapelo Road in Waltham, Massachusetts. The unfinished existing interior space required a complete build-out known as a tenant improvement. The new facility includes offices, conference rooms, and a 5,000-square-foot Customer Briefing Center featuring a gallery of customer work that demonstrates how design technology supports innovation.

The project team designed and constructed the interior on a fast-track schedule. "Autodesk needed to occupy the building in January 2009, giving us a hard deadline," says Laura Handler, virtual construction manager at Tocci. That factor, as well as the LEED-CI Platinum goal, gave the project team a tremendous opportunity to demonstrate the power, scope, and capabilities of Autodesk BIM solutions. "As a team, our goal was to build a digital model of the project, comprehensively test it using advanced energy analysis tools, and then execute it on time in the field."

## The Solution

To help meet these ambitious goals, Autodesk chose integrated project delivery, a new collaborative practice method that requires the owner to cover all direct costs associated with design and construction, while contractually sharing the

project's risks and rewards, including profits, with the architect and builder. A key feature of IPD is early and ongoing collaboration by everyone on the extended design team—both in person and by using the digital model.

Traditional contractual agreements enforce strict separation of roles and encourage the parties to focus on their own limited interests rather than the best possible project outcome. "On an IPD project, we are all in it together," says Chris Leary, principal and project director at KlingStubbins. "It is not just me doing my job as an architect. Everyone has a shared interest in success and is involved from the outset."

On the Trapelo project, this approach gave the architects early access to the expertise they needed from the builder about constructability and how design decisions would impact schedule. "Being able to get those answers at every point in the process was a huge opportunity," says Sarah Springer, design principal at KlingStubbins and senior interior designer on the project.

For example, using traditional approaches, KlingStubbins would have asked its internal engineers to design much of the ductwork distribution and then coordinate with the mechanical subcontractors later. Using the IPD process, the architect and builder brought in the mechanical, electrical, and plumbing engineering

Being able to build intelligence into the model and then fabricate items such as millwork, steel, and plumbing configurations from it is a tremendous opportunity to help reduce cost, improve quality, and offer more value to our clients. It also gives us a powerful competitive advantage.

—John Tocci  
CEO  
Tocci Building Companies

subcontractors early on and worked out the design and coordination in real time. "We did not waste our time designing things that might not have worked in the field," says Leary. For coordination of the mechanical elements with the mechanical engineering subcontractor, KlingStubbins and Tocci used Autodesk® Navisworks® software and Autodesk® Revit® MEP software.

## Focus on Shared Project Outcomes

For the builder, by far the biggest benefit of the IPD approach is an increased ability to understand both the owner's program and the architect's design intent. "We do not usually have a lot of input until we begin construction—long after the design is complete," says John Tocci, CEO of Tocci Building Companies. "With IPD supported by Autodesk BIM solutions, we are intimately involved in the design and in virtually constructing the building before we even set foot on the job site. That is invaluable to us."

Because all of the team members shared risks and rewards, everyone had a strong incentive to keep

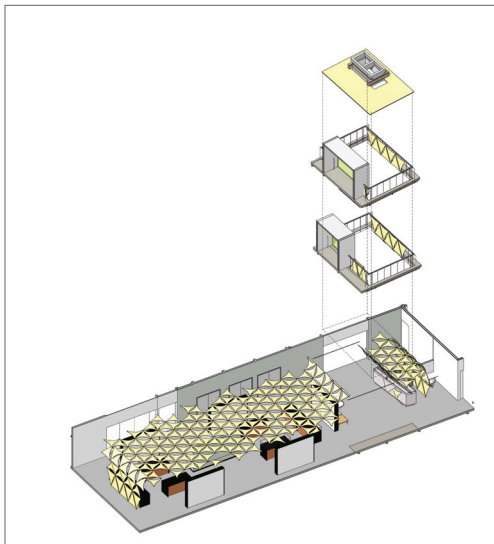


Building Advisory team meeting.

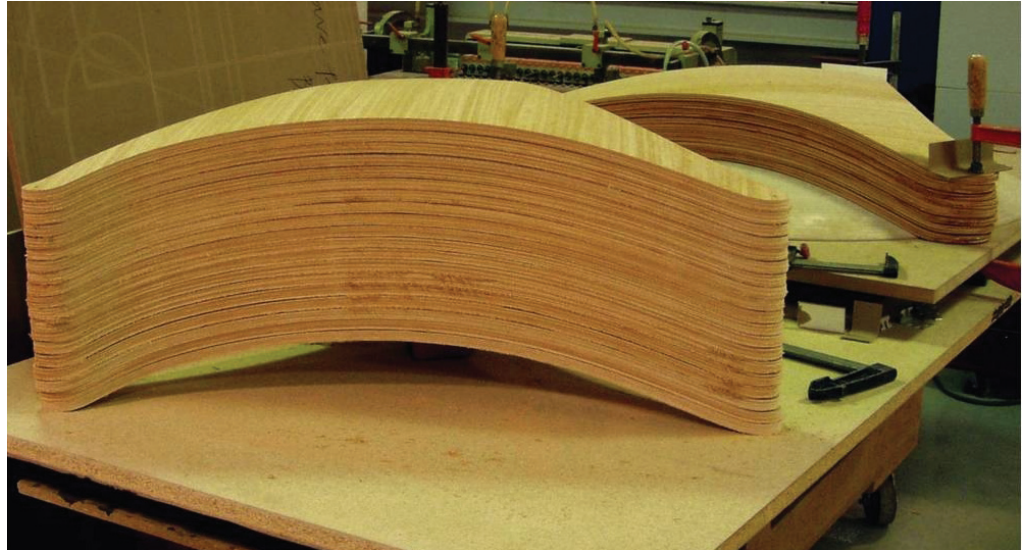
the aggregate project cost as low as possible—and to eschew traditionally defined roles in favor of what actually worked best for the project. For example, rather than have each subcontractor attach the connectors required to hang his or her lighting, ductwork, or fire protection piping from the ceiling, the builder selected a single subcontractor to hang all of them, eliminating redundancy, waste, and the need to rent multiple lifts at a cost of \$2,000/week per lift.

### Make Better Decisions Faster—with BIM

To more effectively implement the IPD process, the project team relied upon a variety of Autodesk BIM solutions, including Autodesk® Revit® Architecture software, Autodesk Navisworks, and Autodesk® Ecotect® software. “IPD requires high levels of collaboration,” says Bernstein. “BIM technology serves as a decision-making platform that facilitates collaboration and makes IPD possible.” Using BIM, the team was able to explore a digital model of the project long before beginning construction—helping them to make better decisions much earlier in the process. Autodesk® Buzzsaw® collaborative project management software also facilitated ongoing collaboration.



Customer Briefing Center and atrium, axonometric view. Courtesy of KlingStubbins.



Customer Briefing Center, millwork fabrication. Courtesy of Tocci Building Companies and RB Woodcraft.

At one meeting, the entire team of architects, builders, and Autodesk representatives sat down to discuss the possibility of creating an atrium in the lobby. “Everyone was really excited about it,” says Handler. “But because schedule and budget constraints limited its size, we were concerned that it would not look substantial or elegant enough.”

After working with KlingStubbins to extract quantities from the model, Tocci determined that the budget and schedule would allow them to build a small, three-story atrium. However, when the Autodesk review team looked at the design in 2D, the results did not entirely convince them. The team then decided to open up the model and use the walk-through tool in Revit Architecture to better understand how the completed atrium would appear. “Because we were all able to look at the model in the same room, we approved it on the spot,” says Handler. “Using traditional methods, this process would have taken several weeks. We finished within hours.”

KlingStubbins credited the IPD process with help from the Revit platform’s data-rich, 3D environment for the quick decision. “In our traditional processes, we spend a lot of time assembling the data—and it is often not even accurate,” says Leary. “With Revit Architecture, we have a high degree of confidence in that data. It is coordinated and more reliable throughout the entire project.”

### Design Greener, More Efficient Buildings

Autodesk Revit Architecture and its interoperability with powerful energy analysis tools, such as Autodesk Ecotect, helped enable the team to achieve its LEED Platinum sustainable design goal. “Revit Architecture actually links directly to these tools,” says Leary. As a result, the design team was able to run necessary simulations, get results faster, and use the output to help them make important design decisions earlier—when they could still have a significant impact.

For example, one of the most important aspects of LEED certification is daylighting. “We modeled several different arrangements of offices, conference rooms, and workstations,” says Leary. By linking the Revit model to Ecotect analysis software, and to Integrated Environmental Solutions (IES) software, KlingStubbins carefully analyzed where daylight would fall within the facility and determined which design option satisfied the goal of illuminating at least 90 percent of the workspaces with natural daylight. “BIM was a crucial part of that process.”

### Reduce Waste Better with a Digital Workflow

The shared model also helped enable the extended design team to utilize a digital design-to-fabrication workflow. “On the Trapelo project, we used this capability in several places, including the HVAC system, fire protection pricing, and in the design of a complex decorative ceiling element in the Customer Briefing Center and Gallery Space,” says Handler.

# Subcontractors utilize BIM to fabricate components off-site—saving time and money.

“The ceiling was a great way to showcase our ability to digitally fabricate design elements directly from the Revit model,” says Springer. After reviewing a variety of design scenarios, the team selected a perforated wooden screen that satisfied the necessary aesthetic requirements, while also providing room for a dozen projectors, four dozen light fixtures, numerous sprinkler heads, and other items that would project down from the ceiling.

After finishing the ceiling model in Autodesk Revit Architecture, the architects sent the design plans to Syracuse, New York-based millwork fabricator RB Woodcraft for review. “They came back with ideas, refinements, and important information about constructability,” says Springer. “Being able to go back and forth with their highly competent staff was wonderful.”

Upon completion of the design, Autodesk® Inventor® software was utilized to create a native DWG 2D profile of the ceiling sculpture. The ability of Autodesk Inventor to create 2D profiles in both DWG and DXF™ format, from a Revit 3D file, helped to essentially eliminate the need to redraw the 2D profile from scratch. “We were able to import this file into our postprocessing software for one of the ceiling panels,” said Gary Zarnowski, general manager of RB Woodcraft, “reducing the need for further redrawing.”

CNC machines on the shop floor then automatically cut the pieces according to plan for off-site assembly. “One of the benefits of using a digital design-to-fabrication process,” says Handler, “is that there’s a straight line of information flow from the designer through the builder to the subcontractors. So there’s not a lot lost in translation.”

## Reduce Risk

“A more conventional project keeps the stakeholders in silos,” says Tocci. “Every company has its own, clearly defined risks. Even when we want to collaborate, we have to jump through some hoops—errors and omission insurance, liability concerns, and notification requirements.”

“If you take half of the effort that goes into managing those risks and instead choose to work in a more collaborative fashion—as in IPD—you can quickly solve or eliminate a lot of problems,” says Tocci. “You can actually deliver a project at the price that you said you are going to deliver it for, at the time you said you are going to deliver it, without a lot of fuss and difficulty.”

Because everyone strategizes together on an IPD project, the big-picture decisions are stronger. “With IPD and BIM, you get better decision making, higher-quality decision making, and faster decision making, and because it is shared, the risk actually goes down,” says Simpson. “In every single IPD project that we have ever done, there have been zero construction claims.”

## The Result

“It is very difficult to properly execute a sustainable design project without employing a BIM infrastructure and the IPD approach,” concludes Bernstein. “We have proved that on this project because it was very complex, on a very short schedule, with a very tight budget—and a LEED Platinum goal.”

## Better Projects

“Both BIM and IPD have had an enormous impact on our business,” says Simpson. “We get



Architect/Subcontractor collaboration on-site. Courtesy of Tocci Building Companies.

demonstrably better results by forming truly integrated teams early in the design process. We also get better cost control, better schedule control, and higher-quality designs. IPD is clearly the way the profession has to go.”

For more information, visit [www.autodesk.com/bim](http://www.autodesk.com/bim), [www.autodesk.com/revitarchitecture](http://www.autodesk.com/revitarchitecture), [www.autodesk.com/revitmp](http://www.autodesk.com/revitmp), [www.autodesk.com/ecotect](http://www.autodesk.com/ecotect), or [www.autodesk.com/navisworks](http://www.autodesk.com/navisworks).

With Revit Architecture and Navisworks, we have been able to intelligently plan the project. We can drill into objects and schedule a specific wall, or zoom out and look at the whole room—or the whole floor—and schedule things separately. We can plan things virtually, fail on our desktop, rethink, and do something that works. BIM enables us to quickly test many options and pick the best one.

—Laura Handler  
Virtual Construction Manager  
Tocci Building Companies