



AUTODESK CONSTRUCTION CLOUD™

How Digitally Connecting Workflows Dramatically Improves 5 Key Construction KPIs

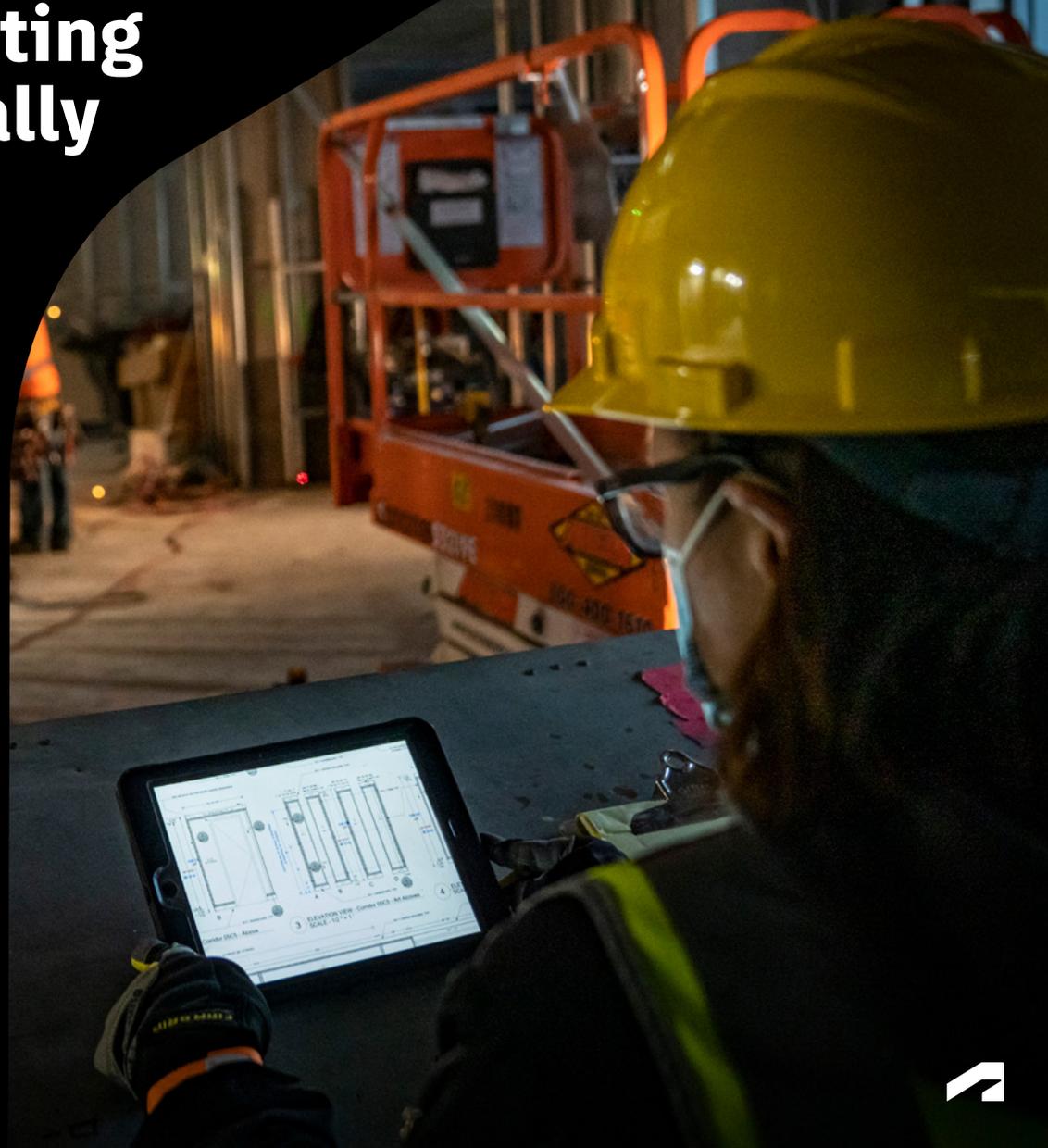
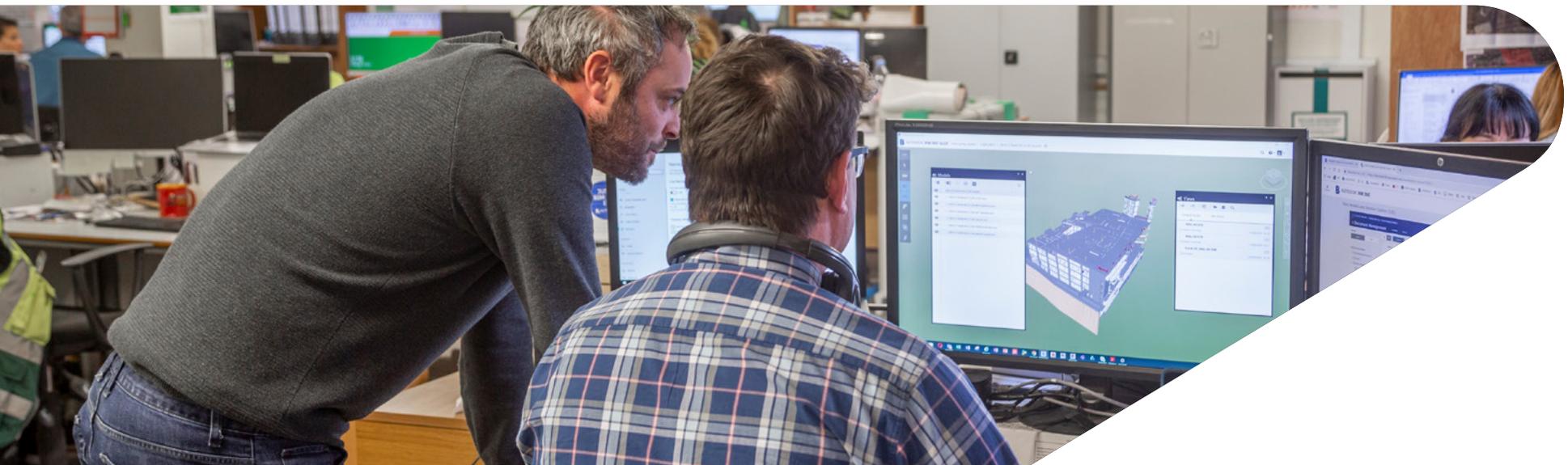




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To truly improve performance, firms must use the power of technology to connect workflows, which optimizes five vital outcomes—winning business, cost, quality, schedule and health safety and environment.

For Pepper Construction, the \$142 million renovation of the Arkansas Museum of Fine Arts¹ represented one of its biggest challenges in its history—and a golden opportunity that showcases the power of using technology to collaborate from design through planning, construction and operations.

“The beauty of this project is that we were able to take a very unique structure and, using technology, find ways to make it more affordable,” said Kristen Erickson, Pepper’s virtual construction manager.

The 133,000-square-foot space was to serve as an entrance to the museum with a stunning contemporary design. Its signature roof—a flowing, folded-plate concrete structure—blossoms to the north and south. Below the roof, a custom curtainwall system allows for breathtaking views of a nearby park.

But before anything could happen, Pepper had to win the bid. Again, technology was key. Using computer modeling and digitally connected workflows, Erickson and her team showed a nervous group of owners how they could not only build the project but also use local labor to do so while maximizing efficiency. “Once we showed them this model, we knew within 24 hours that we had this project,” Erickson recalled.





Connected technology and workflows continued to benefit the project as construction commenced. Using computer modeling allowed the team to fabricate custom wooden concrete forms. Using wood was less expensive and faster than traditional polymer forms. The more efficient, less expensive process also allowed the prefab to be completed in two months and the concrete poured in six months. “That was a much quicker schedule because of technology,” Erickson said.

The efficiency modeling and connected workflows also helped reduce safety and quality incidents throughout the project. “A lot of times in our industry, the design side is very isolated from the construction side, and yet both teams get a lot of benefits when we collaborate,” Erickson said. “Using connected workflows, we create a cycle where we’re working together to create great design and constructibles.”

Numerous reports from FMI² to McKinsey³ point to the same conclusion: Harnessing technology and connecting workflows is vital to success. That’s because traditionally, construction has measured lagging indicators, which lead to schedule creep, cost overruns and lost profits.

In this e-book, we’ll explore how digitally connecting workflows dramatically improves five essential KPIs:

- 1. Winning business**
- 2. Cost**
- 3. Quality**
- 4. Schedule**
- 5. Health, safety and environment**

To truly improve project performance, it’s essential to track leading indicators, or predictive measurements⁴—and that’s where using technology to create connected workflows⁵ comes in.

“The main issue is productivity. The key challenge is that the focus on KPIs mainly targets lagging indicators. This means that you don’t know you’re doing well on the project until you’re nearing the end. And then it’s too late,” said Matt Keen, senior industry strategist at Autodesk.

What are the specific outcomes you should think about as you leverage construction technology and build out your workflows internally?





1 Winning Business

Speed and accuracy are crucial in winning bids—and connected workflows yield both. For example, design-build projects are completed 102% faster than traditional design-bid-build projects, according to DBIA.⁶ Here are other ways connected workflows help win more business:

- **Increased bid efficiency.** Using technology and automation can dramatically increase efficiency in delivering compliant/innovative bids that differentiate the contractor from the competition.
- **More successful projects.** Using connected workflows helps projects stay on budget, on time, and incident-free with high quality. But key project metrics must be captured to identify areas for continual improvement.

- **Better stakeholder engagement.** Technology enables visualization and other tools that get the client to actively participate in all phases. Measuring engagement through post-bid surveys following successful bids will help identify what differentiated the contractor during the bid stage.
- **Higher bid win rate.** Lost bids are a cost to the business. Using tech to monitor win rate is a key metric for bid teams.
- **Expanded service offerings.** Such services include self-perform, investment, facilities management, industrialized construction, using digital technology and BIM, and providing sustainability or post-occupancy services. These are all opportunities to increase the profit margin or reduce cost or risk on a project.

“Connecting data for owners and developers sets builders apart from the competition because it allows them to give stakeholders the information they need to be successful for future upgrades or new facilities. Data is cyclical in construction.”

Cara Wilczynsk
Customer Outcome Executive
Autodesk



2 Cost

Fully 69% of owners say poor contractor performance is the single biggest reason for project underperformance, according to a KPMG report,⁷ yet AGC reports only 23% of firms are taking steps to improve jobsite performance with lean construction techniques, tools like BIM, and offsite prefabrication.⁷ Connected workflows help contractors get a true picture of performance—and control costs—in the following ways:

- **More accurate forecasting.** Accurate and timely reporting that gives the true story of a project's financial health is imperative. Staying true to forecast shows good management of the business in line with senior leadership and owner/shareholder expectations.
- **Better cost controls.** Cost management of change orders and pay application processes ensures sound cash flow management for project stakeholders.

- **Reduction in nonrecoverable costs.** Issues that can't be contributed to a third party (such as poor or missing materials or lost time due to poor scheduling/delays) must be covered. Connected workflows show key value metrics, including actual profit margin versus project profit margin, percentage of contingency attributed to nonrecoverable costs, and amount of nonrecoverable costs per project value.
- **Improved subcontractor qualification.** Assessing subcontractor performance versus cost allows a contractor to mitigate costly risk. Technology shows key risk metrics, such as risk of subcontractor default and subcontractors with poor track records.

“If you're not managing workflows, suddenly you have a \$10 million job with \$5 million in change orders,” said Sunil Dorairajan, senior director, construction industry strategy at Autodesk. “Contractors have to ask themselves, ‘How profitable am I when I'm walking away from this project?’ With connected workflows, that answer gets better and better.”





3 Quality

In 2018, 52% of rework was caused by poor project data and miscommunication—the equivalent of about \$31.3 billion in the U.S. alone, according to the Autodesk/FMI report, *Construction Disconnected*.⁸ Here's how connected workflows address those issues and reduce those costs:

- **Less rework.** Technology brings together key workflows—fabrication planning, design detailing, visualization, site administration, layout, commissioning, quality management and document management—to reduce, and even eliminate rework.
- **Fewer constructability issues.** Incomplete design and lack of design review cause expensive field issues. Connected workflows ensure collaboration between all project stakeholders and a robust review process to manage all issues before they lead to rework on-site.
- **Reduction in defects at handover.** High aftercare (warranty) costs erode a project's profit margin. With connected workflows, a data trail ensures that defects are addressed before handover.
- **Better overall handover experience.** Warranty and poor handover experience impact worker and customer satisfaction. Enhanced digital documentation supports the customer in moving from construction to operations—and provides an opportunity to increase customer satisfaction and contribute to the contractor's reputation.

“Quality is one of the most difficult things to measure as it is deemed subjective, but quality is also a process. When you connect workflows, you can see insights in real time from the data about who's performing well and who's performing poorly. Catching issues early means they have less impact on the bottom line.”

Matt Keen
Senior Industry Strategist
Autodesk

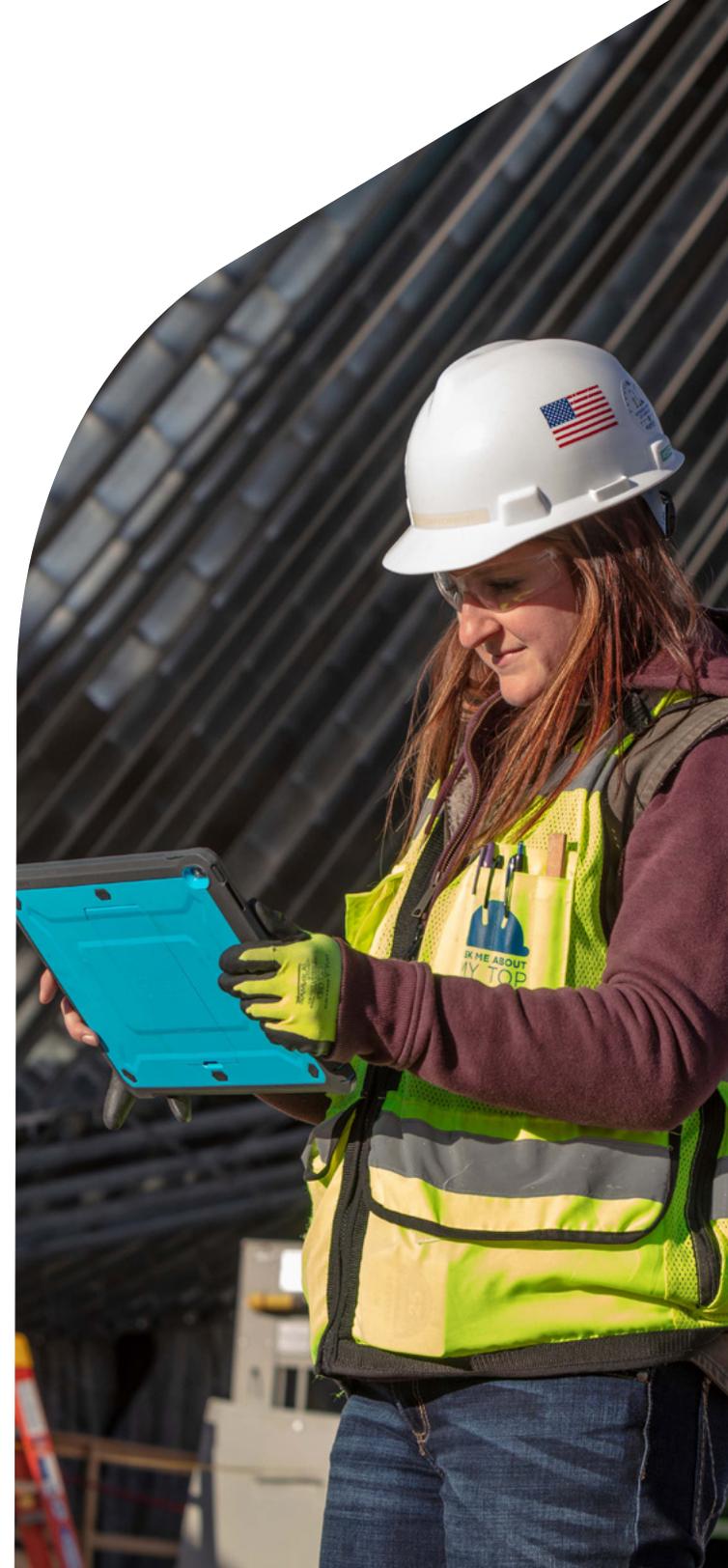
4 Schedule

Schedule slippage results in added costs from overtime/second shifts for more than 65% of general contractors, according to a Dodge/Autodesk report.⁹ Connected workflows address those issues in the following ways:

- **Optimized schedule.** Identifying opportunities to reduce risk and optimize the schedule leads to potential savings for the client and the contractor. This optimization can also reduce the likelihood of claims if program dates/schedules aren't hit.
- **Improved plan-to-actual ratio.** Improving plan-to-actual ratios in schedule builds floats into the program and provides the opportunity for contractors to deliver the project early and enhance their fee.
- **Better schedule control.** Schedule control is about how the master program is related to monthly, weekly and daily planning of tasks/activities. Effective short-term planning (such as pull planning) can ensure correct discipline in scheduling.

- **More efficient resource planning.** Correct allocation and planning of resources (labor, materials, etc.) are essential to ensuring that the master program is followed. The better resources and logistics are sequenced, the less chance there is of project overruns.

“If you want to improve schedule control and resource planning, you need to have the right people working on the project, have the materials in the right place at the right time and track quality management on the work you've completed,” Keen said. “Using data and insights from connected workflows is absolutely paramount to being able to do that.”





5 Health, safety and environment

Nearly 40% of firms aren't using any technology to gain a strategic advantage, according to the 2020 JB Knowledge ConTech report.¹⁰ But 60% of general contractors and trades feel using software to manage safety and/or inspections during construction is of high value to improving this process. Connected workflows are key to that goal in the following ways:

- **Better safety awareness and education.** Using connected workflows gives construction teams better awareness of project risks with timely information based on real-time reported incidents—a proven method to reduce risk and increase hazard identification on projects.
- **Lower insurance premiums.** Demonstrating better working practices through robust processes/use of digital technology can reduce a construction company's exposure to risk. Demonstrating this ability to insurance providers can help reduce insurance premiums.

- **Fewer work hours on-site.** Careful logistics, schedule and process planning, together with the use of technology, can reduce the number of hours workers must be on-site. This can reduce the risk of being exposed to hazards that can cause harm.
- **Less environmental impact.** Connected workflows allow contractors to source materials and products with health and the environment in mind. Demonstrating a positive effect on the community and wider society can boost employee morale, attract talent in a labor shortage, lead to greater productivity and innovation, attract loyal customers with their own CSR requirements—all while delivering better project performance.

“Using technology to connect preconstruction to the actual swinging hammer is crucial. If you don't have those points of connection, you can't connect people with processes and you're not being as effective.”

Sunil Dorairajan
Senior Director
Construction Industry Strategy
Autodesk

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“Using technology to connect preconstruction to the actual swinging hammer is crucial,” Wilczynski said. “If you don’t have those points of connection, you can’t connect people with processes and you’re not being as effective. Because people come before everything else. With connected workflows, you know immediately when there’s an incident and you can take steps to mitigate it.”

Clearly, using technology to connect workflows is a powerful way to improve KPIs. But more than that, making those connections—and having access to real-time, actionable data—unlocks even more potential in a virtuous loop that keeps growing.

“It’s an exciting frontier, and once you dip your toe in the pool, it’s hard to stop,” Pepper’s Erickson said. “Once you have a model, the options from there become limitless. And you don’t need to go all in to begin, either. You can pick one scope of work and say, ‘How can we use these connected processes to improve?’”



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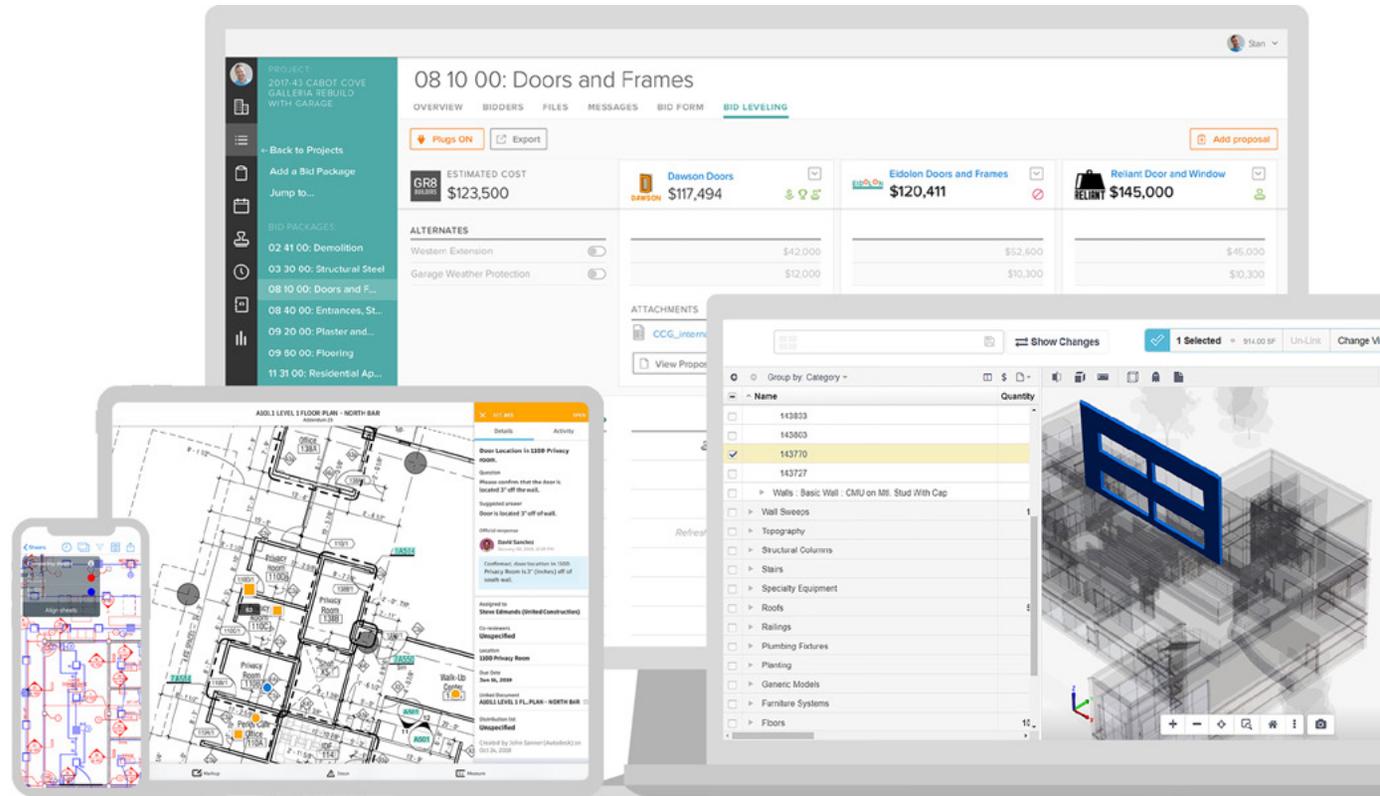
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Our industry requires solutions that connect their information, teams, and technology –breaking down data silos and disconnected processes that hinder true transformation. As we navigate the ever-present push to do more with less, we need to uncover new ways of working, enhance connected digital workflows, and incorporate advanced analytics. To support us on this journey of transformation, we must lean into tools that connect construction – from design to plan, build, handover, and operations.

Built on a unified platform and common data environment, Autodesk Construction Cloud is a powerful and complete portfolio of construction management products that empowers general contractors, specialty trades, designers and owners to drive better business outcomes. Autodesk Construction Cloud combines advanced technology, a unique builders network and predictive insights to connect teams, workflows and data across the entire building lifecycle.

While the industry experiences unprecedented transformation, our mission remains the same: to help construction teams meet the world's rapidly expanding building and infrastructure needs while making construction more predictable, safe, and sustainable. And we've remained steadfast in our promise to deliver the industry's most compelling solutions, connecting data, teams and workflows from the field. This is our commitment to connected construction.

LEARN MORE





With Autodesk software, you have the power to Make Anything. The future of making is here, bringing with it radical changes in the way things are designed, made, and used. It's disrupting every industry: architecture, engineering, and construction; manufacturing; and media and entertainment. With the right knowledge and tools, this disruption is your opportunity. Our software is used by everyone - from design professionals, engineers and architects to digital artists, students and hobbyists. We constantly explore new ways to integrate all dimensions of diversity across our employees, customers, partners, and communities. Our ultimate goal is to expand opportunities for anyone to imagine, design, and make a better world.

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