

WINNING IN PRECONSTRUCTION

Ensure your preconstruction team gets it right
the first time, everytime.



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How its Been Done in the Past

Across the board, large construction projects take an average of 20 percent longer to finish than scheduled, and are up to 80 percent over budget. That's according to a recent McKinsey report on the future of construction technology.

Most of the issues that come up during construction that lead to over-budget, past-due projects become obvious late in the construction process. But if done correctly, most of them can be prevented during preconstruction. Having an integrated preconstruction strategy that focuses on both driving accurate estimates and schedules as well as properly demonstrating visuals of the project scope and sequence will ensure teams win more work and promotes successful execution during construction.



The Challenge

During the preconstruction phase teams are constantly being challenged to find better ways to communicate with the Owners and encounter a lot of other uphill battles:



TAKES A LOT OF TIME...

Doing manual quantity take offs by tracing individual elements and using excel based quantifying can take a long time. And who has extra time to spare when turnaround timelines are often short and Owners have demanding schedules.



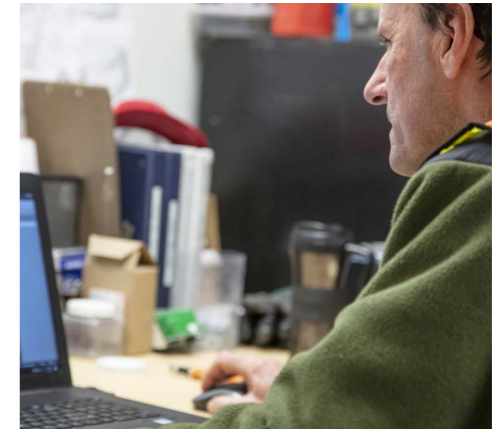
CHANGE HAPPENS...

As with everything in construction, changes to a project design, scope, or timeline are happening constantly. Needing to stay up to date with design changes to ensure accurate estimates means that you need to go back and redo quantifying work every time the model changes.



INFORMATION IS SILOED...

Communication is a critical element of project success and that transparency should start during the initial stages of preconstruction. It is easy to get caught up in having multiple versions of PDF's, spreadsheets, quantity take off's and documents stored on local desktops. When information isn't shared and other team members don't have visibility into the information they need, mistakes are bound to happen and time is wasted.



HARD TO ADOPT...

Many 3D solutions are complex and difficult for teams to learn and adopt. Especially when it is not your area of expertise, learning how to use and navigate difficult software tools can be a roadblock.

It's one thing to deal with design changes and updating quantifications when teams are operating under more traditional Design-Bid-Build delivery methods. But what happens when teams are doing Design-Build projects? Doesn't that just make these challenges even more apparent?

Managing and interpreting design intent and then accounting for all changes in the budget is difficult. Especially when it comes to Design-Build projects where changes to the design is happening simultaneously. Construction teams are hard pressed to keep up with the fast pace of work and coordinate between stakeholders.



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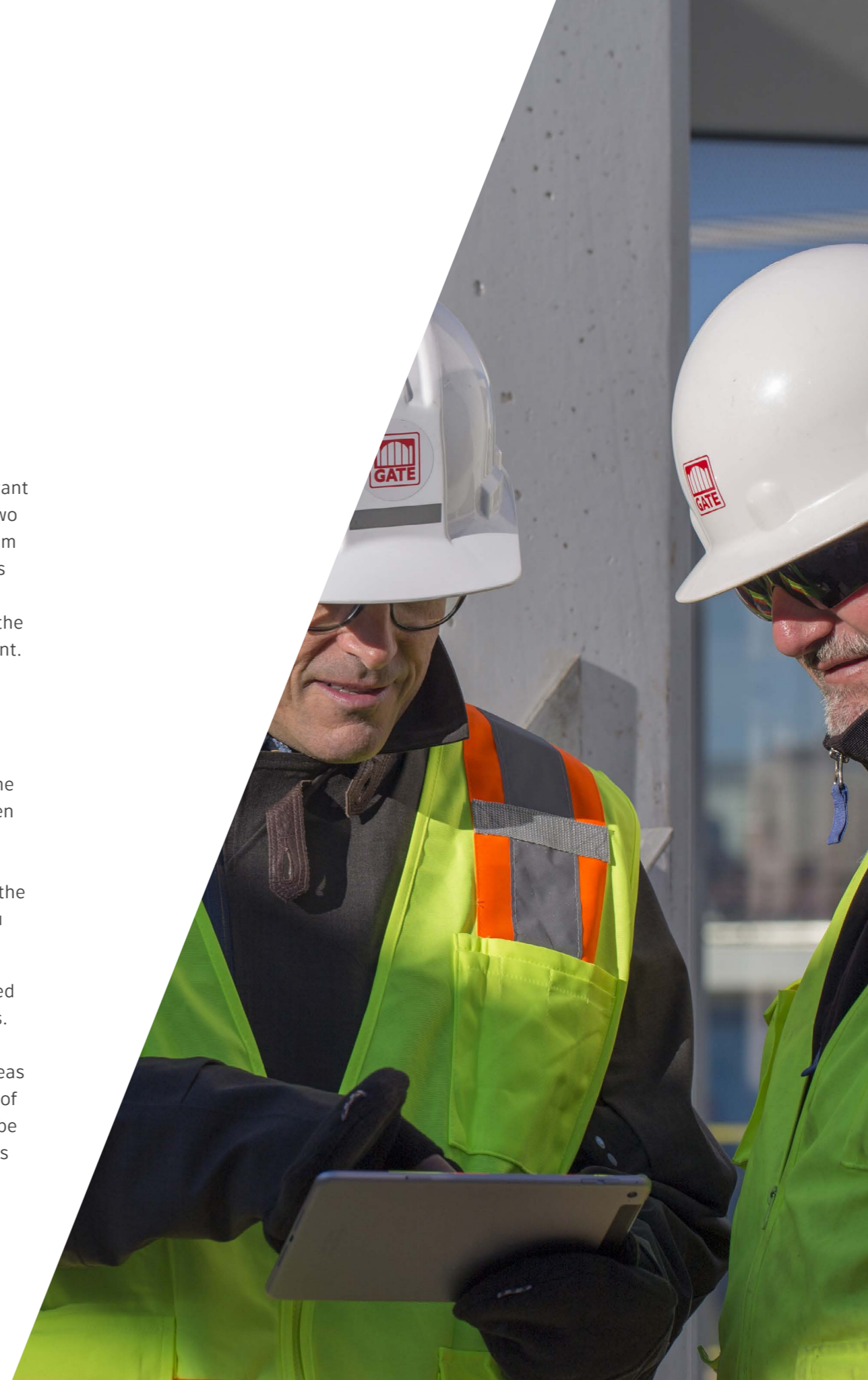
CONTRACT METHODOLOGY

The type of contract that is being used on a project can make a significant difference in how the Contractor approaches and executes the work. Two very popular methods being used today around the world are Lump-Sum and Guaranteed Maximum Price (GMP). In a lump-sum contract savings enure to the benefit of the Contractor, they are incentivized to be as efficient as possible. With a GMP the savings are typically returned to the Owner, or at least most of them, they are less incentivized to be efficient.

Lump Sum Bidding

Putting together an accurate estimates is the first critical piece of a successful preconstruction effort when it comes to a Lump Sum bid. The estimate aligns directly with profitability, and low profits are more often due to poor estimating than to unforeseen circumstances on the job. Accurate estimates are often the difference in winning or losing work; making margin or losing margin. The more uncertainty in an estimate, the greater the contingency you'll add, and the greater the chance that you won't win the work.

Traditional, manual approaches to estimating – including those assisted by 2D takeoff tools – are not up to the task of today's complex projects. Manually locating and counting objects from a 2D drawing is tedious, time-consuming, and prone to misinterpretation and error. And, the areas in which the estimator has less expertise have an even greater margin of error. Consulting Subcontractors or other sources for clarification can be difficult if not impossible under deadline pressure, so many Contractors facing this situation resort to guesswork.





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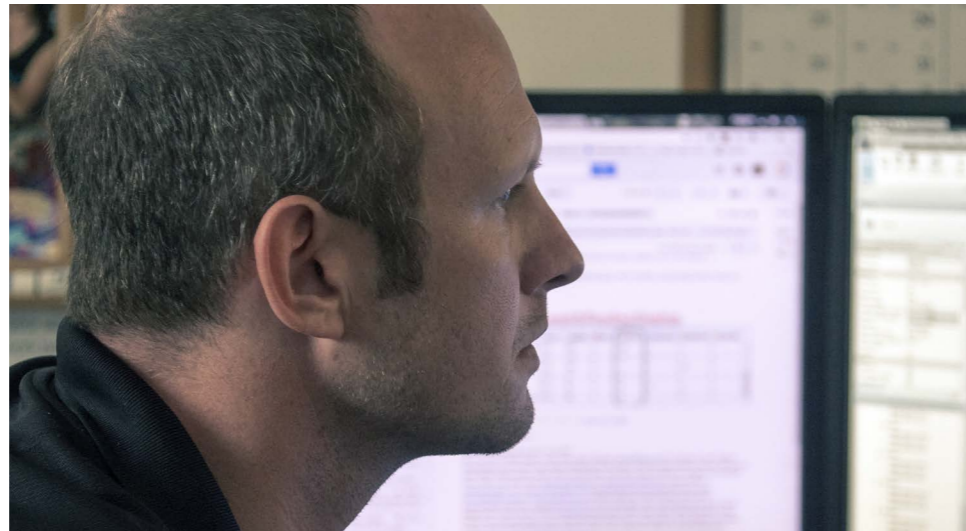


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Beyond Estimating

When the potential for error is high, the Contractor’s confidence in the numbers is low, and he or she will compensate by padding the bid contingency; the lower the confidence, the higher the contingency. The 2012 Construction Estimating Benchmark Report by Software Advice, Inc. showed that Contractors doing manual estimating tend to overestimate bids approximately 55% of the time. Owners do not like contingencies. The highly padded bid that results from a manual estimating process not only misrepresents a Contractor’s actual abilities and costs, it is less likely to win a project when competing with bids based on accurate data.



Guaranteed Maximum Price (GMP)

Unlike Lump Sum estimates, GMP contracts are when the Owner selects a few builders, based on their fees and general conditions proposals, and then interviews them to determine which Contractor to select. Typically this type of contract method has the Architect and the Contractor selected on or about the same time. The intent of the Owner is to have the Contractor work with the Architect during the design phase and develop cost estimates, identify constructability issues, and build a solid project schedule. Rather than focusing on your lump sum value as a key differentiator, teams need to convince the Owner as to why they are the best preconstruction team to partner with to arrive at the price the Owner can work with, as opposed to a Design-Bid-Build process in which the Owner has little or no control over the price and may be surprised on bid day.

This type of contract poses a different set of challenges. Since the Contractor has the benefit of going through detailed preconstruction analysis, change orders are not likely to be accepted by the Owner, unless it’s an Owner change. In addition, the Owner has full audit rights during the project, often referred to as “open-book”, which requires the Contractor to keep detailed records with clean audit trails.

How can you effectively secure the confidence of Owners that you are the best fit for the job? One way is to leverage technology that easily allows you to visually demonstrate how you plan to execute the project. This may include visual sequencing, showing conditioned models, or demonstrating how change management impacts budget.

Later chapters discuss how to sell preconstruction during the interview in greater detail, but this is a critical component of winning a GMP contract.



APPROXIMATELY

55%

of the time bids tend to be **OVERESTIMATED** due to manual estimating



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Value of Integrated Preconstruction

The greatest challenge in preconstruction is accurately hitting multiple moving targets. Design iteration is a necessary part of the design development process, it can't be eliminated but it can be controlled and accelerated.

Today's technology enables Architects, Contractors, Subcontractors, vendors, and Owners to collaborate much more effectively and rapidly than ever before. Using available BIM programs, quantification and estimating tools, document management systems, and change control systems enables all stakeholders to rapidly assess changes and determine their impact on cost, time, and constructability. The same technologies enable the Contractor to better communicate to the Owner what the impact of the changes are in a way that speeds up the decision making process and enables the team to arrive at the most optimal cost, schedule, and construction sequence.

Another critical aspect of the preconstruction process is the hand off from preconstruction to the construction team. Ensuring that the construction team knows where all of the critical construction challenges are, work in place tracking, status of long-lead items, site layout options, construction sequencing, budget line items, and a host of other important documents critical to understanding the project. Knowing what we knew and when we knew it, being able to communicate more effectively with Subcontractors regarding scope and sequence serve to make the project far more efficient than traditional means and methods allow.



The Value of Model Quantification

Because of the increase in model-based projects, Contractors today are basing estimates on a combination of 2D and 3D takeoffs. Estimators often develop early cost estimates using just a 2D program, but as the model evolves and becomes more inclusive of all construction elements, it becomes increasingly difficult to manage updates in a 2D environment. At that point, leveraging BIM for quantification becomes a more viable option.

Need more convincing? Here are the top seven reasons to start doing model quantification today:

1. MORE ACCURATE BUDGETS

When teams have the most up to date models and quantification is automated with more collaborative based solutions, estimates are not only more accurate, but also more competitive.

2. INCREASE EFFICIENCY

By using sophisticated quantification solutions, teams are able to produce bids faster with more confident quantities.

3. WIN MORE WORK

Improving your bid accuracy and efficiency is the first step in winning work. But on top of that, differentiating from the competition with better visual quantity management will bump up your win rates even more.

4. AVOID BOTTLENECKS

With easy to use quantification solutions that don't involve any prerequisite knowledge of design authoring tools, teams can more easily cross collaborate and share information.

5. VERIFY SUBCONTRACTOR NUMBERS

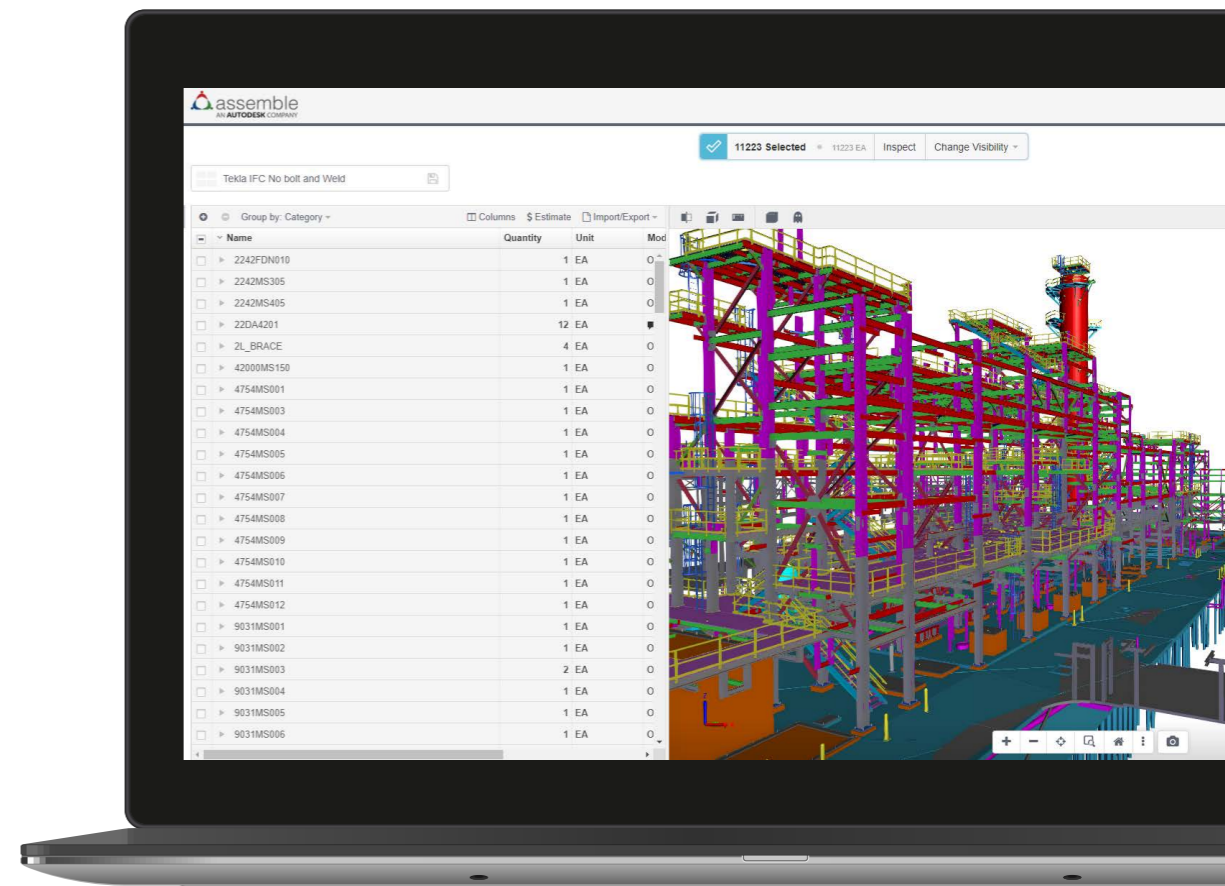
On bid day, general Contractors can easily dive into bid packages from the model to verify bids and quickly check that quantities provided by a Subcontractor are reasonably consistent with quantities contained in the model.

6. STAKEHOLDER ENGAGEMENT

Collaborating with Owners, Design Teams and Trade partners on a single platform.

7. BUDGET CONTROL

Tracking quantity trends by scope as the design develops prevents budget slips and can facilitate conversations for optimizing design early to lower costs.



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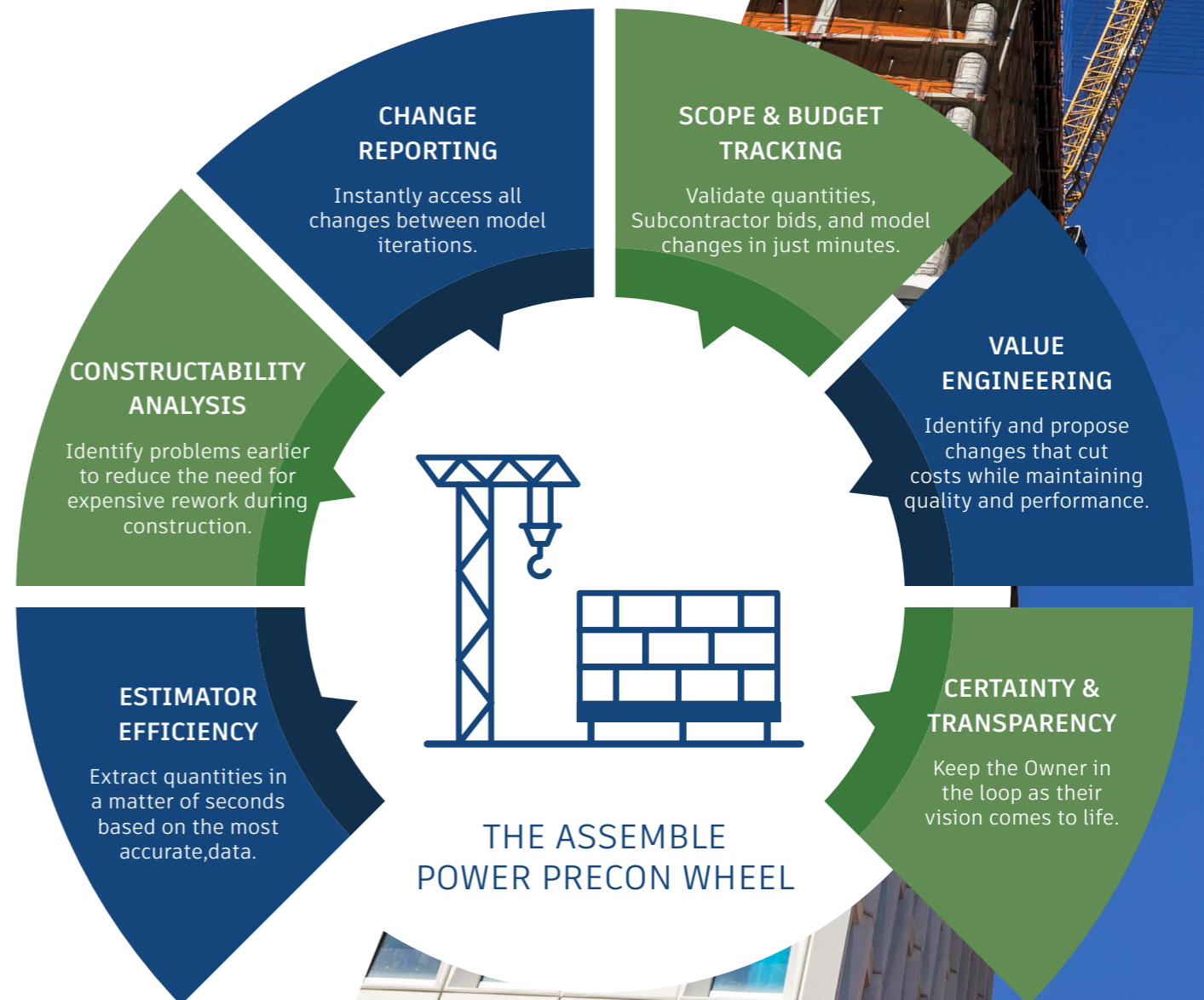


Beyond Estimating

POWER PRECON

Putting “Power Precon” into practice is about taking a holistic approach. It is not just about increasing estimating efficiency, it’s about building a road-map for construction that maximizes cost and schedule savings while maintaining transparency with the Owner and the rest of the project team.

The first step in putting “Power Precon” into action, is finding the right technology solutions that support the various components of delivery. Tools like Assemble Systems, a SaaS solution that enables construction professionals to condition, query and connect BIM data to key workflows, and BIM 360, a unified platform connecting your project teams and data in real-time, from design through construction, can help power up your preconstruction game.





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Constructability Analysis

During preconstruction the Owner, Architect, and general Contractor all have to understand the design intent and make important constructability decisions. Practicing “Good BIM” means giving construction teams visibility into the designs early in the process. This allows them to provide an expert opinion on whether a proposed design is actually buildable as well as give recommendations on changes and sequencing to help optimize the end result.

This constructability process often requires what-if analysis to determine the best methods and cost controls. Managing this analysis and communicating effectively with all stakeholders is critical. One of the key ways to do this is through visually demonstrating constructability issues via a system that enables you to condition and manipulate the model.

Cloud based solutions like Assemble and its new integration to BIM 360 & Navisworks allow teams to condition a design model and translate it for use in construction. With this new conditioned model, that is also now rich with saved metadata for future use of iterative changes, preconstruction teams can connect it back to the project schedule, scope, and budget. This ensures that as designs change, critical elements like cost and time are automatically updated giving Owners full visibility into the impact of a change.

In addition, with built in version control capabilities, it allows teams to test different options (without losing work on the original) to ensure they are developing the right plan to deliver the project on time, on budget, with high quality, and safely.



“It is important to start with the end in mind and understand the essence of a solid project information model to be able to use and re-use the digital information across the enterprise (cost avoidance and minimizing risk). Solid 3D information models are the answer. By implementing and using BIM 360, we have seen an enormous increase in information consistency and quality across the supply chain. Rework and cost of failure have been significantly reduced across all project stages.”

- GERT-JAN DITSEL, BIM MANAGER, DURA VERMEER



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Iterative Precon Estimating

Owner's expectations for preconstruction continue to increase. They expect real-time updates, often weekly, to understand the status of design, cost impacts, scope options, and schedule implications. Preconstruction teams need to be able to take new information from the design team and immediately ingest changes and determine how these changes impact the project.

This is next to impossible in a 2D manual process. With a system that automatically identifies changes from one iteration to the next, teams can now keep up to pace with Owner demands. Assemble allows preconstruction teams to process rapid identification of changes, the cost impacts, and visualization of sequence impacts and design intent change within minutes.

Beyond quantifying changes, iterative preconstruction estimating is about communicating these changes to the Owner and Architect in a language they can visualize and understand. With automated quantification and saved BIM data, Assemble can easily translate model impacts to everyone on the team. Equally important, the entire team: Owner, Architect, Contractor, and Subcontractors can have real-time access into the progression of the project.

Project Sequencing

Project sequencing during preconstruction is essential to building the project plan and ensuring the most efficient project schedule. By visualizing construction tasks, teams can get a more accurate sense of what needs to happen and when. This process requires multiple iterations and what-if scenarios, for the teams to understand the project and communicate it effectively. Many projects have limited site space and developing an effective project plan requires the ability to visually determine what spaces can be used for staging as well as when they can be used. Where to place cranes, identify projected picks and determine the load capacity required.

Sequencing visualization tools like Assemble that are interconnected to BIM data enable you to condition a model and set it up to show a simple visual platform to communicate sequence options to project stakeholders. Not only are you then able to build an effective schedule, but you are also left with a sequenced model that can be used in downstream during construction for Percent Complete / Work in Progress exercises to better manage project cost.





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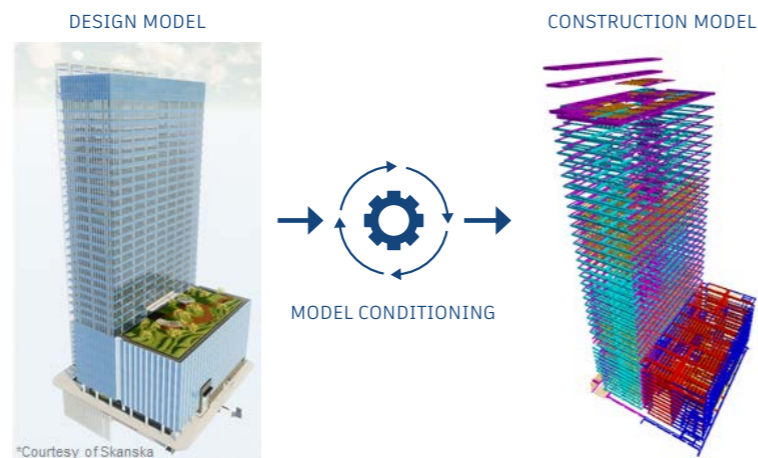
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SELLING PRECON AT THE INTERVIEW

Preparing the Model for the Interview

Simply building a model, or using an Architect's conceptual model, is no longer enough to carry the interview, everyone can do that. The Owner wants to see practical application of the technology used on their project, but not by the VDC teams, they want the preconstruction and onsite teams to demonstrate how they use the tool to do their jobs.

Model conditioning tools like Assemble enable project teams to take the Architect's model a step further and breakdown relevant steps for project planning. Successful interviews require that the project team has a well defined workflow, graphically laid out, and demonstrated in a way the Owner clearly sees the value. Without connecting the design to a work breakdown structure, scope, or schedule, you are left with silos design data rather an integrated preconstruction plan.



Taking the design model and conditioning it to demonstrate detailed preconstruction planning during the interview is a key differentiator.



Demonstrating Change Management

During the interview the Owner wants to know that he or she will get clear and timely information regarding any changes. Iterations accelerate rapidly during preconstruction and the project team needs to demonstrate to the Owner that their process can manage the volume and frequency of change and provide concise insights to cost, time, and constructability impacts resulting from design iteration.

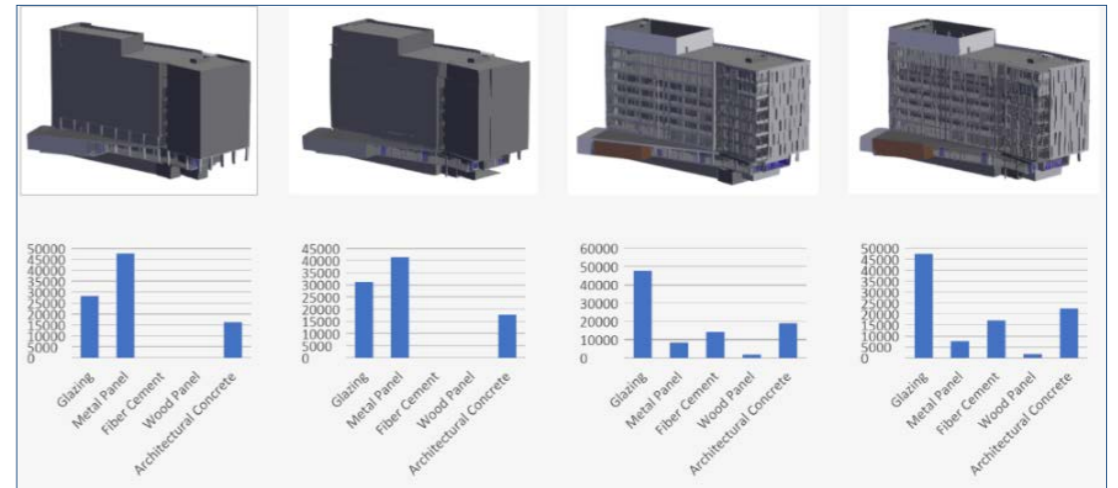
By leveraging reporting capabilities to show snapshots, progressions, and variance dashboards, project teams can quickly show project updates to Owners on a regular basis.

“Assemble provides us with immediate insight into design changes, which enables us to respond faster to the process of the change. Without Assemble, identifying the scope differences and quantifying their cost impacts took days or even weeks, now it takes just minutes.”

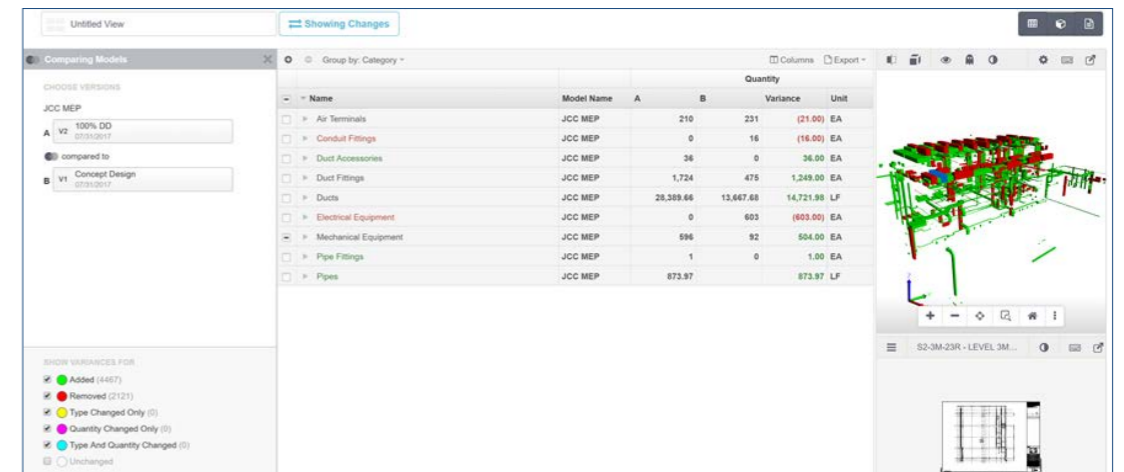
- FLINTCO

“BIM 360 has powerful document management functionality. We use it to make online markups and change request. This in turn enables us to easily assign a task to the design team and the designers can answer queries and address construction issues in a timely manner.”

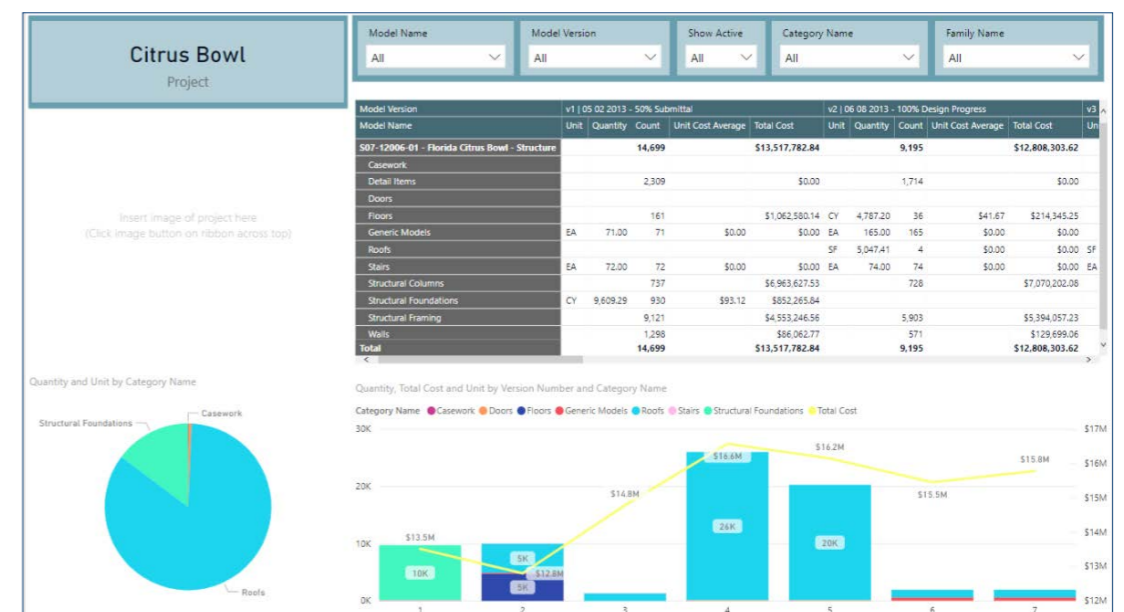
- KEVIN XU, PROJECT INTEGRATION DIRECTOR, ALPHA KING



EXAMPLE PROGRESSION VISUAL REPORT



EXAMPLE SNAPSHOT REPORT



EXAMPLE VARIANCE DASHBOARD REPORT

Demonstrating Value Engineering

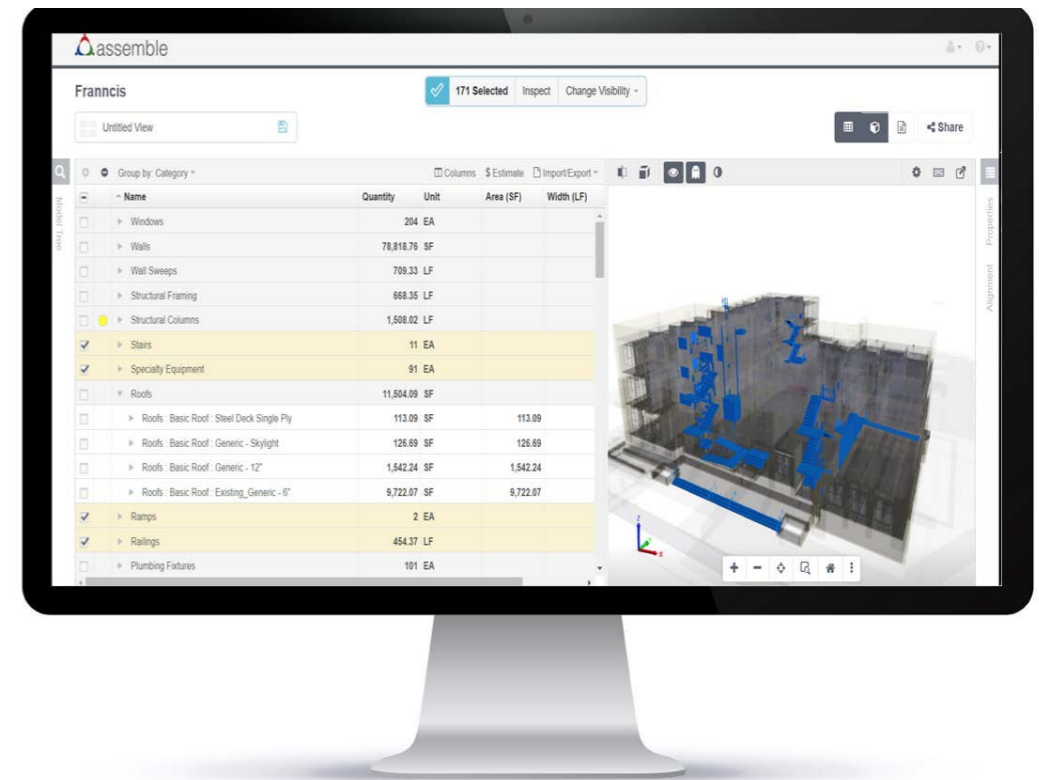
Value engineering (VE) has become a standard practice for many, if not most, AEC projects today. As common as it is, however, VE is not always fully understood or well executed. VE is not a design review process. Nor is it a cost-cutting exercise conducted at the expense of project integrity. Designers should apply VE by considering alternative design solutions to optimize the expected cost/value ratio of components within a project. Contractors should use VE to identify and propose changes that cut costs while maintaining or enhancing the quality, value, and functional performance required by the Owner. When done effectively VE benefits the entire project team!

But when applied optimally, VE is a creative, organized exercise conducted collaboratively – and as early as possible – by all project stakeholders to deliver project requirements at the lowest total cost. Progressive project Owners are looking for partners to provide advice and guidance regarding options to deliver a project on time, under budget and up to a high level of quality. Collaborative VE ensures that all parties are working toward the same goal.

Whatever the approach to VE on any given project, one aspect holds true across the board: VE is effective only to the extent that it is carefully planned and executed. Fortunately, new technology is making this easy and affordable for AEC professionals.

Preconstruction solutions like Assemble have developed tools that sidestep traditional obstacles and allows AEC professionals to easily and affordably optimize VE by greatly enhancing the speed, accuracy, and outcome of the process. Flexible VE tracking and collaboration provides a window into accurate quantities of elements, tracks proposed changes, and creates an audit trail for later verifications.

Using a cloud-based model data management platform provides all project members with the ability to access the model information and easily understand the elements, quantities and costs being discussed – regardless of their physical locations – facilitating team collaboration is the cornerstone of true VE.



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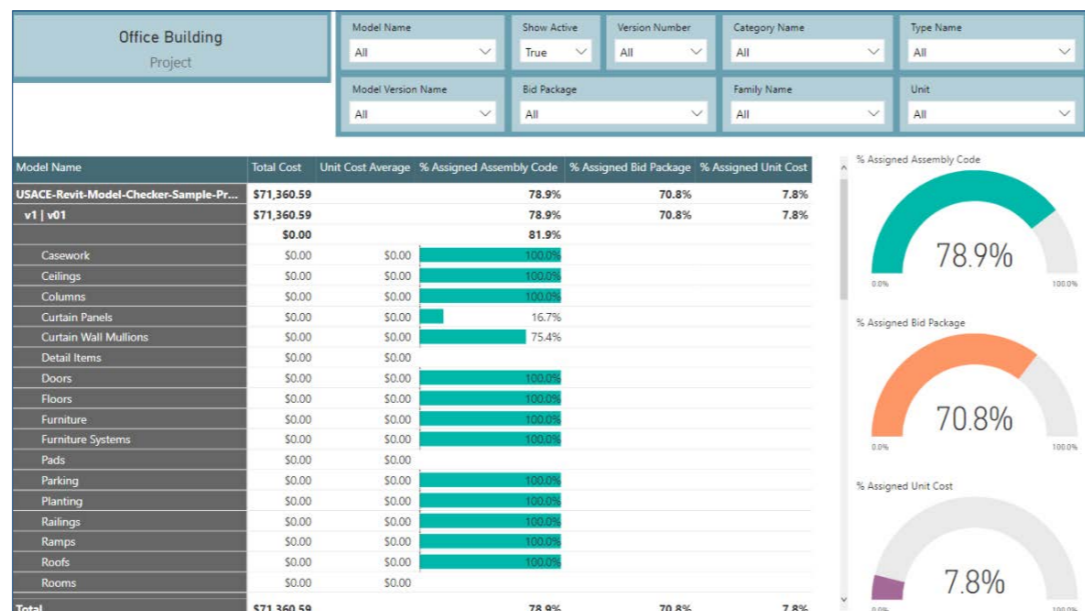
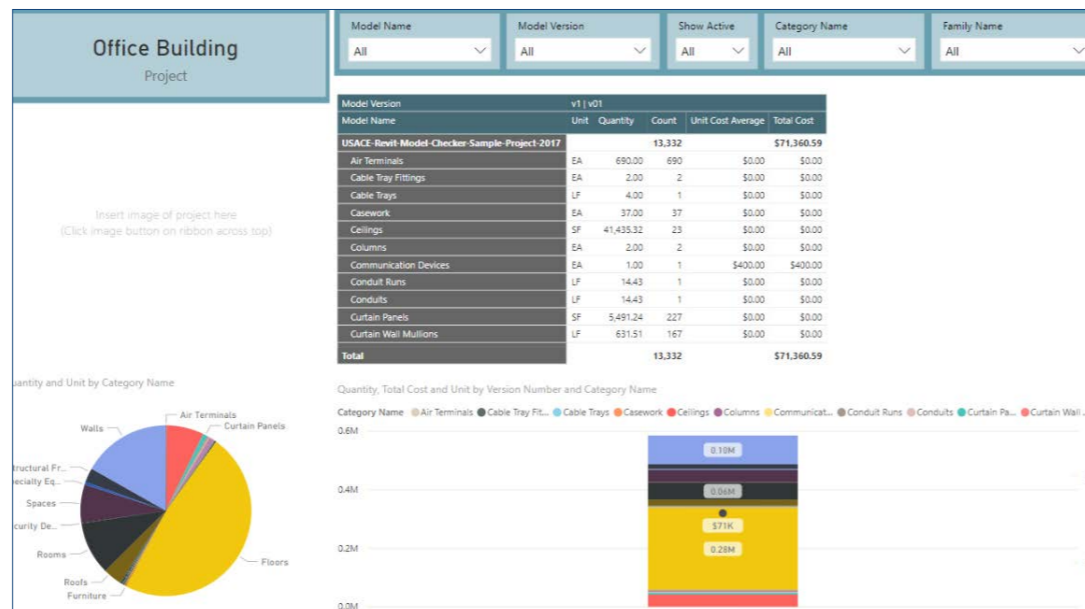
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The Owner Dashboard

Every Owner has their “pet-peeves” regarding transparency of information, validity of information, and timeliness of information. Regular reports are the standard of the past, and dashboards are quickly becoming the new expectation. A typical preconstruction schedule includes a regular cadence of meetings, but Owners want to be able to check-in on progress and changes at any time.

This is where leveraging a cloud platform can really shine. Teams can work with the Owners to identify the key aspects of their concerns and build a custom project dashboard allowing them to see real time information and ease uncertainty.

EXAMPLE OWNER DASHBOARDS USING ASSEMBLE SYSTEMS



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BEYOND ESTIMATING

Don't Tell The Client What You Will Do, Show Them!

The easiest way to convey project scope is by showing visual representations of what needs to be done. This is of course the primary way design teams show their work, but what about preconstruction teams?

Using BIM models that tie back into budgets and schedules is a great way to visually represent preconstruction activities. The best part about leveraging a more automated cloud based quantification tool is that it allows for visualizations to happen across the entire project team. Everyone can access the “Conditioned” BIM model in the cloud whether they are in an office or on a jobsite using a mobile device.





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P. Agnes, Inc. Uses Assemble to Expand Model Data Throughout The Entire Construction Lifecycle

P. Agnes, Inc., is a family-owned Philadelphia Metro-area-based firm with expertise in preconstruction, Design-Build, construction management and general contracting for the healthcare and higher education sectors. This family owned construction firm implemented the use of cloud-based preconstruction tool, Assemble, to establish BIM processes to use model data throughout the entire construction lifecycle including both Owner views and advantages for team members working in the field.

OWNER VISUALIZATIONS

A picture is worth a 1,000 words...and a 3D model is worth 1,000 pictures.

Using the modeling views from Assemble, P. Agnes builds transparency and trust between its team and Owners in two primary ways:

1. Exploring design options and visually illustrating for Owners the challenges and opportunities of 'what if' scenarios.
2. Communicating with Owners about any changes that arise during project delivery.

Most Owners are not construction professionals, and therefore are not used to reading plans and 2D drawings. Using a 3D model to visualize what's happening on the project provides the most value as you're able to group, sort and filter data.

MODELS IN THE FIELD

Knowing the use cases for the field could be broad, P. Agnes kept implementation simple by first asking their superintendents how current Assemble outputs could be leveraged.

Through Assemble's Web and App access, P. Agnes gave its superintendents access to 3D model views to use in problem-solving on site. Immediately they found value in both consuming the information and contributing information:

- Marrying 3D views to the 2D sheets, field superintendents more effectively communicated with teams onsite and used the information for on-the-fly problem solving.
- Simplifying project handoff and management, superintendents used Assemble to provide real time status updates.

P. Agnes continues to use field feedback to enhance modeling upstream in a way that supports these downstream users in saving time and improving communication.





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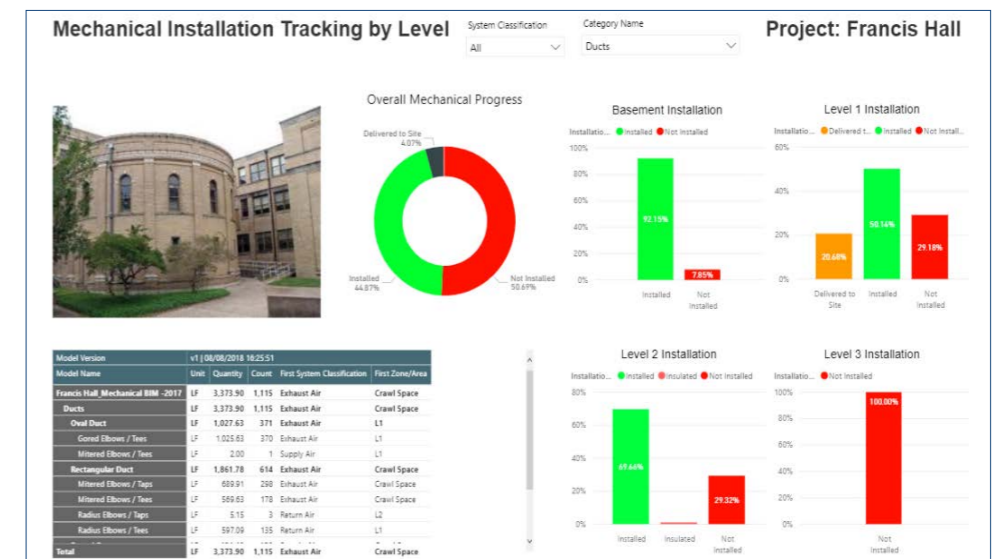
Extending Precon: Real Time Percent Complete Management

Construction doesn't start when you break ground, the whole process typically begins with a pen and paper and some rough concept designs. From the first models to final punchlist closeout, and turn-over the whole project lifecycle is connected. With the transition from one teams phase to the next, it is crucial for the technology hand-off to be seamless.

The move from preconstruction to construction is arguably the most important critical since the foundation of the project is set and onsite work is starting to ramp up. So choosing solutions that are integrated and built using a common data platform is key to making this changeover much easier.

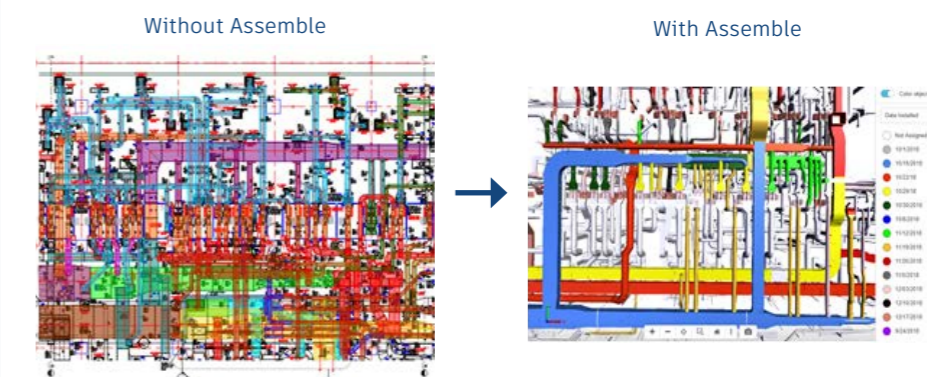
So how can preconstruction tools like Assemble help in the field?

- **WORK IN PLACE TRACKING:** Teams can leverage models in the field for Work in Place (WIP) tracking and schedule, sequencing and coordination discussions. By making models accessible through the cloud and more importantly simple to understand and use, construction teams can organize models around relevant data, view data that has been pre-filtered for daily needs, engage and update live field information from the site and connect conditioned model data and quantities to project reports in real time.
- **PERCENT COMPLETE PROCESS:** Teams can select model objects and status from the field on a mobile device. Connecting status to model objects provides a visually rich progress report, with automated colorization, that is directly tied to the project quantities.
- **ACTIONABLE DATA FROM THE FIELD:** Connect issues in the field directly to the impacted model objects for more precise tracking and improving future designs.



EXAMPLE WIP DASHBOARDS

TRACKING PERCENT COMPLETE



ASSEMBLE ALLOWS FOR MORE ACCURATE & EFFICIENT TRACKING



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- **COST LOADED SCHEDULE:** Conditioning a project model with work breakdown structure, unit costs and schedule provides a complete picture of how project dollars will be spread along the project timeline.
- **SCOPE VISUALIZATION:** Imagine highlighting all of the fire rated elements, or isolating a single Subcontractors work scheduled for the week, or displaying all of the elements that are behind schedule in only a few clicks. All of these visualizations are easy to create in Assemble and can be shared with the rest of the project team.
- **PROJECT TEAM EFFICIENCY:** Put an end to Project Engineers re-quantifying in 2D or highlighting linework by scope/trade. With a unified system, teams can save the work done during preconstruction and spend time on more important tasks.

“I can sort and filter the data from Assemble by installation status and activity Ids in a matter of seconds to see quantities installed. With the manual takeoff methods, it would take hours and when we would go back and double-check, the numbers would come out different every time. With Assemble, now we have extreme confidence in the number we are reporting”

- SPENCER HOBSON, SENIOR PROJECT ENGINEER, MCKINSTRY

“Leveraging model data for quantification has resulted in significant cost and time saving. With the use of Assemble, our takeoff time has decreased by up to 40%.”

- PLANT CONSTRUCTION COMPANY



Get instant access to BIM data
for preconstruction workflows
with Assemble.

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