Trimble

THE MEP CONTRACTOR'S GUIDE TO CONSTRUCTIBILITY

As construction projects become more complex, the need for speed and efficiency increases as well. The level of wasted time and effort that used to be considered unavoidable is now not only avoidable, but even unacceptable for construction companies that wish to succeed in an increasingly competitive marketplace.

To achieve the speed and efficiency that's expected these days, without sacrificing quality, contractors and professionals throughout all phases of a construction project need to rely on technology that promotes and supports what has become known as "the connected jobsite." But, technology alone can't accomplish all that's necessary for a number of reasons:

- **Multi-company collaboration is necessary.** Few organizations are large and diverse enough to handle all phases of every job in-house, so collaboration with other companies and the use of subcontractors is still very common, especially across the MEP disciplines.

- **Information and experience are siloed.** Following decades of "how we've always done it," most construction disciplines remain in silos, even within the same organization.

- **Tech adoption is slow.** The construction industry has historically been slow to adopt new technology and practices because updating is generally expensive and time-consuming. This is especially true of small companies and individuals that often serve as subcontractors.

- **Workflows are different.** Every successful organization has likely developed its own unique workflow that's worked well, but it's unlikely to mesh perfectly with any other company's workflow.

Resolving these lingering issues requires a unified process and workflow that coordinates and connects all phases of a building project, breaking down silos and facilitating clear and quick collaboration between all parties.

Finally, that unified process exists.

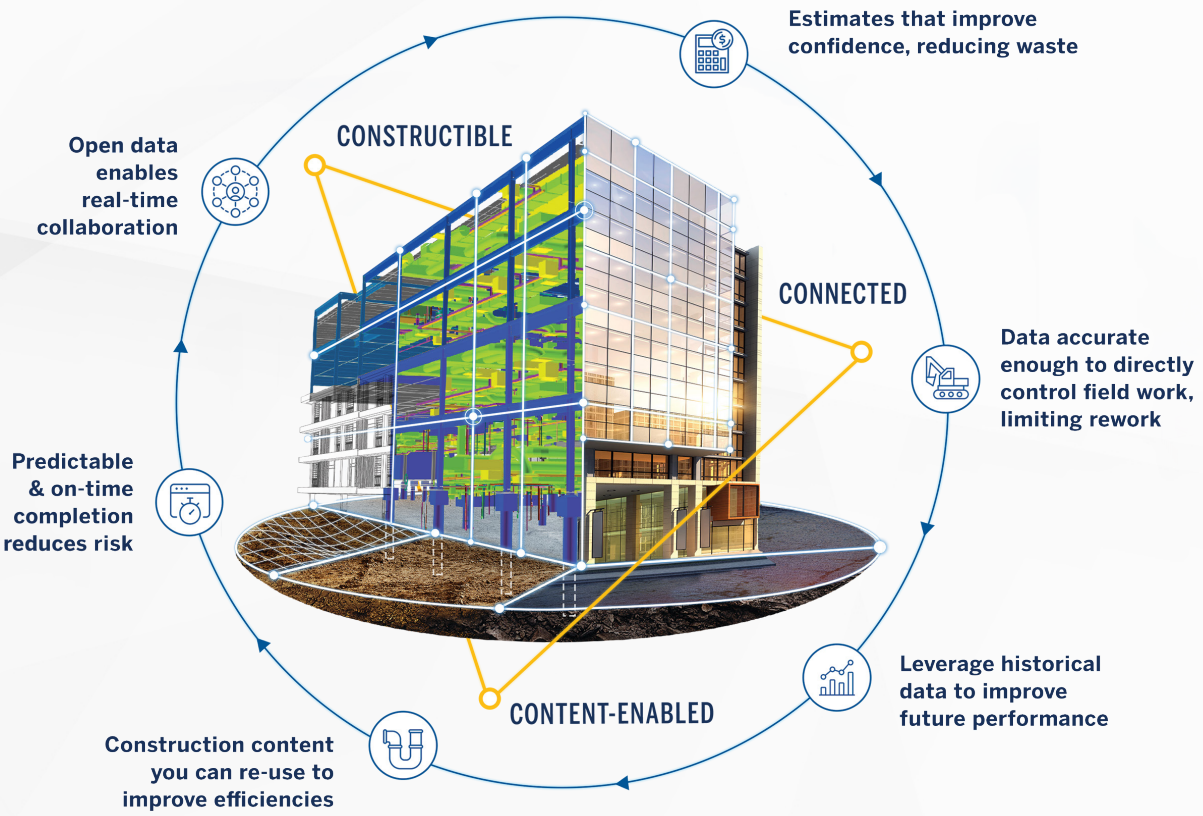
The Constructible Process

The core of The Trimble Constructible Process is The 3 Cs:

1 All phases and trades are **CONNECTED**

2 Models and workflows are **CONTENT-ENABLED**

3 **CONSTRUCTIBLE MODELS** drive smarter workflows



Connected

By liberating data and breaking down silos, coordination and product management are improved across every touchpoint.

Of course, all the data in the world is not going to help anyone if it can't be quickly and easily shared, discussed, understood, and integrated into every phase of the construction workflow. So, the necessary hardware and software solutions bridge that gap, allowing...

- Architects and designers to effectively communicate their ideas to the estimators and project managers
- Detailers to effectively process jobs through fabrication
- Contractors and project managers to appropriately coordinate the building work onsite
- Facility managers to take full advantage of constructible content to get the most out of their new buildings

Content-enabled

Constructible content is any digital asset that provides the technical information and geometric parameters necessary to fully define a physical object such as a building component, length of pipe, or fabricated housing for machinery. Working with Managed Content ensures that 3D models are created using the most up-to-date data and parts' specifications direct from the manufacturer. That way, there's no confusion as to what it is, what it's for, where it goes, and how it needs to be installed.

When various pieces of constructible content are connected as described above, it allows experts at every phase of a construction project to easily collaborate to turn an architect's initial idea into a completed structure.

Constructible

Enables real-time collaboration from the field to the office and back, using living and customizable data so accurate, you can build the digital design you promised, on time and on budget. Precise geometries help uncover issues earlier. In constructible workflows, building data is used in the field to direct the construction process.

In the office, **constructible** models allow different trades to coordinate properly. If the information is not accurate (the models are not **content-enabled**), this is a waste of time. Likewise, if the ability to share is limited (the phases are not **connected**), coordination suffers and waste occurs.

In the field, the same high level of detail (LOD) constructible models can be used for fabrication, layout and installation purposes, ensuring everyone stays on the same page. And, if changes are required, they are made universally via the models, so everyone is immediately aware and can quickly adjust as needed.

So, following The Constructible Process is really the key to a successful building project workflow. But, let's dive a little deeper into what this optimal workflow looks like from the MEP contractor's perspective.

To learn more about The Constructible Process and its impact on modern construction, download our free ebook: **How the Constructible Process Will Transform the Construction Industry in 2020**

The MEP Workflow

In decades past, MEP contractors often followed a workflow that incorporated 2D design drawings (both architectural and structural), which were then manually converted into 3D models using software like AutoDesk Revit or SketchUp. These models allowed for clash resolution, a valuable means of identifying and eliminating problems in the design before they led to costly fabrication or installation errors and rework. Then, additional 2D drawings and schematics would be produced as needed by fabricators, installers, and professionals in other departments.

While this workflow was superior to the pre-BIM methods in many ways, it doesn't hold up today considering how far the requisite technology has progressed. There's no longer any need to manually convert drawings into models and back again, since **a truly connected workflow based on The Constructible Process allows for the use of the same content-enabled, constructible models throughout the entire building project**.

As a result:

- MEP contractors can capitalize on the clash identification, visualization, and data-rich benefits of these models while avoiding the potential problems inherent in every manual process.

- The information contained in the model can be updated once with the new version becoming instantly available to all stakeholders in real-time.

By fully utilizing the available technology and adopting the more collaborative approach to complete project management that The Constructible Process facilitates, MEP contractors will find their place in the following generic workflow to be most profitable and advantageous.

Design for constructibility

While the initial architectural and structural concepts are unlikely to include much detail regarding MEP specifics, these initial plans and designs do serve the vital purpose of interpreting the owner's overarching vision for the project and putting it into a concrete form (no pun intended) that effectively communicates that vision to other stakeholders.

When **architects produce 3D models** to communicate their designs, they're not yet constructible models. But, they do provide the foundation for what will eventually become constructible models, and they save the time and effort it would take for structural engineers and MEP detailers to convert their designs into models that can be used from that point on.

The planning phase also includes the estimates and requisite job submittals MEP contractors need to generate if they're seeking work as subcontractors on a project. If the architect has provided a 3D model, both these jobs can be completed more quickly and efficiently with access to a **library of managed digital content** and **pricing services** along with software solutions designed to coordinate each component of the model to a completed **estimate** and/or job submittal package.

Once the job is won, the ability to use the same constructible model to move from the initial estimate into **project takeoff** also saves precious time while adding to the model's robust backbone of valuable data.

Coordinate the detailing

MEP detailers are responsible for zooming into the initial design or model and determining how to apply practical engineering and construction knowledge and experience to **designing the structure's mechanical, electrical, and plumbing systems**.

This important work directly impacts both the fabrication and installation phases by providing the details needed to quickly and efficiently produce and install every pipe, outlet, and duct needed throughout the building. But, it can also bring to light issues in the initial design or estimate, sometimes requiring further collaboration with the architect, structural engineers, and even the owner. By resolving these issues virtually **using collaborative 3D models**, the detailer can save a tremendous amount of time and money on both ends of the project and help produce a better product overall.

Optimize the fabrication process

By **passing a content-enabled constructible model to the fabrication shop**, detailers and project managers offer shop managers all the benefits of that data:

- Pre-verified measurements for every component
- Up-to-date manufacturer specifications
- A complete "big picture" understanding of how each component fits into the completed structure
- Detailed fabrication instructions

With the right solutions installed, data from the 3D models can be seamlessly integrated with cutting machine automation platforms, enhancing the fabrication process even more. At this stage, the model's value to the scheduling and budgeting aspects of **project management** creates additional value:

- By taking advantage of just-in-time manufacturing, fabrication shops can maximize profitability and efficiency.
- Shipments from the fabrication shop to the jobsite can be arranged to minimize bottlenecks and streamline scheduling of labor and necessary equipment.

Ensure fast and efficient installation

The installation phase is improved in much the same way fabrication is improved by the use of constructible models. By taking advantage of the right technology, every subcontractor, foreman, and manager on the jobsite has access to the same information. As a result, every aspect of the complex building process becomes more efficient and profitable:

- Initial layout preparation can be dramatically sped up by feeding constructible model data into **integrated layout solutions**.
- If the work involves any existing structures, **laser scanning** of as-built conditions can also be integrated with the data contained within the constructible models.
- As components come in from the fabrication shop, there's no confusion as to where each one belongs and exactly how it needs to be installed.
- In the rare circumstance where issues arise during installation, everyone previously involved in the project — from the fabrication shop all the way back to the architect and the owner — can reference the same detailed model to discuss the ramifications of a change and come to a quick decision that's best for everyone involved.

Facilitate long-term structural maintenance

Even after the project is completed, The Constructible Process offers **benefits for owners and facility managers** who can use the as-built constructible models as robust reference material to inform ongoing maintenance requirements, energy and space optimization, and future remodel or upgrade projects. The ability to pass along as-built constructible models to a new owner could even increase the resale value of the property.

Bringing it all together

Reviewing all the steps described above, it becomes clear:

Following The Constructible Process is the key to a successful building project workflow for MEP contractors in the modern construction environment. No other process incorporates the most advantageous technology and best practices in the same seamlessly connected way, producing optimal speed, efficiency, and profitability without sacrificing quality.

To learn more about The Constructible Process and how it can apply to your organization, take our free assessment, **How Constructible Are You?**