7 Essential Capabilities of MEP Modelling Software

Trimble

Contents

As an M&E engineer or designer, you are tasked with generating models that precisely reflect what is going to be built. You must confirm dimensional accuracy, ensure quality and create usable and reliable outputs for downstream work—all while staying on schedule.

Your efficient and quality work is critical to the operations leader, project manager, and business owner. Suppose you can improve accuracy, eliminate rework, and reuse data across workflows. In that case, you can boost your team's productivity, ensure a steady project flow and shorter completion time, and preserve your company's profits.

But MEP design and detailing jobs are technically complex and challenging under the best circumstances. Not only do you face disruptions and inevitable rework requests, but most basic modelling software only prompts you to indicate whether an item is a pipe, duct, or conduit. This software doesn't necessarily show or capture information on manufacturers or ratings (such as fire ratings or other technical data) or provides you with integrated calculations for sizing the MEP systems.

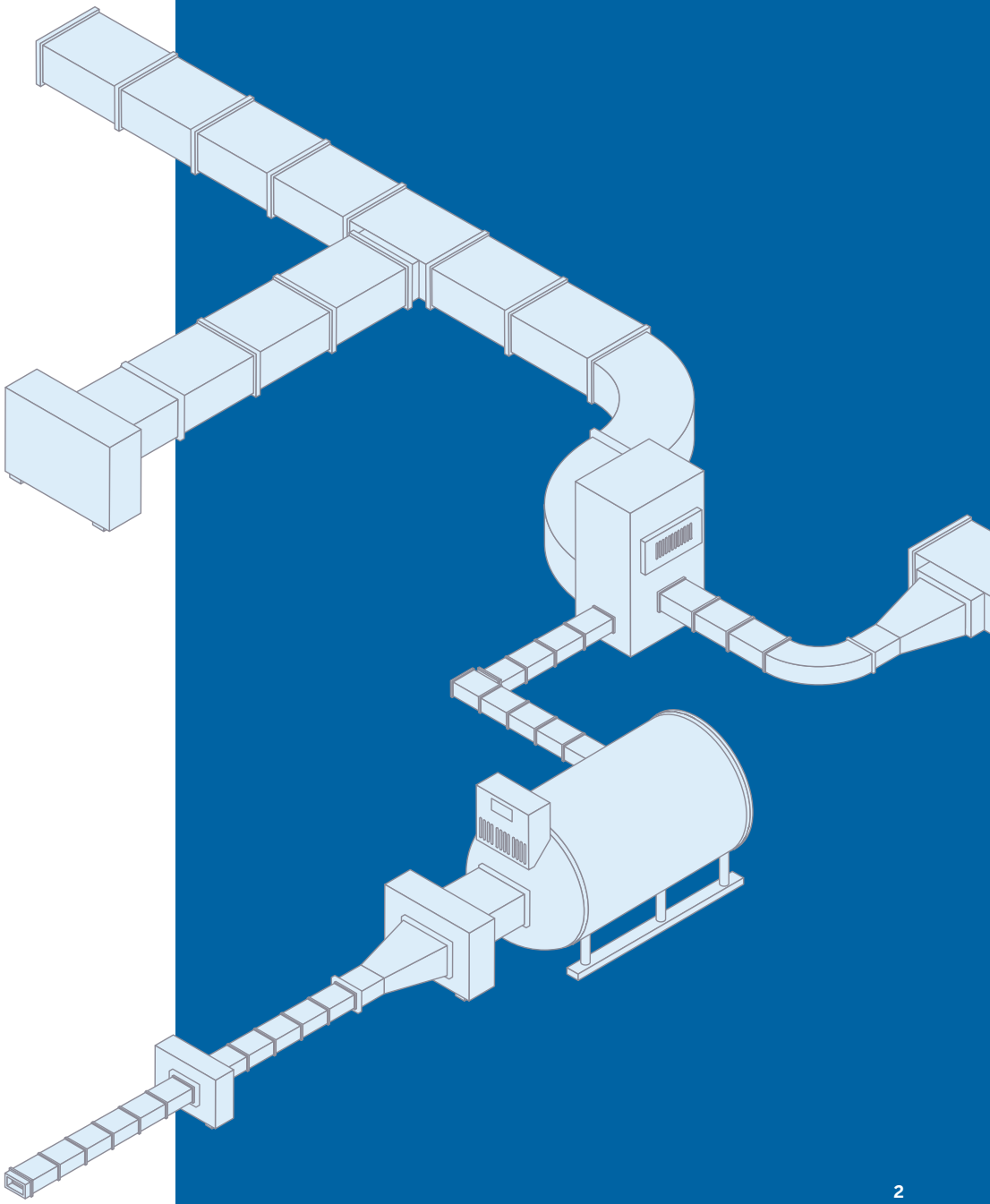
Better construction starts with MEP data modelling.

Fortunately, there are companion tools and add-ins that will help. No matter how you've integrated building information modelling (BIM) in your workflows, better MEP-specific tools can help you meet the demand with more reliable data that you can plug into your specific processes.

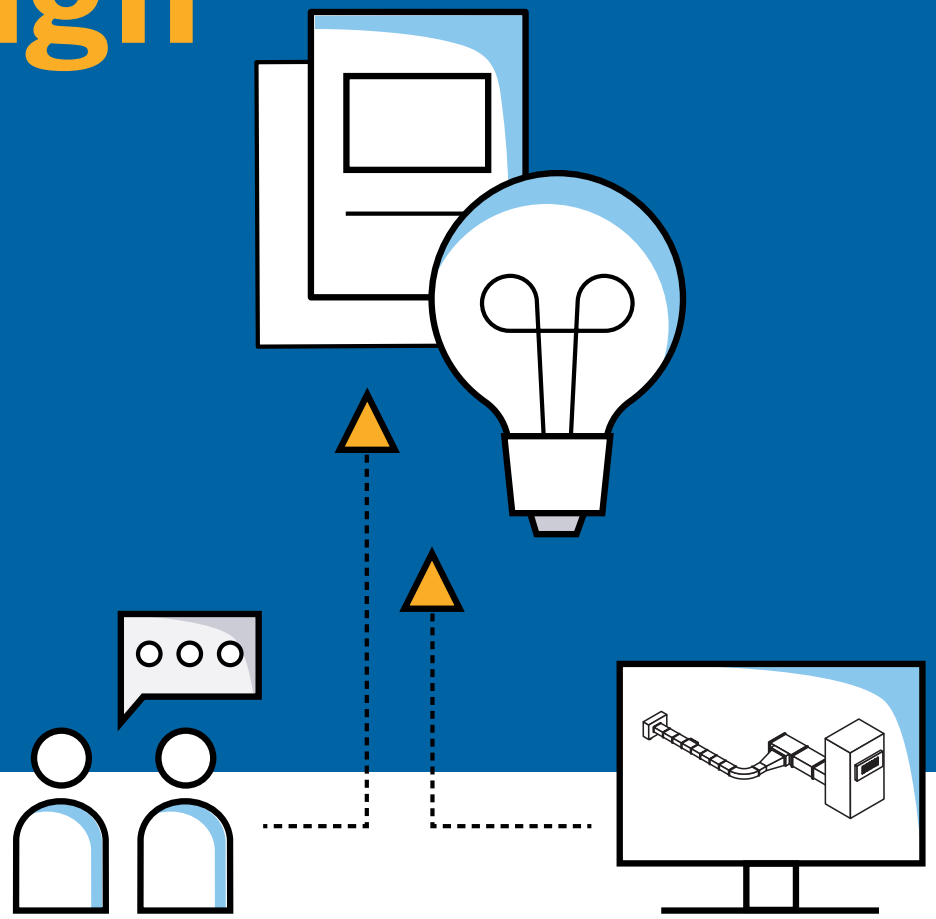
One of the MEP-specific tools to consider is modelling software integrated with your chosen design platform. This software provides trade-specific user interfaces and specification-driven content selections, including, amongst others, calculations and productivity tools.

In this eBook, you'll discover seven key capabilities to look for when selecting MEP modelling software. You'll learn how to find a solution that will enable you to produce fast and accurate models, reports, and prefabrication outputs by

- Generating constructible models based on rich data,
- Conducting fast, accurate, fully integrated calculations based on the latest local standards and norms,
- Raising the quality of the entire design-to-construction process,
- Making turnaround times faster, and
- Equipping your team to accomplish your prefabrication goals with collaborative, digital workflows.



Conceptual design



Collaborate in the most realistic modelling environment.

Conceptual design is an early phase of the MEP design process outlining a project's broad functions and forms. At this stage, engineers and designers are increasingly utilising conceptual design to learn about potential design issues and subsequently try to find a solution in the early stages of the design process. Following the conceptual design stage is "detailed design" or "developed design." At this point, the M&E engineer or designer tightens the reins on the design scope, and the main building components are developed and described. It's also the point that explores the cold, hard truths of what is and isn't possible.

During the conceptual design phase, a consultant team (including architects, M&E engineers and structural engineers) will develop, among other things, the design concept, outline specifications, the cost plan, procurement options, program and phasing strategy, constructability and construction logistics, and the development of the project brief.

Therefore, it is essential to consider CAD software suitable for conceptual design, especially with BIM in mind. Only then can collaboration between project stakeholders be seamless from the initial project phases, helping engineers, both consultants and contractors, keep their projects within budget and on schedule as they move along the "developed design" or "technical design" RIBA stages and beyond.

Important capabilities

- Ability to create a clear user interface which is easy to understand and interpret
- Ability to create schematic diagrams within your conceptual design stage
- Incorporating drawings, reports and other structured data directly related to the built asset and its facilities, levels, rooms, zones, systems and components in the project information model
- Ensuring that conceptual design can be reused later on in the process for 3D models and airflow diagrams by rapidly producing various M&E system configurations based on different locations, solution metrics and architectural inputs
- The input of design goals, along with parameters such as performance or spatial requirements, materials, production methods and cost constraints

2

Fully integrated calculations

Improve design accuracy by eliminating manual and time-consuming calculations.

Mechanical (HVAC), electrical, and plumbing calculations are essential when designing new technical installations in a building. MEP calculations are imperative to achieve maximum building efficiency in terms of energy consumption, wastewater treatment, space allocation, etc. But some companies still use or prefer the traditional method of manually calculating and solving equations. This approach can detract M&E engineers from focusing on the entire design scope of the project, as it goes against the motto: "work smarter, not harder".

Therefore, M&E engineers should equip themselves with MEP modelling software to perform the most essential calculations.

M&E engineers who perform integrated system calculations benefit from a more efficient and productive workflow. More importantly, they encounter fewer errors because they no longer have to conduct manual calculations or data exchanges with an external calculation program. Fully integrated building and network calculations also keep the MEP system designs compliant with local regulations, allowing for more security and confidence in the output of your calculations.

Other benefits of fully integrated calculations include increased quality and consistency and the ability to remain responsive to the frequent changes that occur during the design of a project, resulting in greater customer satisfaction.

CIBSE SVA SOFTWARE VERIFICATION ASSESSMENT

Software Verification Assessment by CIBSE

The Chartered Institution of Building Services Engineers (CIBSE) is the professional body for the United Kingdom that exists to advance and promote the art, science and practice of building services engineering. It is an international operating authority setting standards and publishing guidance and codes.

MEP firms can work closely with the institution to develop Software Verification Assessments (SVA), assuring that the calculations performed by the MEP modelling software follow a certain quality standard. Only when passing the verification process for calculations such as ventilation, air systems, heating and cooling water systems, drainage systems and more can MEP engineers ensure to work with the most accurate and industry-compliant calculations.

Learn more

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Important capabilities

- Generate fast, accurate, fully integrated calculations based on the latest local and/or European standards and norms
- Perform all types of calculations, from “simple” calculations to more complex calculations such as the transient thermal response of buildings or noise level calculation for duct systems
- Ensure the MEP software is certified (i.e. CIBSE’s SVA)
- Ability to see and work directly with the calculation overview in the BIM model

BIM content

Access “managed content” libraries in your MEP modelling software.

“Content” refers to the in-line commodity items to build mechanical, electrical, plumbing, process piping and HVAC systems. These items can include pipes, valves, fittings, strainers, junction boxes, electrical boxes, ducts, dampers and a variety of trade specialities that comprise the systems you’re modelling.

Maintaining content in-house may be a tempting option. After all, most of the work an MEP firm instals on any given job is likely contained within a database of +/- 10,000 items—that’s not too much to handle, right? And after you factor in all the last-minute demands and object modifications, it’s easy to see how your data could quickly become corrupted with incorrect values.

> “Bad data may have caused $1.8 trillion in losses world-wide and may be responsible for 14% of avoidable rework, which amounts to $88 billion in costs.” (Autodesk, 2021)

To avoid the pitfalls and costs of inaccurate content, look for MEP modelling software that tackles the problem head-on and furnishes libraries of reliable, manufacturer-specific BIM content for your projects.

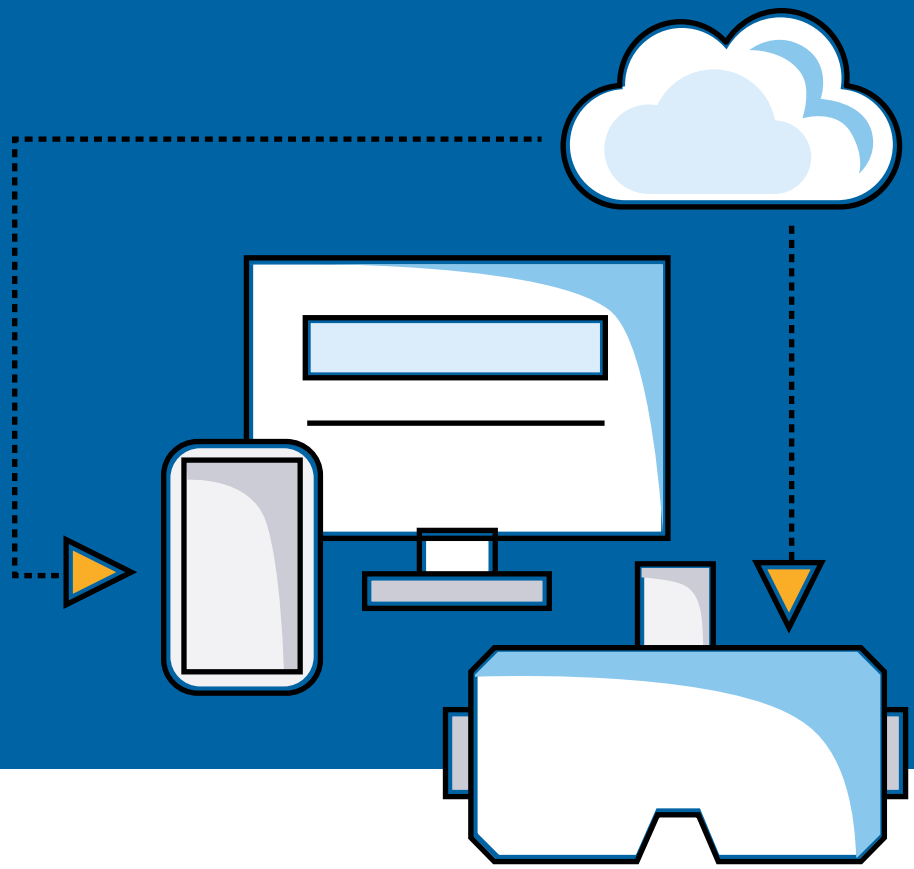
Furthermore, it’s important to make sure the software provider has the headcount and processes in place to manage all this data systematically. You should easily find specific BIM content updated by the software provider with the correct dimensional, symbolic and 3D information. Having updated and accurate data will lead to seamless end-to-end workflows across all project phases and stakeholders.

Important capabilities

- Software-integrated product lines and/or open and free BIM object libraries that ensure up-to-date content in the file type you need (e.g., DWG, RFA, IFC)
- Consistency across content by using software that has consistent data definition
- High level of detail (LOD) of the required components depending on the design phase
- Ability to support integrated calculations for both generic and specific models
- Content that comes with a rich set of data (e.g., material values, connection types, dimensions)
- Shared collaboration system and libraries with consistent data that integrate into any workflow

4

Engineering schematics



Speed up project delivery with ready-made, localised symbol libraries.

Engineering schematics or concepts are vital when saving time and speeding up project delivery by providing ready-made, localised symbol libraries. And when M&E engineers can link and synchronise elements between schematic diagrams and families in the model, such as pumps, boilers, condensers and heaters, they enable a data exchange to ensure that the required data is consistent throughout the project lifecycle.

But without accurate symbol libraries, you may end up synchronising incorrect, non-localised symbols. This can mean that you'll have to manually line up the schematic diagrams and families. And that's time better spent elsewhere.

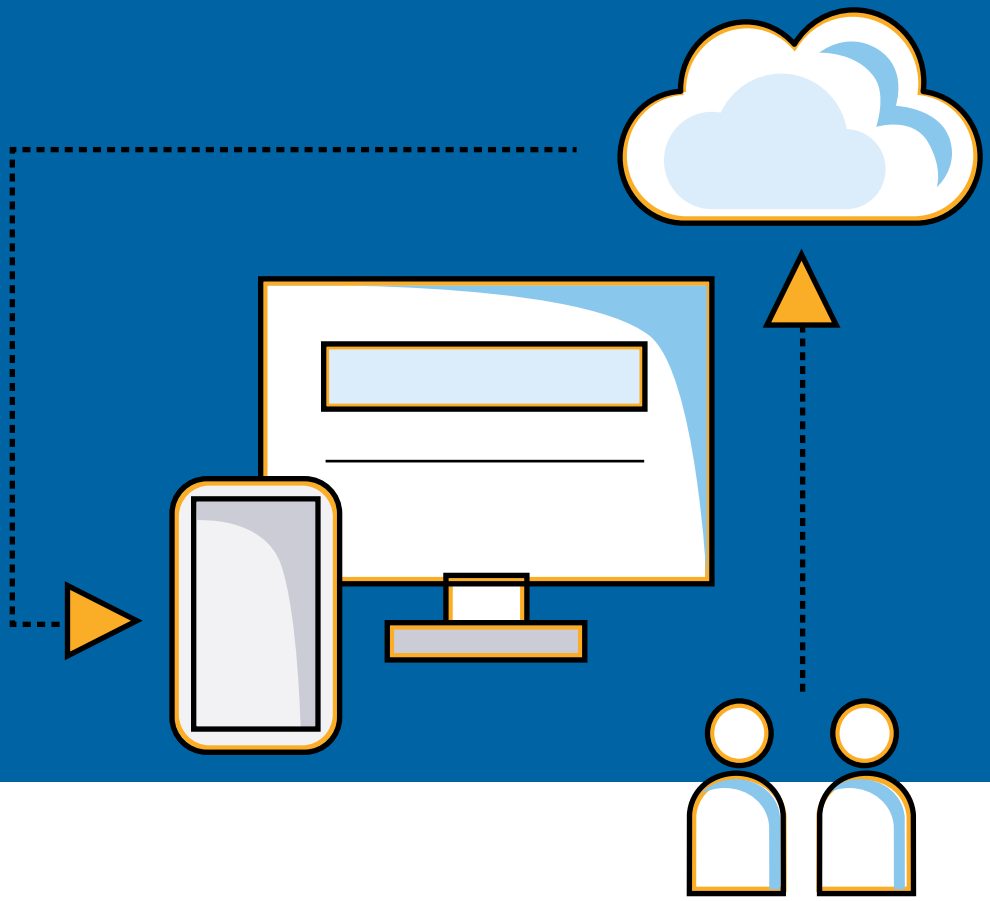
Therefore, when choosing your MEP modelling software, make sure it synchronises the value parameters between symbols and 3D elements. This ensures that all the data in your diagrams, design drawings and schedules are up-to-date throughout the construction project's duration. In an ideal situation, you should be able to select and configure the parameters to be synchronised and determine the direction of information flow, whether from the schematic drawing to the model or vice versa.

Important capabilities

- Create schematic diagrams with full synchronisation and data connectivity for mechanical, electrical and plumbing design projects
- Provide tools for linking symbols or lines in the schematic drawing that correspond to devices in the model
- Enable synchronisation of parameter values between the schematics and the model
- Transfer the calculation results together with, e.g., device position codes from the model to the schematic drawing
- Ensure a broad range of smart productivity and collaboration tools with your schematics functionality
- Full availability in the existing CAD software or full integration within third-party software (such as Revit)

5

Common data environment



Share data in a common data environment to improve collaboration.

Your MEP modelling software enables you to generate data valuable to other project phases and collaborators. You are compiling vital information, such as the relationship between your BIM outputs. But team members often hamper their collaboration efforts by filing project information in disconnected silos. Even file transfer methods such as email can increase the risks of miscommunication because of how outdated information propagates, resulting in rework and an incomplete, inaccurate audit trail.

You can now improve communication and collaboration by connecting teams and stakeholders to all project data in a Common Data Environment (CDE).

A CDE helps avoid disputes by functioning as a single reference point that teams and stakeholders can access on any device. It maintains a full, accurate version history for complete visibility into progress and associated amounts spent.

Incorporating a CDE also makes pertinent project information accessible to everyone based on their defined role and permission set. For example, when an on-site worker or project manager has a question, they can access the CDE for answers or highlight their question for you or others. And once you populate your CDE with data, this information is linked to every step in the process, helping you view, manage, and forecast costs as the project progresses.

Important capabilities

- All project stakeholders can access, share and collaborate on all project documents from a centrally stored location
- Project stakeholders can view and extract data from BIM models without BIM software access
- Models can be annotated and coordinated digitally in real-time, which eliminates the need for paper drawings
- Ability to upload and securely store various file formats (such as PDF or Revit) with minimal storing data limitations
- Easy to navigate through the interface with little training required

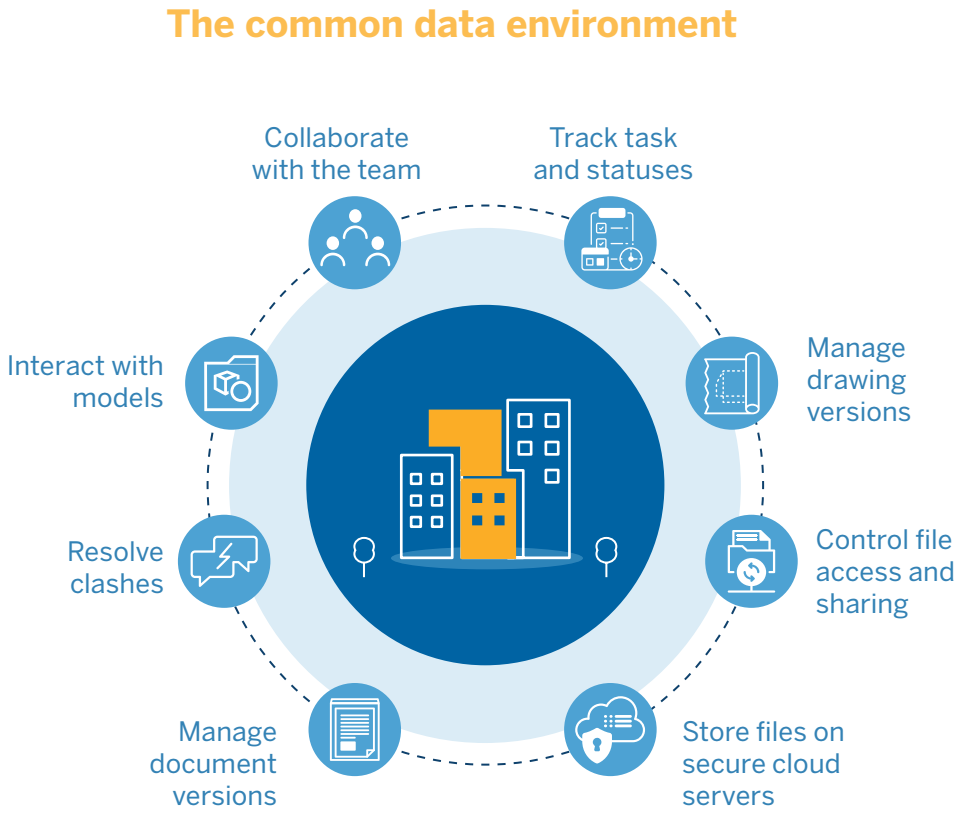


Figure. How construction companies implement a common data environment (CDE).

6

Easy on business operations

Reduce the workload of your IT team.

MEP modelling software is vital to improving your design and construction process and realising the full potential of BIM. But owning software involves much more than downloading and installing an application, especially when using it with multiple other applications. For many MEP firms, owning software often requires the labour expense of your IT team's oversight, not to mention the cost of downtime when they can't immediately fix an error.

Therefore, consider MEP modelling software that reduces the workload of your IT team and frees up your people and capital for more important things. For instance, ensure the company has the resources in place, such as a support team and a broad portfolio of solutions, to help you resolve issues and enable a complete workflow—all the way from design to done.

Additionally, when you incorporate software into your processes, you're entering into a relationship with the software company. For this reason, you should know how often they update their software, what security mechanisms they use and how they maintain data privacy.

Important capabilities

- Does not require large IT staff to maintain
- Minimises security risks and protects data
- One platform that serves all MEP disciplines and other construction management software
- One subscription that supports the entire design workflow
- Assisted onboarding for expert-led implementation

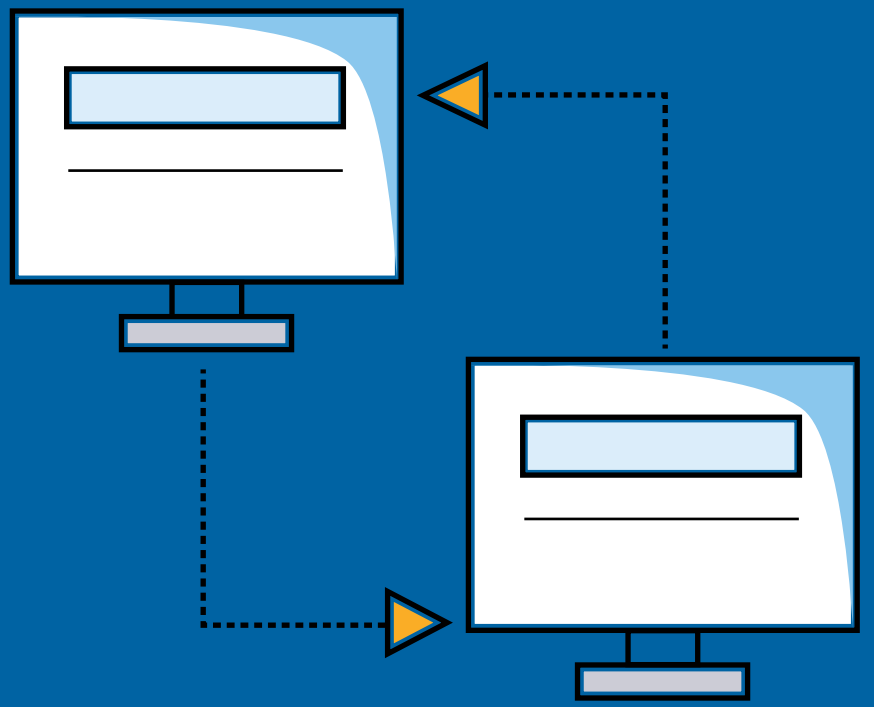
CWC
crookes walker consulting

Improving efficiency and consistency in MEP engineering workflows

Crookes Walker Consulting made it their strategy to continuously invest in the latest software for their clients to profit from the best engineering capabilities. In order to present the needed result for the client, CAD/BIM manager Sam Williams quickly set his eye on a particular BIM software to facilitate better standardisation and time savings across the design and engineering process. Not only was Crookes Walker Consulting able to accelerate ROI and save up to 50% of the time to complete some MEP engineering tasks, but choosing the software also gave them a competitive advantage. According to Sam, "The results we get... give our clients more confidence in working with Crookes Walker. Clients see we're using tools at the forefront of technology to serve them better."

Read the case study

Connected workflows



Every part of your workflow relates to every other part.

A model is the ideal visualisation tool for many reasons. It can help you track construction progress, issues, and change orders. It's useful when updating the budget and can be used to compare actuals to bid assumptions.

But conventional MEP modelling software often needs to improve these abilities because it cannot flow the model data seamlessly across all these workflows. Instead, a detailer exports the data, manipulate it in a spreadsheet and sends it to their colleague, who then imports that data into another application for another specific task.

In this manner, team members rarely realise actual analysis and synergy with other teams. Not to mention, these kinds of import/export workflows are tenuous, labour-intensive and easily subject to errors and omissions.

To realise team-oriented problem solving, the first step is to put as much actionable data in the hands of the stakeholders and give them a more convenient way to visualise and interact with each other.

When the modelled work is extended to a CDE that informs everyone else on the team about the data they need to do their job, you have the foundation for true collaboration, accountability, and profitable project management. Anyone can access the model, from mechanics to project managers to upper management, and have specific information delivered to their computer, tablet, or smartphone.

Aberdeenshire COUNCIL

Streamlining design and modelling for public building projects

Aberdeenshire Council, charged with managing the public services of Scotland's Aberdeenshire region, often struggled to keep up with their workload due to challenging design and modelling workflows. Ged Philip, Design Engineer at Aberdeenshire Council, revealed the team sometimes spend "10 or 15 minutes just to get a pipe to fit another pipe," while the inability to do calculations with the previous MEP software had them jumping between programs in an attempt for sizing accuracy on mechanical and electrical systems. With so much riding on efficient building projects from schools to housing developments, complex tasks needed simplifying – it was time a reliable solution stepped in to take control!

Read the case study

Important capabilities of a connected construction workflow

- Easy data handoffs from the model
  - To coordination software: Sharing the output as a single reference point and collaborating in real-time with all stakeholders.
  - To field layout software: Taking the accurate digital data in an information model and using it to inform accurate construction, operations, or maintenance in the field or on-site.
- Unified collaboration through shared model visibility
  - Clear coordination capabilities to identify, document, and manage issues.
  - Augmented reality views to superimpose the model on the job site (e.g., for applications like clash detection).
- Conveniently access up-to-the-second project information on mobile devices—anywhere, at any time

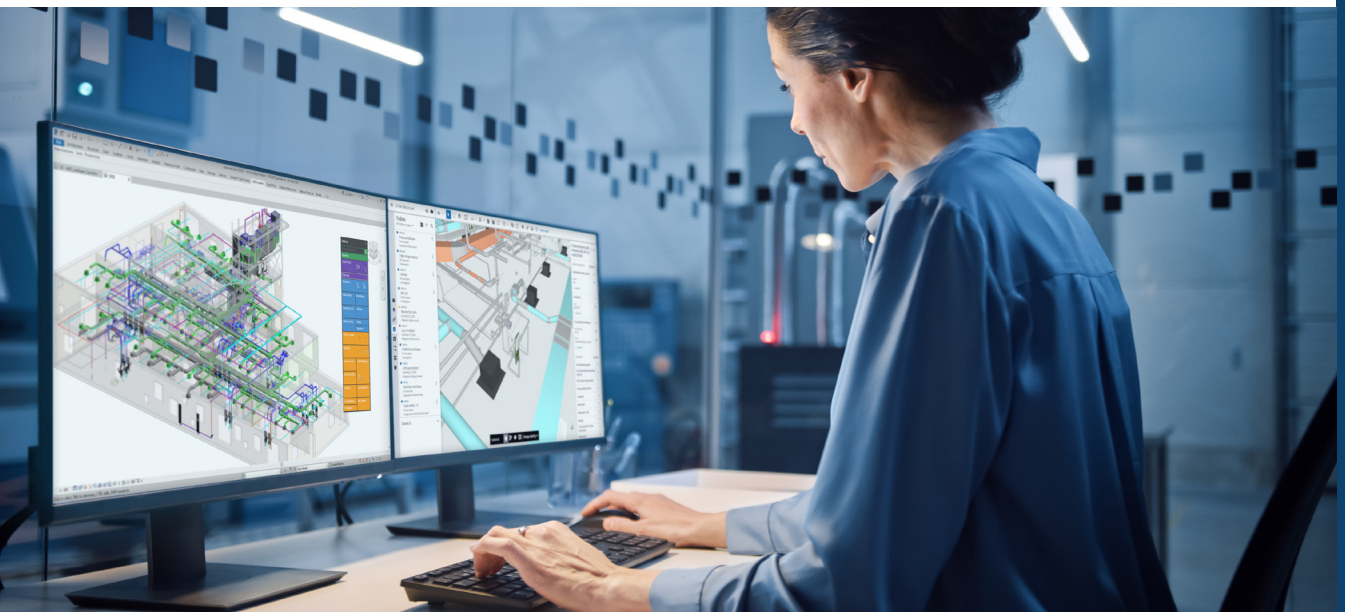
Trimble's approach

As an M&E engineer or designer, you're one of the few who fully understand the complexity of every project. You also recognise that a single technology solution employed throughout your company can significantly impact accuracy and efficiency as you plan and build constructible models.

But getting the right technology—one with the 7 essential capabilities mentioned in this eBook—is no easy task.

Stabicad: Connect your design and detailing workflows and unlock capabilities beyond your standard Revit functionality. Stabicad lets you create truly constructible models in Revit, and with comprehensive UK-compliant integrated calculations and up-to-date manufacturer content, you'll streamline your processes while bringing mechanical and electrical teams together in one easy-to-collaborate space.

Trimble Connect: Trimble Connect is one of the industry's leading collaboration tools. Instantly, it allows you to connect the right people to the right constructible data, at the right time. You can work anytime, anywhere and from any device – it's at your fingertips.



Food for thought: Sustainability in MEP design

Addressing climate change has become everyone's business, especially throughout the construction industry, where building materials and construction contribute 20% of annual global CO2 emissions (United Nations Environment Programme, 2021). But when incorporating sustainable building practices in your MEP-centric workflows, there isn't much clarity on how to make it easy and profitable.

Fortunately, you can better manage a sustainable construction workflow while reducing your operational impact (and costs) with your MEP modelling software. Through managed content, integrated calculations, and a CDE, it's much easier to be conscious of the materials used and the amount of waste reduced.

When evaluating MEP modelling software, ask to what degree it supports sustainable construction. Make sure it helps you:

- Reduce the energy consumption of a building, such as through heat loss and cooling load calculations
- Reduce the number of materials needed for a project through sophisticated prefabrication/spooling capabilities
- Reduce project turnaround times with the help of a CDE/ viewer and issue management

About Trimble

Trimble is an industrial technology company transforming the way the world works by delivering solutions that enable our customers to thrive. From purpose-built products to enterprise lifecycle solutions, Trimble is transforming industries such as agriculture, construction, geospatial, and transportation. Core technologies in positioning, modeling, connectivity, and data analytics connect the digital and physical worlds to improve productivity, quality, safety, transparency, and sustainability.

Trimble Construction technologies give users control of their operations with best-in-class solutions and a common data environment. This innovative approach improves coordination and collaboration among stakeholders, teams, phases, and processes across the construction lifecycle. Trimble MEP provides software solutions to make mechanical, electrical, and plumbing engineers and contractors more productive and profitable.

Discover more about
MEP modelling software at
go.mep.trimble.com/uk/invest-in-stabicad

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