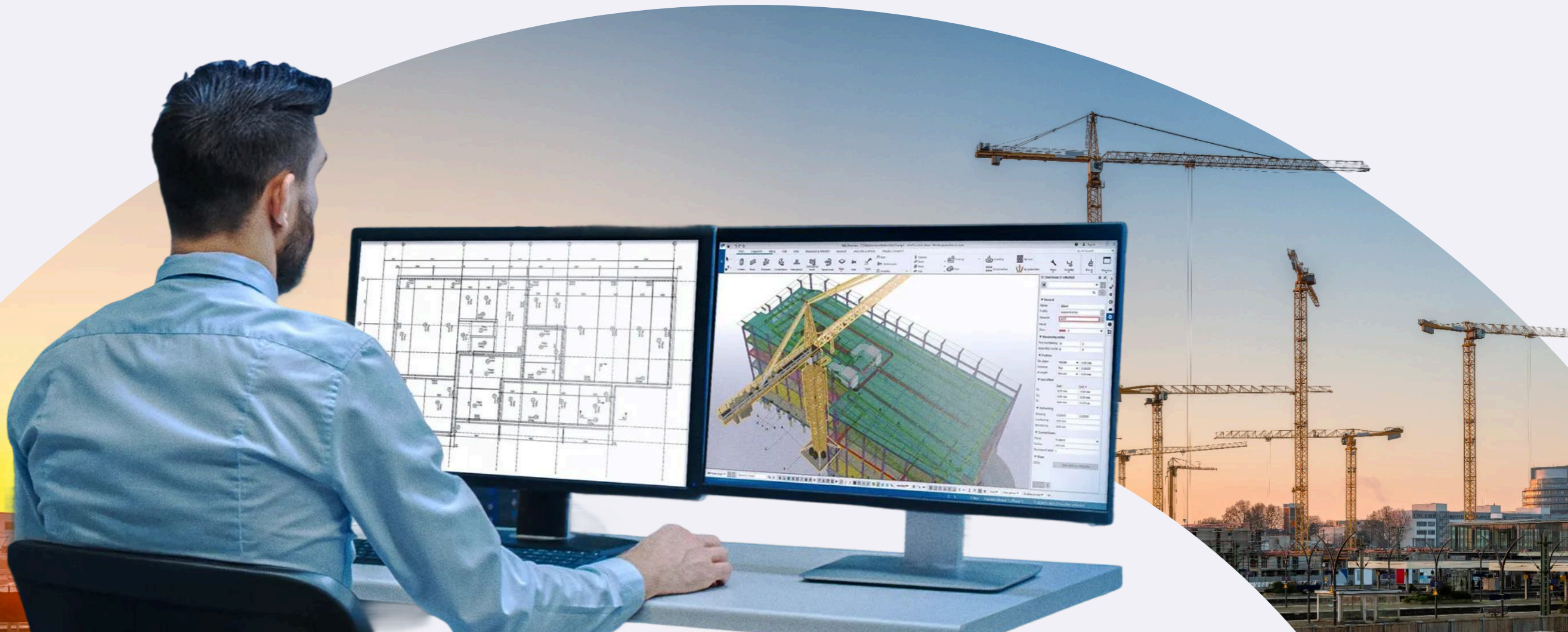


5 principles for efficient design & detailing





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The hidden cost of inefficiency

Each day only has so many hours. You may start with the best intentions, only to feel frustrated when the working day ends and you haven't completed as much as you hoped. Sometimes, you don't even realize you're losing valuable time. If you have a process that you've always followed a certain way, it can sometimes be hard to visualize a more efficient way of doing it.

WHERE VALUABLE HOURS VANISH

Think about it: where does that lost time actually go?

It often leaks away in the frustrating cycle of rework caused by late-stage design changes. In an ideal world, the initial design would be flawless, but the reality is that changes are inevitable. Inefficient processes magnify their impact and lead to extra work.

Similarly, the constant need to keep pace with evolving design changes—whether due to client requests, regulatory updates, or unforeseen site conditions—can become a major drain if your team lacks streamlined methods for managing and implementing these shifts. This is just one example of where efficiency can be improved, and there are many others.

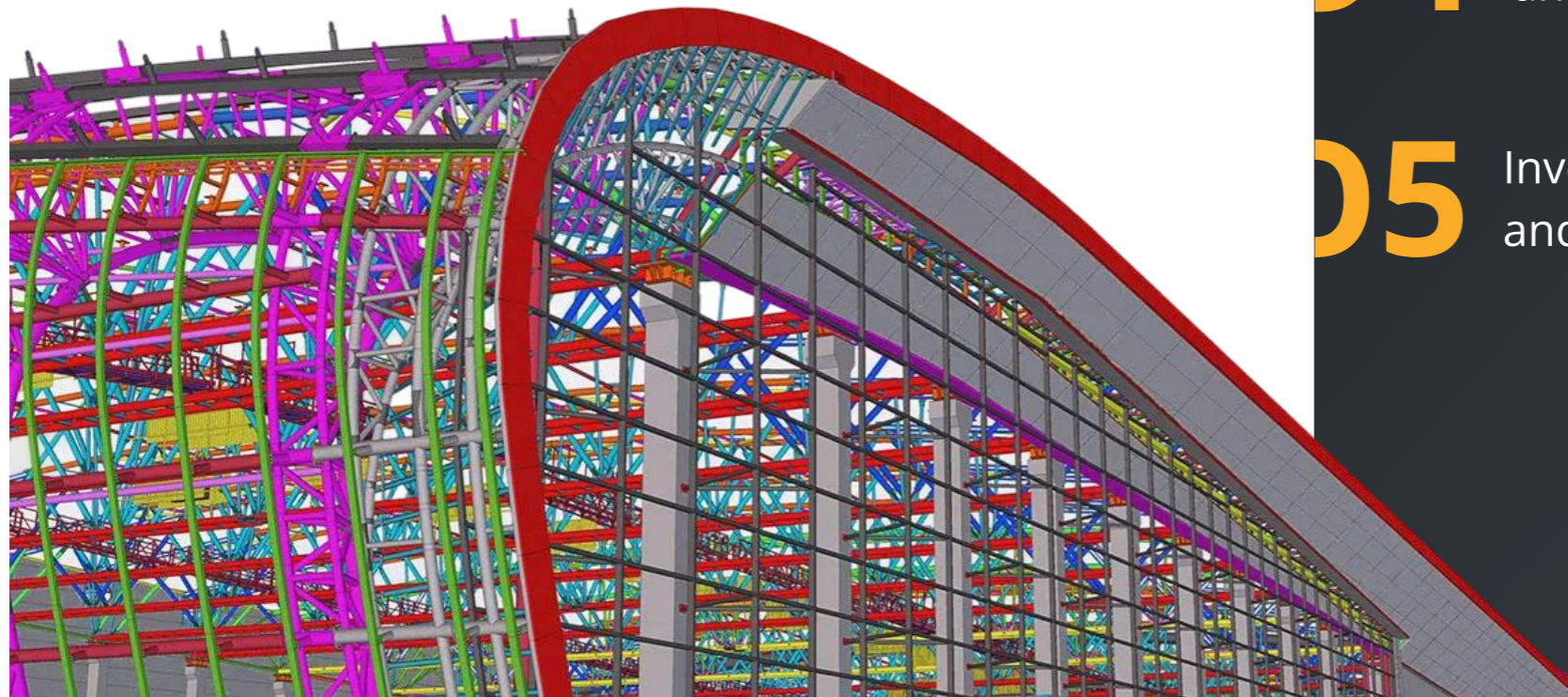




The five principles this guide will cover are:

This guide is intended to get you thinking about how you are currently working, how you could be working, and the steps you need to take to get there. As you go through this guide, note your current processes and how implementing these principles would look in your business.

- 01** Implement robust design review processes
- 02** Standardize detailing practices and libraries
- 03** Use technology for automated checks and validation
- 04** Focus on continuous improvement and knowledge sharing
- 05** Invest in the right tools and training





PRINCIPLE

D1

Implement robust
design review
processes



PRINCIPLE 1

Implement robust design review processes

Beyond regular project communication, there should be a built-in review process at key stages of the design. These checkpoints help reduce rework, improve coordination, and ensure alignment between disciplines before moving forward.



01 Conceptual design

At this stage, the fundamental design intent is paired with the project brief, performance requirements, and initial feasibility assessments. This review focuses on high-level concepts, material choices, and overall structural or MEP system approaches.

ITEMS WOULD INCLUDE:

- Schematic system layouts
- High-level load calculations
- Preliminary material selections
- Initial design concepts
- The project brief

02 Preliminary design

Once the design reaches this stage, it has developed in more detail. Therefore, this review is about checking for spatial coordination, load considerations (structural), system sizing and routing (MEP), and constructability at a building-wide level.

ITEMS WOULD INCLUDE:

- Design drawings
- Preliminary structural analysis results
- Sizing calculations for MEP systems
- Spatial coordination plans
- Constructability assessments



03

Intermediate design

This stage can be thought of as a checkpoint within the detailed design process. Use this to identify potential clashes or integration issues between disciplines (structural, architectural, MEP) and ensure the design matches the design intent established in earlier phases.

ITEMS WOULD INCLUDE:

- Partially detailed drawings and models
- Updated structural analysis models and results
- Developed MEP routing and equipment locations
- Progress on materials takeoff
- Beginnings of an inter-discipline 3D model

04

Pre-coordination

This stage brings in a higher level of detail, specifically focusing on the coordination of all building systems within the 3D model. This is where clash detection, constructability, and spatial integration are reviewed in detail. This stage is critical for BIM projects.

ITEMS WOULD INCLUDE:

- Federated BIM model featuring all disciplines
- Clash detection reports
- Spatial coordination drawings and sections



05

Pre-release

This is a final check of the detailed drawings, models, and documentation. The areas to check are accuracy, completeness, and adherence to project standards before the models are issued for construction or fabrication.

ITEMS WOULD INCLUDE:

- Final detailed drawings
- Final structural analysis reports and calculations
- Final MEP schedules and specifications
- Material takeoffs
- Federated model view and documentation for fabrication/construction

Implementing design reviews takes commitment and some collaboration shifts, but the long-term gains, including less rework, stronger coordination, and more efficient delivery, are clear. By embedding these review stages into your workflow, you're not just catching errors—you're building a foundation for higher-quality designs with lasting cost savings.

Senior leadership may see these review stages as potential bottlenecks. However, the reality is that they are essential risk-mitigation measures that bring greater predictability to each project.



Construction costs have outpaced inflation globally. McKinsey found that costs have risen 1–3% faster than inflation each year—and nonresidential construction prices in the U.S. increased by 52% between 2015 and 2023.

Low productivity and inefficient processes have a measurable financial impact. By implementing reviews, teams are able to proactively identify and address issues, preventing costly surprises and schedule delays later.

This added predictability and reduced risk lead to more reliable project outcomes and improved financial performance.





PRINCIPLE

02

Standardize
detailing practices
and libraries



Standardize detailing practices and libraries

There are several ways to introduce standardization across your projects. The key to success for these libraries is that they're easily accessible and regularly reviewed and updated. This ensures they continue to reflect new products, standards, and best practices.

Create a system that works logically for your projects. Some examples of this could include:

- By connection type for structural steel
- Fitting type for piping
- Symbol type for electrical

Also, include the same data for each component. A good starting point is material grade, size, manufacturer, and code compliance. In addition, provide a visual representation of how the component appears in both in model and 2D drawings to help the user quickly select the right asset when browsing the library.

This may sound like a heavy lift, but we promise it pays off in the long run.

Alternatively, some design and detailing software solutions house and update this library for you. That means once you've created this standardized component library, the maintenance is minimal compared to manual updates.





Once you've defined your component library, standardization needs to extend across drawings, reports, files, and team processes. Here's how:

Establish clear drawing standards

Each team works slightly differently, and drawings are no exception. One way to tackle this is to define a structure layering system for different element types. Include standard lineweights and styles to differentiate between elements and improve a drawing's readability.

Annotations are a key part of drawings, but they don't have to vary so much. Use a consistent font, size, label format, notes, and tags to keep annotations visually consistent across all drawings. While these details may seem small, a consistent visual style helps people find information faster.

Create templates for common drawing types and reports

Develop pre-configured drawing templates for common views with preset scales, view settings, and annotation styles. They're particularly useful for foundation plans, framing elevations, general arrangement drawings, and single-part or assembly details.

For reporting, create standardized templates for material lists, bolt summaries, weld lists, and other project-specific reports to ensure consistent data output. Software solutions like Tekla Structures simplify this process with customizable drawing and report templates that can be shared across projects and teams, ensuring consistent quality across projects



Implement naming conventions for file and model elements

This is a great way to organize project files and encourage shared ownership across the team. It can be applied easily, whether you are using manual processes or software.

Establish clear and logical naming conventions for drawings, models, reports, and other project files. Include key information like project number, drawing type, and revision. When deciding on a naming convention for model elements, include details that easily identify the object type, such as columns, pipes, or ducts.





Make training and documentation available

It's one thing to make these changes, but they only work if everyone is aligned. Be sure to communicate any changes clearly and provide dedicated reference materials for quick access.

This doesn't have to be a formal, tedious process. Even a short video call to demonstrate the new naming conventions, followed by a "how-to" email, can be effective.

Critically, make sure someone serves as a point of contact for people to go to with any ongoing questions while you track adoption. If you notice inconsistency, schedule a brief follow-up session.

This may not be the most exciting part of the process. However, handling administration in advance saves time in the future.

This creates a predictable system with readily available components that reduce ambiguity, speed up drawing production, and minimize errors. Ultimately, it frees valuable time and ensures a more reliable detailing process that benefits every project.





PRINCIPLE **D3**

Use technology for
automated checks
and validation



PRINCIPLE 3

Use technology for automated checks and validation

Applying technology allows teams to identify clashes and verify compliance more quickly and objectively, elevating software from a design tool to a proactive quality-control system that delivers measurable savings earlier in the project.

These benefits come from using key features within your modeling software to catch errors before they escalate. The following practices show how technology supports proactive quality assurance during design and detailing.

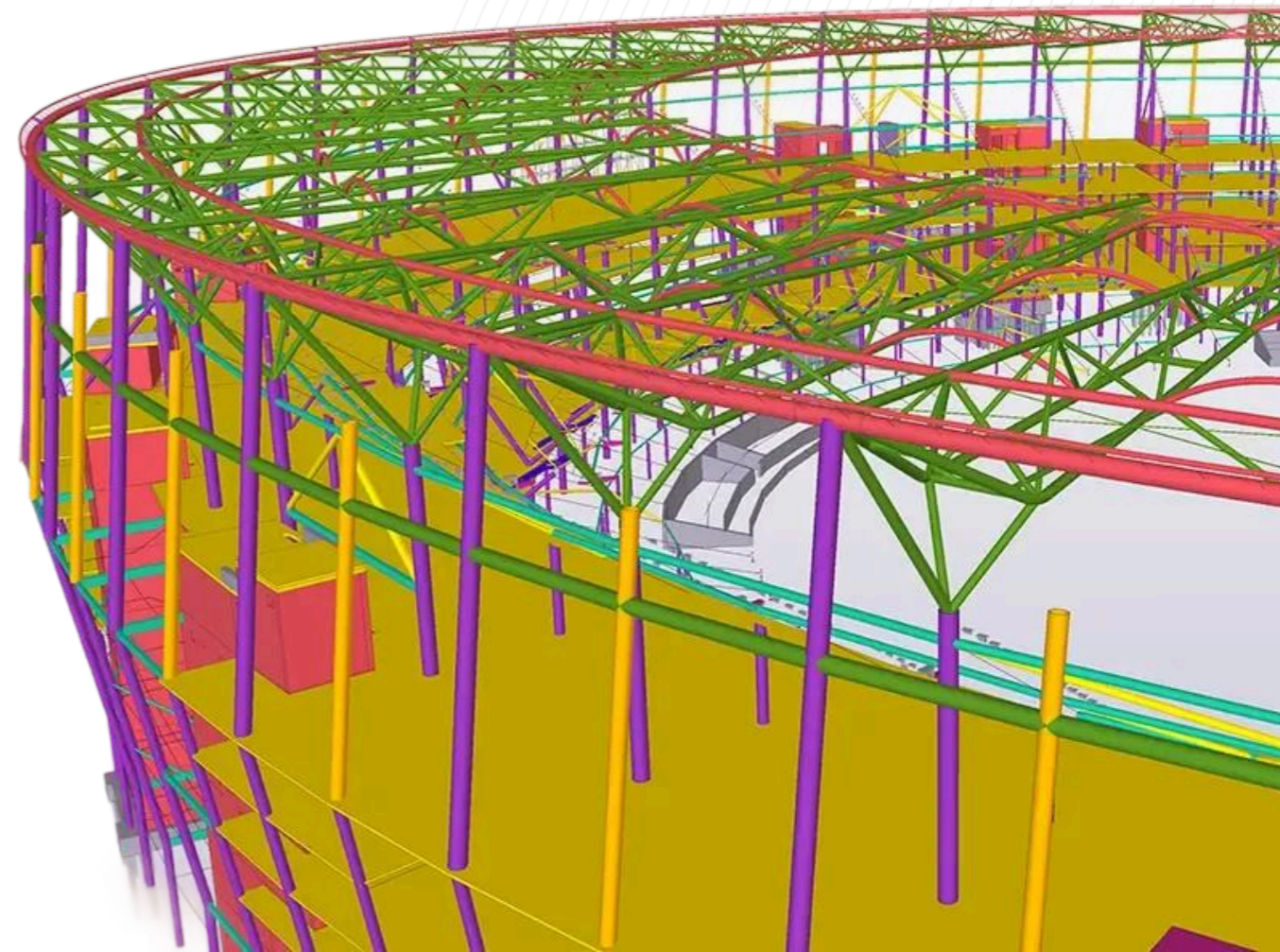




Use clash detection software regularly

Clash detection is a powerful feature within BIM workflows that automatically identifies geometric interferences, or clashes, between different elements of a 3D model. This is crucial for preventing issues during construction or fabrication. Users can define rules to focus on specific clashes—between objects, full models, or MEP and architectural systems.

Running clash detections at regular intervals immediately reduces the risk of hard, soft, or tolerance-based clashes being missed. These clash detection setups can usually be saved for reuse in future projects. Equally important is creating a clear workflow for how these clashes should be managed once identified. In basic terms, this would entail directing a clash resolution to the team responsible for the affected elements.





Explore model integrity validation features

Imagine your BIM model as the central database of your building project. Like any database, it needs to be accurate, consistent, and well-structured to be truly useful.

Model integrity validation features in your BIM software act as a quality control center for this database. They automatically check the model for errors, inconsistencies, and deviations from standards, ensuring it remains a reliable foundation for downstream work.

Prioritize warnings that come from an automated model check. Not all warnings are critical issues, so ensure there is a review process in place to address them appropriately.

Regularly using model integrity validation features is like performing routine health checks on your BIM model. They help you identify and fix potential problems early, ensuring your model stays accurate, dependable, and ready for use throughout the project lifecycle.





Applying technology allows teams to identify clashes and verify compliance more quickly and objectively, elevating software from a design resource to a proactive verification tool that delivers savings earlier in the project. The benefits are immediate and measurable.



Automate drawing and report generation with built-in checks

Your BIM model is more than a 3D representation; it's a data-rich record of your project.

Instead of manually drafting every view, dimension, and annotation—or painstakingly compiling reports by hand—BIM software can use the information already embedded in the 3D model to generate these outputs automatically.

During this automation process, the software can also perform predefined checks to ensure consistency, accuracy, and compliance with standards.

Adding automated checks and validation to your design and detailing workflows creates a built-in quality control step. These safeguards identify and resolve potential issues with a level of speed and accuracy that manual reviews can't match. This not only minimizes costly errors later in the project, but also instills greater confidence in the integrity of your models and documentation.



PRINCIPLE

D4

Focus on continuous improvement and knowledge sharing

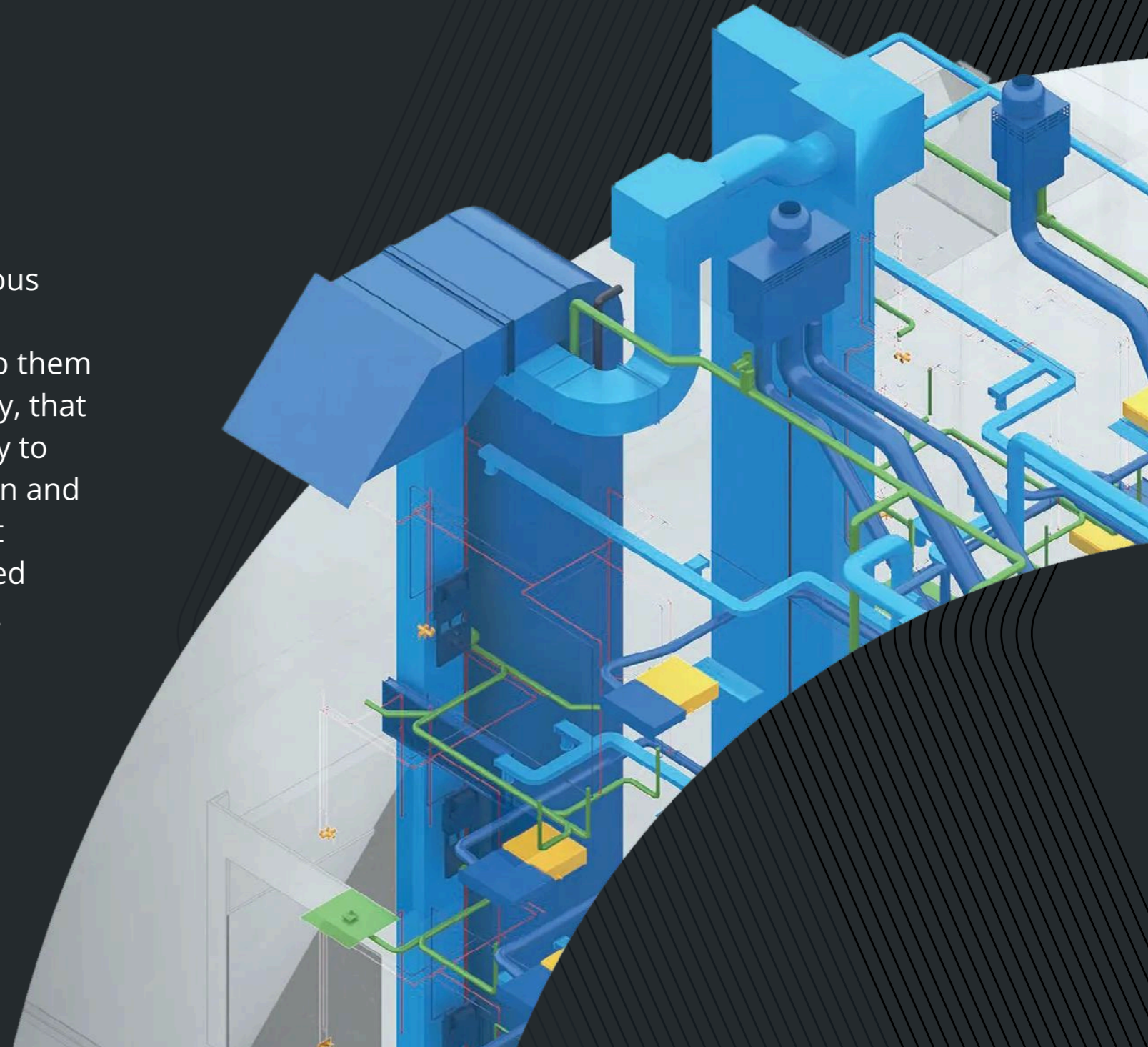


PRINCIPLE 4

Focus on continuous improvement and knowledge sharing

Efficiency isn't a fixed goal, it's a continuous process. As important as it is to put the infrastructure around your teams to help them become more efficient in their day-to-day, that will only get your business so far. The key to real efficiency is having the ability to learn and adapt quickly. If you create a culture that allows for that, the potential for continued business growth becomes much greater.

The following practices help support that kind of culture.





Foster a culture of learning and feedback

Learning from experience should be part of the way teams work every day. The more you embed reflection and feedback into your culture, the easier it becomes to adapt and improve over time.

Start by gathering input during the project. When progress slows or goes off track, people don't always speak up. That's where surveys come in. Regular, anonymous surveys can help you collect honest feedback without placing blame. Use them to gather feedback from the team on current processes, identify pain points, and ask for suggestions for improvement.

This kind of feedback also makes post-project reviews more useful. When a project finishes, teams should take time to reflect on what worked, what didn't, and what could be improved moving forward.

Creating a culture of reflection and shared learning is what drives lasting efficiency gains. With continuous improvement and collective knowledge at the center, your team can adapt more effectively to challenges, solve problems proactively, and build upon past successes.





Encourage internal knowledge sharing

Every business has employees who are software champions. They spend their days in the software, so it's only natural that they become attuned to shortcuts, best practices, and workflows.

Leverage this knowledge by setting up regular office hours for users to share expertise and learn from each other. Creating a Slack or similar chat channel (such as #TeklaTips) for people to join is an effective and easy way for software users to share knowledge and offer assistance.

As mentioned earlier in the guide, make sure shared documentation is available and accessible to everyone. Even something as simple as a living document of common FAQs can be helpful for someone who just wants a quick answer to a query.

Also, pairing a less-experienced team member with a senior colleague is a fantastic way to provide guidance, share knowledge, and offer support.





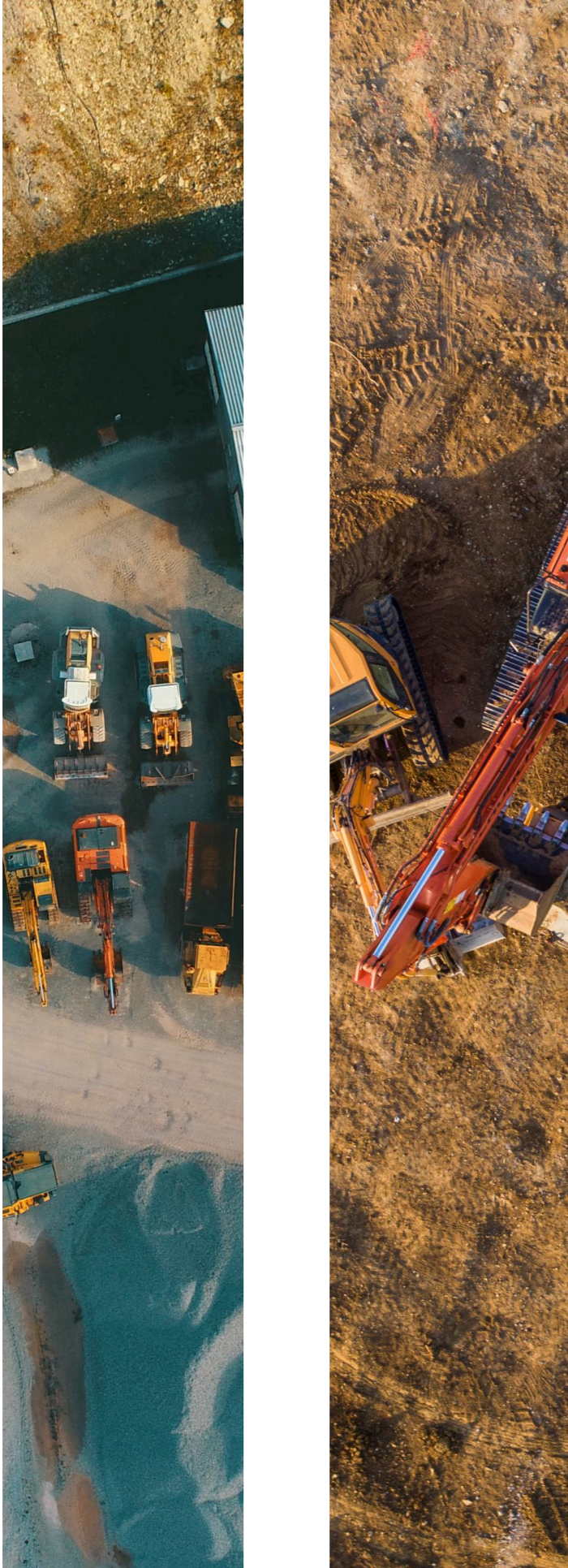
Support professional development

Not everyone's career progression is in the form of a ladder. Modern careers often grow in many directions, shaped by each person's strengths, interests, and goals. Growth doesn't just mean climbing to the next title, but also moving into new roles, expanding responsibilities, or building deeper expertise.

Whatever path your employees are on, you'll get the most from them by investing in their careers. This doesn't have to be a monetary investment—offering opportunities to lead meetings, share workflow tips, or take ownership of small process changes are all meaningful ways to build skills and confidence.

Career growth doesn't always move upward. For many people, progression can mean deepening a skillset, taking on new responsibilities, or shifting into a different type of role.

When you encourage professional growth in the flow of everyday work, people gain confidence, expand their skills, and contribute more over time.



Prioritize training and onboarding

One of the common pitfalls of adopting new software is just that—adoption. When a new tool is introduced, teams may respond with hesitation or enthusiasm. Both reactions can lead to incomplete or incorrect software use.

Implementing comprehensive training is therefore crucial. For those initially skeptical, well-structured training demonstrates the tangible benefits of the solution and clearly shows how it can streamline their workflows, ultimately making their jobs easier.

On the other end of the scale, even the most enthusiastic early adopters benefit from thorough instruction, gaining a complete understanding of the software's capabilities and avoiding gaps in understanding.

Many software providers, including Trimble, recognize this need and offer self-paced modules and instructor-led sessions as integral parts of the onboarding process to support different learning styles and improve the chances of successful adoption.





PRINCIPLE

05

Invest in the
right tools and
training



STEP 5

Invest in the right tools and training

The tools your team uses every day have a direct impact on how efficiently they can work. Choosing the right solution isn't just about checking off a list of features. It starts with understanding how that tool supports your projects, your people, and your long-term goals.

Start by considering the types of projects you take on, the level of complexity involved, how your teams collaborate, and what workflows are already in place. You don't need to fix everything up front; just make sure those realities are acknowledged. Then bring the right teams into the conversation to help identify what the software actually needs to do. It sounds simple, but many teams still end up with software that doesn't fit the realities of daily work.





Match features to real-world needs

Once the relevant teams are involved, conduct a thorough feature matching exercise. This goes beyond identifying a feature requirement, such as “3D modeling.” Dig deeper by asking questions like, “Do we need advanced tools for complex geometry?” or “Do we need staged construction analysis?”

Pair each feature with a pain point and outcome. For example, if coordinating ductwork with structural elements is a challenge, your outcome could be better clash detection and collaboration tools. Then prioritize features into must-haves, nice-to-haves, and future considerations.





Evaluate tools using long-term criteria

Once you've completed the feature matching exercise, you're ready to start evaluating what's available in the market. At this stage, look beyond features and consider how well each solution supports your needs over time.

Some key considerations include interoperability with other solutions, scalability for future growth, cost versus value, and local support.





Interoperability

No man is an island, neither is software. It must have the ability to link with other solutions that are used within the business or it risks being more time-consuming than your old way of working. Assess the software's ability to exchange data with other tools in your ecosystem (e.g., architectural BIM software, analysis packages, fabrication equipment). Look for support for open standards like IFC, which are increasingly adopted across North America for data exchange.

Scalability

When evaluating software solutions, you need to consider business growth. A solution may fit the bill for your business as it stands, but you need to stress test it against best case scenarios. Some questions to ask could be, what are our project growth plans in the next 3 to 5 years? Do we see a need to collaborate with larger and more distributed teams in the future? When do our peak workloads usually occur and could the software handle this without a slowdown in performance? By asking these questions, you will ensure that any chosen solution can handle the challenge of business growth.





Cost versus value

Consider this: the cheapest software is often not the best option. Two metrics to look out for are total cost of ownership (TCO) and return on investment (ROI). If a software costs X amount over five years but will provide a predicted ROI of 70% in the first year alone through time savings and clash reduction, it suddenly becomes a need to have. This then shifts the search from being purely cost-based to one of value-adding. A question to keep in mind throughout the process is, how will this solution help the company achieve its strategic objectives?

Local support

When choosing a software solution, local support is something that can separate the true software partners from all of the other providers. The commitment to local knowledge and nuance means that your business can not only lean on your account manager for product support, but also best practices and more. Not to mention, being in a local timezone means that your working relationship can be timely and personable, rather than existing in multiple email threads and IT tickets.



User training

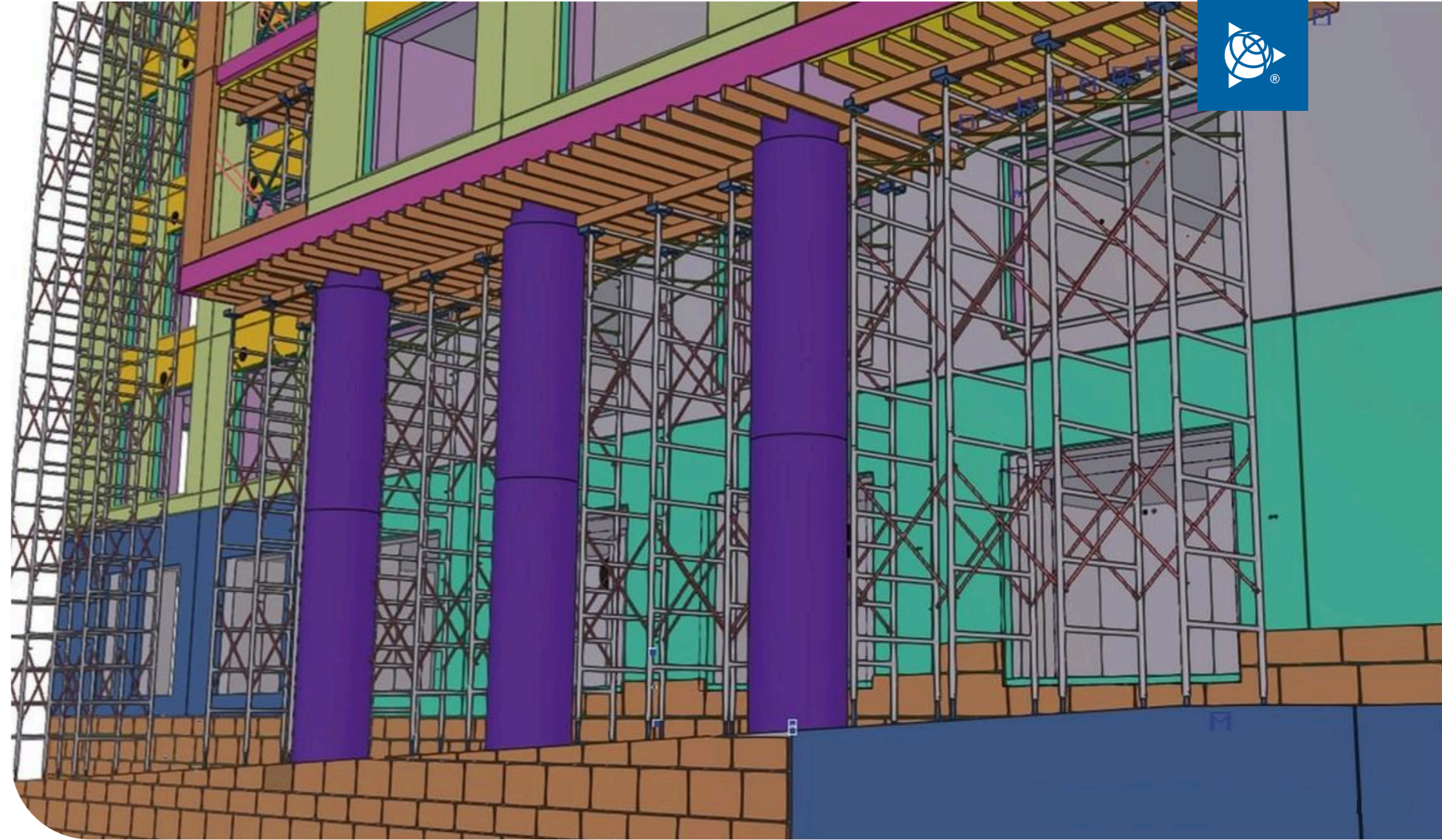
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Make your investment count

Ultimately, carefully chosen software and thorough, ongoing training aren't just expenses—they're essential investments. Equipping your team with the right tools and the knowledge to use them effectively is the bedrock upon which the previous four principles can be realized. This commitment to your team's capabilities and their resources is the final, crucial element in building a truly efficient design and detailing workflow.



Key takeaways

So, you've seen where the hidden costs lie and the tangible steps you can take to see real time savings within your business. This isn't just theoretical advice; it's a roadmap to a more productive and less frustrating workday. Here's your action plan:

01

Implement robust design review processes

Stop letting errors snowball. Bake in those design reviews at every key stage—from initial concept to final check—to catch problems early and keep everyone on the same page.

02

Standardize detailing practices and libraries

Get serious about consistent detailing. Build libraries, set rules, and stop starting from scratch on every project. Those small gains in time pay dividends by the end of the project.

03

Use technology for automated checks and validation

Your software isn't just for modeling. Use automated checks for clash detection, code compliance, and model integrity. Let the computer handle the grunt work of finding errors.

04

Focus on continuous improvement and knowledge sharing

No one knows it all. Make knowledge sharing and process improvement part of your team's DNA. Regular feedback and lessons learned are how you get better, faster.

05

Invest in the right tools and training

Stop fighting with outdated or clunky software. Invest in the right tools and the training to use them properly. It's an investment in your team's time and your project's success.

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 construction technologies give users the control of their operations with best-in-class solutions and a common data environment.

For more information about Trimble (NASDAQ:TRMB) visit [construction.trimble.com](https://www.construction.trimble.com).

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