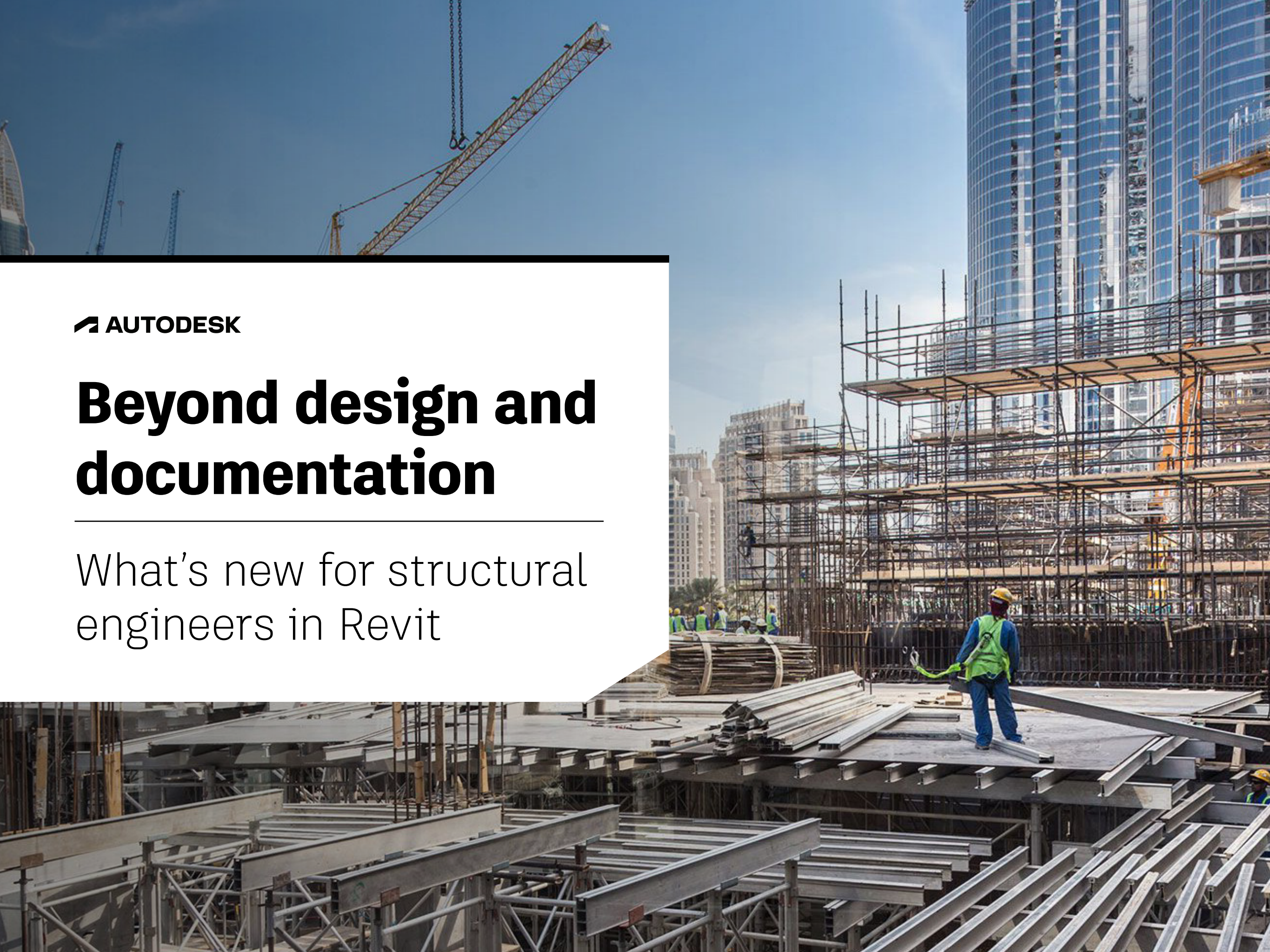




Beyond design and documentation

What's new for structural engineers in Revit



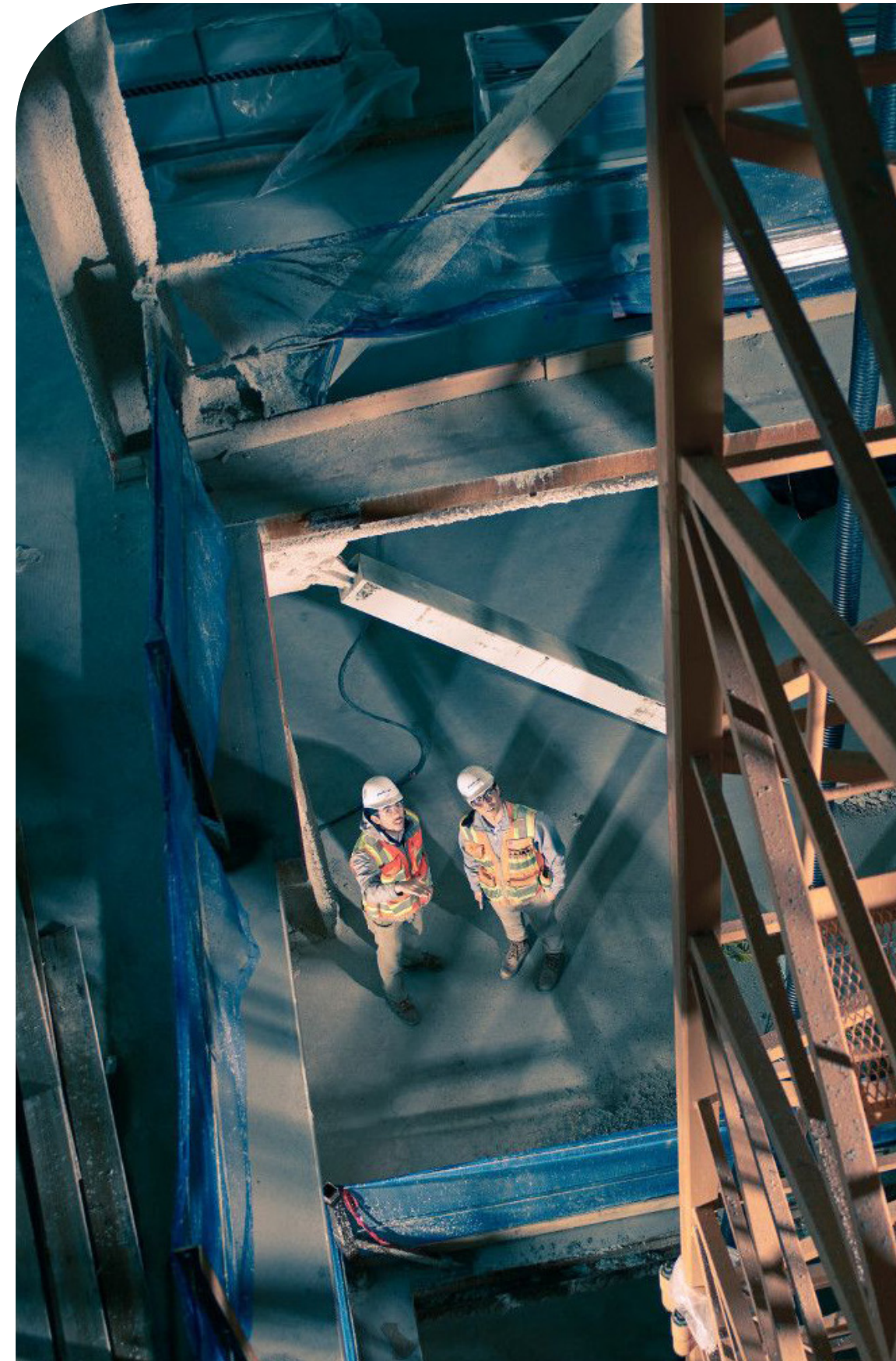
Introduction

With the entire AECO industry facing increasing pressure to deliver projects more quickly and accurately, structural engineers in particular face challenges:

- Labor shortage—including skilled engineers, detailers, and shop workers—causes firms to turn down work and puts greater pressure on fabricators to automate their lines and increase output.
- Detailers need a faster and more seamless way to collaborate with the rest of the design team. However, data is often isolated, causing a disconnected workflow.
- Growing project complexity increases the pressure to do more with less and fuels the risk of inaccurate estimates.
- Lack of coordination on the job site creates waste and inefficiencies, impacting not only cost and timeline but having environmental implications.

This e-book explores how Revit helps structural engineers address these challenges with new features for:

- 01** Structural analytical modeling
- 02** Concrete design
- 03** Steel design



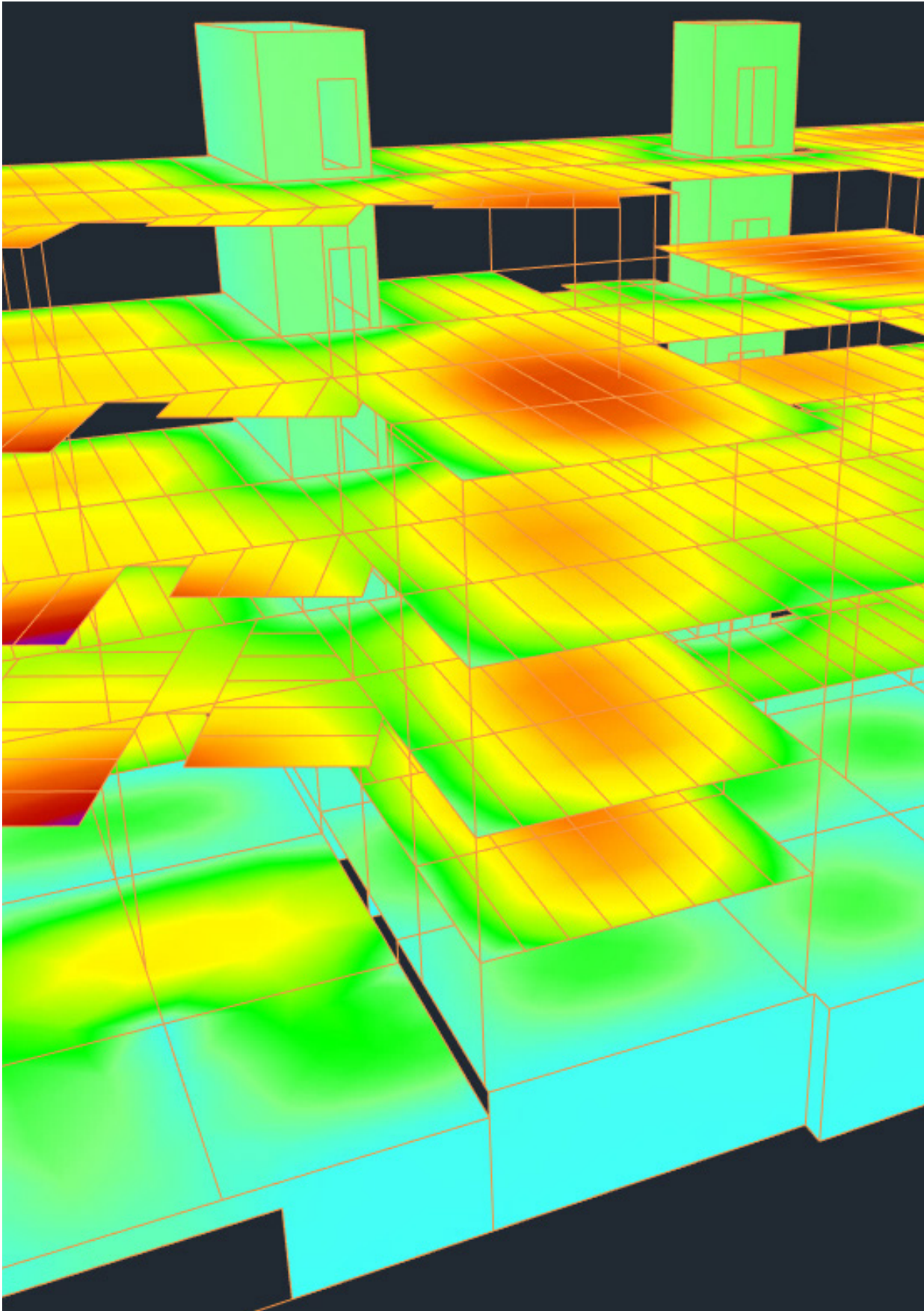
Analytical modeling in Revit

With more structural engineers adopting BIM workflows, the call for collaborative analytical processes within BIM is on the rise.

The structural analytical modeling workflow in Revit has been reimagined to help engineers coordinate across structural physical and analytical models while driving BIM-centric analysis workflows from Revit.

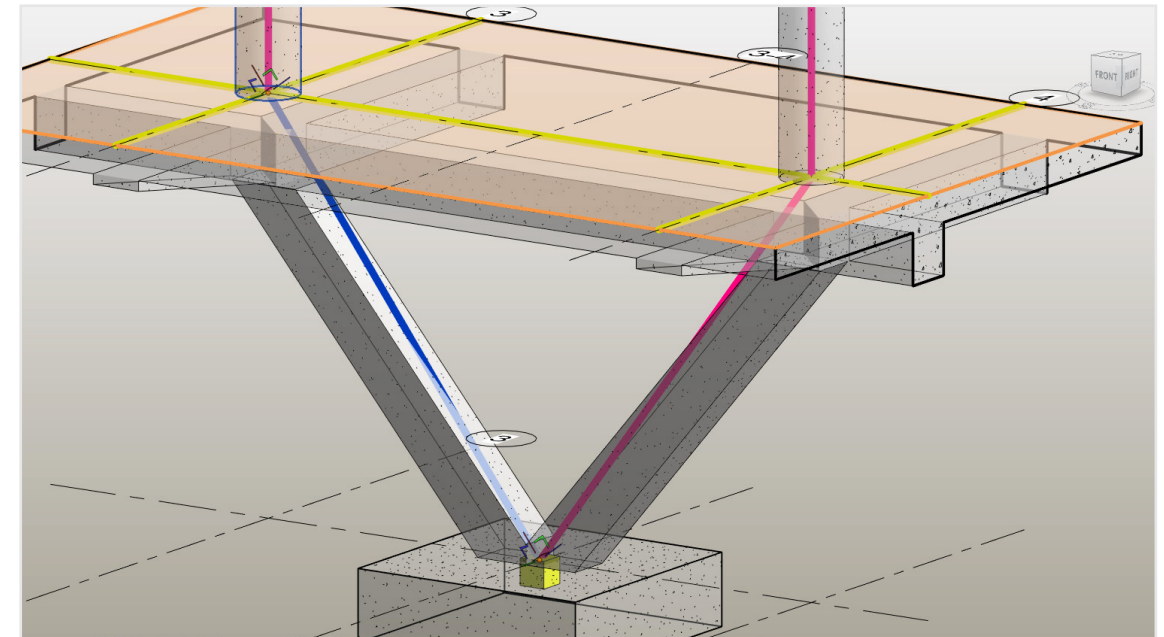
Benefits for structural engineers:

- More easily generate representations of any structure type—buildings, bridges, frames, pavilions, stairs, and more.
- Create consistent analytical models that align with your preferred engineering approach.
- Enable structural analysis jobs from Revit models.
- Analyze multiple analytical models for a single physical representation.

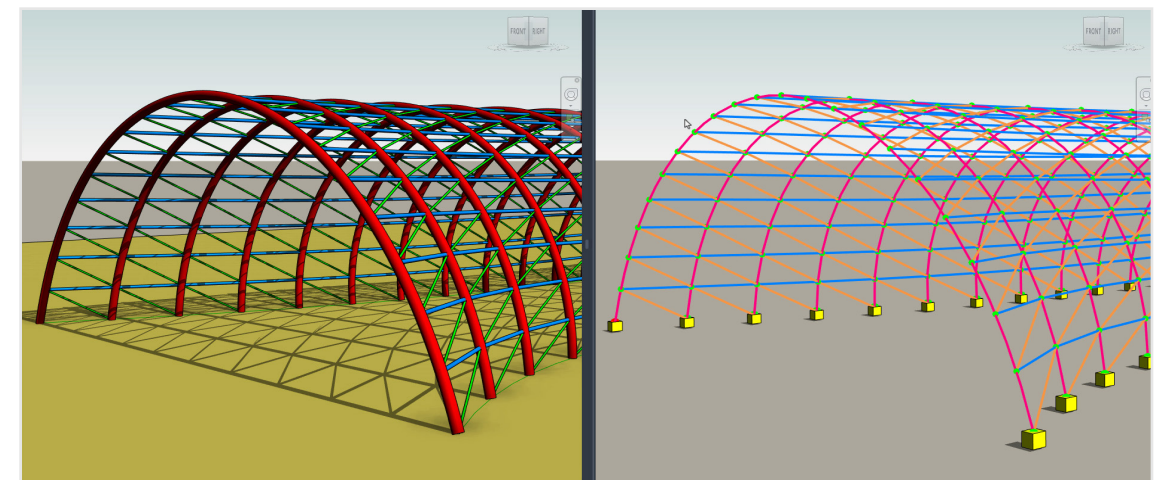


Engineers can:

- Use existing physical geometry in Revit 2D and 3D views as context for the analytical model and then define the physical-analytical relationships, element-by-element.
- Assign analytical elements their structural role, type, and shape, define their cross-section rotation, and specify how these elements should be analyzed.
- Easily associate physical and analytical model elements with each other. Then quickly locate associated elements within the model and automatically synchronize a property's physical and analytical models.
- Associate multiple analytical panels or members to a single physical object (or vice versa).
- Associate analytical models with physical geometry while ensuring each element remains independent.
- With the modeling autonomy enabled by member and panel objects, the analytical model can represent generic objects, roof structures, stairs, and compound geometries in addition to Revit structural elements.
- Revit's versatility for defining analytical model geometry enables true, bi-directional analysis software workflows and the capture of edits made in other tools.



The physical geometry can serve as a context for the analytical model.



The analytical model is independent, with its own set of properties.

Enhanced structural analytical loads

Revit 2024 has a more versatile and precise structural load definition and more flexibility in analytical modeling. Each load type comes with distinct options to help place the load onto the analytical element.

Apply point, line, and area loads to your analytical model. Structural loads always have a host element, and changes in the host position trigger a load position update. All types of loads can be defined at any location within the host. For example, you can:

- Apply hosted loads to specific areas of panels and members.
- Apply planar loads to user-defined, sketched areas of analytical panels.
- Apply linear loads to specified segments of analytical member lengths and analytical panels.
- Place point loads anywhere on their hosts.
- Copy structural loads to other hosts.

Preserve structural loads and attributes when splitting analytical members:

When you assign a load to a specific host and divide the analytical member along its length, Revit also divides the load and correctly associates new instances with analytical elements.

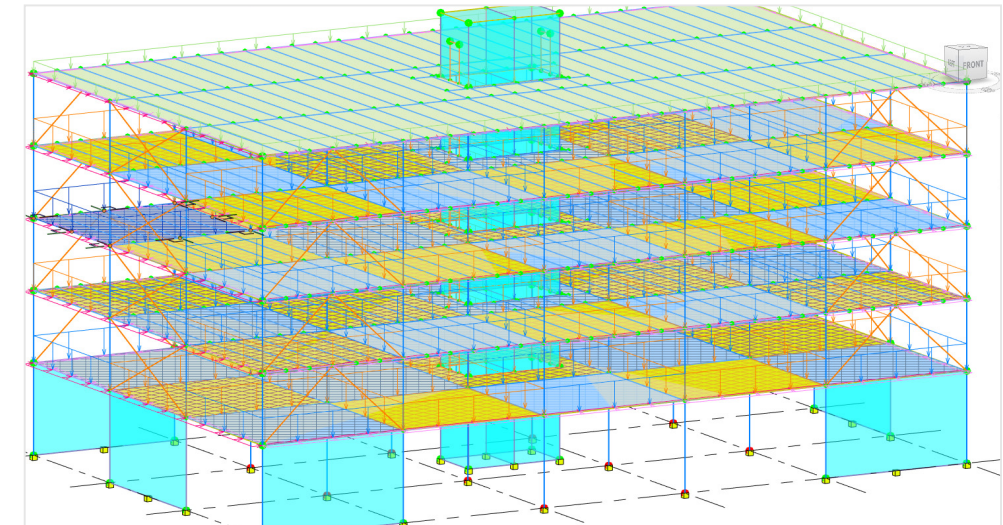
Clear load documentation with color coding:

Document the analytical model by color coding structural area loads to differentiate between load natures and load cases.

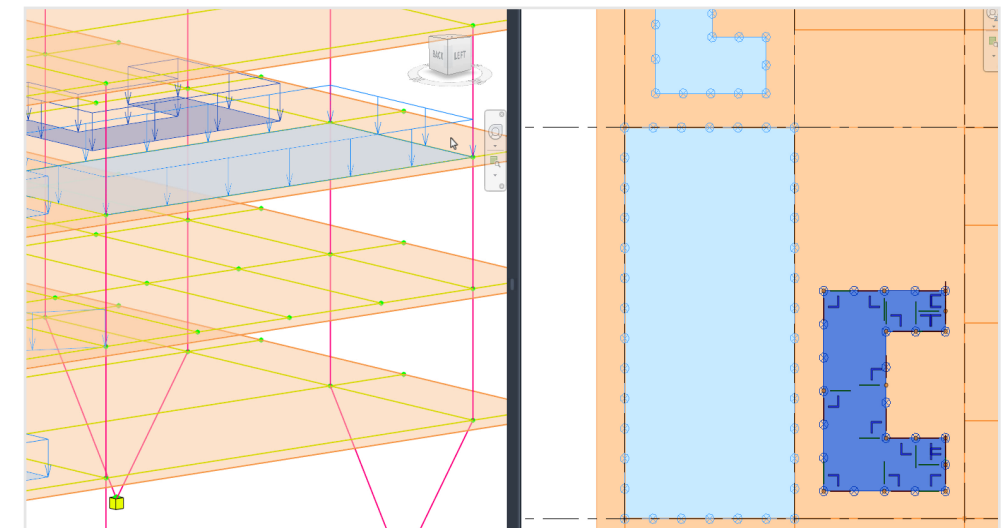
You can control the visibility of loads with view filters, enabling easier creation of parametric floor loading plans.

Scaling loads:

Control the scale of loads via the structural settings dialog box. Set the minimum and maximum load value and set the actual length of the arrows to visually check load magnitude.



Clear load documentation with color coding.



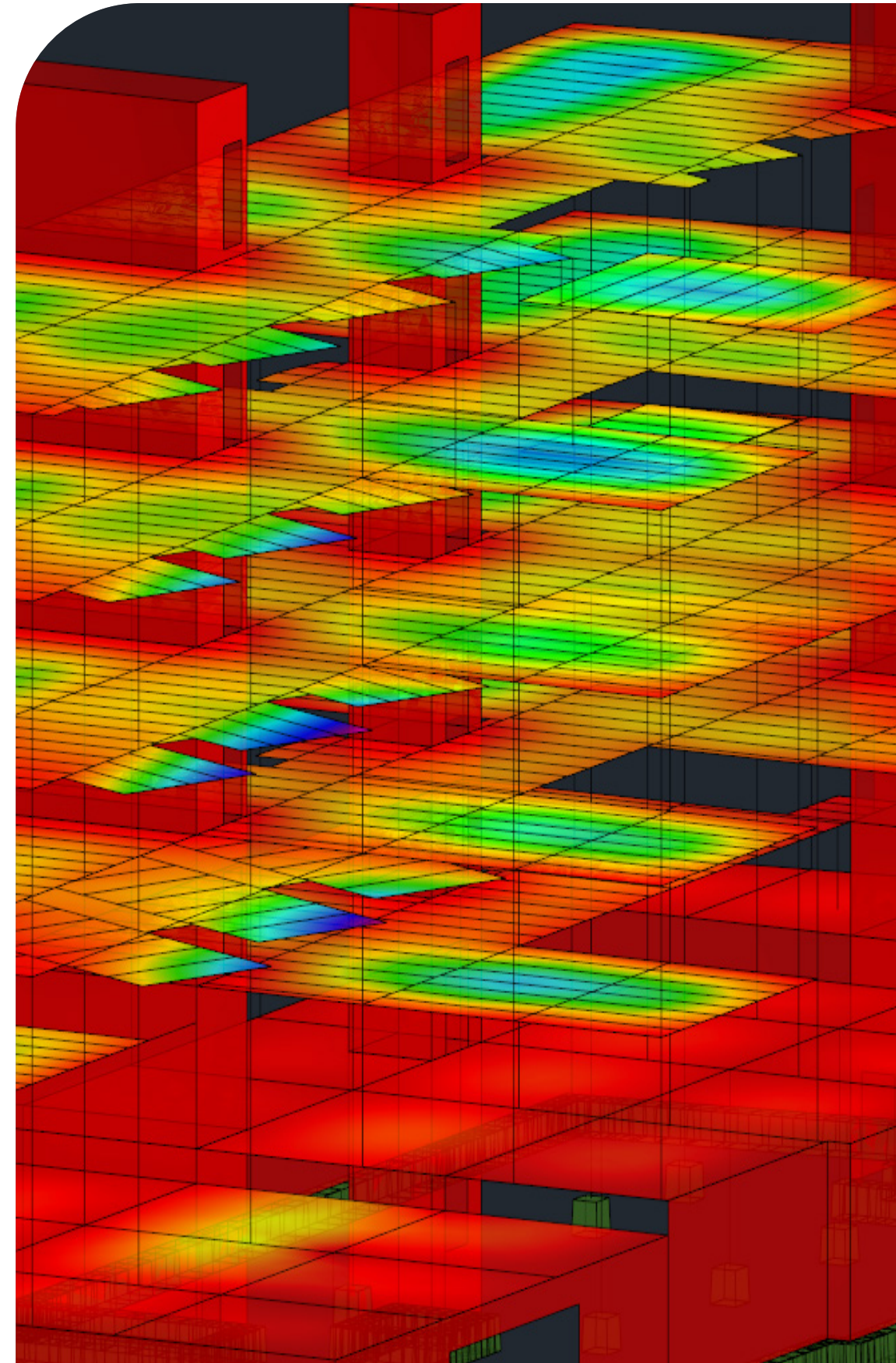
Defining structural loads at any host location effortlessly.

Revit to Robot Structural Analysis Pro link enhancements

The new load definition introduced in Revit 2024 fully transfers to Robot Structural Analysis Professional.

Here's how the enhanced link between Revit 2024 and Robot Structural Analysis Professional 2024 better supports BIM-centric structural analysis workflows:

- Improved transfer capabilities for panel properties which differ in thickness and material
- Transfer of analytical panels created by extrusion in Revit
- Assignment of the default steel design type in Robot Structural Analysis Pro based on the analytical member structural role defined in Revit
- Round trip of steel design parameters between Revit and Robot
- Transfer of arc members from Revit to Robot



Concrete design

Revit provides detailers with advanced BIM capabilities for modeling 3D concrete reinforcement and creating shop drawings and bending schedules.

All these rebar documentation features help streamline coordination between designers and fabricators by improving shop drawing clarity and efficiency.

Concrete detailing in Revit can help you create 3D rebar models with high fidelity and accuracy. You can design with clash prevention in mind and transition from design to detailed models while respecting both perspectives and following local code requirements.

New path alignment options for free form rebar

With Revit 2024, you can choose how to align the bars in the rebar set and make the bars in the set parallel to the planar face selected in the align/close constraint.

You can also toggle the stirrup orientation for the aligned distribution by pressing spacebar. This applies only for the closed stirrups in the rebar set.

These capabilities, increase the versatility of 3D rebar modeling and help you define accurate reinforcement for standard and non-standard shapes of concrete elements.



Adaptive propagation for rebar

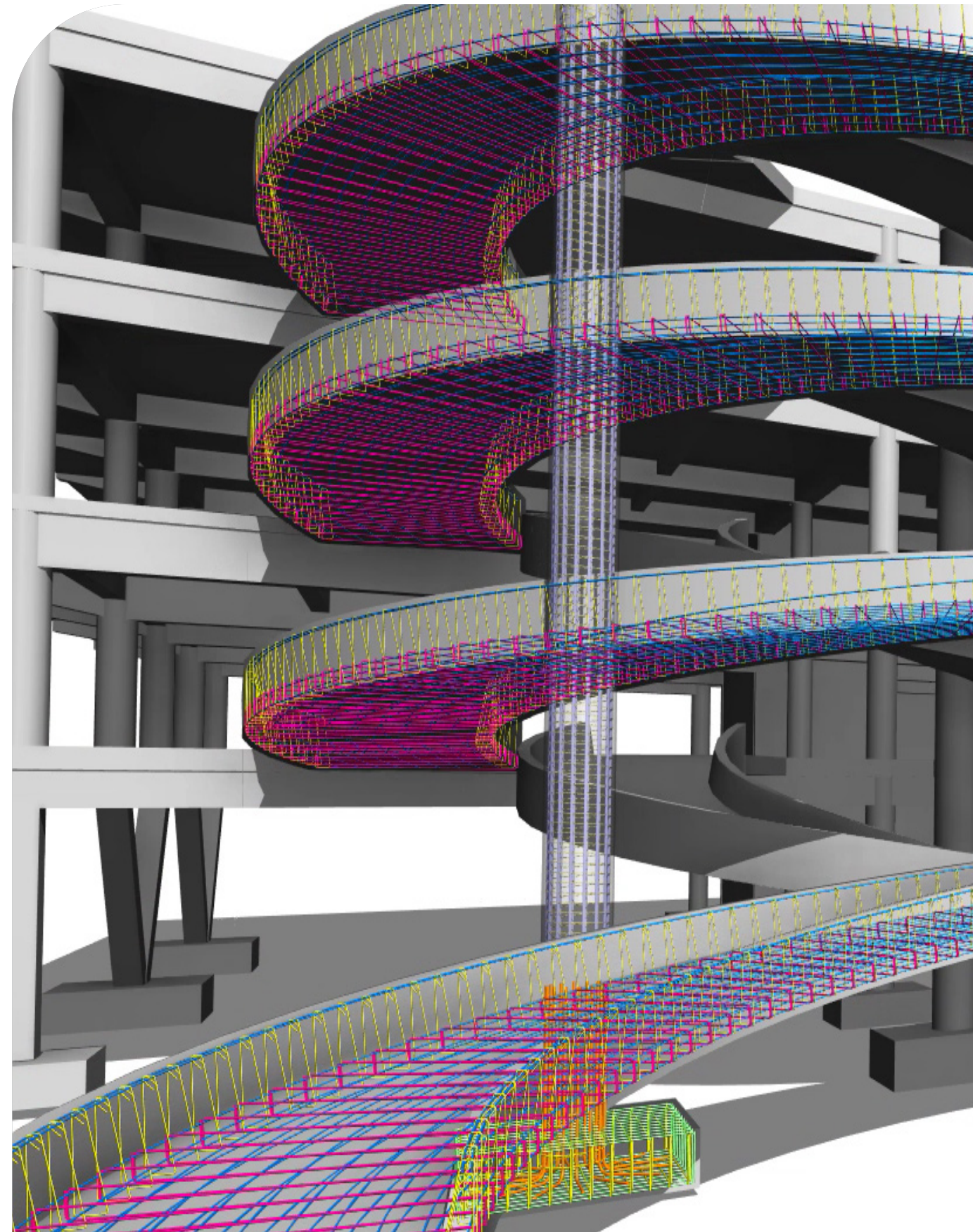
Revit adaptive propagation features for rebar improve your efficiency when detailing concrete structures.

When working on a design that has several similar concrete elements, you can quickly and accurately copy shape-driven rebar from one concrete host to another. You can also align rebars to a destination host or face. The power of adaptive propagation means these concrete host elements don't need to be identical for the newly created bars to match their new host.

When modeling complex structures such as curved buildings, you might use free form rebars which can be placed in virtually any concrete host and which also have adaptive propagation features.

Shop drawings

Preparing reinforcement drawings is an important task in rebar detailing. Structural detailers use shop drawings to clearly communicate design intent and fabrication instructions to fabricators and contractors.



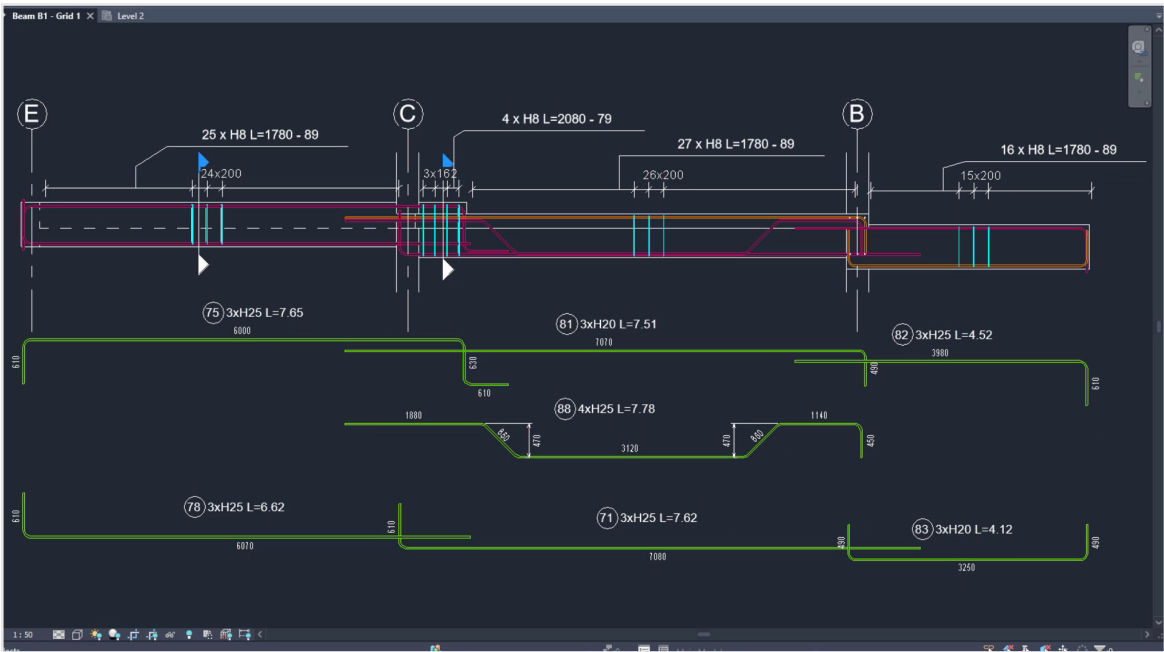
Bar bending details on reinforcement drawings

With Revit 2024, you can add bending details to your reinforcement drawings to create accurate bar bending and installation instructions. Bending details are view-specific and can be placed in any 2D view (plan, section, and elevation views) that contains the host rebar. Revit creates bending details as true vector geometry and updates rebar changes automatically.

The bending detail is driven by standard Revit type properties, allowing you to have multiple types that you can use in different situations. The bending details also use Revit dimension styles, so you can set up a couple dimension styles to support the bending detail tools and configure the amount of information displayed within the bending detail.

| Bar Length | Quantity | Total Bar Length | A | B | C | D | E | F | G | H | Bending Detail |
|------------|----------|------------------|-----|------|-----|-----|-----|---|-----|----|----------------|
| 2220 | 45 | 99900 | 0 | 0 | 0 | 0 | 0 | 0 | 400 | 0 | |
| 3740 | 121 | 452540 | 0 | 3740 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 1930 | 120 | 231600 | 120 | 370 | 520 | 370 | 520 | 0 | 120 | 70 | |
| 720 | 120 | 86400 | 120 | 520 | 0 | 0 | 0 | 0 | 120 | 70 | |
| 1670 | 91 | 151970 | 120 | 540 | 220 | 540 | 220 | 0 | 120 | 70 | |

Bar bending details in rebar schedules.

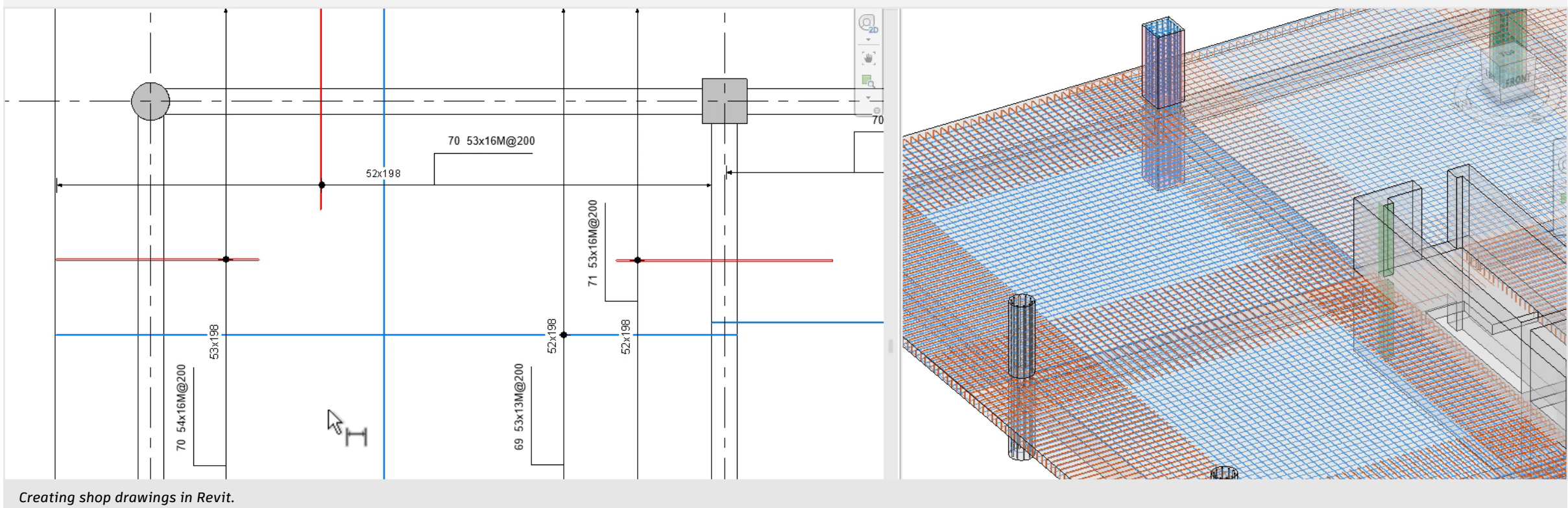


Bar bending details on reinforcement drawings.

Bar bending details in rebar schedules

Bar bending details on reinforcement drawings and in rebar schedules allow you to create comprehensive rebar drawings according to industry practices. The bending details can also be used in schedules, especially useful for non-standard shape codes. Note that in many regions and countries, shape codes and bending details are always shown and required in the schedule, regardless of whether the rebar is standard or non-standard.

You can edit bending detail options, including which dimensions are displayed for the bending detail or which dimension styles are used, through the dedicated options menu. You can select whether to show the rebar shape parameter names or the actual values of segment lengths. Bending details are only visible when you place the schedule on a sheet.



Automatic tag placement for multi-rebar annotations

Place multi-rebar annotations with Revit 2024.1 three times faster by orienting the tag parallel to the dimension line, at a specified offset. Place multi-rebar annotations with just two clicks, and the tag automatically aligns to the dimension line.

Multi-leader tag enhancements

Remember when you were adding annotations in cross-sectional views of columns and—even though all the main reinforcement bars had the same diameter—you couldn't use a single tag because you had too many rebar sets?

Enhancements for multi-rebar annotations make it even easier to annotate your designs in Revit quickly and accurately.

- Select multiple elements and generate a single tag for all of them
- Control the visibility of individual tag leaders with dedicated commands in the ribbon
- Snap and adjust tag leaders individually or simultaneously

Displaced rebar representation

This feature lets you slightly offset bars from their actual positions in concrete shop drawing views to help collaborators see these elements more clearly and better understand your design intent.

When rebars are displaced in a view, their positions change in that view only, and you may still tag the displaced bars as usual.

Steel Design

Library-based connection design automation

Revit gives you access to library-based steel connection design automation features that help structural engineers work on typical steel buildings faster and more precisely.

Structural engineers and fabricators can blend their own specific rules into libraries of connections, which will serve as the single source of information for all new projects.

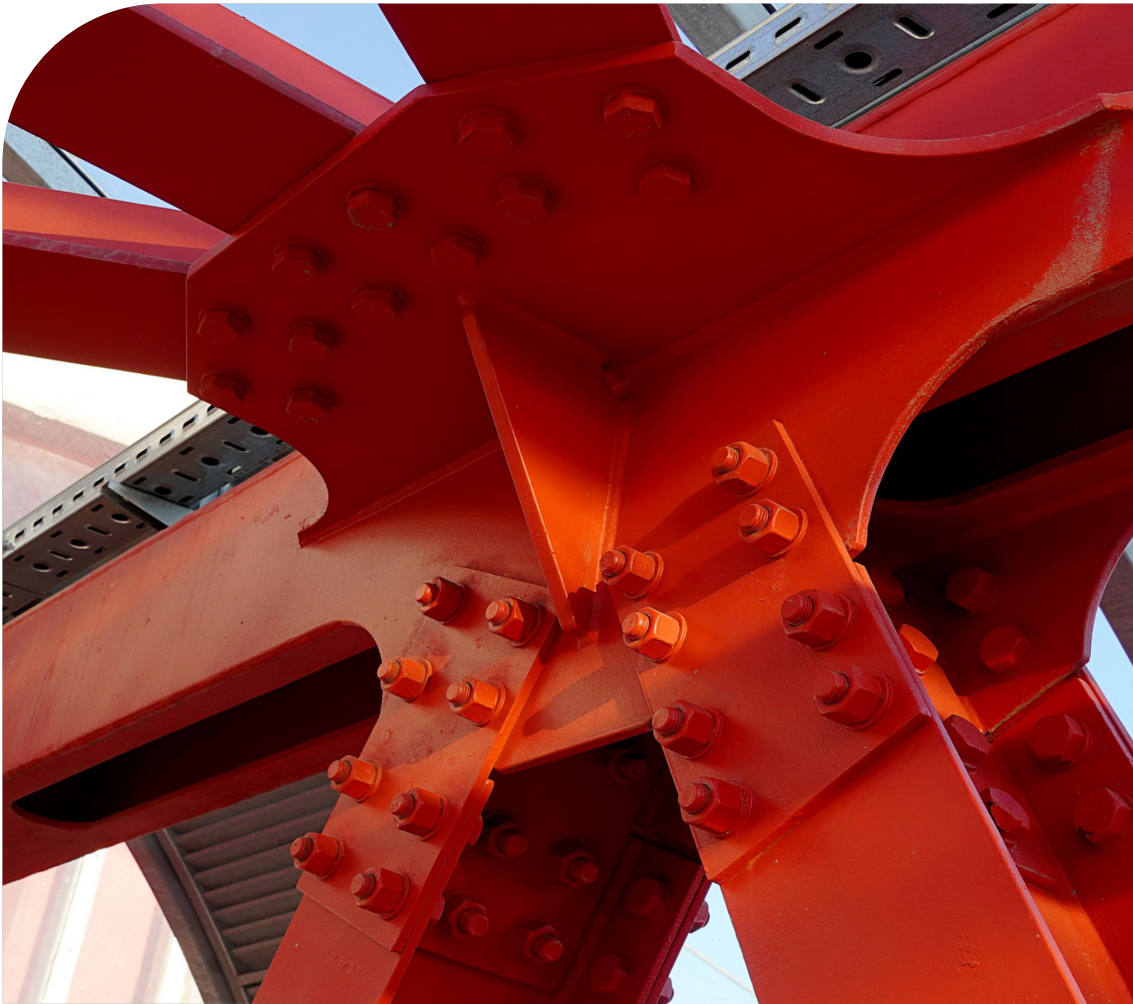
Steel connections library content

Revit has sample libraries of steel connection types configured according to commonly used engineering standards. These have embedded associations between the connections proposed by the tables from the standards, the steel profiles to which they fit, and the ranges of compatible member end forces.

Single- or double-angles, shear end plates, seated connections, column splices, base plates, fin plates, and many more connections are included in Revit content packs available via your Autodesk account portal.

The sample libraries support:

- AISC Steel Construction Manual 15th Edition and 14th Edition
- BCSA and SCI publication P358, “Joints in Steel Construction—Simple Joints to Eurocode 3,” 2014 Edition (also known as the Green Book)
- German DSTV, “Standardized Joints in Steel Structures to DIN EN 1993-1-8,” (“Typisierte Anschlüsse im Stahlhochbau nach DIN EN 1993-1-8”) 2013 Edition



Custom standards: You can take the Autodesk libraries and duplicate or edit existing connection types to expand and customize your own.

The “Associate Connections with Profile Sizes” is meant to be a universal tool for all engineers to express the rules they need for each steel connection type. Once saved in libraries, you can reuse them across projects, saving countless hours.

Automation of steel connections design

Steel connections automation makes creating the design intent model easier with steel off-the-shelf connections placed in the model automatically.

This functionality uses structural analysis results to control steel connection placement and tightens the integration between the analysis and detailing phases of a project, helping you make better design decisions when adding steel connections to the structural model.

You can use either the member end forces dialog to specify internal forces and moments for steel connections or use structural analysis results imported into Revit from Robot Structural Analysis Professional or third-party tools.

In the steel connection automation player, Revit provides sample rules for placing steel connections based on predefined ranges of applicability.

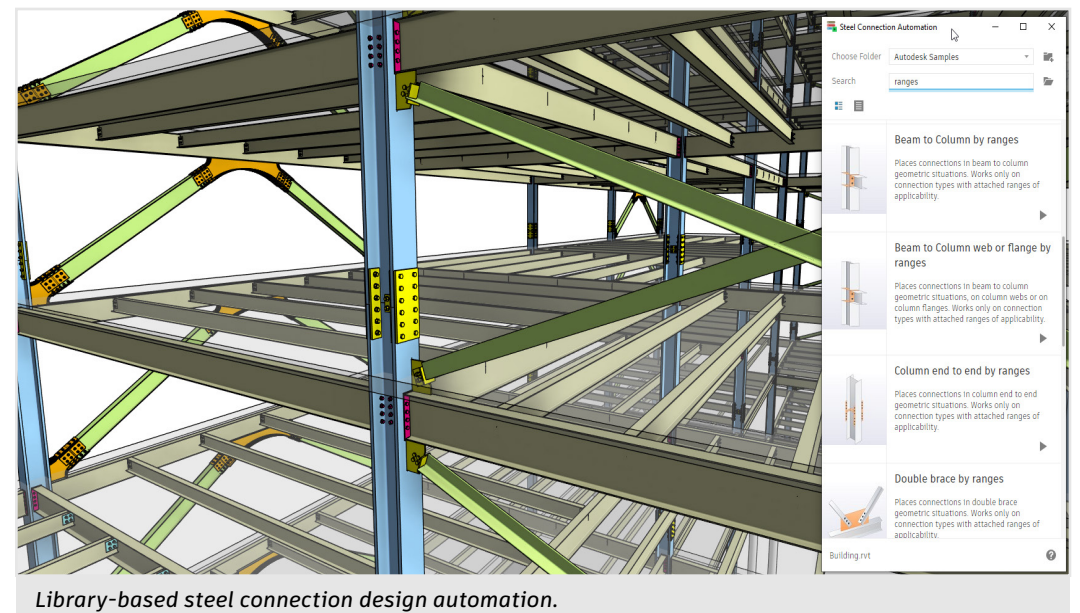
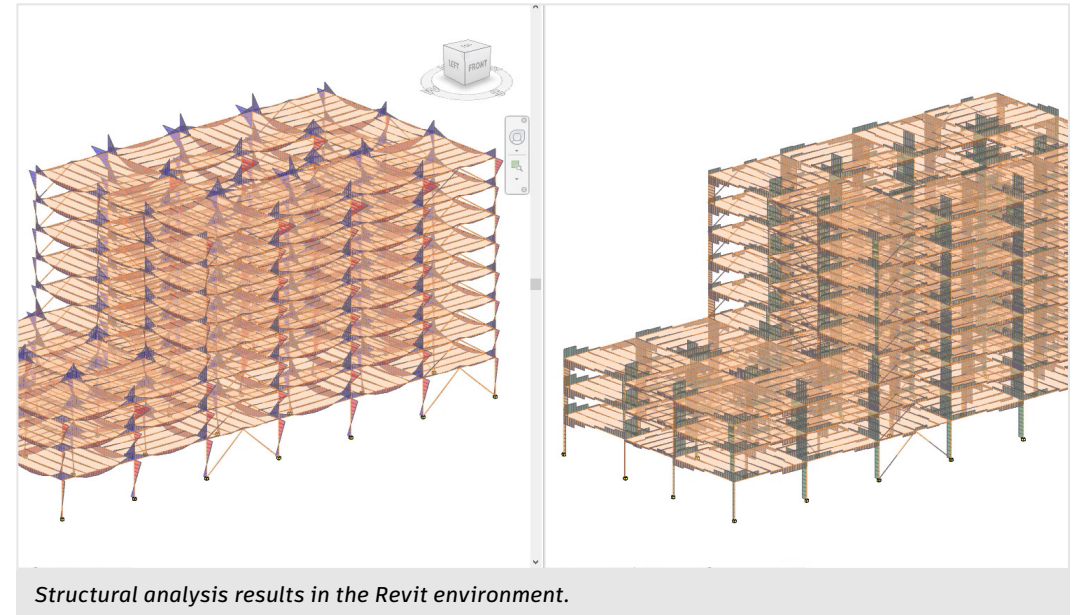
All physical structural members can utilize information stored within analytical elements since they are associated with each other.

Rules for each type of steel connection are used to place them based on relevant criteria such as profile sizes, steel grades, and **capable internal forces**.

These rules work in tandem with predefined libraries of connections (Revit files) containing the connection types, desired geometry parameters, and associated ranges of applicability to ensure connections are selected appropriately.

Lastly, you can now use the **split element and split with gap tools** on all structural framings and columns to enable faster modeling in scenarios that require splitting.

Revit software has long been a tool for structural design. Now as these new features demonstrate, it's an increasingly valuable tool for structural engineers to work in integrated BIM workflows.



Additional Resources

Watch the *AEC Collection Essentials: What's New for Structural Engineers in Revit* on-demand webinar.

[Watch now >](#)

Get more information about BIM solutions for structural engineering.

[Learn More >](#)

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