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# Structural Design and Fabrication Workflow for 3D Reinforcement

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## Learning Objectives

- Understanding the value of connecting your engineering analysis model into your Revit workflow
- The benefit of transferring your intelligent constructability data from Analysis & Design software to Revit® and vice versa
- Creating a connected and advanced BIM workflow to utilize advantages that only intelligent BIM data offers
- Explore a working Design-to-Fabrication workflow powered by Autodesk® BIM 360®

## Description

In this class, you'll discover a practical structural workflow around Revit® software that takes advantage of rich engineering data, and you'll learn how to share the project intelligently with engineers, designers, detailers, and fabricators, essentially utilizing the "I" of Building Information Modeling (BIM). This process will create a better-connected BIM workflow that integrates structural analysis data, real 3D reinforcement, and steel connection verification in Revit. When transferring intelligent structural analysis data from an engineering software to Revit, combined with powerful Revit add-ons, you can easily automate placement of 3D bars based on United States codes and drawing generation of such details. We'll also see how Revit and BIM 360® can help you produce data ready to fabrication. Revit engineering models contain a large amount of extremely useful data, and we will see how it can be beneficial to incorporate all stakeholders up to the fabricators in the BIM workflow.

## Speakers



**Michael Conte is the Local Product Manager at GRAITEC Inc**, an innovative software developer and solution provider in addition to being an Autodesk® Platinum Partner operating across Europe, and with Gold Reseller status in the United States. As a Structural Engineer from Montreal, Canada he has been providing structural analysis and design solutions to engineers throughout North America for over 5 years. From small engineering firms to large governmental entities, Michael has provided his expertise toward structural analysis software as well as a streamlining their BIM workflows.



**Joseph is Product Director at GRAITEC INNOVATION SAS** in charge of all internal products and provides dynamic analysis and reinforced concrete consultancy to highly skilled GRAITEC customers. Joseph Pais is a structural engineer with 20 years' experience in the AEC industry. Joseph started his career working for the French SNCF Company on the “Concorde Lafayette” train substation. Then, in 1997, he moved to GRAITEC France as a structural engineer doing demos-training-projects on the internal calculation software's. Joseph has also taught dynamic analysis and reinforced concrete design for more than 10 years at the French university, Conservatoire National des Arts et Métiers (CNAM).

### **Who is GRAITEC?**

GRAITEC is an innovative CAD, CAE and BIM software author, delivering cutting edge technology, and BIM implementation and support services to the AEC industry. The company has evolved to become one of the largest Autodesk® Partners and Value Added Resellers in the world.

GRAITEC provides cutting edge technology solutions improving customers' business activities and design processes. Our innovative BIM (Building Information Modeling) technology dramatically increases user productivity and safety thanks to automation, embedded design and control procedures. Through its capacity of exchanging smart data, GRAITEC Structural BIM Solution also highly facilitates collaboration between construction design, engineering and building professionals for faster, smarter and more effective communication.

## Class Overview

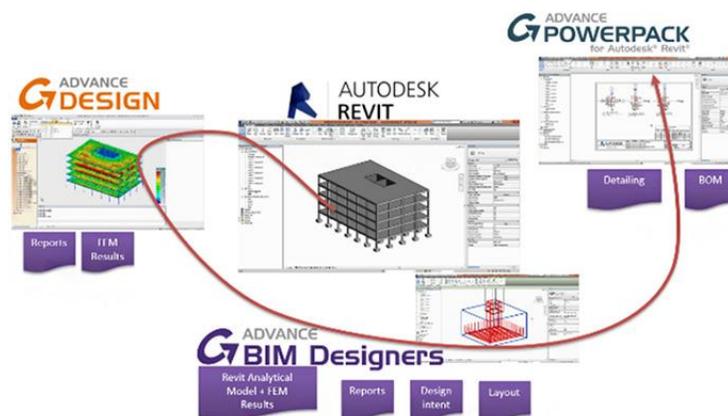
GRAITEC Advance BIM Designers – Concrete Series is an innovative series of applications for rebar detailing and modeling using engineering BIM data.

Advance BIM Designers is a BIM Solution for improving structural project management. It helps users to create, design, document, track and control structural reinforcement of a BIM project whilst also working in multiple BIM environments.

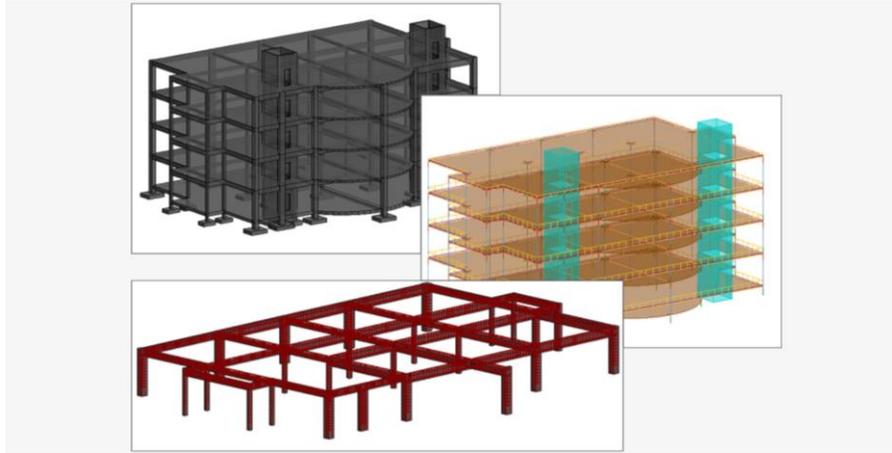
Working to various international standards, the RC (reinforced concrete) BIM Designers automate the design and creation of 3D rebar cages and produce related documentation including design reports, drawings and schedules, for common concrete Column, Beam and Footing elements.

## Understanding the value of connecting your engineering analysis model into your Revit workflow

When applying a mature BIM workflow GRAITEC BIM Connect supports intelligent model integration utilizing native products objects or families, thereby seamlessly aligning Revit's descriptive model (LOD 400) with its counterpart analytical model in GRAITEC Advance Design, and corresponding detailed model (LOD 500 -better managed in products such as Autodesk Advance Steel) for bidirectional model sharing and supporting the transfer of analytical data to Revit.

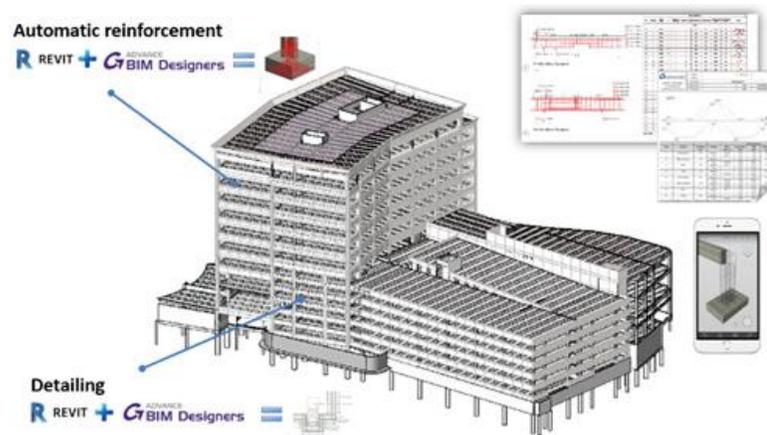


Reinforced Concrete BIM Designers are compatible and integrated with Autodesk Revit 2017 and 2018, GRAITEC Advance Design, and are also available as a standalone solution. They introduce highly advanced, flexible and productive workflows, coupled with a high-degree of automation when compared to traditional structural processes. This offers a practical solution that simplifies the workflow between structural engineers and technicians.



### Identifying the benefits of transferring your intelligent constructability data from Analysis & Design software to Revit and vice versa

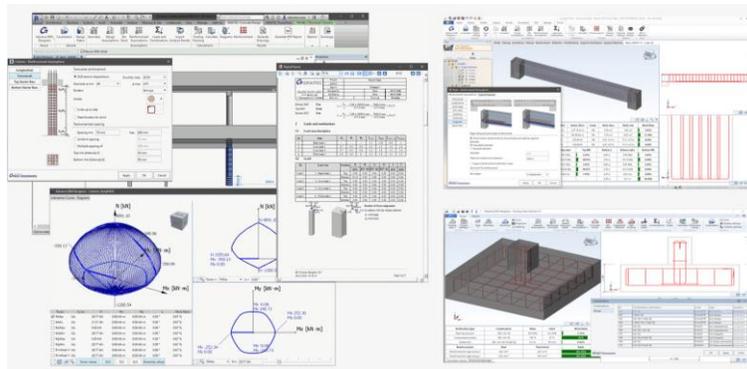
The Reinforced Concrete BIM Designers can be used at any stage of the process to support multiple workflows, from completely isolated processes to fully connected BIM. For example, the reinforcement generator can interrogate the FEM results to automatically calculate rebar or can be used on its own to simply generate rebar cages based on user input. Equally, the user can apply estimated forces and use the Reinforced Concrete BIM Designers to produce reinforcement cages for the entire project's columns, beams and footings - very powerful for estimating as reinforcement can be created for an entire project in minutes. Fully detailed customizable design reports, including detailed calculation formulas with references to the code for rapid validation, can be produced from any platform in a single click.



Following the requirements of Eurocode 2, as well as the USA (ACI 318-14) and Canadian (CSA) standards, the RC BIM Designers enable's a truly connected and automated structural BIM workflow, leveraging both BIM data and multi-platform integration.

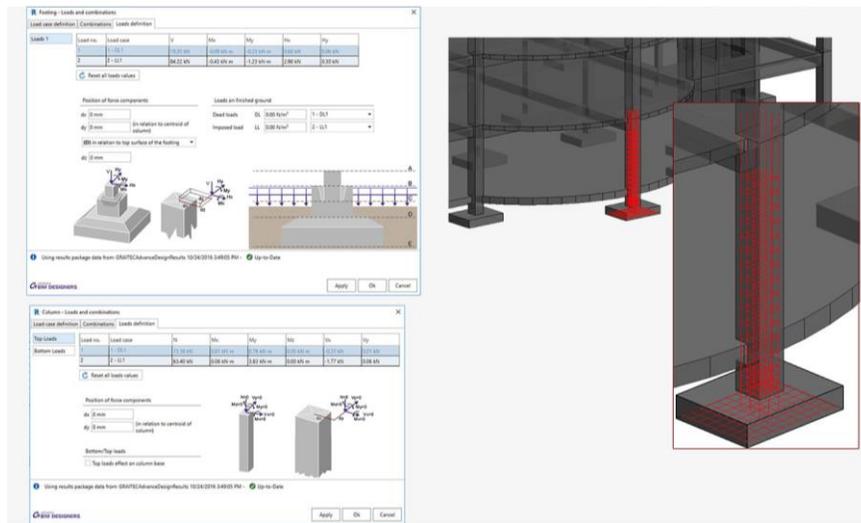


Display graphical results for performed verifications, such as stability checks, interaction curves or diagrams, to obtain a better overview of the status of the designed element.

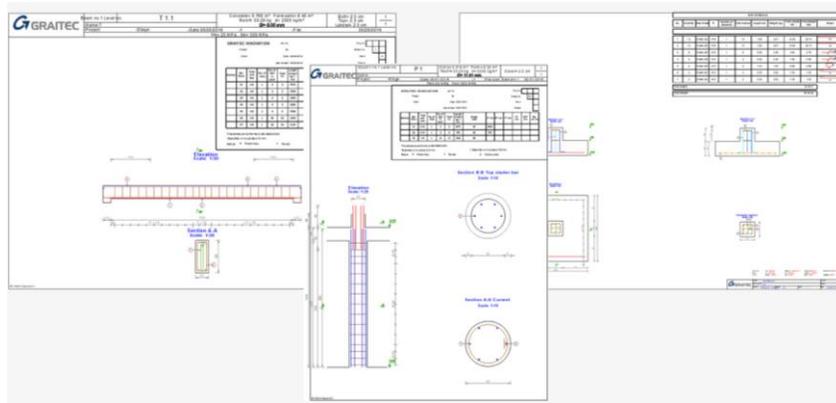


### **Creating a connected and advanced BIM workflow to utilize advantages that only intelligent BIM data offers**

Once the design has been carried out there are always changes to the model that are inevitable throughout the design process. Working on a BIM platform such as Autodesk® Revit® the RC BIM Designer has a significant advantage. In addition to creating a more intelligent and productive BIM workflow, this process is also efficient and will increase productivity that is improved with specific functions per job. When it comes to integrating other disciplines Autodesk® Revit® is more advantageous, with a better collaboration between project disciplines, changes that are necessary though the project design cycle can be carried out and changes to the structural rebar cages can also be produced more rapidly. This means that the collaboration is much improved with other actors of the project thanks to enhancements of reports and RC drawings. This can be as easy as relaunching an RC calculation when the engineer has become aware of the necessity of a beam opening due to MEP. These more detailed assumptions allow for a more fine-tuned design.



**Explore a working Design-to-Fabrication workflow powered by Autodesk® BIM 360**  
 The RC BIM Designers have been localized for Europe, Canada and North America. Country specific, user configurable templates enable fully dimensioned and annotated drawing views and sections to be automatically produced, complete with bar schedule and the option to also create a drawing sheet.



## Helpful Reference

<https://www.graitec.com/advance-bim-designers/reinforced-concrete-designer/>

**ADVANCE BIM DESIGNERS**  
 Products » BIM Designers » Concrete Series

**BIM Designers Concrete Series**  
 Design-driven reinforcement calculation for concrete beams, columns or footings