

SOFiSTiK Structural Analysis integrated in Revit - Workflow and Advantages

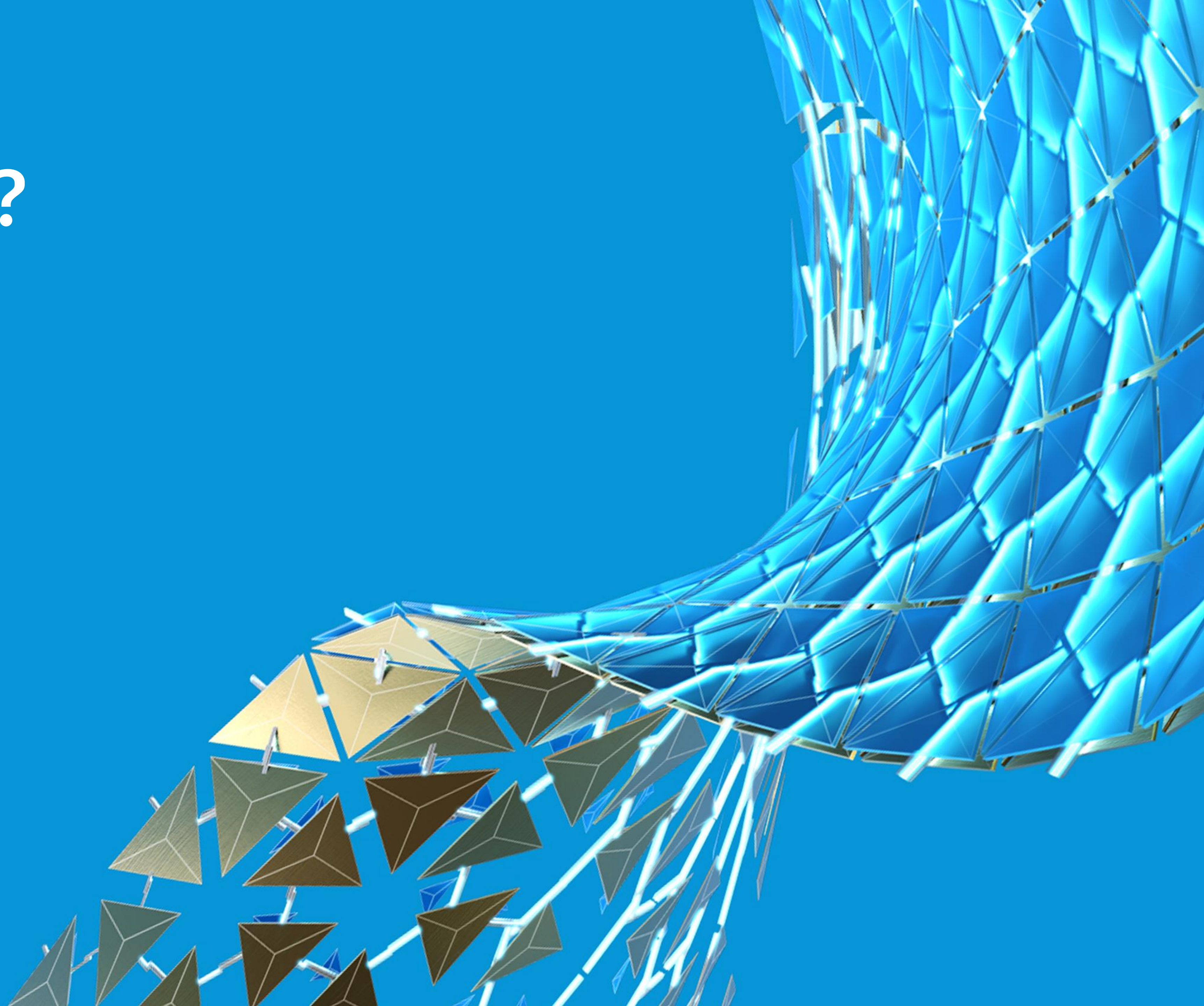
Andreas NIGGL

Head of Development, SOFiSTiK AG | 

Noëlie MAGNIERE

Product Manager, SOFiSTiK AG | 

Who are we?





About the speaker

Andreas Niggel

After receiving his PhD in Structural Engineering at the Technical University of Munich, Andreas is working in software development for SOFiSTiK AG, a leading European supplier of software for analysis, design and detailing.

Currently, he is leading a team which integrates structural analysis into Revit, allowing the user to keep within this platform for all structural work from analysis to detailing.



About the speaker

Noëlie Magnière

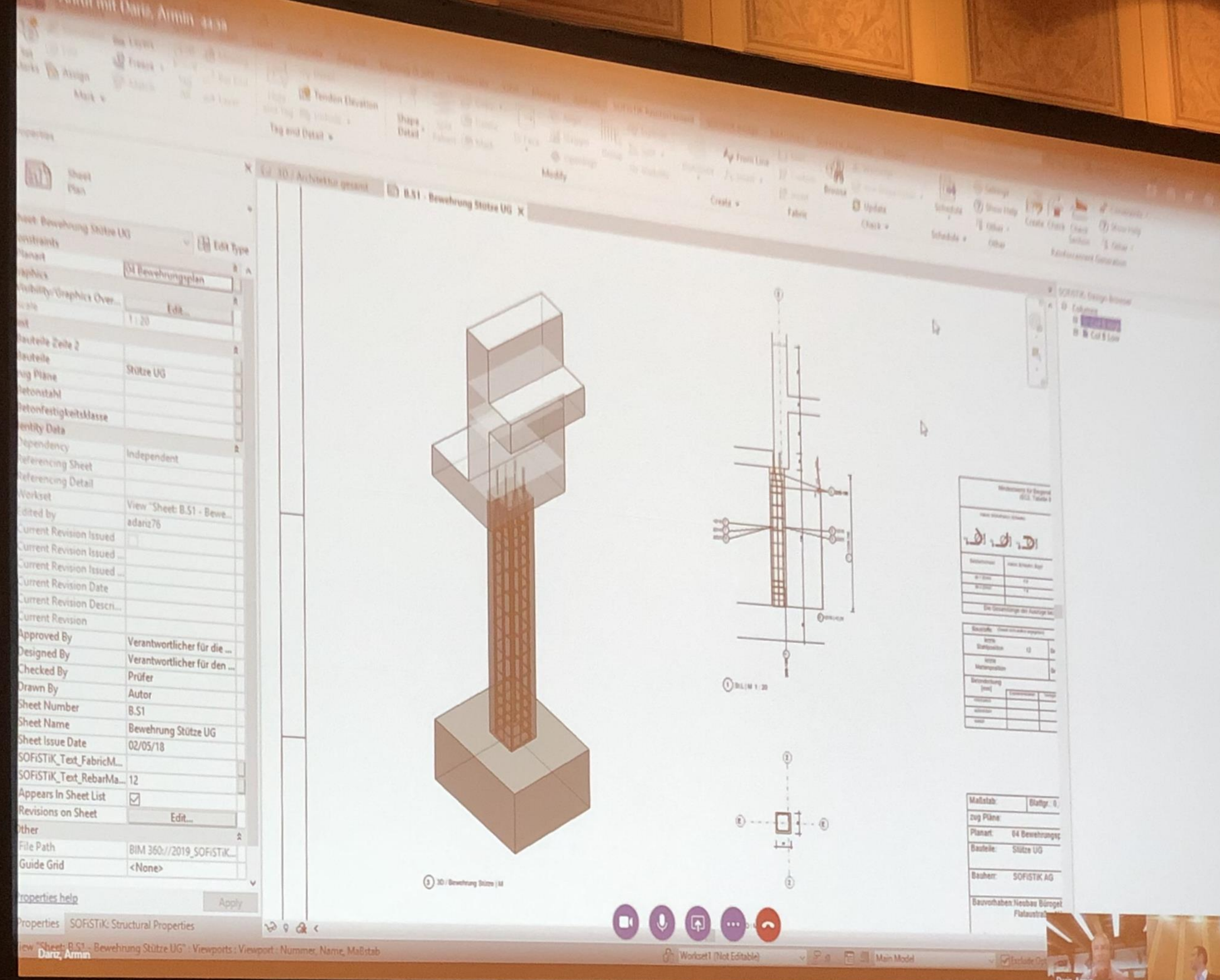
Noëlie Magnière is a product manager at SOFiSTiK AG, a leading European supplier of software for analysis, design and detailing in structural engineering. There, her primary focus are solutions for a seamless integration of structural analysis in BIM workflows.

She has Master of Science degrees from Ecole Centrale de Lyon and from Bern University of Applied Sciences. After a few years leading academical R&D projects in Switzerland, Noëlie moved to Germany and is working since then at the interface between software users and the development team.

AU Las Vegas 2018

“Revit: The Hub for Structural Analysis in a Collaborative Environment”

Thomas Fink, Andreas Niggli





Lusail Katara Hotel, Doha, Katar

General planning: Kling Consult consultancy for Design and Civil Engineering | Client: Katara Hospitality, Hoha (Qatar) | Software: Autodesk Revit Structure, SOFiSTiK FEM Software



3rd Bosphorus Bridge, Istanbul, Turkey

Conceptual Design: Michel Virlogeux, Jean-Francois Klein, T-ingénierie



Brasília National Stadium, Brasil

Client: Novacap, Brasilia | Structural design, roof and esplanade: schlaich bergemann partner | Architects: gmp· Architekten von Gerkan, Margund Partner, Castro Mello Arquitetos, São Paulo

Software for better design

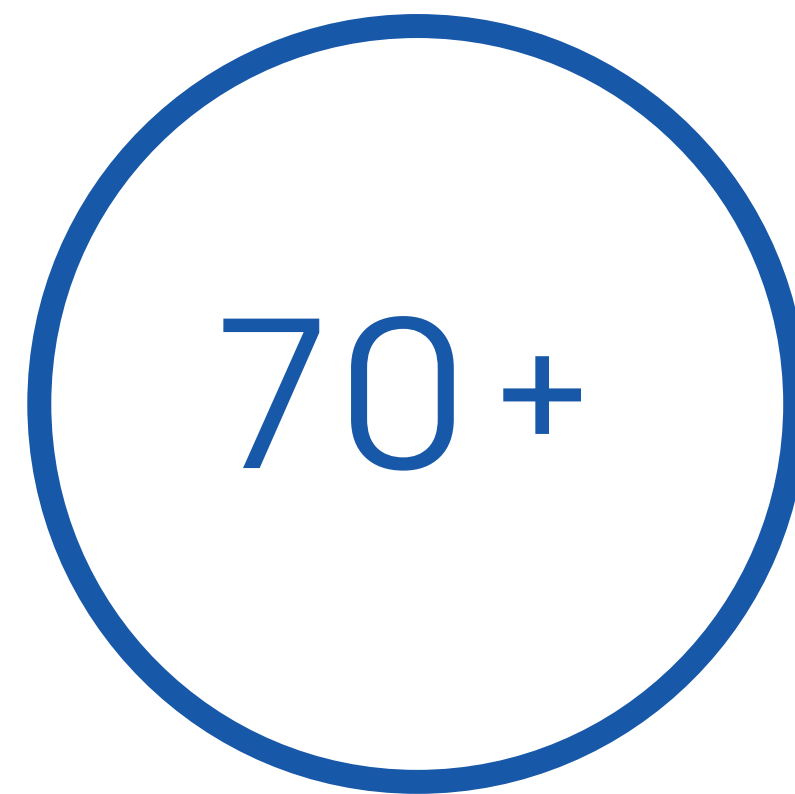
Bridge | Building | Steel & Lightweight | Tunneling | Geotechnics
One tool – One database – Modular Structure



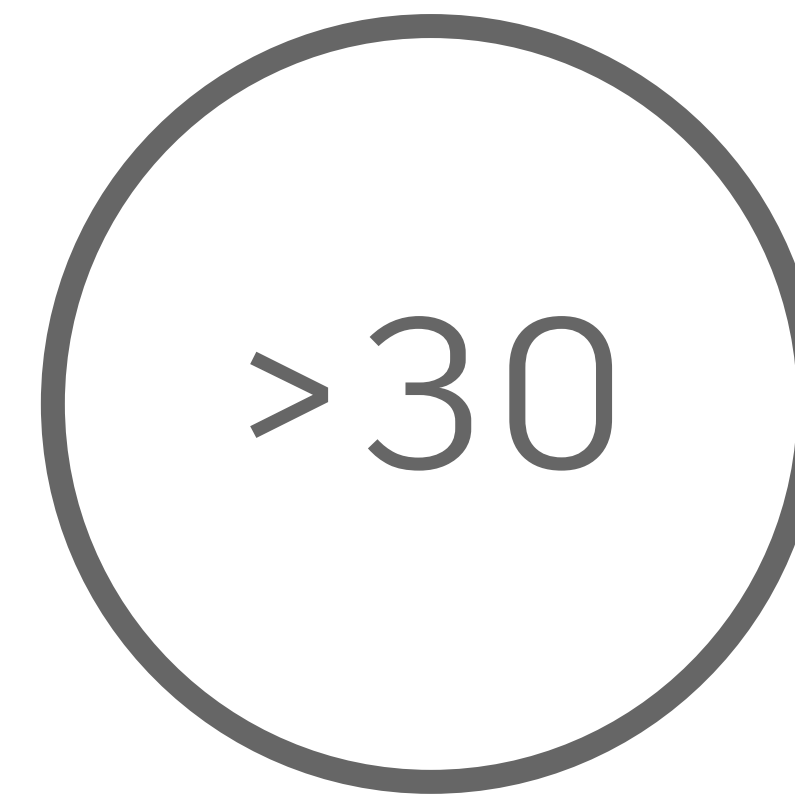
SOFiSTiK facts & figures



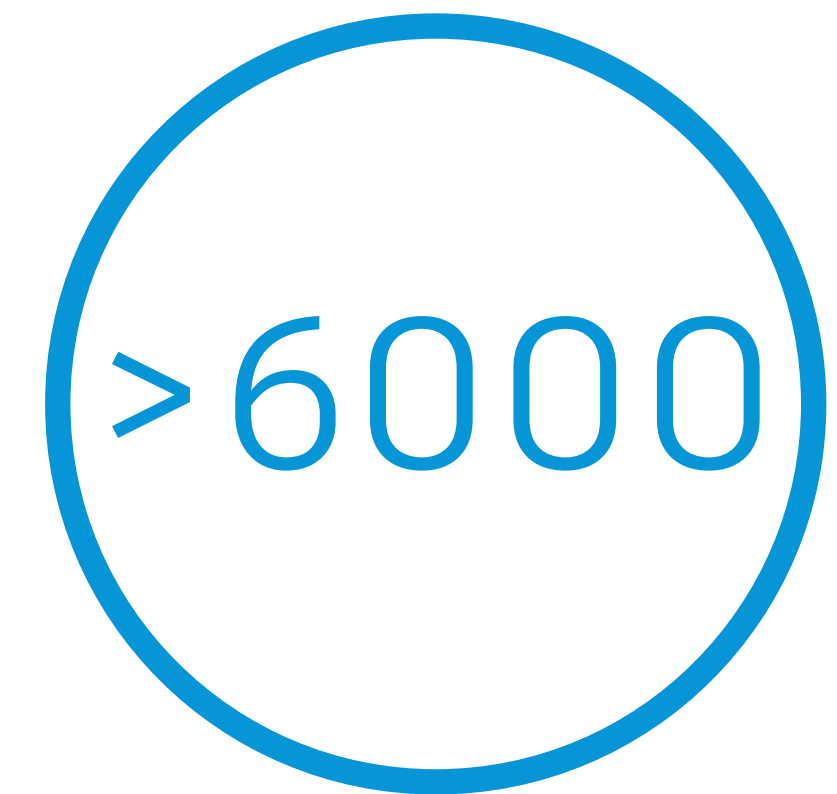
FOUNDATION



EMPLOYEES



PARTNERS &
COMPETENCE CENTERS



CUSTOMERS

SOFiSTiK and Autodesk

SOFIPLUS

AUTOCAD

Graphical input based
on AutoCAD

**Reinforcement
Detailing**

REVIT

2D reinforcement
sheets out of 3D-
Rebar models in Revit

**Analysis
+
Design**

REVIT

Structural analysis of
buildings and member
design directly in Revit

**Bridge
Infrastructure
Modeler**

REVIT

BIM for parametrized
bridge design and
detailing



We don't just develop...

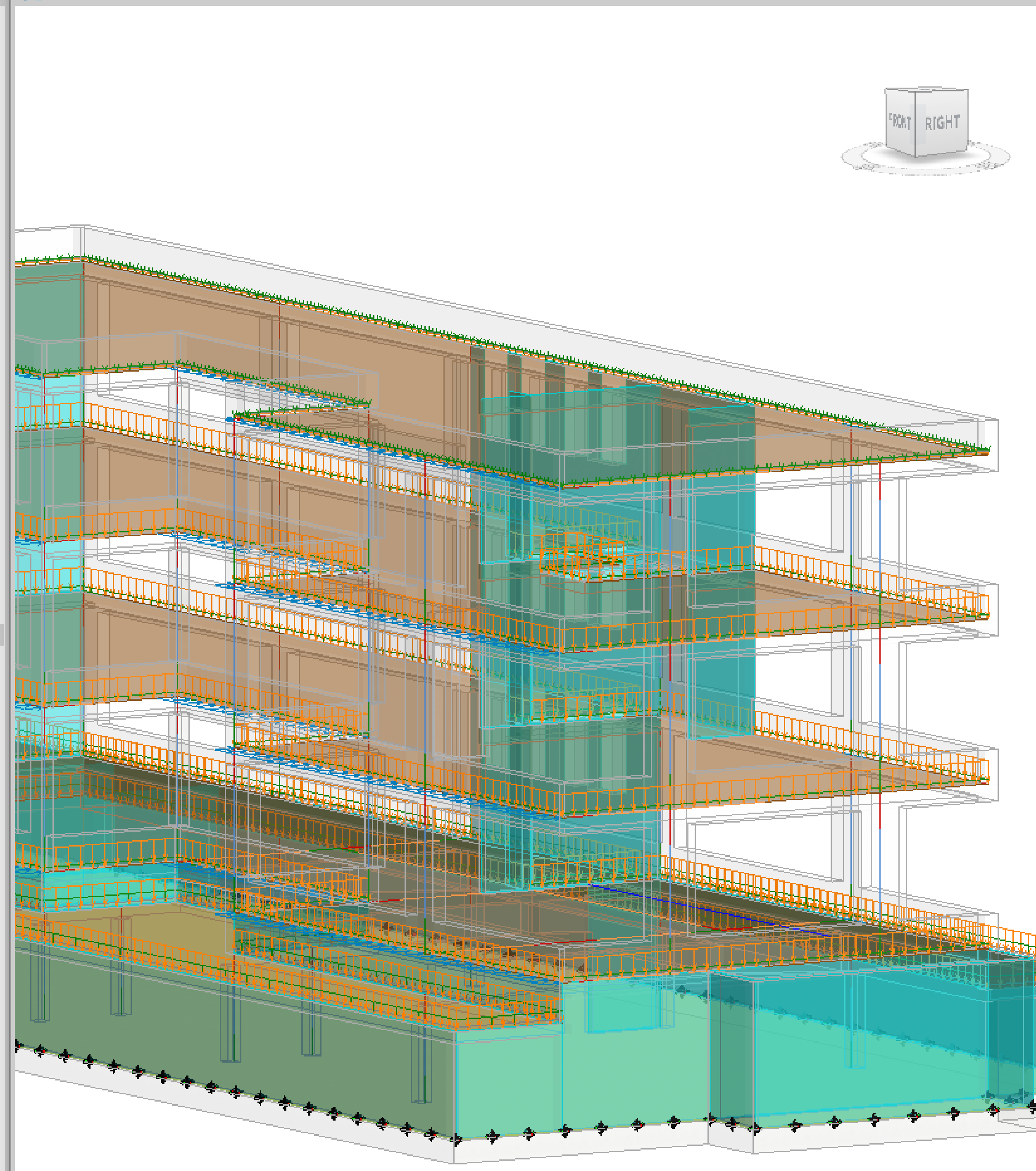
A photograph of a modern, multi-story building at dusk. The building has a light-colored facade and large windows with dark frames. Many windows are illuminated from within, showing interior spaces with lights and furniture. The sky is a deep blue. In the foreground, there is a low wall and some landscaping. A semi-transparent blue banner is at the bottom left.

We build too...

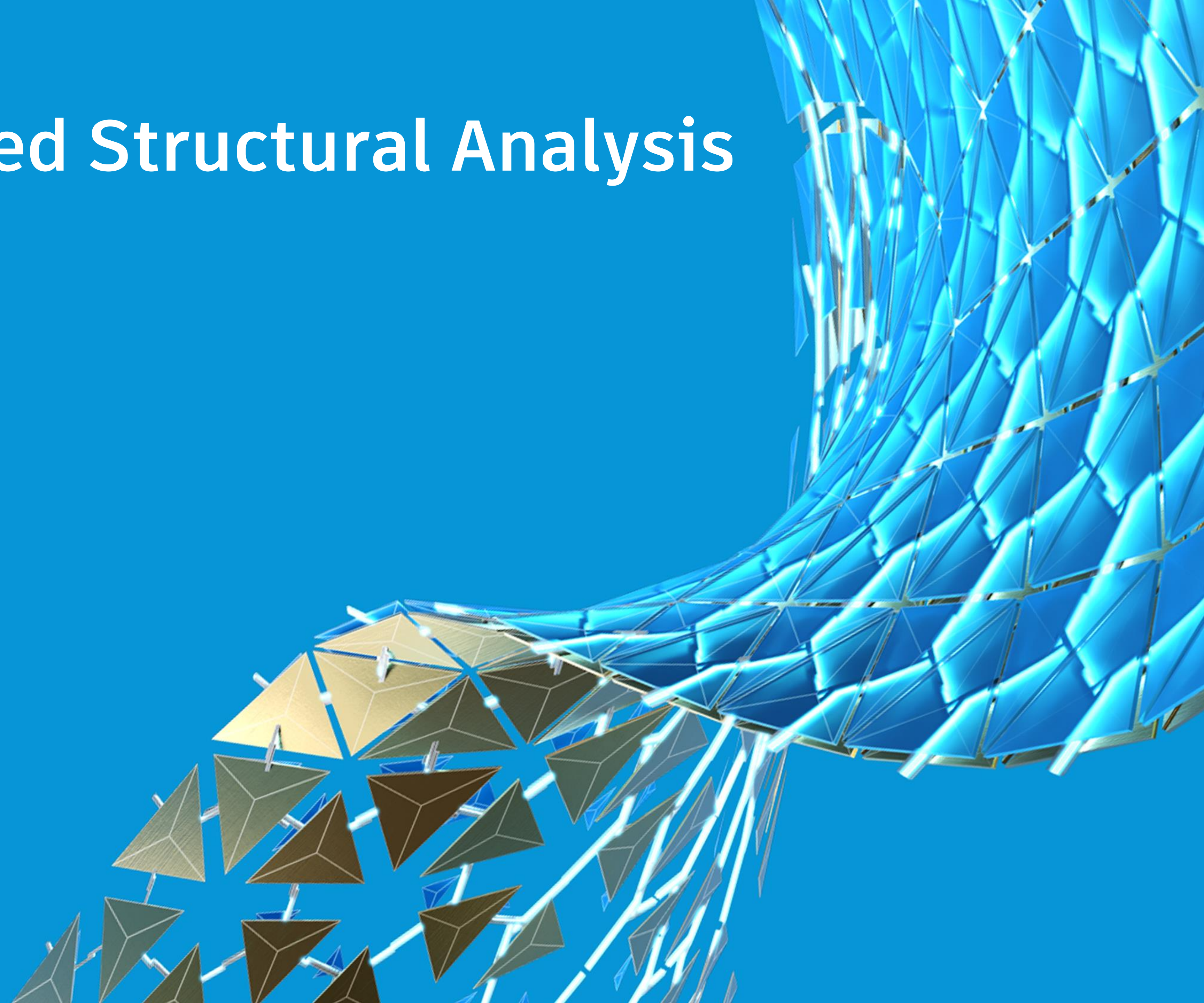


SOFiSTiK Headquarter, Nuremberg





BIM-integrated Structural Analysis - WHY ?



**This is the only way that allows
efficient planning
“It is important that the model
becomes the ,single source of
truth“”**

Sebastian Sailer – EBP Schweiz

SOFiSTiK User Report: *State of the Art Underground Parking Design*



Working with SOFiSTiK
A user report

State Of The Art Underground Parking Design

Autodesk® Revit® and SOFiSTiK software solve complex static problems in challenging projects

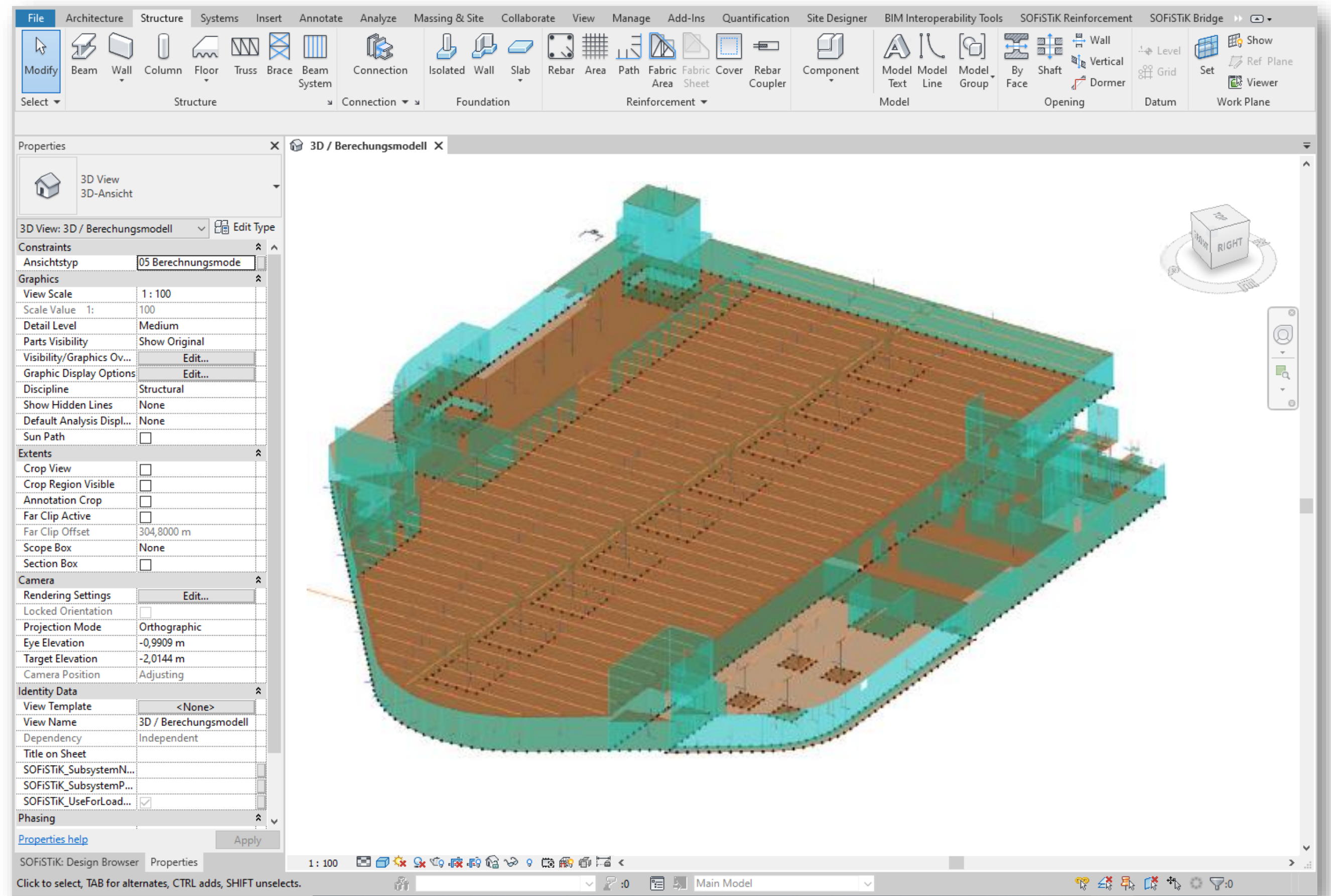
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The new commercial construction in the Meuchwis-area in Schlieren (next to Zurich) was commissioned by the Migros cooperative (the biggest swiss retail chain) and is extraordinary: The proximity to the Limmat river required complex water drawdown measures during the construction stages. The light-weighted wood construction of the higher floors, starting with the ground floor, was the reason why standard case buoyancy had to be avoided solely with the weight of the basement. Extreme cases require special solutions.

In fact, plans to flood the basement in case of buoyancy were drafted. According to the clients wishes, the underground car park was built with very few columns. As a result, customers can comfortably park and will favor this branch for shopping. As many building components as possible were prefabricated to lower construction time. At the point the client extended the design team with the BIM-experienced architects of Werknetz Architektur and engineers of EBP, the room for maneuver was already radically restricted, as the building height and lower edge of the floor slab were already fixed.

Standards assure efficiency

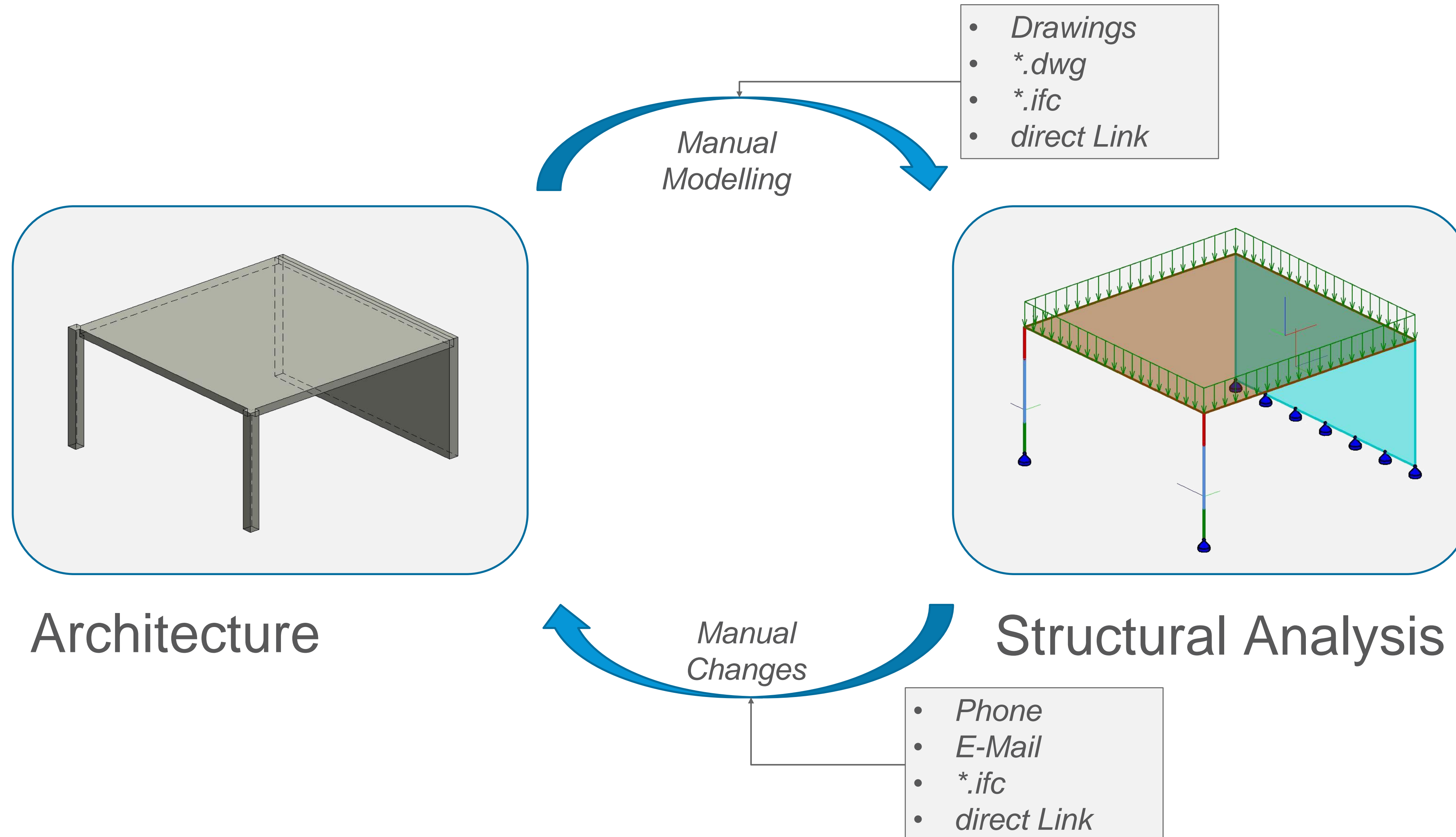
The EBP engineering division is in the Building Information modeling (BIM) business since 2012 and had a leading role in the creation of the first



EBP Schweiz AG's Analytical model in Revit

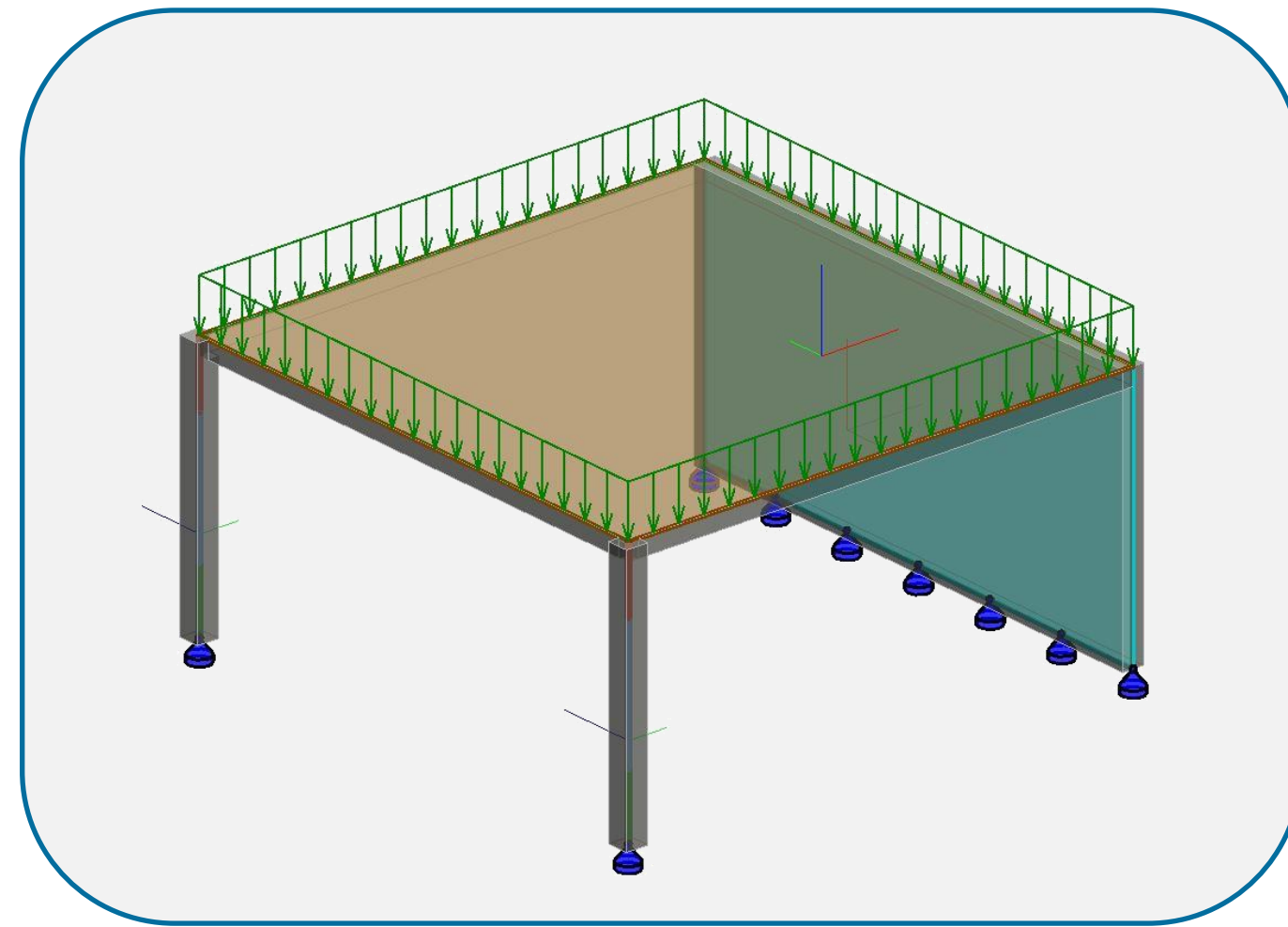
Source: SOFiSTiK User report *State of the Art Underground Parking Design*

Traditional Structural Analysis Workflow



BIM-integrated Structural Analysis Workflow

*Architectural
changes*



*Automatic!
Analytical
adjustments*

One Single Model
=
Revit Solution!

Advantages

EFFICIENCY

- Avoids separate and repetitive input of analysis model
- Immediate reaction on modifications in architectural model

INSIGHTS

- Assess results in the authoring BIM-System
- Combine model data with analysis results and raise additional information

DATA CONSISTENCY

- Avoids synchronization and parallel storage of data
- Coordination of analysis with BIM-Model

COLLABORATION

- Share structural analysis data through Revit Cloud Worksharing
- Collaboration within/out of domain of structural engineers

SOFiSTiK Analysis + Design for Revit 2021

Autodesk Revit 2021 - R21-Webinar A+D.rvt - 3D View: 3D / Subsystem Ebene 3

File Architecture Structure Steel Precast Systems Insert Annotate Analyze Massing & Site Collaborate View Manage Add-Ins SOFiSTiK Analysis Modify | Analysis Results

Project Settings Check Warnings Analysis Materials Sections Load Natures Mapping SSD Current System: 3D_Subsystem Level 3 Visualization Graphical Output Report Column Beam Slab Show Publish Results Edge Releases Loads Lines Utilities Import Results Export to Excel Interfaces Folders Help Add-In User Interface

Modify | Analysis Results

SOFiSTiK: Structural Properties

Result View

General

Result scope: internal forces

Data source: 3D_Subsystem Level 3

Load case: 1 : Self Weight - Linear

Display pattern

Scaling: 100 %

Show legends: ☒

Show FE mesh: ☐

☐ Column Results

☐ Beam Results

☒ Slab results

Display Forces: ☐

Display Moments: ☒

m_{xx}: ☒ surface

m_{yy}: ☐ surface

m_{xy}: ☐ surface

m₁: ☐ surface

m₂: ☐ surface

☐ Wall results

☐ Support Results

☐ Outline Results

Properties help Apply

SOFiSTiK: Slab Design

General

Design group

Name: Slab Level 3

Data source: 3D_Subsystem Level 3

Design

Design code: DIN EN 1992 (NA:2013)

Design Method: Baumann Method

Output

Range of output: Standard

Members

Name

STB 25 cm Beton - C 25/30

STB 25 cm Beton - C 25/30

Calculate OK Cancel

Geschossdeckenliste Bewehrung

Planliste

Stützenliste

Stützenliste Ebene 1

Stützenliste Ebene 2

Trägerliste

Wandliste

Wandtypenliste

Sheets (Planart)

Families

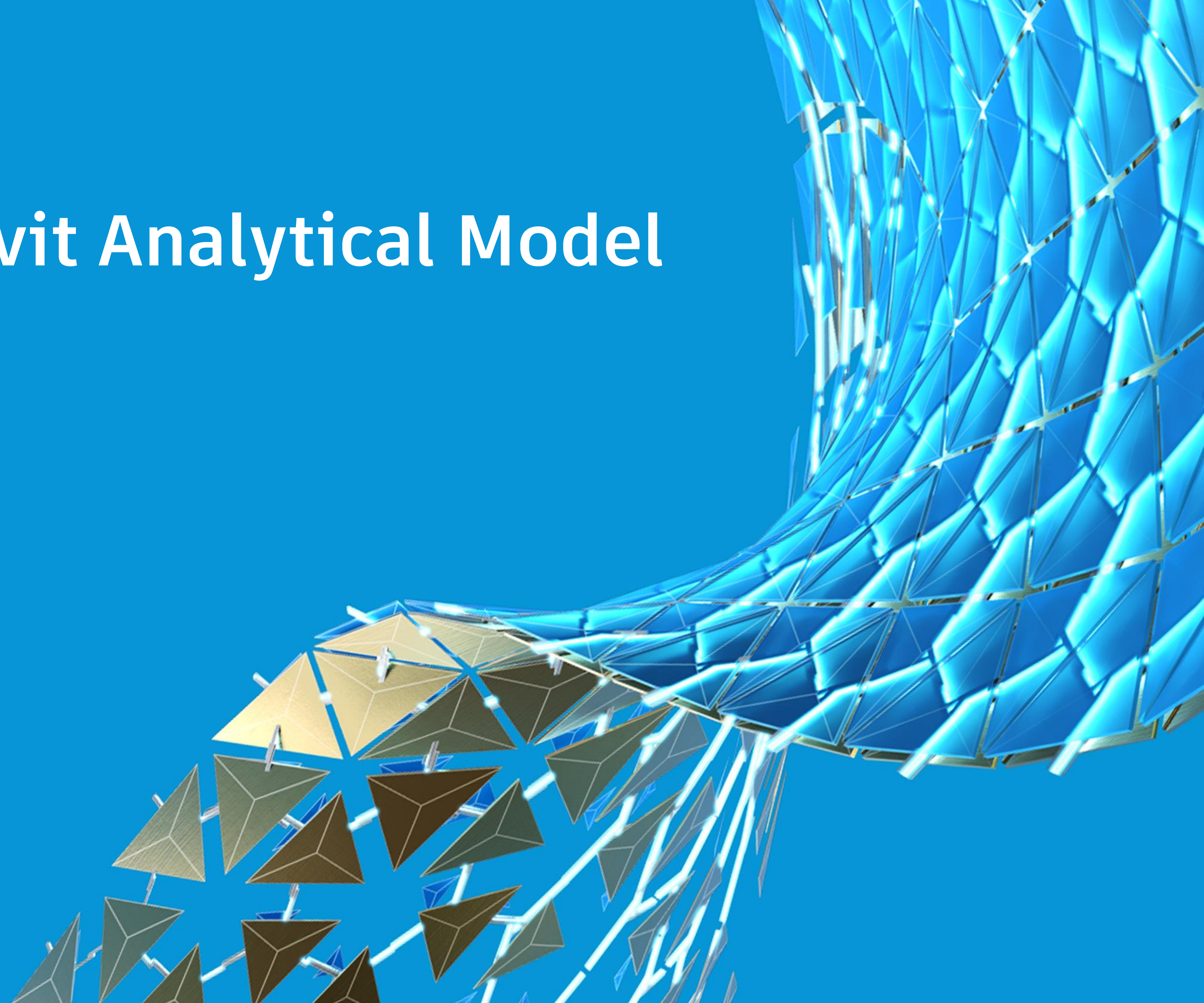
Groups

Revit Links

1 : 100

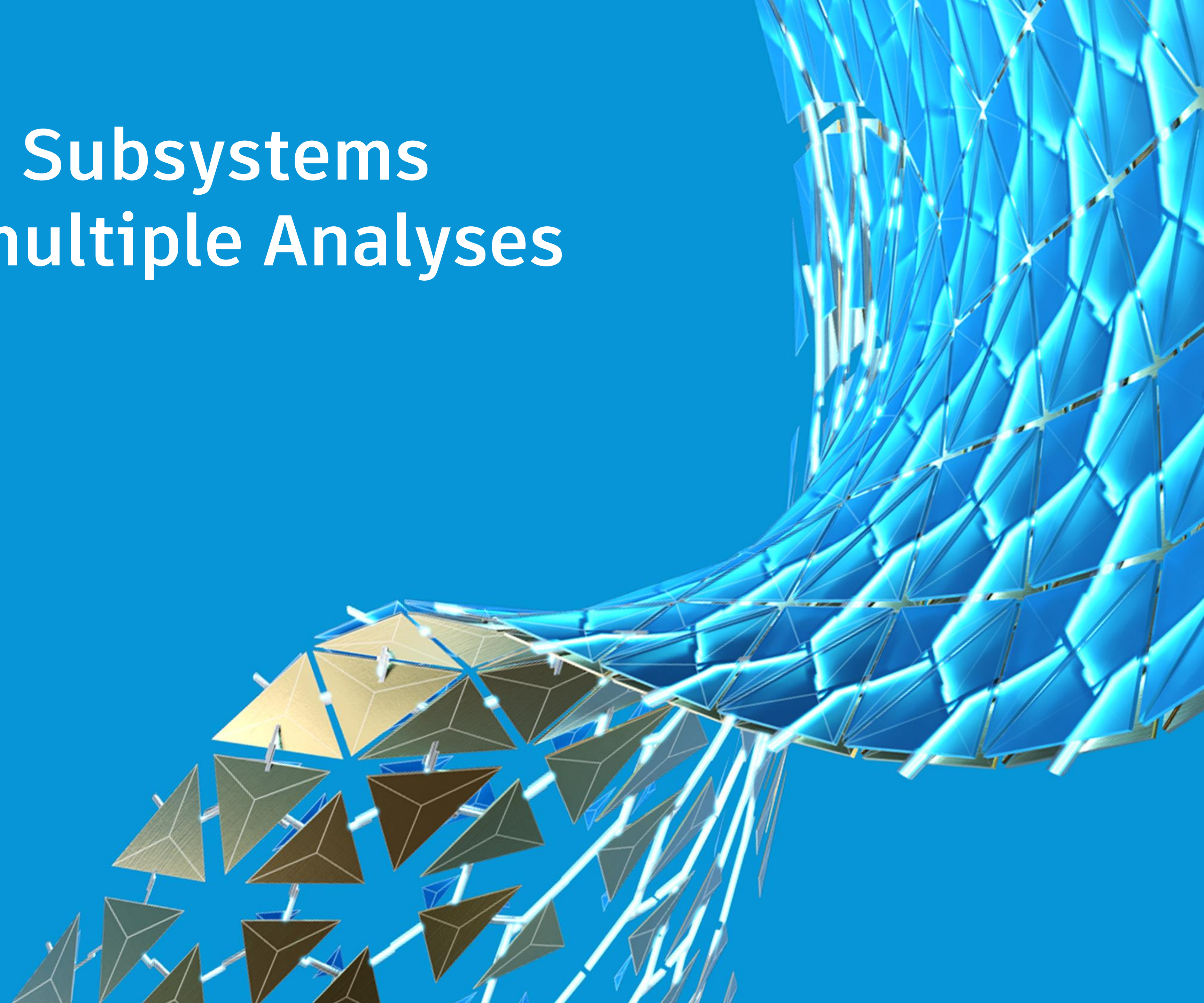
Main Model

Workflow 1 – Enriching Revit Analytical Model

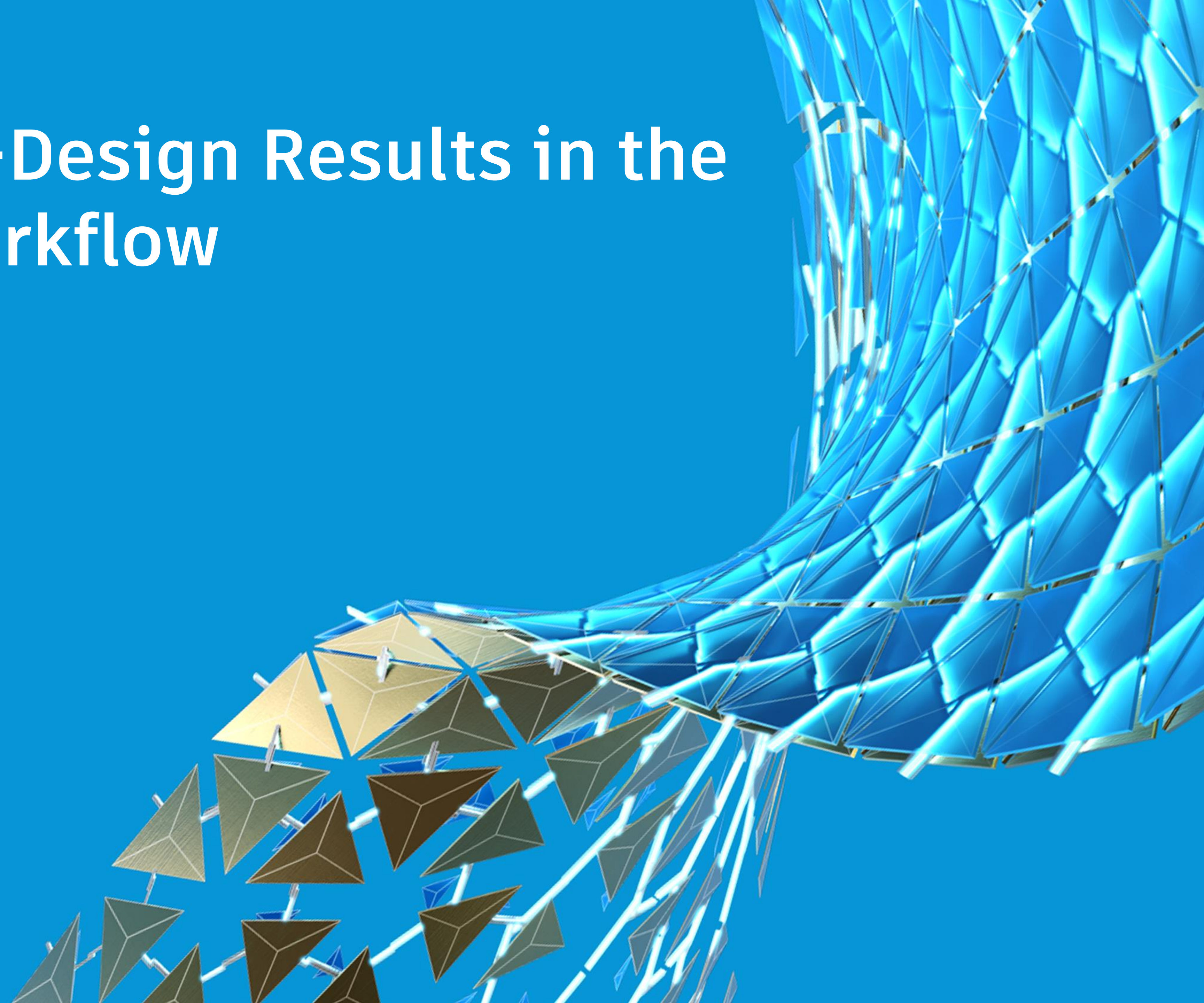


Workflow 2 – Subsystems

One Model, multiple Analyses

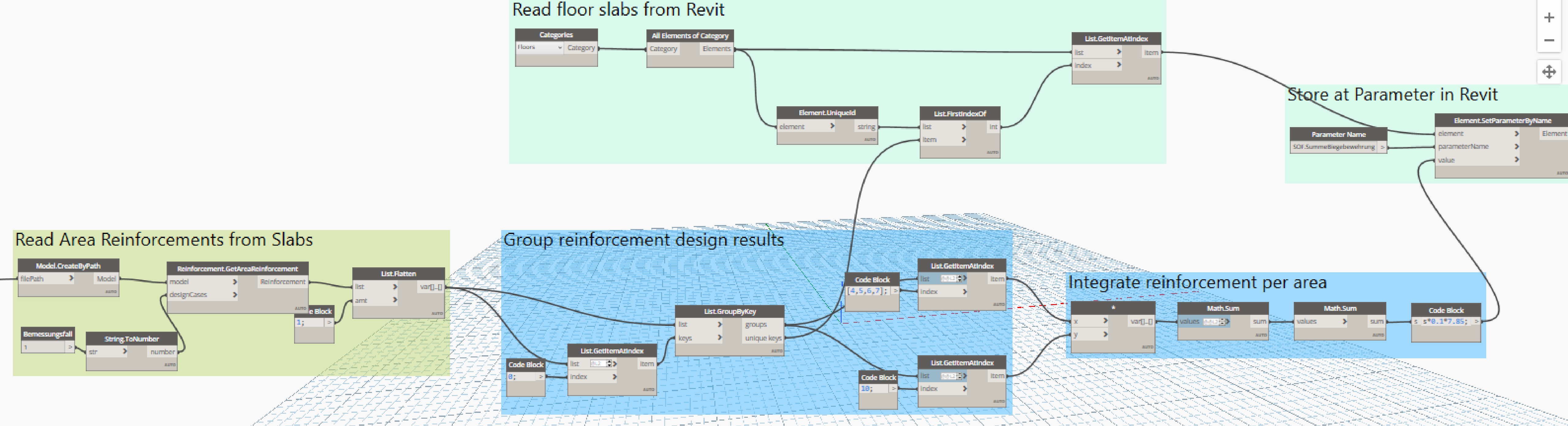


Workflow 3 –Design Results in the Modeling Workflow



What else?

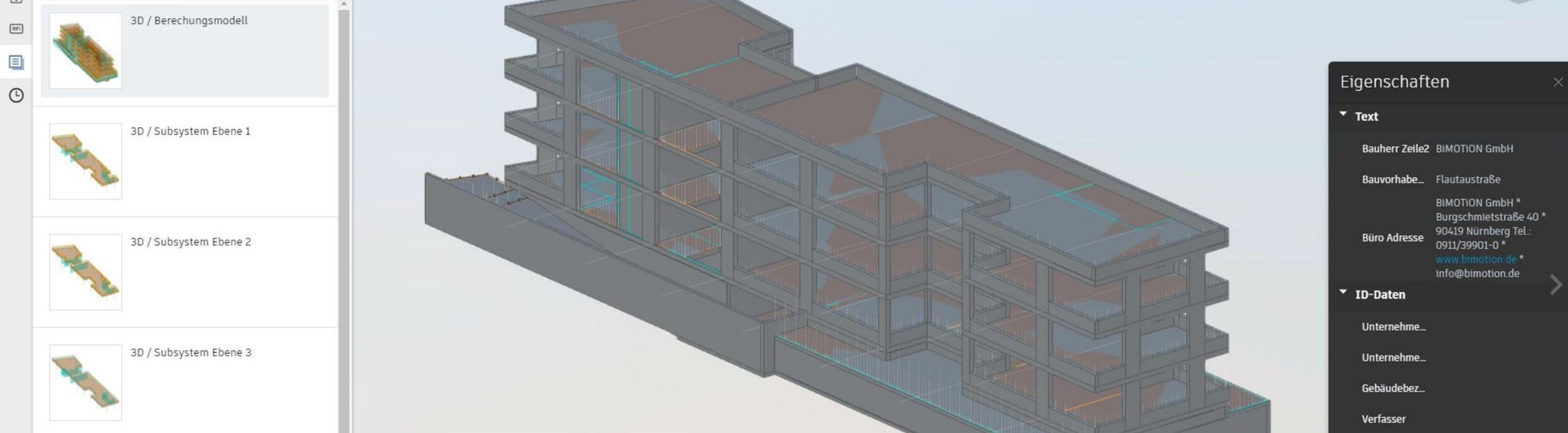




Dynamo for Automation and Results Evaluation

SOFiSTiK Analysis + Design provides Dynamo interface to automate analysis and process results data

- Process and Export results in customized format (Excel, JSON)
- Transfer selected results back to Revit, e.g. in Parameters (Punching design, Area reinforcements)
- Setup analysis driven design loop



Collaboration through BIM 360

All analytical properties, calculation controls and optionally results are stored in .rvt and can be shared through Revit Cloud Worksharing

- Collaboration on analysis within domain and between different domains
- Sharing of main / subsystems on BIM 360 Document Management
- Visualization of selected analysis results on BIM 360 viewer

Suchen

▼ Geschossdecken



▸ Geschossdecke



▸ Geschossdecken (analytisch)



▸ Wände



▸ Wände (analytisch)



▼ Tragwerksstützen



▼ Rechteck Stützen - Ortbeton



▼ 30/50 cm - Beton C 30/37



Rechteck Stützen - Ortbeton [17]



Rechteck Stützen - Ortbeton [17]



Rechteck Stützen - Ortbeton [17]



Rechteck Stützen - Ortbeton [17]



Rechteck Stützen - Ortbeton [17]



Rechteck Stützen - Ortbeton [17]



Rechteck Stützen - Ortbeton [17]



Rechteck Stützen - Ortbeton [17]



Rechteck Stützen - Ortbeton [17]



▸ 30/120 cm - Beton C 30/37



▸ 30/100 cm - Beton C 30/37



▸ 30/75 cm - Beton C 30/37



Eigenschaften



▸ Abhängigkeiten

▸ Tragwerk

▼ Abmessungen

Volumen	0.307500000000043 m ³
B	0.3 m
D	0.5 m

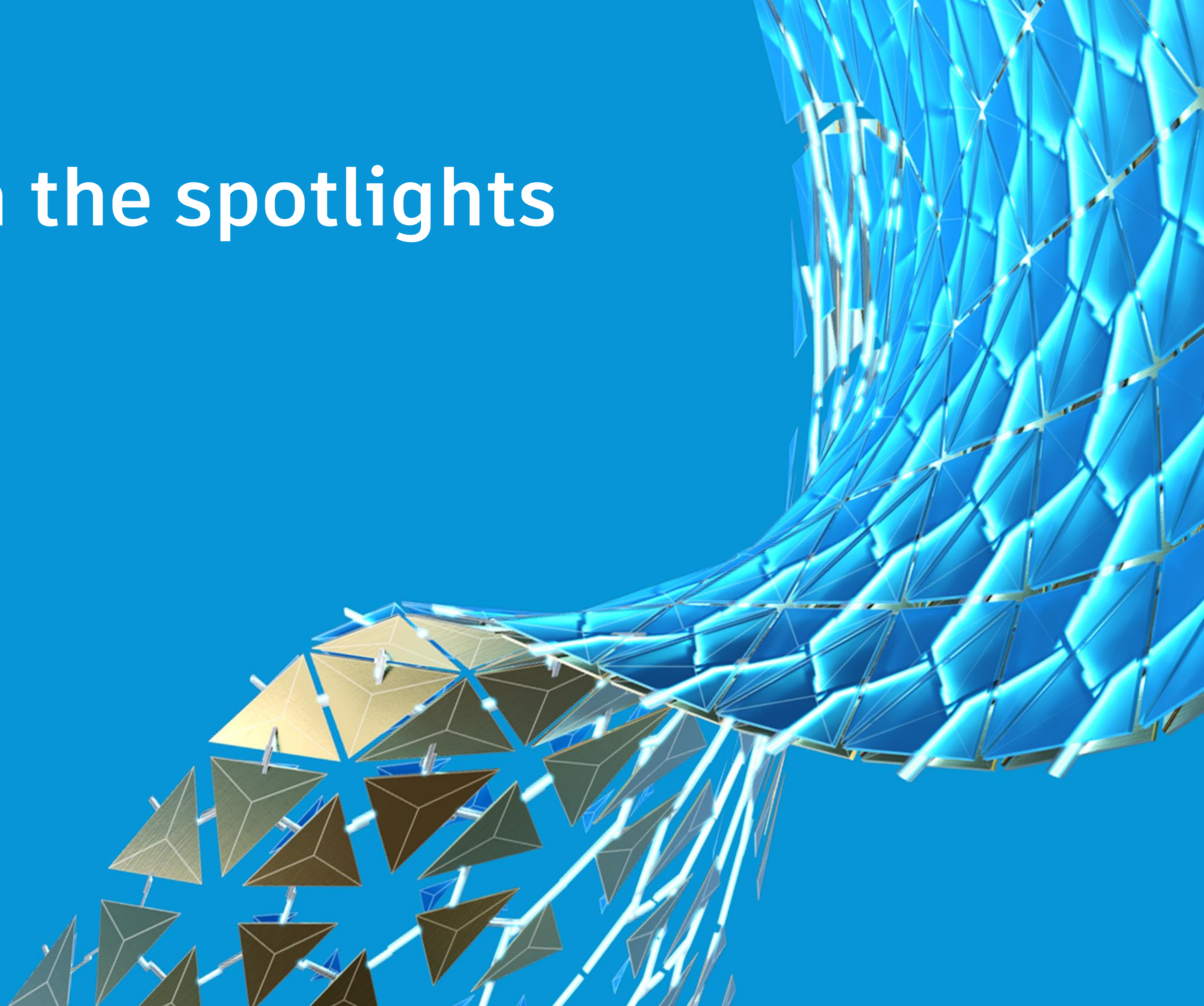
▼ Statische Berechnung

SOFiStiK_DesignGroup	S02 Level -1
SOFiStiK_DesignNormalForce	-2961.38918127089 kN
SOFiStiK_DesignMomentMy	-17.2213358869033 kN m
SOFiStiK_DesignMomentMz	-17.2423937938937 kN m
SOFiStiK_DesignAsLongitudinal	13.8483874616213 cm ²
SOFiStiK_DesignCombination	1.35G(1+2)+1.5Q(100)+0.75S(4)



▼ ID-Daten

Typname	30/50 cm - Beton C 30/37
Bild	

Our users in the spotlights



Successful in BIM with SOFiSTiK



Working with SOFiSTiK
A User Report

Impulses, Ideas, Inspirations

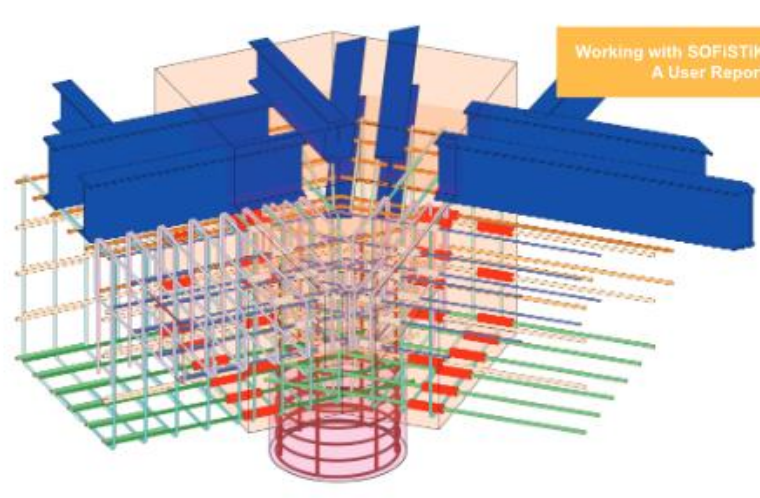

Autodesk® Revit® and SOFiSTiK pass the "endurance test" at IDK Kleinhann Cologne

Autodesk Revit and SOFiSTiK underwent an endurance test at the IDK engineering office in Cologne, as they were used for planning and calculating the extension of their company's building. The results were convincing: for the purpose of structural and reinforcement planning, the software is exactly what is needed when it comes to efficiency and effectiveness. The possibility to create parametric components allows for new-found flexibility, and an innovative partner such as SOFiSTiK fits perfectly with the business philosophy of IDK.

"We are willing to stay one step ahead and try new things", says Christian Richert, one of the partners of IDK Cologne. With more than 50 employees in Cologne, Berlin and Düsseldorf, the company has carried out numerous large-scale projects over the past 55 years. Thereby, their focus is on the "balance between economy, ecology and technical performance". The persistent willingness to change is part of the company's DNA and the enthusiasm of the company's management is contagious, positively influencing their employees.

The convincing SOFiSTiK-Revit-Interface

Their first contact with Autodesk Revit is almost ten years ago, but only after an increasing number of architects began working with Revit in the field of Building Information Modelling (BIM) the decision was made to purchase it. Additionally, SOFiSTiK was purchased to carry out structural calculations. "The advanced interface had us convinced", says Christian Richert. The implementation of the software consisted of a compact training for all employees, followed up with "learning by doing". Questions were gathered and later addressed in a refresher training. New employees, who already



Working with SOFiSTiK
A User Report

BIM - reinforced experience

HOCHTIEF puts SOFiSTiK's 3D reinforcement software to the test

Is it worthwhile to generate reinforcement drawings on your own based on your 3D model, or is it better to provide subcontractors with the appropriate software? HOCHTIEF Infrastructure GmbH in Essen tested SOFiSTiK's BIM solution as part of a master's and bachelor's thesis. The results are very promising.

HOCHTIEF is building the world of tomorrow, states the Essen-based construction Group's website. The company's global focus is on complex infrastructure and building construction projects, as well as the mining business.

With its Building division, or HOCHTIEF Building for short, the Group subsidiary HOCHTIEF Infrastructure GmbH is responsible for the building construction business in Germany; in the Building technical office, 70 experts – architects, civil engineers, physicists, façade builders and technical building services specialists – take care of the planning and design management of construction sites. Not only decades of specialized know-how are gathered here, but they also research and develop new optimized solutions for construction sites and buildings of tomorrow.

Methods and software in the field

HOCHTIEF is one of the leading BIM-pioneers in the world. This shows, when new insights into the application of the method are explored and then tested in the field. Now the team of structural engineers in Essen wanted to find out whether it is possible and economical to use existing Revit models for (semi-) automated creation of reinforcement drawings directly in Revit.



Working with SOFiSTiK
A user report

Let's do integral planning



Working with Autodesk and SOFiSTiK software, Thomas Lorenz ZT GmbH, Graz handles complex BIM-projects

What software allows for efficient structural planning in 3D? FH-Prof. DI Dr. Thomas Lorenz did not expect that the answer to this question would lead him and his office directly to Building Information Modelling (BIM). Since then BIM has become the method of choice for most of the office's projects. Especially useful: SOFiSTiK static solutions are integrated in Autodesk Revit, this way work can be done in a single model which not only saves time, but also improves planning quality.

FH-Prof. DI Dr. Thomas Lorenz has always been the kind of person to think outside the box. In fact, already during his first assignment as a start-up consultant back in 2003, he combined structural planning and construction supervision. This way of thinking enabled the growth of his business in a unique manner. His team was encouraged to introduce ideas and interests, often leading to new directions for the company. Today the Thomas Lorenz ZT GmbH (TL ZT) has 56 employees functioning within the departments of planning, design, construction management and administration. Furthermore, the company is positioned on both national and international levels as a specialist in project management, general planning and structural planning. In addition to this, they are especially contracted to take on local construction supervision for particularly challenging architectural building constructions as well as technologically demanding infrastructure projects.

The 3D Idea

Before BIM (Building Information Modelling) even became a buzzword, one of the employees in the static department was bitten by the "3D-bug" and



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State Of The Art Underground Parking Design

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„Connecting architects and structural engineers in this way has vastly improved our work“

FH-Prof. DI Dr. Thomas Lorenz – Thomas Lorenz ZT GmbH

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- + BIM user reports

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Webinar SOFiSTiK Analysis + Design for Revit - New Features

In this webinar we show you structural analysis of buildings and member design directly in Autodesk® Revit®

Date: Thursday 17th of September 2020
10:00 am - 11:00 am CEST

Register now


Software for better design

SOFISTIK develops software for every aspect of structural engineering. Our solutions provide the foundation for innovative workflows and comprehensive digitization in the construction industry.


A team of more than 70 employees, we are pioneers, developers, consultants, and creative thinkers. Each one of us is personally committed to creating powerful solutions that truly help our customers achieve their goals.

Get to know SOFiSTiK.

Satisfying customers is our goal




User Report: BIM in the sixth dimension
6D planning of the Unstrut Bridge using Autodesk® Revit® and SOFiSTiK.



User Report: Impulses, Ideas, Inspirations
Autodesk® Revit® and SOFiSTiK pass the "endurance test" at IDK Kleinhann Cologne.

More User Reports


User Reports




Engineer Markus Leschanz
Ingenieurbüro step ZT-GmbH

"We are working on a Model that not only contains all the necessary information, but also allows us the possibility to create section drawings, as a major quality improvement."


User Interview with Engineer Markus Leschanz
Mr. Leschanz from Ingenieurbüro step ZT-GmbH reports on his first BIM project with Autodesk® Revit® and the SOFiSTiK Bridge Modeler.




User Report: Impulses, Ideas, Inspirations
Autodesk® Revit® and SOFiSTiK pass the "endurance test" at IDK Kleinhann Cologne



User Report: Dimension
6D planning of Autodesk® Revit® of Emch+Bergel calculation and digital model.




User Report: State Of The Art
Underground Parking Design



Dipl.-Ing. Dr. techn. Georg Trauner
Porr Bau GmbH

"SOFISTIK is an open program that, because of its versatile use, offers all kind of possibilities for (nonlinear) construction simulation."

User Interview with Dipl.-Ing. Dr. techn. Georg Trauner



User Report: planning



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