



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 in-

troduce 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

started modelling digital ships during his free time. This led Thomas Lorenz to the idea of searching for a software that also makes 3D-modelling possible for load-bearing structures. Several months later this same employee modelled the ÖBB-building in 3D, with the help of Autodesk Revit, and derived the formwork plans from the digital model – highly efficient and of high quality. “We completed our plans twice as fast as we had using previous methods, and we have profited from the geometrical consistency: any changes made on the model consequently changed the derived plans,” recalls Thomas Lorenz.

### From 3D to BIM

At the beginning of 2016, TL ZT switched to BIM and Revit: An external consultant facilitated the process of this switch and assisted in developing guidelines which would guarantee high model-quality. Motivated and well trained, the team began tackling even bigger projects. The investment in consultation, training, hard- and software payed off and the consensus of the employees was that the office had become a thriving work environment. Spearheaded by pioneers, users and new employees, the company continues to grow in with every new task.

### SOFiSTiK Amazes

TL ZT had developed its own software for concrete design and was looking for a partner who would further the distribution of this software in Germany. It was through this that they came across SOFiSTiK. Initially, they did not plan on using the German structural analysis software for their business. “For the most part, we knew that SOFiSTiK is ‘sophisticated’ and therefore highly complex,” says Thomas Lorenz. However, it turned out that two of our employees were already familiar with the software. Shortly thereafter, DI Gernot Lechner, who had previously been working as a structural engineer, joined the team. He had learnt about the software at university and had come to appreciate it. This was yet another valuable addition to the expansion of company knowledge.

### Integrating Revit to Achieve Unique Solutions

SOFiSTiK software is notable due to its remarkable functionality and its superior flexibility: it makes no difference whether the Input is graphical or alpha-

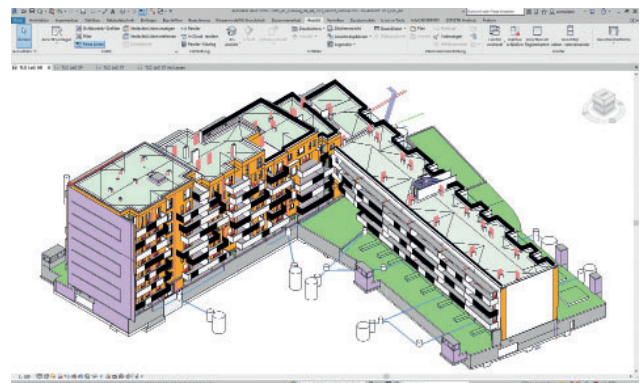
numerical. Each user is free to work according to their preference. Another unique selling point is the complete integration of Autodesk Revit. This way the load-bearing structure becomes part of the digital model.

Revit already provides a lot of functions to include structural information while modelling. Marking building components as “load-bearing” almost goes without saying; however, Revit also makes it possible to apply loads directly to the structure. Revit automatically generates the analytical model and needs to simply be adjusted for any additional calculations. From there, the SOFiSTiK-Plug-in carries out a preliminary check of the system ultimately generating the FE-model; the information of this model is once again made available in Revit.

### Applicable in Everyday Use? Absolutely!

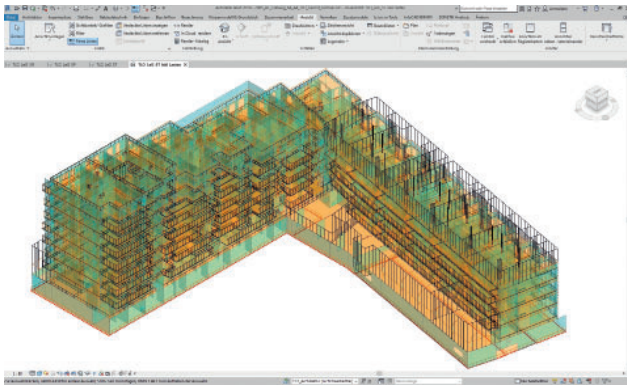
A big building project of C&P Immobilien AG and the Haring Group, located at Grillweg in Graz, will serve at the litmus test for the practical use of model-based architectural and structural planning. The goal is to build roughly 700 apartments, carried out in four construction phases, as well as offices and shops on the ground floor.

TL ZT is entirely responsible for the general planning of the project, that is, architectural and structural planning: open space planning, construction physics, fire safety and soil mechanics, which will be carried out by partner companies. Planning began in January 2019 and will run until the end of June 2021; the building shell will be completed by the end of 2020. The second construction phase will be entirely planned in SOFiSTiK in Autodesk Revit.



Which parts are being modeled? How detailed is the information? – Autodesk Revit offers many possibilities, and every decision influences the quality of future analyses of the model.





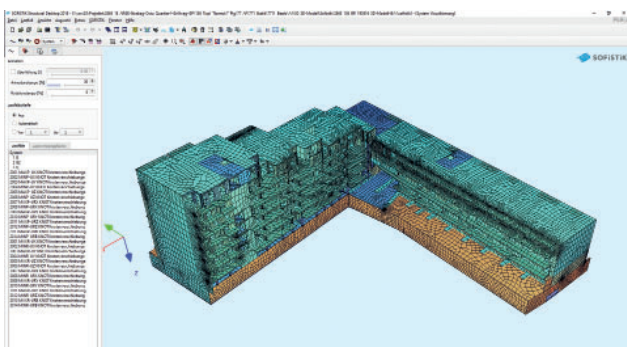
The architectural Autodesk Revit model includes the analytical model, which is prepared by the engineers for further processing. Particularly useful: SOFiSTiK checks the model for inconsistencies prior to the calculation.

### A Digital Model for Everyone

The employees responsible for architectural modelling worked in close contact with the structural engineers, as they were using the same model. This model was not only used to derive formwork and execution plans, but also to determine masses and the construction physics team used it to do their calculations. Additionally, the model is being provided in IFC-format to other project parties, such as reinforcement detailing.

### SOFiSTiK-Tools for Structural Analysis

Alignment of building components and load application was done in close collaboration of the design engineers and the structural engineers. Whether a building component within the model is designed, for example as a short wall or a column, plays a crucial role in the preparatory work. The FE-model and the linear analyses are calculated directly in Revit with SOFiSTiK. After which, all building components are designed with SOFiSTiK Structural Desktop (SSD – the SOFiSTiK finite element solver).



Will it hold? The static calculations by SOFiSTiK ensure that the building will be able to withstand wind, snow and other actions.

ment solver).

### Reduced Time, Higher Quality

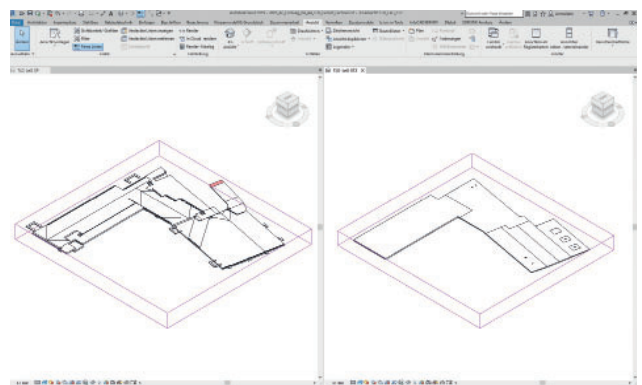
The workflow at TL ZT has changed substantially: The designing and structural engineers must start creating the digital model sooner and in closer collaboration with one another. The model must include the entire building shell.

This saves time for the project as a whole, since one is able to work using a single model. Mistakes are avoided because all information only exists once. Additionally, SOFiSTiK checks the analytical model for inconsistencies in advance avoiding unnecessary reworks which further saves time.

### Keep Learning, Think Big

Every new project – and at TL ZT, every project is at least a 3D-, most of the time even a BIM project – provides new learning experiences. “Today we create, for example, the floor slab only for the static model in a separate workspace,” explains Gernot Lechner. “This way, the structural area is not partitioned into many individual slabs and allows it to mesh better. This ‘trick’ is not noticeable for anyone else who is using the model.”

In-house developed tools will help in the future to automate the reinforcement detailing process; in this regard, SOFiSTiK-tools will help with annotati-



Every project provides an opportunity to learn: If the floor slab is modeled in a separate workspace, the structural area is not partitioned in many individual slabs and allows for better meshing.

ons and sheet creation.

Thomas Lorenz still sees a great deal of potential for development; yet, at the same time, the following is clear to him: “Connecting architects and structural engineers in this way has vastly improved our work. Even the older employees cannot imagine reverting to what was once referred to as ‘conventional working methods’, methods which their younger counterparts are no longer even



The 2nd construction phase of the Grillweg-project alone, contains hundreds of individual building components. Thanks to SOFiSTiK, the calculation based on the architectural model was fast and error-free– and upon any alterations, everything will immediately be updated.



FH-Prof. DI Dr. Thomas Lorenz is sure:

„As an entrepreneur one must be ready to invest and trust in one’s employees, in order to break new ground together.“



DI Gernot Lechner, one of the SOFiSTiK-specialists at Thomas Lorenz ZT GmbH:

„One must take the process of implementing BIM one step at a time – starting with small projects and progressively moving on to bigger ones.“



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