



## **STRABAG and Doka bet on BIM-to-Field**

### **Paperless construction site thanks to digital twin**

**A replacement structure for a hydropower plant is being created in Flums SG – completely paper-free. In doing so, the client, planner and builder are relying entirely on BIM. Doka is also on board. The formwork experts are producing the formwork plans entirely in 3D. The data are exported to the overall model for the work preparation and used for ordering materials and execution. On the construction site, the 3D formwork model ensures more efficient workflows.**

St.Gallisch-Appenzellische Kraftwerke AG (SAK) is replacing the hydropower plant on the Schils river in Flums SG. Lead contractor STRABAG is putting BIM-to-Field into practice for the first time – using digital 3D models on the construction site for the three-storey Säggüetli power station – for the entire process. Instead of having the construction plans on paper, an all-digital, model-based process is being used: from excavation, through reinforcement and formwork, to quality assurance. Data will be shared in open IFC standard via corresponding cloud solutions and send directly to the foreman's iPad on site.

#### **Interactive 3D world**

The field test emerged at the initiative of the Pöyry planning office, which wanted to deliver the implementation plans as 3D models instead of on paper. Together with client SAK, STRABAG agreed to make the transition from model-based construction on the Flums site to a BIM-to-Field pilot project. Doka also sees BIM as a ground-breaking method. The company has been working intensely on this topic for a number of years, to coordinate formwork solutions even more precisely with the construction process and ensure greater efficiency on the construction sites.

The formwork experts have already amassed international experience on various projects. This is Doka Switzerland's first BIM-to-Field project. Despite having worked with BIM models several times already, this is a first for Doka engineer Frank Stritzke to see his 3D formwork model being used on the construction site. "We started with the transition from conventional planning in AutoCAD to 3D planning in Autodesk Revit. This made some workflows more complex because of the volume of information contained in these models. However, the effort involved was worthwhile: Formworks for complex object geometries can be implemented considerably faster in 3D and collision control is much easier thanks to the simulation options available on the digital twin," says Stritzke. The software as well as the object libraries needed to plan the formwork parts are under continuous development. "By collaborating closely with our BIM team in Amstetten, we have been able to incorporate our experience in the project with STRABAG directly in further developing our processes, the Revit libraries and the software." Important findings were made during the project preparation and planning phases of the construction project. This showed that it pays off to resolve problems with the model in advance and to coordinate the processes clearly – especially with regard to data exchange and the interfaces to the construction site – to avoid disruptions to the construction process on site at a later stage and to facilitate efficient workflows.

#### **Added value on the construction site**

Now that the formwork for the ground floor has been erected and the first stage concreted, site manager Christian Häni is convinced about the new work methodology: "Using the 3D model



makes assembling the formwork child's play. If the starting point is calibrated with the total station, anybody, in principle, can assemble the formwork correctly. You just have to follow the model." The software used allows the workers to view the formwork model from any angle and enlarge details if necessary. The paper plans usually contain only certain object dimensions and very few sections are drawn. The 3D model allows me to show or hide model properties, measure distances or create sections as required. Not only is this particularly efficient, but the plans are also easier to follow. Even if something does needs to be changed, this can be done much quicker with the digital workflow," says Häni. Instead of days, it may now take a few hours for an updated model to become available. Once the formwork concept has been optimally aligned to the local conditions on the construction site, the materials required for each concreting stage can be automatically determined from the model and ordered just in time (JIT). This allows us to work with fewer materials, which is a major advantage given the limited space on the construction site.

The new workflows have been very well received in recent weeks – we are learning by doing, as the expression goes. Even so, we still have to overcome a few challenges. STRABAG BIM-manager Stijepan Ljubicic emphasises: "The greatest hurdle to be surmounted in introducing new processes is the uncertainty among the parties involved. We have to involve everyone along the way." Once construction section 1 has been completed next August, it is up to the project partners to draw an initial conclusion. However, Ljubicic is already confident that the expertise gained from this pilot project can be used to further scale up and standardize BIM workflows in the company. STRABAG and Doka have laid the foundation for bigger and more complex BIM-to-Field projects.

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#### **About Doka:**

Doka is a global leader in formwork solutions; it develops, manufactures and distributes innovative products for use in all areas of the construction industry. It has a highly effective sales network of 160+ distribution and logistics sites in over 70 countries, guaranteeing rapid, professional provision of both equipment and technical support. Doka is an Umdasch Group company and has 7,000 employees worldwide.

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#### **In short:**

Project: Hydropower plant with exposed concrete surfaces

Location: Flums SG

Formwork systems: Framax Xlife, 3-SO, Staxo 100

Services: 3D formwork planning with BIM

Construction execution: STRABAG AG

Construction period: July 2019 – September 2020

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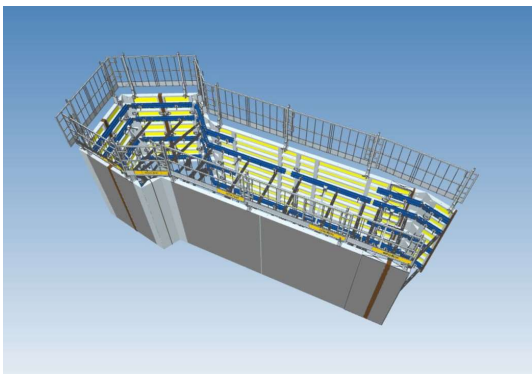
#### **Photos:**

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*Controlling the formwork structure using the 3D formwork model on the tablet with the Trimble Connect app. The tablets were placed in particularly robust protective covers to withstand the weather conditions of a winter construction site and tough everyday use on the construction site.*

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*3D formwork model of the first stage on the basement floor. Autodesk Revit is used for the planning.*

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*Site manager Christian Hänni (left) and BIM manager Stijepan Ljubicic (right) from STRABAG AG discuss the next concreting section.*

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*Site manager Christian Hänni (left) and BIM manager Stijepan Ljubicic (right) from STRABAG AG check the formwork construction on the 3D model.*

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