

BIM2Field in Brandýs: the digital construction site in the Czech Republic

STRABAG completed a bypass around the Czech town of Brandýs nad Labem in a period of 22 months. The city, situated on the Elbe about 35 km from Prague, commissioned the STRABAG Transportation Infrastructures team to build a 4 km long bypass road including two roundabouts. Sounds like a routine transportation infrastructure job, doesn't it? In fact, however, the contract represents a technically pioneering undertaking. That's because STRABAG built the road using BIM2Field, which involves a wide range of digital tools to enable the seamless transfer of data from a digital BIM model (Building Information Modelling) directly to the construction site. The work at Brandýs shows how complex transportation infrastructure projects can be digitalised to make them faster and more efficient.

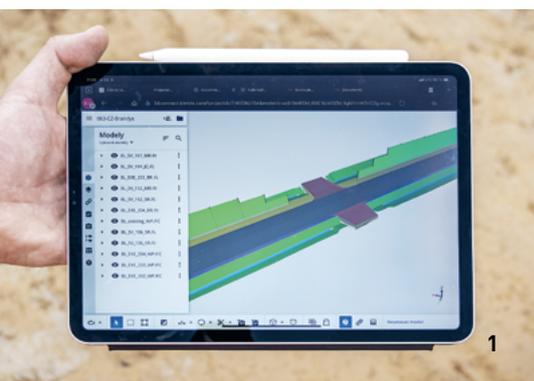
4 KM
BYPASS ROAD

2
ROUNDBOUTS

22 MONTHS
PROJECT SCHEDULE

STRABAG
WORK ON PROGRESS

from the digital model to the construction site – and back again

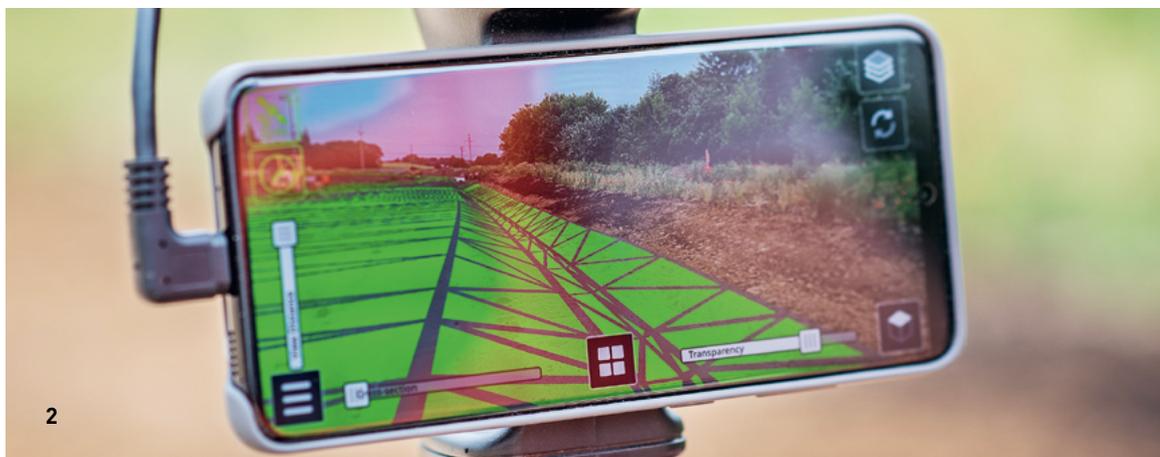


1

In Brandýs, STRABAG is using BIM2Field to drive forward process optimisation on the construction site. But what exactly does BIM2Field mean?

BIM2Field stands for model-based working on the construction site. BIM is short for Building Information Modelling, a kind of digital twin of the construction site. The BIM model bundles all the planning- and process-related information about the construction project digitally in a central location and makes it available to all project participants for working on site. That includes the building information and ground conditions as well as daily tasks such as quality checks and performance reports. This information is first entered into the digital model and must then be transferred “2Field”, i.e. directly to the construction site, through digital tools such as smartphones or GPS antennas. Vice versa, if something has already been built, the project information can theoretically be fed back into the digital model environment – this is then called Field2BIM. In this way, digital modelling and project implementation enhance each other in a reciprocal way.

Thanks to BIM2Field, all those things that previously had to be painstakingly drawn up on countless 2D construction plans are now easily available in digital form. That not only facilitates and accelerates the workflow, it also makes it more sustainable because BIM2Field guarantees a paper-free construction site. Through the constant flow of information, the BIM model improves the planning quality and ensures a more efficient construction process. The development and implementation of digital measures thus supports the STRABAG Group's sustainability strategy throughout the entire design-build-operate life-cycle of buildings.



2

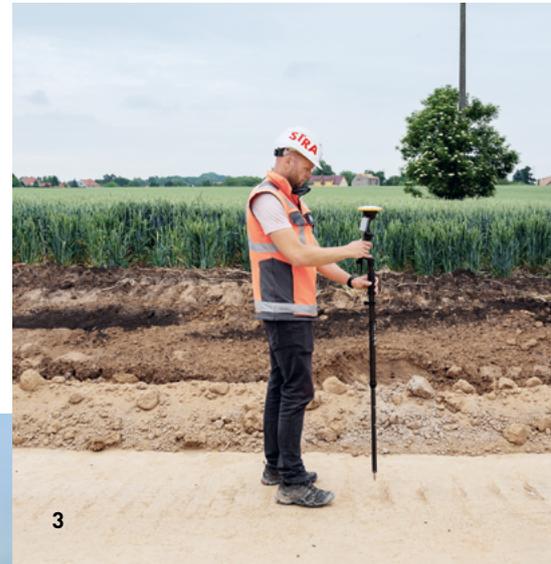
1 The BIM model always at hand: With mobile devices, the construction site staff can always consult the digital model. / 2 The smartphone superimposes the AR layer directly on the landscape, making the 3D data of the construction project visible.

The smartphone as a construction site scanner for the jacket pocket

BIM2Field literally builds on the use of digital tools. And the most important of these tools for making digital applications on the construction site as simple and as flexible as possible is the smartphone. A smartphone fits in any jacket pocket, most people always have one with them anyway and, with just a few add-ons, it can become a jack-of-all-trades on the construction site. The Trimble SiteVision software transfers the 3D model from the cloud directly into the hands of the user: on their mobile phone. When in use, an augmented reality (AR) layer is created in the smartphone display. The AR layer superimposes the 3D model directly onto the natural landscape so users can check on site whether the roadway in Brandýs is properly aligned, what further work needs to be done at a specific location and whether there are any pipes or cables hidden underground. Everything at a glance and completely digital!

Smartphone plus satellite-based GPS localisation: making high-precision measurements possible

But the AR layer generated by the smartphone is only part of the solution that sets BIM2Field apart. The best results for documenting and organising the construction site are obtained when the smartphone is combined with a powerful GPS antenna. A so-called GNSS antenna (Global Navigation Satellite System) allows mobile devices such as smartphones to be localised on a construction site based on satellite information to provide extremely reliable location and time data. The accuracy of GPS positioning lies within a range of 2 cm to 3 cm. No smartphone alone can match that. With a simple cradle for connecting the phone, users can make precise measurements with a few swipes and gestures. In order to plan, manage and accurately document construction progress, data from drone flights are used as an additional layer of information.



3+4 Site manager Jiří Cingroš sets up satellite-based localisation with his smartphone/ **5** The model data are transferred directly to the construction machine, here also visible in the operator's cabin.



Autonomous machines through BIM

The digital management of the construction site offers another exciting advantage: the model data collected from the construction site can also be used for machine control. Excavators and bulldozers can then be controlled and calibrated automatically by the data to make them faster and more effective in the field.



All parties involved in the construction must speak the same language. This language forms the basis of BIM2Field.

Karel Vonka,

Technical Business Unit Manager BIM and Digitalisation for the Division Transportation Infrastructures and Building Construction Czech Republic/Transport Infrastructures Slovakia (UB60)

Access for all through a cloud-based data environment

With BIM2Field, the collected data ends up directly with the people in charge on the construction site, where it can immediately be put to use. All information and data collected by digital tools – whether 3D models, GPS positioning, drone or machine data – are recorded in a uniform manner and are available at any time for all construction participants in a cloud-based data environment. A foreman, for example, can extract all information straight from the BIM model and evaluate it for his particular work step. A sand dam thus becomes an AR image that shows the precise dimensions along with a coloured representation of the various subsoil layers.

The biggest challenge for the digitalised construction site is to create standardised data so that everyone involved in the project speaks the same language. The STRABAG BIM team is already working on a nationwide standard in this regard. For further development, even more data will be needed, which is why all public-sector construction projects in the Czech Republic with a contract volume of more than € 5 million are being realised using BIM models starting in 2024.

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