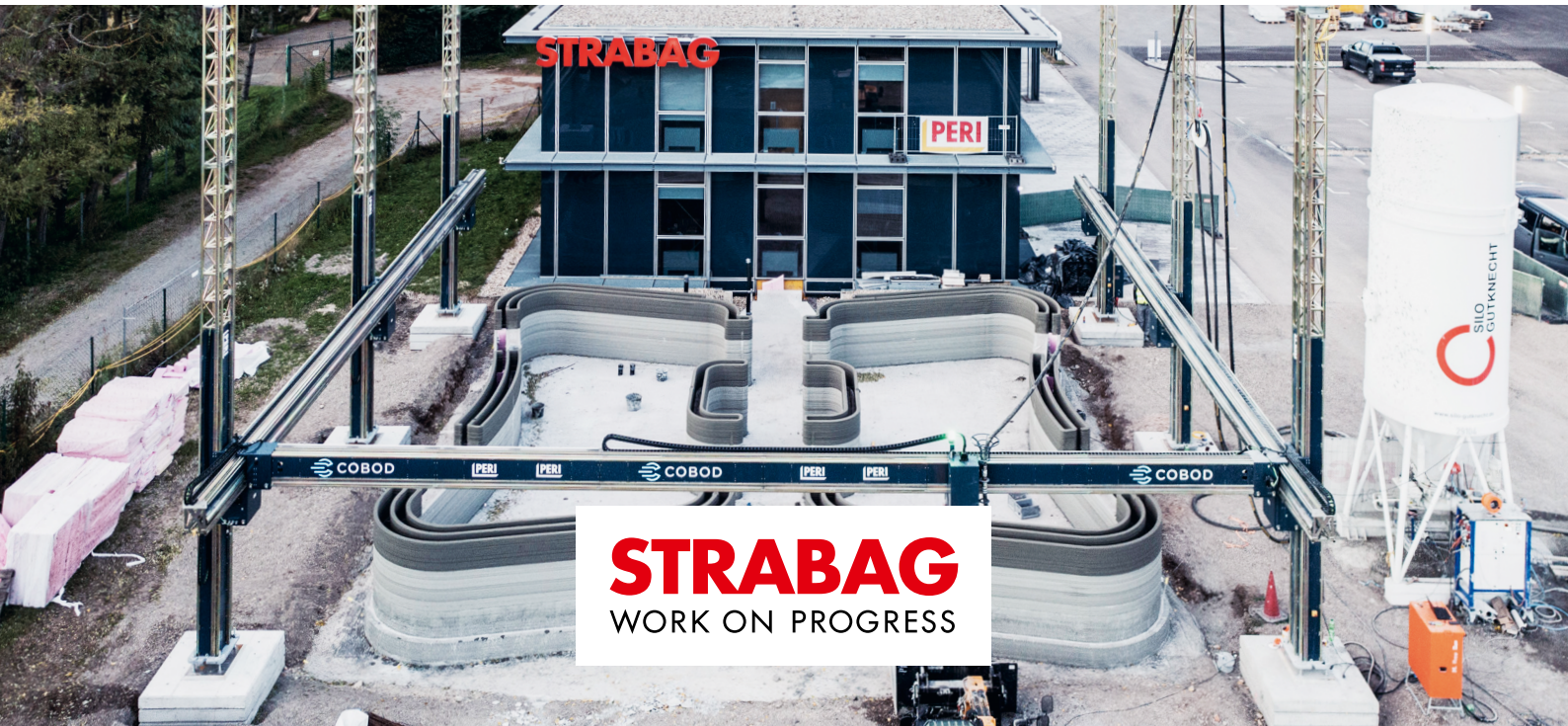
Factsheet

The first 3D-printed building in Austria

Austria's first 3D-printed building was realised in Hausleiten, Lower Austria, where STRABAG completed an approximately 125 m² office extension at its asphalt mixing plant in collaboration with PERI, the scaffolding and formwork manufacturer and a pioneer in 3D concrete printing. The project was completed using one of the largest 3D printers in the world.

"3D concrete printing enables resource-efficient construction: precise use of materials and reduced construction times lead to significantly lower CO_2 emissions.Simultaneously, efficient production saves costs on the construction site. With its flexibility and scalability, 3D concrete printing opens up new possibilities – from customised designs to large-scale projects of the future."

Dipl.-Ing. Jens Hoffmann,
Central Division Manager STRABAG Innovation & Digitalisation



How does 3D concrete printing work?

The print head moves about three axes on a securely installed metal frame. The advantage of this system is that the printer can move to any position within the structure being built and only needs to be calibrated once. The 3D printer applies the print material (a dry mortar) in layers, thereby creating the walls. Laying down two parallel printing paths creates a hollow wall that is then backfilled with cast-in-place concrete to act structurally as a load-bearing system. To create the outer wall, a second cavity is formed by printing another mortar path further outside the previous wall and filling this with thermal insulation material.

The printed walls can be regarded as a kind of “lost” formwork system. During the printing process, the printer already takes into account the water, electricity and other utility lines and connections that will be installed at a later point. The BOD2 gantry printer is certified in such a way that work can also be carried out in the print room during the printing process. This allows manual work, such as the laying of pipes and connections, to be easily integrated into the printing process.

Before the work can start, the project is first created as a BIM 5D® model, which is then translated to the 3D printer using slicer software.

The printing material is stored in silos. The ready-to-use dry mortar is then pumped directly into the print head during the printing process after the addition of water. The Tector Print brand material used for printing the office building in Hausleiten was developed by Holcim and is adapted to the special requirements of 3D concrete printing.

Complex designs in a short amount of time

Construction 3D printing offers several advantages where its use makes technical and financial sense. The BOD2 gantry printer used in Hausleiten can print concrete at up to one metre per second, which significantly shortens the construction time. The structural works for the building in Hausleiten were completed in around 45 hours of pure printing time. Construction 3D printing also offers significantly more design freedom compared to classic concrete construction, with the possibility of easily creating architecturally complex rounded designs.

Technology and training to combat the skilled labour shortage

Currently, 3D printing is only suitable for construction projects up to a certain size. No matter how innovative the technology of 3D printing is, the human factor remains essential for the successful realisation of construction projects. Therefore, we are addressing the severe shortage of skilled labour in two different ways: by investing in our in-house training, for example at our STRABAG campus in Ybbs, and through the use of modern technologies. This not only increases productivity, but also inspires young people to pursue an exciting and promising career in construction.

To see what the project looks when finished and hear some voices commenting on the technology, watch the film.