

**Bentley**<sup>®</sup>  
Advancing Infrastructure



## Project Summary

**Organization:**  
Hatch

**Solution:**  
Manufacturing

**Location:**  
Katanga, Democratic Republic  
of the Congo

### Project Objectives:

- To implement digital processes to deliver a sulfuric acid plant in a remote region of the Democratic Republic of the Congo.
- To streamline workflows and meet the fast-tracked project schedule while creating a digital twin of the entire plant.

### Products Used:

LumenRT, MicroStation<sup>®</sup>, Navigator, OpenBuildings<sup>™</sup> Designer, OpenPlant<sup>™</sup>, ProjectWise<sup>®</sup>, STAAD<sup>®</sup>

## Fast Facts

- Hatch established a 100% digital strategy to deliver a USD 245 million sulfuric acid plant in the Democratic Republic of the Congo.
- ProjectWise established a connected data environment to manage and share information across five global offices.
- Using Bentley's applications to create a digital twin helped integrate processes and meet the timeline.

## ROI

- Working with a digital twin streamlined workflows and eliminated paper deliverables, cutting six weeks from the project schedule.
- Using the digital twin model for material extraction and procurement saved 10% to 15% in purchasing costs.
- Hatch completed the fast-paced project under budget in less than 24 months, saving 20% in capital expenditure costs.

# Hatch Sets Industry Benchmark Using a Digital Twin to Deliver Sulfuric Acid Plant in the DRC

Leveraging Bentley's Open Applications Facilitated 100% Paperless Workflows to Achieve Commissioning within One Week

## A Sustainable Solution for Copper Mines

A resource-rich area, Katanga is a remote province located in the southern part of the Democratic Republic of the Congo (DRC). It boasts abundant reserves of copper and cobalt, with copper accounting for 50% of all DRC exports. To leach copper oxide minerals, the copper mines need sulfuric acid, and the supply in Katanga is constrained, having to be hauled long distances over sections of unpaved road to reach the secluded area. This situation causes high environmental risks. To sustain one of the largest copper mining operations in the DRC, a new sulfuric acid plant is being built in Katanga that will manufacture thousands of tons of acid daily. Global professional services company Hatch was retained as the engineering, procurement, construction, and manufacturing contractor to deliver the facility.

The USD 245 million project features a 1,400 ton-per-day manufacturing facility and an electrical waste heat power generation system with a steam turbine unit, critical to plant operations due to the limited power grid supply in the area and complex integration with the existing electrical network. In addition to these technical challenges, the project presented logistical and environmental difficulties, given its remote location. A further challenge was meeting the client's fast-tracked schedule. To overcome these complexities and accommodate the accelerated timeline amid a team of engineers distributed globally across five offices, Hatch sought a sustainable technology solution, digitalizing all workflows and deliverables. Upon completion, the DRC plant will be capable of making all the sulfuric acid that the copper mines need while exceeding world standards for sulfur dioxide emissions, optimizing environmental sustainability.

## Open Applications in a Connected Data Environment Streamline Workflows

Hatch implemented a collaborative digital strategy using Bentley's open applications, streamlining workflows and facilitating quality engineering processes that saved time and costs. The project team used STAAD to model and analyze the structural steel components, and OpenPlant and OpenBuildings Designer to create a digital twin model of the

entire acid plant. ProjectWise served as the collaborative platform to establish an open, connected data environment to manage and share information across five globally dispersed engineering offices. "Bentley's industrial plant products, and specifically ProjectWise, assisted the teams in executing the project following the same work-sharing principles out of our offices in Canada, South Africa, India, Australia, and the DRC," commented Johan Palm, project manager at Hatch.

Bentley's open applications provided flexibility within the design environment, enabling a single 3D model to be used for layout, analysis, design, and fabrication. This flexibility also optimized coordination throughout all stages of engineering and construction, as well as presented opportunities to capitalize on digitalization to improve efficiencies. The interoperable digital technology allowed operations teams to interact in the model environment for hazard and operability study checks, improving operations reviews and enhancing operational safety. Integrating Navigator facilitated digital communication with on-site personnel, commissioning teams, and installation contractors through mobile devices and tablets. Providing field teams with real-time digital access to the accurate 3D model eliminated time otherwise needed to deliver drawings on site, facilitated quality engineering, and enabled issues to be resolved prior to construction and installation.

Overall, leveraging Bentley's intelligent design and analysis applications within the connected data environment enabled Hatch to upstream quality processes, improve procurement and logistical strategies, and minimize construction rework. The digital solution allowed geographically dispersed teams to jointly move the discrete paper isometric drawing production process into continuous digital delivery sets for site fabrication. This capability optimized coordination between global delivery teams and site fabrication to accommodate the aggressive schedule. By working in the connected data environment with Bentley's open applications, Hatch was able to accelerate project delivery, streamlining workflows to cut six weeks from the schedule and resulting in substantial return on investment for the client.

*“Hatch has done several paperless projects, and it established an improved digital way of working that we offer on all our projects. The benefits that our clients gain from our approach span not only the engineering, procurement, and construction management (EPCM) project delivery phase but also extend well into operations and maintenance.”*

*– Randy McMeekin, Global Managing Director, Hatch.*

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## **Leveraging the Digital Twin Optimizes Deliverables**

Bentley's integrated applications helped Hatch develop a completely paperless delivery process, establishing a digital twin and automating previously manual workflows to overcome the project challenges. Leveraging the 3D digital twin for all production needs eliminated generations of traditional paper drawings, improved the piping and steel fabrication processes, and maximized opportunities in data-centric procurement. Both structural steel and piping were along the critical path of the accelerated project schedule. Having a single digital twin model for engineering into fabrication and analysis saved six weeks on the critical path.



*The USD 245 million project features a 1,400 ton-per-day manufacturing facility and an electrical waste heat power generation system with a steam turbine unit.*

By directly purchasing steel quantities from the 3D model, the project team automatically produced digital deliverables to the fabrication management systems. This digital approach moved the steel fabrication process upstream as part of the engineering efforts, reducing engineering time by eliminating the need to generate redundant steel layout drawings. In addition, working in a digital environment provided Hatch with multiple alternative procurement strategies to lower bulk material costs, facilitating data-centric procurement rather than using general arrangement and isometric

drawings. The 3D digital twin, with its accurate information in a centralized data environment, cut three months from the schedule compared to producing and taking measurements from paper drawings.

Using the digital twin model for extracting material quantities freely issued to the fabricator and the on-site installation contractor allowed the material supply process to simultaneously occur with production of piping isometric deliverables, all in a continuous digital flow among different time zones that resulted in saving 10% to 15% in purchasing costs for the client. Given the remote location of the plant, all these materials needed to be transported 2,800 kilometers to the site along roads containing gravel sections. The digital twin facilitated shipping of bulk pipe materials rather than prefabricated piping spools, reducing transportation costs by four times.

## **Digitalization Industrializes Project Delivery**

“Hatch has done several paperless projects, and it established an improved digital way of working that we offer on all our projects. The benefits that our clients gain from our approach span not only the engineering, procurement, and construction management (EPCM) project delivery phase but also extend well into operations and maintenance,” stated Randy McMeekin, global managing director at Hatch. The biggest value within the concept of utilizing a digital twin is the ability to shift forward the start of production and cut the ramp-up time. The 100% digital solution accelerated operational readiness, reduced capital expenditure costs by 20%, and enabled Hatch to deliver the fast-paced project in under two years, from feasibility to startup. These outcomes were achieved through quality controlled, digital modeling workflows managed in Bentley's connected data environment. Working in that environment with Bentley's integrated applications facilitated production of the digital twin, and optimized and accelerated engineering processes, as well as industrialized project delivery to set an industry benchmark that reduced production ramp-up time from six months to one week.