

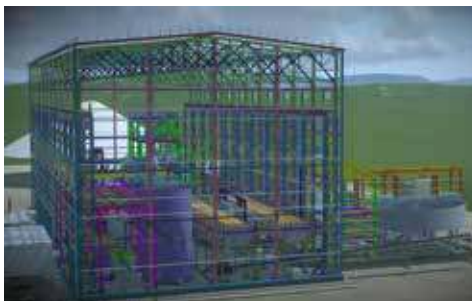
AAEngineering Industrializes Delivery of Gold Ore Processing Plant in Seismic Region

Bentley's Open Applications Saved USD 2 Million and Commissioning Ahead of Schedule

INVESTING IN REGIONAL AND NATIONAL GOLD PRODUCTION

Situated in the Talas region near the Kara-Bura mountain pass, Dzhamgyr deposit is just one of Kyrgyzstan's numerous gold fields. Since 2009, the ore from this mine has been exported to Kazakhstan for processing. In an effort to move away from exportation and invest in regional and national economic and industrial development, Kyrgyzstan is working to create a closed cycle of gold production, where both the extraction and processing of ore is carried out within their country. Aligned with this vision, they decided in 2018 that a gold processing plant would be built nearby the Dzhamgyr mine. The USD 75 million project required construction of the main factory building along with ancillary services infrastructure, including a crushing and screening complex, a laboratory, storage pond, tailings storage facility, poison and ore storage areas, shift camps for operating personnel, and new roadways and accesses.

AAEngineering delivered the winning bid for this engineering, procurement, and construction project located at an altitude of 3,500-meters in a dangerously seismic area. With seismicity up to 10



AAEngineering won the bid to build a USD 75 million gold processing plant in a dangerously seismic region of Kyrgyzstan amid a short construction schedule and an ensuing pandemic. Image courtesy of AAEngineering Group

magnitudes and increased risk of avalanches due to slopes reaching 75 degrees, the project location presented extreme conditions and was subject to strict environmental standards. In addition to the geographical and geological complications, AAEngineering had to also overcome technical, engineering, and coordination challenges among the globally dispersed project team, as well as accommodate the limited construction period amid an ensuing global pandemic.

DIGITALIZING WORKFLOWS TO SYNCHRONIZE DESIGN AND CONSTRUCTION

While AAEngineering utilized digital applications during conceptual design to determine economic and environmental feasibility for their initial proposal, they then needed to execute their client-approved plan amid the challenging site conditions and required timeline. They wanted to forecast time and places of snow avalanches and landslides, while ensuring safe construction, installation, and timely delivery of materials along serpentine roads. Additionally, they had to meet special environmental requirements working at an altitude above 2,500 meters. Given that various service infrastructure was being built on different sites, they also had to consider connectivity among all facilities in terms of roadways and utilities to enable integrated plant operations in the mountainous area.

Faced with these factors, compounded by the very short construction period, AAEngineering knew time was of the essence. "The area has a very short construction season, lasting only four or five months. It rains the rest of the time," commented Andrey Aksyonov, director of the information modeling department at AAEngineering. They sought to simultaneously organize and perform multidiscipline design and construction works. To carry out these processes concurrently required integrated digital

PROJECT SUMMARY

ORGANIZATION

AAEngineering Group

SOLUTION

Land and Site Development

LOCATION

Talas Region, Kyrgyzstan

PROJECT OBJECTIVES

- ◆ To design and construct a gold processing plant in a seismic area amid a pandemic.
- ◆ To optimize collaboration and decision-making through digitalization.

PROJECT PLAYBOOK

AutoPIPE[®], Bentley Raceway and Cable Management, ContextCapture, glINT[®], iModelHub, iModel.js[™], iTwin Design Insights, iTwin Design Review, iTwin Design Validation, iTwin[®] Services, LumenRT, MicroStation[®], OpenBuildings Designer, OpenPlant, OpenRoads Designer, OpenRoads[®] ConceptStation, PLAXIS[®], ProjectWise[®], Promis.e[®], ProStructures, SITEOPS[®], SYNCHRO[™] 4D, SYNCHRO Control

FAST FACTS

- ◆ The USD 75 million project presented extreme site challenges amid a short construction schedule and an ensuing pandemic.
- ◆ AAEngineering leveraged digital applications to coordinate and simultaneously perform construction and design works.

ROI

- ◆ Leveraging ProjectWise and Bentley's digital twin technology optimized collaboration and scheduling across 500 work sites.
- ◆ ContextCapture and OpenRoads Designer helped save 30% to 40% in time designing and routing safe, mountainous roadways.

With Bentley Systems software, we could organize simultaneous design of project disciplines and start construction before the design stage ends.

– Igor Vetuil, General Director, AAEngineering Group

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workflows and accurate modeling and analysis applications for visualization and simulation. Moreover, given the geographically dispersed team and the pandemic quarantine, they knew that digital twin technology in a cloud-based environment would allow them to effectively collaborate, communicate, and make informed decisions quickly.

LEVERAGING BENTLEY'S OPEN APPLICATIONS

Already familiar with Bentley applications, AAEngineering used the digital technology to propose several design options for the various facilities to the client, as well as provide an economic analysis for each alternative, demonstrating their readiness to deliver the project in accordance with the contract terms. The applications allowed them to, beginning with the tendering stage, go beyond conventional engineering methods. "It was as early as the tendering stage when we had surveyed the numerous areas with quadcopters and built digital terrain models using ContextCapture," explained Igor Vetuil, general director at AAEngineering. Upon winning the project bid, they set up the structure for execution and selected ProjectWise as the coordinated platform to share project information in an open, connected data environment, optimizing communication and scheduling among 500 work sites. Based on the initial digital terrain models, they modeled the facility construction sites and access roads using OpenRoads Designer, defining maximum safe traffic speeds and visibility zones, critical in the highlands. Meanwhile, they carried out the architectural and structural design using OpenBuildings Designer and ProStructures. The interoperability of ProStructures with third-party software enabled all steel and concrete components to be exported without losing information.

In addition, due to the large amount of water in the mountains, AAEngineering had to model a drainage channel to drain water and bypass the tailings dump. PLAXIS provided the geotechnical analysis that was necessary for them to optimize design of the drainage network and ensure stability of the tailings and storage pond dams. Throughout the design process, all stages of construction were controlled by ContextCapture and SYNCHRO, enabling construction simulation and virtual planning that allowed

design and construction to occur simultaneously. "In view of the complexity of the construction at height and the ultra-short construction time, we needed well-planned construction stages, which we performed using SYNCHRO," commented Aksyonov. Leveraging Bentley's digital twin technology, AAEngineering hosted virtual review sessions, enabling all stakeholders to better understand the scale of construction and its complexity, resulting in more informed, collaborative decision-making.

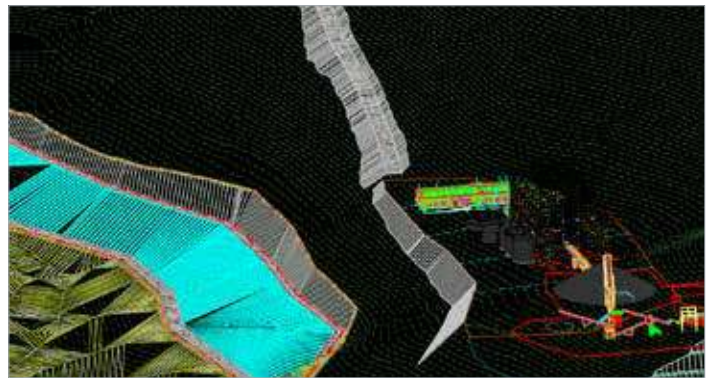
ADVANCED DIGITALIZATION TRANSFORMS INDUSTRY STANDARDS

"Without using ContextCapture and OpenRoads, it is difficult to imagine the possibility of designing the multistage construction sites, on-site engineering works, roads, and highway spirals," said Aksyonov. The road routing and construction areas were thoroughly optimized, decreasing transportation expenses hauling soil—and avoiding potential costly errors—that saved up to USD 2 million while reducing design time by 30%. Using Bentley's collaborative modeling and analysis applications and digital twin technology streamlined communication and design review among the geographically dispersed team, reducing time and costs associated with business travel. Through digitalization and visualization, they virtually adjusted design solutions, eliminating on-site construction errors to keep the project moving forward amid COVID-19.

Using Bentley software, AAEngineering performed coordinated multidiscipline design and started construction works during the design stage, critical to meeting the short construction timeline. By executing design and construction in parallel, they completed construction and enabled plant commissioning ahead of schedule, resulting in additional dividends for the client. Based on the successful application of BIM and digital twin technology, AAEngineering achieved competitive market advantages and have established themselves as a regional leader in the industry. They have industrialized project delivery through digital lifecycle processes and set new standards of development in information modeling and the use of digital twin technology, transforming the approach to plant design and land site development projects in the future.



Leveraging ProjectWise and Bentley's digital twin technology optimized collaboration and scheduling across 500 work sites. Image courtesy of AAEngineering Group.



ContextCapture and OpenRoads Designer helped save 30% to 40% in time designing and routing safe, mountainous roadways. Image courtesy of AAEngineering Group.

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