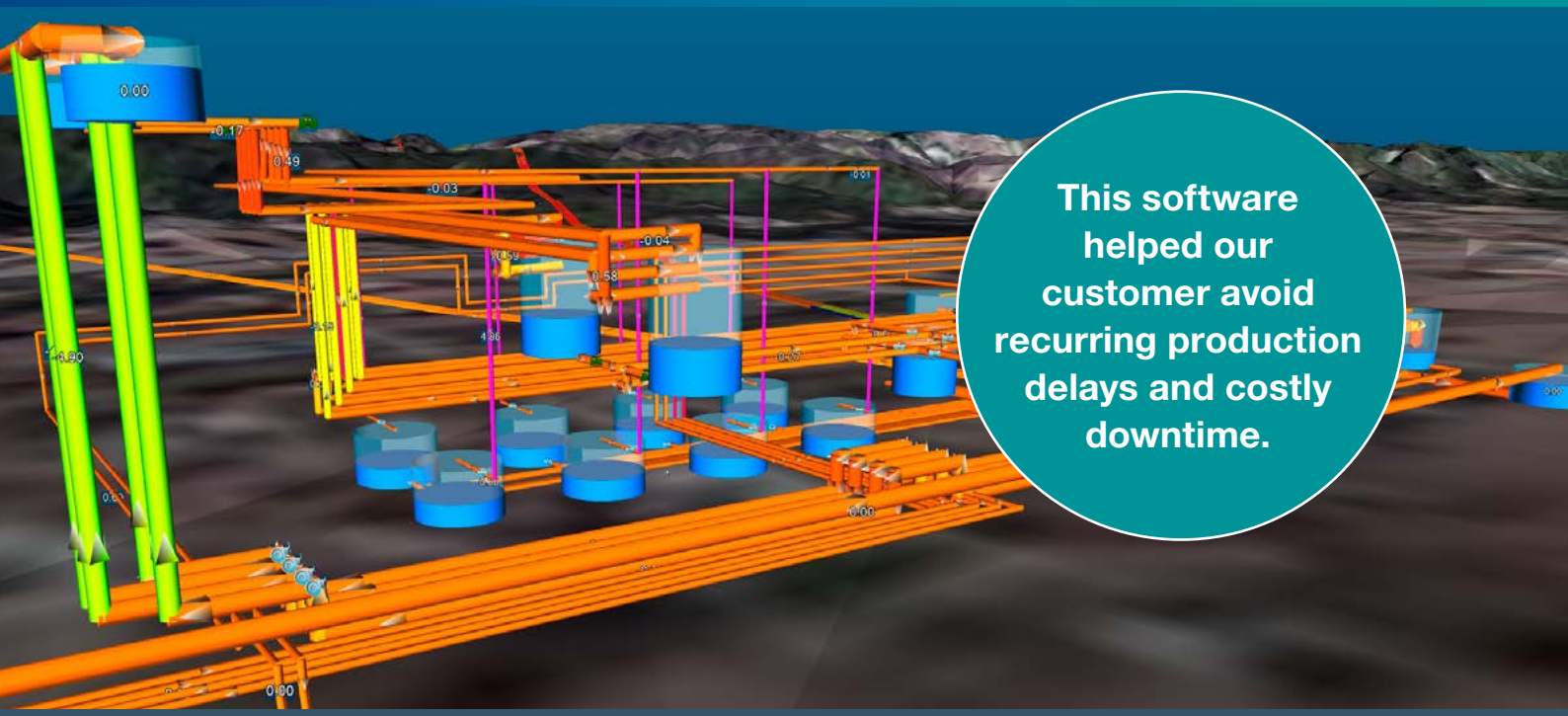
Howden knowledge article

Pumpsim™ DESIGN



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3D pumping simulation systems

The success of a pumping system depends not only on the equipment chosen but also on the placement of pumps, pipelines, and valves. Unfortunately, many companies do not give due attention to the design of their pumping systems, which can lead to production slowdowns and costly downtime.

Florian Michelin, Managing Director of Ventsim™ solutions at Howden, explains that a lack of record-keeping often leads to forgotten, ineffective pipelines that can affect the performance of a mine's pumping system.

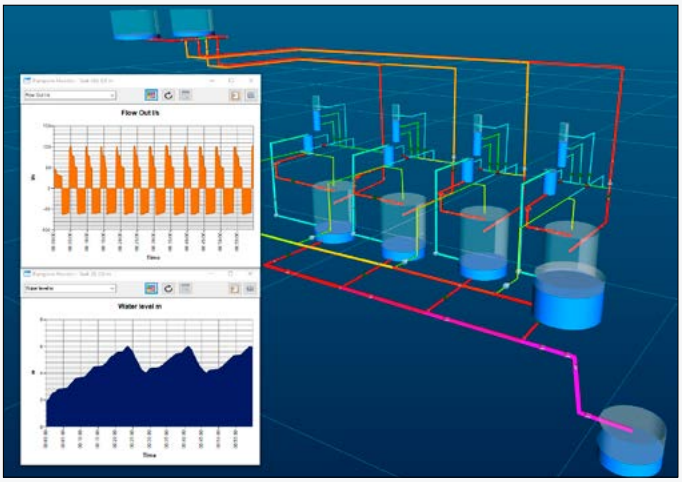
To help change that, Howden iterated its innovative Ventsim modeling software that tracks a mine's ventilation systems and developed Pumpsim™ DESIGN. This similar software brings a visual element and ease of use to modeling an operation's pumping systems for water, compressors, and gas drainage.

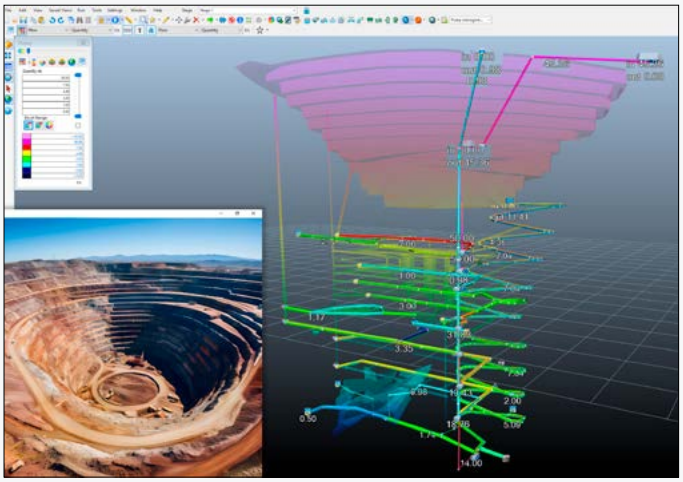
"The key aspect of water in underground mines is the surface water goes underground to be used, usually for dust suppression systems [and] jumbos need water to flush out the drilling," Michelin said. "The key use of Pumpsim DESIGN is to ensure that you're going to get enough water to the different areas where you need it and at the right time. If you have too many people using water and your pipeline is not designed adequately for that, you're going to have worksites that will not have enough water, and production will slow down."

Water flow and pressure are simulated within the model, which can help make informed decisions to improve the pumping system, such as which valves to use and where or what size pipelines to use to ensure that water is taking the fastest route to the next sump or back to the surface. Pumpsim DESIGN can also run dynamic simulations, forecasting the system's effectiveness in typical operations or helping determine solutions when problems arise.

Concerning dynamic simulations, an underground copper mine needed a complete rethink of its water pumping system to improve its capacity to accommodate deeper mining and better system reliability. The project required detailed planning and pre-calculations for the dewatering system. Pumpsim DESIGN was an effective tool in designing and simulating an effective system for pumping waste water out of our mine.

"Typically pumps will have sensors, such as when the water level gets above a certain height, it will start a pump, and another level stops, and you might have people using water at different times of the day," Michelin said. "You can program that into Pumpsim DESIGN and then run it as a dynamic simulation, where the water underground in a different tank will be changing through time. From there, you'll be able to see what issues are happening or how the water is changing in different tanks."





Creating a digital model allows companies to keep up-to-date knowledge on the state of their pumping systems years after they have been installed, which can lead to optimized solutions to problems that the company might not have known existed.

“One of the first sites we installed Pumpsim DESIGN at, by the end of the installation, we were getting a few warnings alerts from the system. One of them was that the pump was cavitating, which means it would be damaged very quickly,” Michelin said. “When they went to check what was happening, the pump was constantly cavitating, and the impact of that was they had to replace this pump monthly which was a high cost to the mine. With Pumpsim DESIGN, we got a pump that was more suited for the job that could last longer instead of trying to replace it constantly. This software helped our customer avoid recurring production delays and costly downtime.”

“The software does bring savings, but it’s really about giving people a better understanding of what is happening on the ground to make informed decisions.”

For instance, according to the Rosebery Mine case study, efficient design is key. The site is a polymetallic underground mine on the remote west coast of Tasmania, Australia.

The mine’s ground conditions in the level 44K pump station had become unstable, threatening the operation of the central pump station. Failure of the main pump station would cause flooding in the working area, leading to a lengthy downtime.

A new Pumpsim approach and model simulated the entire mine water reticulation system. As a result, it relocated the pump station and avoided unnecessarily recirculating 100% of the operational water through 60m of the other head. The new solution represented millions of dollars in refurbishment, drilling, power, and pump purchase savings. An estimated $5 million in CAPEX and an additional $200,000 per year as OPEX.”

In summary, Pumpsim DESIGN is an innovative software with a visual element and ease of use to model a mine’s pumping systems for water, compressors, and gas drainage. By simulating water flow and pressure, companies can make informed decisions about the placement of pumps, pipelines, and valves, ultimately optimizing their pumping systems to avoid production slowdowns and costly downtime.

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