



Virtual Mine: 3DEXPERIENCE Mine

Enabling mining innovation through virtual worlds

“3DEXPERIENCE Mine helps mining companies understand, control and increase the value of their businesses”

Right: an example of the project-management tools available in 3DEXPERIENCE

What if you could fully understand every aspect of a mining operation, find innovative ways to improve it, and know every nook and cranny of it without ever having travelled to it? You can with Dassault Systèmes and the world of the virtual mine. The technology takes customers on a transformative innovation journey that is a true leap forward into the 21st century and beyond.

The mining industry is at a tipping point in its history, in need of innovation to ensure it remains sustainable and able to better weather challenging economic times. That is why there has been a growing call from leading industry executives over the past several years to bring philosophies and technology proven in other industries into mining.

Mining executives are seeking to move beyond technologies currently used in the industry, to answer increasingly complex questions that will enable them to develop sustainable businesses that can succeed in any economic climate. To do this, they are looking to make transformations within their businesses, to bring consistency to operational performance and to enable

greater enterprise agility. With variable demand and prices, lower grades, deeper deposits, increasingly remote operations, more stringent regulations and allocation of capital improvement needs, it is critical to ensure sustainable profitability.

Dassault Systèmes has worked with companies around the world in other industries such as automotive and aerospace to enable them to transform their businesses through its 3DEXPERIENCE platform – a platform for innovation. In mining, we call this the 3DEXPERIENCE Mine, a platform that spans exploration, mine construction, mine planning, operations through customer delivery, and ultimately mine closure.

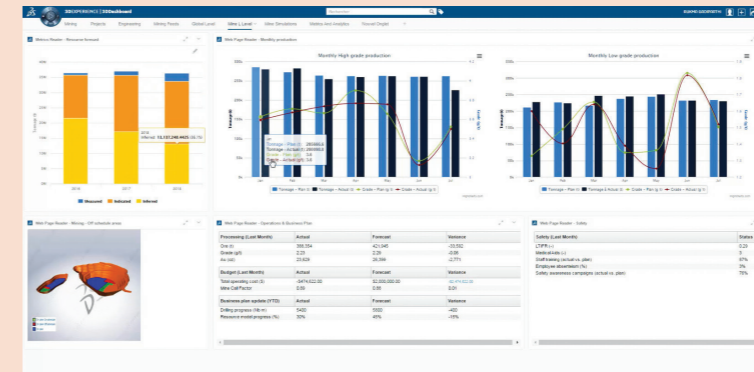
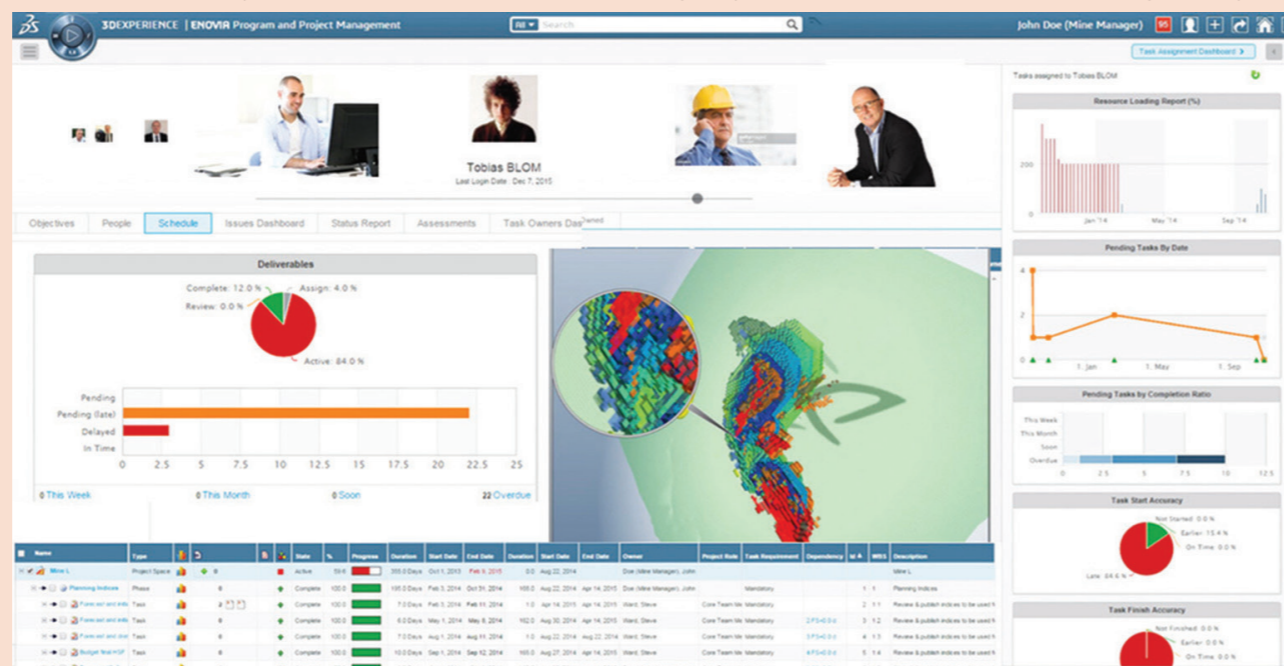
3DEXPERIENCE Mine helps mining companies understand, control and increase the value of their businesses. With data from across all aspects of the operations, it is also a collaborative engine, with end-to-end traceability and

decision-support. 3DEXPERIENCE Mine provides a single version of the truth by centralizing, sharing and managing all data such as: resources, reserves, mine designs, plans, production schedules, analytics, historical data, etc. Through this, it provides an immediate, global understanding of how well processes are functioning right now, this week and this month with the ability to rapidly identify problems and introduce improvements. It also drives advanced simulation which will allow more complex scenarios to be researched.

The mining enterprise from the operational level to the c-suite is connected by 3DEXPERIENCE Mine in a virtual universe for modelling and design, simulation, execution and monitoring and collaboration. Providing the applications that drive key mining company functions, big data on premise and in the cloud, it drives the day-to-day running of mining businesses and their operations globally.

3DEXPERIENCE Mine enables mining companies to:

- 1. **Achieve stability** by bringing consistency to the performance of its mining operations through the reduction of variability of processes.
- 2. **Realize a new level of excellence** through the rollout of consistent, yet flexible, processes and measurements globally. It improves efficiency and productivity further by allowing adjustments to be made rapidly based on changing conditions in the operation or the market.
- 3. **Attain enterprise-wide agility** by leveraging global data collected from all mining operations, geology, projects, logistics, etc., to identify, simulate, optimize and validate new innovations and adjustments in strategy. Here, collaboration is universal, allowing strategic teams to work together, regardless of location, including vendors, to very rapidly solve problems.



Above and left: screen views from 3DEXPERIENCE Mine

3DEXPERIENCE Mine enables ideas to be explored, simulated, proven and improved upon in the virtual world which would be impractical or cost-prohibitive to try out in the real one. Imagine the wildest and most provocative ideas you may have for your mining business, or a pillar in engineering, logistics, or mine construction that you would love to explore, but would be afraid of the cost of failure. 3DEXPERIENCE Mine removes these barriers. Any idea, big or small, can be investigated.

On a large scale, for example, one can walk through a virtual version of a mine site before construction, while at the same time review the economic impacts of changes to the configuration of equipment, the plant, or locations of stockpiles or haul roads. Out-of-left-field ideas, such as the utilization of blimps to in lieu of the building of a railway network to connect the mine to a port, could also be explored.

On a smaller scale, engineers may use

the virtual world to test the assembly of a virtual version of a modular plant before it is fabricated and shipped to site. As a virtual version of a mining business and its operations, the Virtual Mine will enable collaboration in new ways, bringing together the best and brightest minds from inside and outside of the company.

Mining companies can connect to their vendors in 3DEXPERIENCE Mine to create a virtual team of experts. A mining company may use the system to gather data on equipment performance with the objective of improving the efficiency of its global fleet by, say, 10%. To meet this goal, real-time data could be incorporated from production schedules to account for maintenance routines, or rescheduling done on the fly with work orders issued to equipment operators to keep production on track within shift.

When equipment breaks down, data can be shared with the vendor to gain their assistance in diagnosing and resolving the problem. Questions that could be answered might be:

- How can performance be improved by identifying equipment uptime, maintenance time and other issues causing downtime?
- Will changes in capacity, equipment utilization and routing be needed to most effectively increase productivity and lower costs?
- What is the best strategy for part sourcing?

Together with mine plans, schedules, optimal routing, stockpile utilization and processing, all options can be simulated with 3DEXPERIENCE Mine to come up with the best options. However, a more interesting possibility is utilizing mining data to find modular equipment designs that are optimized for specific types of mines and mine deposits, making them more efficient.

In another scenario, imagine a sudden rise in commodity demand. Mining companies will want to maximize the opportunity while not escalating costs and decreasing productivity. Corporate strategic planners, operations decision-makers, and planning engineers can work together, leveraging geological models, market data, logistics data, historical data and other information to simulate different ramp-up options to find the lowest-cost, most economically sustainable options for ramping up production and then scaling down when necessary.

Since 3DEXPERIENCE Mine spans the mine site to customer delivery, it enables mining companies to deploy demand-based scheduling. This keeps them tightly attuned to customer demand and operational performance, providing key performance indicators to planners that enable them to make smart adjustments to plans to maintain peak efficiency.

With 3DEXPERIENCE Mine and its Industry Solution Experiences, Dassault Systèmes provides ready answers to questions mining companies have, such as:

- To rapidly scale up/down production, what changes would be required at specific mines (infrastructure, plant capacity/location, personnel, etc.)?
- What is the most economical way to implement changes?
- When re-opening or closing mines, is it cost-effective to reallocate equipment to/from operations?

The world of virtual experience is rapidly going to change the way that mining innovates and runs its businesses. It will see the dawn of an exciting new era as the new frontier upon which new possibilities will be imagined and discovered. Dassault Systèmes and 3DEXPERIENCE Mine are leading the way. Visit 3DS.com/natural-resources.

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