SIEMENS DIGITAL INDUSTRIES SOFTWARE

Advanced Engineering Simulation for the Mining Industry

Inspire innovation with advanced engineering simulation

According to the International Energy Agency (IEA), the world's energy requirements will continue to increase until 2040, which will have an enormous impact on the global mining industry. Market volatility and the drive toward increased sustainability means that doing more of what we've always done will no longer be an option. Our current systems must improve and new cloud-based technologies must be applied so that we can "get more with less" across the mining supply chain. Suppliers who cannot adapt will be at an extreme disadvantage. Business leaders across the mining industry are now asking, **"How can we improve our performance without adding seriously to cost?"**

SIEMENS

Traditional prototyping: slow and steady used to win the race

Mining industry participants need to achieve continuous improvement. Across the supply chain, the need to reengineer assets and systems of all sizes and shapes is nothing new. Perhaps processing unit yields needed to increase. Maybe a design change was required to reduce warranty claims that were eroding gross margins. Regardless of the need, engineers were typically able to resolve the issue using the day's traditional methods. Over time, performance improved.

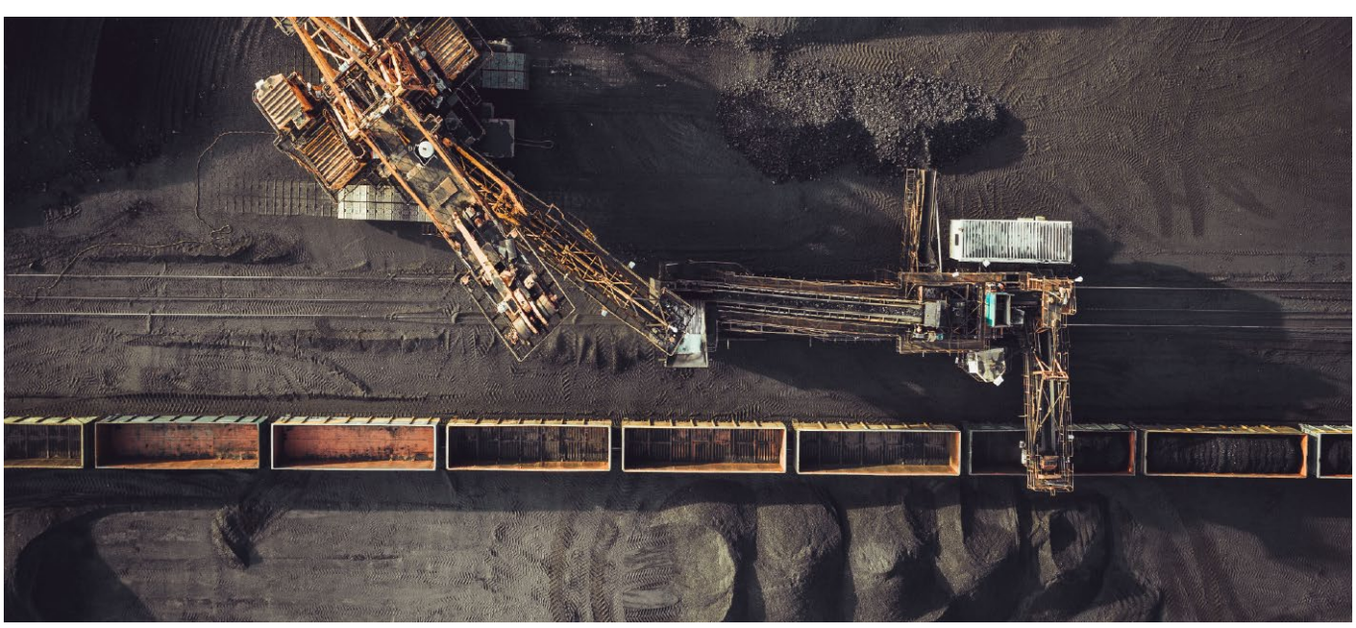
They accomplished this using proven methods such as physical prototyping, complex calculations on spreadsheets and early computational modeling tools. Users could imitate reality and manipulate their systems' potential behavior to suit their needs. The new design candidates were produced under controlled conditions, and their performance levels were assessed and iterated until the new requirements were met. Full-scale models could then be made and tested in the field, and with luck they performed as predicted in advance of fullscale production.

Regaining the lead requires a new approach

Today, every mining business is being driven to increase output, consume less energy and produce less waste regardless of its business model. That hasn't changed. What's new is the incredible pressure to do more of it, faster, and at a time when industry profit margins are highly variable. Local regulations for decarbonizing and reducing emissions are also creating new barriers for some businesses and opportunities for others. Unfortunately, those who cannot add and leverage new capabilities to improve their processes will struggle to survive.

Time spent on simulation is seldom wasted

What's needed is a closed-loop approach to innovation that allows for the systematic improvement of intricate equipment designs and processes and their corresponding performance in operations. One way to do this is to combine advanced engineering simulation tools with high-performance computing (HPC) systems that seamlessly connect with cloud platforms to better understand the complex physics occurring within mechanical or chemical systems. Such knowledge can then be applied in ways that correct performance deficiencies, improve operating capabilities or create new ways to generate value – either within your business or that of your customer.



Faster prototyping

One way that mining equipment providers can benefit from advanced engineering simulation is to accelerate their product development processes so better designs can be commercialized quicker. A key area where this is true is when we look at how new prototypes are produced for evaluation.

Historically, in traditional prototyping, physical models were produced and tested and it took a significant time to produce satisfactory results. The process can be accelerated by using multi-physics simulation software to more accurately predict how new designs will behave before moving to the prototype phase. With current cloud-based technologies, it is possible to integrate the modeling results from multiple disciplines onto one unified platform and produce more accurate real-world results. New designs validated this way have a much higher probability of performing as expected during physical testing. Arriving at a final design sooner reduces costs by lowering the number of expensive iterations and accelerating the deployment schedule.

Mining companies that have mastered the technique were able to connect their design and simulation teams to efficiently accelerate the create-simulate-iterate process. In a 2017 study conducted by the Aberdeen Group, best-in-class engineering teams that adopted simulation-based design processes decreased their development times by 29 percent. Furthermore, by taking advantage of the integration capabilities between their design and multi-physics simulation tools, they built 27 percent fewer prototypes for significant savings in cost and time.

Innovative new designs

The combination of engineering simulation and design exploration empowers mining engineering teams to develop disruptive new plant and system designs that will make their submission stand out in a competitive bidding situation. For example, engineering service contractors and engineering, procurement and construction (EPC) firms can simulate mechanical and chemical processes to produce plant designs that will provide a lower total cost of ownership, reduce emissions or accommodate more stressful operating conditions. Owner-operators may wish to troubleshoot specific plant areas to improve performance and reliability or develop proprietary process technology that provides them with a competitive advantage.

Exploring the design space: the new frontier

Some of the most exciting developments happening today are in the emerging area of design space exploration. When multi-physics simulation results are fed into mathematical models to explore and suggest new designs that automatically satisfy all given constraints, revolutionary new designs and configurations can be found. The number of successful outcomes goes up by eliminating the unintentional human biases that strongly influence and limit design output. Even new arrangements that were possible but not previously manufacturable can now be 3D printed, taking advantage of the latest high-performance materials. Furthermore, 3D printing on the cloud can add a new level of sophistication to workflows. For example, users can upload, edit and print their designs from any device, at any time. In combination, these exciting new capabilities can produce disruptive innovations that will solve the most challenging problems facing the industry today.

Conclusion

Advanced engineering simulation continually supports and improves your assets' comprehensive digital twin to increase innovation possibilities and accelerate business revenue. With the massive amount of change being forced on every energy business, the ability to empower your teams to innovate and apply engineering capabilities to ensure you can outperform the competition has never been more important. Regardless of what part of the mining supply chain you're doing business in, disruptive innovation tools are ready to improve how you grow your business. Why wait?

Siemens Digital Industries Software,

Americas: 1 800 498 5351

EMEA: 00 800 70002222

Asia-Pacific: 001 800 03061910

For additional numbers, click here.

About Siemens Digital Industries Software

Siemens Digital Industries Software is driving transformation to enable a digital enterprise where engineering, manufacturing and electronics design meet tomorrow. Xcelerator, the comprehensive and integrated portfolio of software and services from Siemens Digital Industries Software, helps companies of all sizes create and leverage a comprehensive digital twin that provides organizations with new insights, opportunities and levels of automation to drive innovation.

For more information on Siemens Digital Industries Software products and services, visit siemens.com/software or follow us on LinkedIn, Twitter, Facebook and Instagram.

Siemens Digital Industries Software,
Where today meets tomorrow.

siemens.com/software