



SIEMENS DIGITAL INDUSTRIES SOFTWARE

Integrated Design and Configuration

Success in digital mining begins with integrated design and configuration

Engineering design teams across the mining industry must produce innovative new concepts in less time that will operate as highly functional and reliable assets in the field. To do this, they must take advantage of new cloud-based technologies that will allow them to meet the project requirements of their internal or external customers in revolutionary ways. With solutions that integrate next-generation design and configuration technologies and create work environments that allow design teams to be highly productive, the most successful innovators in the mining industry will win by producing better designs faster.

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The current state of automation in engineering design

Design and manufacturing teams in the mining industry today use a wide range of engineering design, simulation and manufacturing software to model and produce physical assets. Some businesses are more advanced than others, but most have incorporated a wide range of computer automation over the years, allowing their teams to design in the digital age and move away from manual methods. Over time, many design systems were adopted within organizations by different engineering teams and disciplines that offered the unique functionality needed for each of their respective trades.

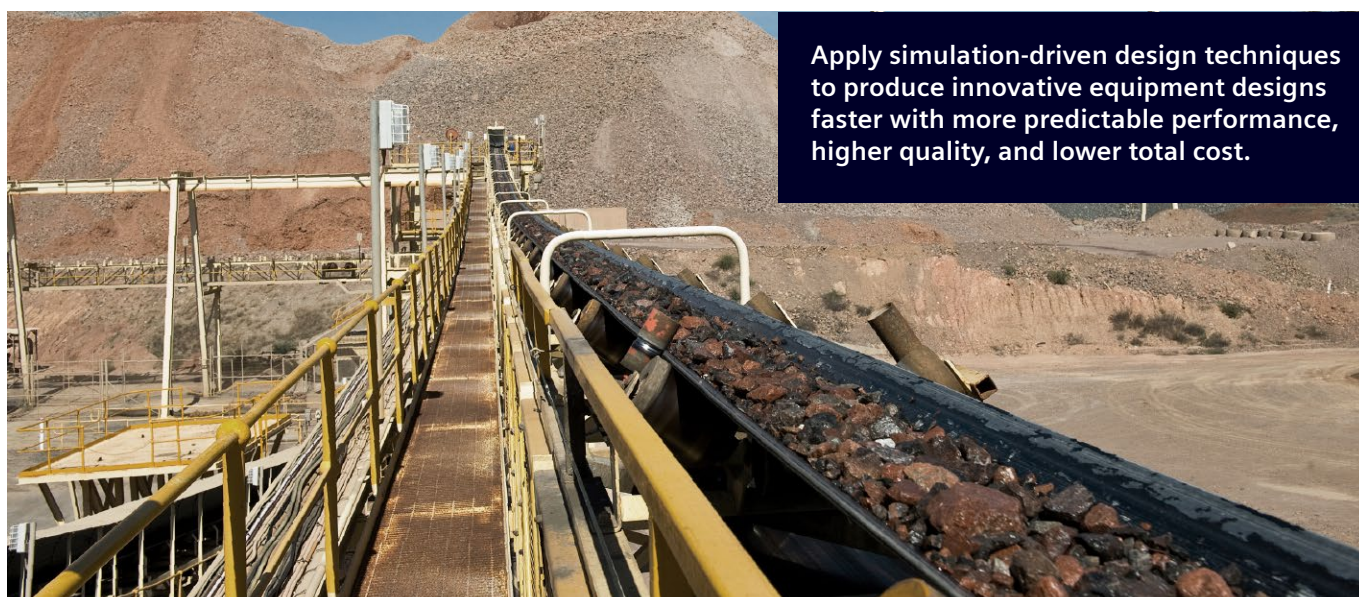
The hidden costs of the way things are today

What's not generally understood is that over many years mining design teams adopted a wide variety of discipline-specific software tools that are still frequently used today. As such, businesses have become highly dependent on a legacy of high-cost, disconnected modeling software tools that were never designed to work together. The implication is that some of the highest-value knowledge workers in mining companies today cannot collaborate effectively while performing their highest-value activities. This stifles innovation right when and where it's needed most to succeed. Furthermore, game-changing new technologies that will produce high growth business opportunities are much harder to adopt and integrate, adversely affecting overall business competitiveness. It's a vicious circle.

Why exponential returns await mining design teams

The good news is that mining wasn't the first industry to run into these issues. Before anything in any industry gets made, manufactured or produced, it gets designed. This reality affects every engineering discipline and every aspect of every supply chain. Although the mining industry is well-known for its conservative adoption of new technology, it is a direct beneficiary of the improvements made across entire classes of software. More digitally advanced sectors, such as the automotive and transportation industries, have worked with software providers to improve functionality across entire types of software such as design and configuration management solutions. These improvements are directly applicable to most other industries, including mining.

Modern tools, such as the current versions of computer-aided design (CAD) software, used daily by high-value design engineers, have been improved with cloud capabilities to address the need for better interdisciplinary collaboration. Additionally, digitalization's power and applicability connect new ideas, best practices and emerging technologies in novel ways that generate value across the economy regardless of where they originated. Some examples of new capabilities and practices that are gaining traction in mining include the integration of advanced engineering simulation into the design process, cloud-computing adoption, the application of artificial intelligence (AI) and machine learning (ML) and new developments in materials science such as additive manufacturing. Let's discuss these further.



Apply simulation-driven design techniques to produce innovative equipment designs faster with more predictable performance, higher quality, and lower total cost.

Simulation-driven design

The top priority for design teams is to bring innovative new solutions to market or operations faster. Period. In the past, simulating the performance of new prototypes followed design. Usually, this resulted in an iterative and time consuming improvement process producing a final result that hopefully operated as predicted. To accelerate this process, forward-leaning engineering teams now integrate simulation directly into the design process to understand model behavior earlier, making corrections right away. A recent study by the Aberdeen Group concluded that simulation-led design shortened development times by 29 percent. In the volatile mining market where newer and more sustainable ways to produce and supply materials are being sought, such radical increases in development cycles can profoundly impact cash flow.

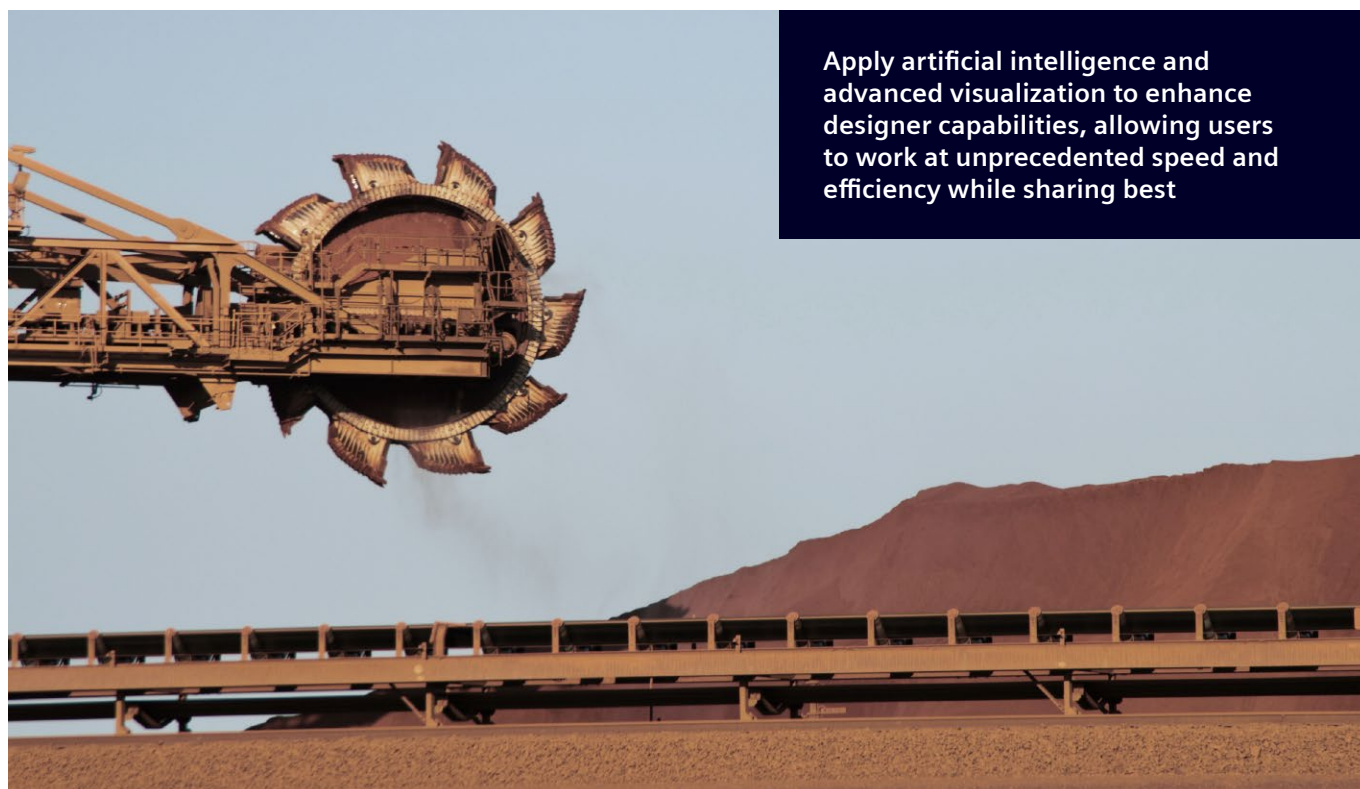
Artificial intelligence, machine learning and cloud

By improving the integration between engineering disciplines and across the asset lifecycle from engineering and simulation to manufacturing and production, the opportunity for wholesale process improvement across the enterprise emerges. One example of this includes applying AI and ML capabilities to improve the productivity of design teams and capture best practices that can be leveraged by other parts of the organization. Automated AI and ML tools can now predict the next steps in a designer's work and update the CAD interface to get maximum efficiency from the software capabilities and valuable insights into their design efforts.

Improving software adoption rates and the increasingly effective use of the design technology will ultimately lead to a more robust, comprehensive digital twin. Having a cloud-based solution means breaking down traditional geographical barriers and letting users access data from anywhere and on any device. Unlike legacy systems, cloud-based solutions are designed for scalability and availability. Users can scale and grow to manage increased demands as needed.

Additive manufacturing

The robust capabilities of better-architected design and configuration solutions also facilitate incorporating new production capabilities, such as additive manufacturing. By providing designers with new materials and state-of-the-art methods to produce them, disruptive leaps in equipment designs become more common. New product configurations that are stronger or lighter but were not previously manufacturable can now be quickly 3D printed and physically evaluated. Built-in validation processes check and improve new designs before they are printed to optimize the associated total cost. The convergence of these technologies will pay dividends by delivering innovative new designs faster while reducing the costs of prototyping, production and spare parts management.



Apply artificial intelligence and advanced visualization to enhance designer capabilities, allowing users to work at unprecedented speed and efficiency while sharing best



Conclusion

Finally, it's important to remember that most experts agree that approximately 80 percent of product and equipment costs are determined by decisions made in the design process. We also know that knowledge workers on engineering design teams are among the company's highest cost and most scarce resources. These high-value resources and their critical roles must have access to the best available technology, allowing them to collaborate fully and productively. They must connect to state-of-the-art technologies and use them effectively to produce disruptive solutions that deliver a compelling return-on-investment (ROI) for the end user. Given the disproportionately high impact that design has on every activity that follows, mining industry participants that need to be the most competitive in their industry are well-advised to see this investment as mission-critical to the future health of the entire business.

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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.

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