**Volgaburtnash**

Leading rock cutting tool manufacturer adopts digital technologies to enhance its competitive edge

**Products**
NX, Teamcenter, Simcenter

**Business challenges**
Improve product competitiveness
Expand into new markets
Reduce order-to-delivery time
Optimize manufacturing cost with design standardization

**Keys to success**
Introduce a digital process for product design and manufacturing
Implement a unified environment for design and production planning with Teamcenter PLM and NX CAD/CAM
Improve NC program development efficiency and manufacturing equipment utilization
Pursue digitalization as a foundational strategy

**Results**
Shortened new product development time from 4 months to 10 weeks
Cut tooling facility workload by 50 percent
Reduced NC programming time up to 30 percent

Volgaburtnash accelerates product design and production planning time, reduces manufacturing costs with Siemens Digital Industries Software solutions

Maintaining market leadership
Volgaburtnash JSC is the largest Russian rock cutting tools manufacturer. Established in 1948, the company designs and manufactures drill pipes and cutting tools for oil and gas, mining and construction industries, serving customers in Russia, the CIS countries and more than 60 other countries. The company’s key objective is maintaining its leading position in the domestic market and expanding its global market share. To do so, Volgaburtnash continuously improves product competitiveness with a focus on quality, order-to-delivery time and competitive pricing.

The company’s approach to production enables it to successfully compete with the leading U.S., Swedish and Chinese manufacturers, in both domestic and international markets. Volgaburtnash offers a full range of highly customizable boring tools to meet customers’ needs. The key priorities are continuous technical support for the customer’s drilling operations and delivering an attractive price-to-performance ratio. These priorities have transformed the company into a respected market player.
Pursuing digitalization
Recently Volgaburmash completely upgraded its manufacturing facility and replaced more than 90 percent of its equipment. The upgrade was the first stage of the company’s transformation to advanced processes, then further to digitalization. Volgaburmash’s customers are rapidly introducing digital technologies, and the company’s primary objective is to become a partner for digitalization in the boring industry.

Volgaburmash has leading-edge manufacturing equipment, matching that of industry leaders. “The key success factor is the high quality of our products and processes,” says Marat Matevosyan, general director, Volgaburmash. “I do not believe we can further develop the company without digital technologies.”

When digitalization emerged, the company’s level of digital technology coverage was quite low. It lacked a unified software deployment strategy: the accounting department used software with limited capabilities, manufacturing worked with an in-house system, and the designers operated legacy systems from various vendors. The company sought to introduce a unified approach to digital technologies.

Selecting a reliable partner
While choosing the digital platform, the company compared proposals from the leading global vendors. The key requirement was the solution coverage: it had to embrace every production activity. It was already clear that the solution had to be future-proof, evolving as new challenges emerged.

Another key requirement was a highly skilled team responsible for the deployment. “We compared the experience with comprehensive deployment projects,” Matevosyan explains. “All the factors led

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Digital twins of products and manufacturing
Volgaburmash decided to implement the digitalization project in stages, beginning with the design stage and continuing through manufacturing. The company wanted to establish a concurrent, collaborative approach to new product development using NX™ software for computer-aided design (CAD), the Simcenter™ portfolio of simulation solutions, and Teamcenter® software for product lifecycle management (PLM). This integrated software platform enables Volgaburmash to build parametric product models and easily switch from new product design to product configuration. It has also enabled the creation of product digital twins.

The project continued to the production planning stage with the use of Teamcenter Manufacturing and NX CAM. Advanced computer numerical control (CNC) machine tools perform 100 percent of the machining operations. NX CAM and Teamcenter Manufacturing have taken the production to an entirely new level in which all manufacturing processes are virtually verified prior to running on actual CNC machines.

Volgaburmash has created a digital twin of the entire factory for optimal production utilization. A key aspect is the end-to-end change management capability embracing every product development stage. The new digital technologies enable much faster changes, and the change effects are tracked instantly and automatically. Siemens Digital Industries Software technologies have enabled the company to eliminate paper drawings and conventional manufacturing documents, saving significant time in product development and production.

Faster product design, production planning and manufacturing
The cost of a drill bit is just one percent of the drilling operation cost, but the equipment efficiency totally depends on the bit efficiency. Because the drill bit advance rate directly affects the rig operation time, it is crucial to customize the bit for specific site geology and drilling technology.

For drilling tool suppliers, the speed and quality of customization, from data acquisition through manufacturing, is a major competitive advantage. Fast design, production planning, and manufacturing is a top priority. Volgaburmash worked with the Siemens Digital Industries Software team to develop a modular design approach, using NX to create parametric
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product assembly models. Each mockup includes the fewest components that can satisfy the customer’s boring tool requirements. The modular approach is flexible, and helps reduce the number of stock keeping units (SKUs) and equipment setup downtime.

Drill bit manufacturing is a complex multi-step process that takes months. It includes forging a standard set of drill bit rolling cutters and legs, machining of the components and final assembly. “Before, we needed up to four months to design a bit and plan its production,” Matevosyan notes. “But now, we can make up to 10 customized designs every month using Teamcenter, NX CAD/CAM and Simcenter. This cuts new product order-to-delivery time by up to 60 percent.”

Volgaburmash uses NX to design all new products, and also to create annotated 3D models of legacy designs, a project that will take six months to complete.

Reducing workload
The use of NX has also enabled Volgaburmash to reduce the workload of the tooling facility by 50 percent. Using the product and manufacturing information (PMI) capabilities of NX, the company can include manufacturing and process information directly in 3D models, which can automate downstream processes including CNC and quality inspection programming. It also eliminates the need for conventional design and manufacturing documents like paper drawings and process charts.
Volgaburmash JSC is one of the largest Russian manufacturers of rock cutting tools. The company has manufactured more than 8.5 million drilling bits for oil and gas, mining and construction industries. The bits have supported the recovery of millions of tons of oil and billions of cubic meters of natural gas and rock.

Digital design
Using NX and Simcenter for product development has enhanced the company’s competitive edge. Firstly, Volgaburmash has significantly accelerated its design and manufacturing processes. Secondly, much more data can be systematically acquired and analyzed, offering many new opportunities for design and manufacturing simulation. Thirdly, modular design is more cost-efficient. Now the company offers a larger range of products – each product is a modular combination of standard components.

People: a key asset
Changing engineering technology means more work for the company’s personnel: they are required to learn something new while performing their regular jobs. On the other hand, state-of-the-art software unleashes creativity and productivity, because the computer does routine and labor-intensive operations automatically. To improve the efficiency of existing and new systems, Volgaburmash relied on extensive training. As a result, company experts quickly started using the NX parametrization feature to create a complex customized analysis routine that generates geometry and overall design of drilling bits. The experience demonstrated the value of continuous learning.

Digitalization: a foundational strategy
Volgaburmash excels at digital technologies compared to its global competitors. The company’s top management regards the proficiency with digital technologies as a starting point. The company has many new ideas and many proposals made by Siemens experts. Deployment and upgrading of state-of-the-art information technology (IT) systems is a major activity, and Volgaburmash clearly realizes the business value it brings.

One of the company priorities is product quality improvement at every lifecycle stage. There are plans to integrate the Teamcenter quality management solution into the existing IT infrastructure. Another equally important task to be solved with Teamcenter is analyzing big data coming from various sources to inform decision making.

Volgaburmash plans to completely digitalize the factory operations. Using the digital twin of the entire factory, engineers will simulate any changes prior to their implementation, and acquire and analyze manufacturing and cost-related information required to get insights and optimize operations. “Digitalization is the foundation of our strategy,” Matevosyan says. “I believe we have selected the right partner to implement our strategy. Siemens has all the components and experience, and, what is more important, a clear vision of the deployment and evolution process in real-world conditions.”