CLOUDERA | Severstal

CUSTOMER SUCCESS STORY

IMPROVING MANUFACTURING PROCESSES AND PRODUCTIVITY THROUGH STREAMING AND AI

IMPACT

- Implemented several solutions that automatically control the speed of production processes using ML models, increasing productivity by more than 5% on chosen units, providing more than 100 thousand tonnes of additional metal processing per year
- Developed energy-efficiency projects that lead to a reduction of costs and carbon emission
- Created a vast number of solutions based on computer vision, which controls product quality and workplace safety

Severstal is one of the world's leading vertically integrated steel and steel-related mining companies, with major assets in Russia. Severstal is Russia's prime high-quality supplier of flats, longs and steel pipes for the construction, automotive, machinery, and oil & gas industries. Severstal is also one of Russia's largest producers of iron ore and coking coal.

Challenges

The company's strategy's key elements are creating an excellent customer experience and achieving leadership in expenses. It could be producing more steel from the same amount of raw material or for the same period. Another use case is shipping to customers more excellent quality products. One of the chosen ways to reach these goals is implementing digital products and integrating them into the value chain.

To do this, the company has developed the largest data lake in Russia's industrial sector (6PB of capacity) in a push to be able to store and work with big data. Besides, Severstal needed an end-to-end solution to help collect, manage, and analyze data. Several challenges were considered in choosing an appropriate solution. Every minute, a single industrial assembly can generate several millions of data points. Moreover, Severstal's production system consists of different mills and mines across Russia, and every facility consists of plenty of these assemblies. Another requirement was handling real-time data feeds. Because steel production contains many high-speed processes, it is crucial to receive, process, and send control action to a facility within seconds.

Solutions

Severstal migrated to a Cloudera CDH data lake, as it offered a complete end-to-end solution to support the company's objectives. The architecture also includes streaming data - with Kafka, NiFi, MiNiFi, and machine learning (ML) models. Professional Services has been instrumental in supporting these efforts.

"Working with Cloudera has been a natural partnership. We chose to move to CDH because it offered a complete end-to-end solution. We also resonated with the data-in-motion vision, as Kafka, NiFi, and MiNiFi have helped us stream data that has helped us improve our production process. This has a transformative impact on our business," said Boris Voskresenskii, Chief Digital Officer of Severstal.

The use cases in production could be grouped under three headings: computer vision applications, operations optimization using analytic tools, and automatic control of industrial assemblies using AI.

Severstal applies computer vision to control industrial safety, quality of steel products and raw materials. For example, Severstal implemented a solution that detects defects of the steel surface. It includes ten cameras set on the production line sending over five million photos of steel surface each day to a CV-model. The model processes received photos and predicts whether the photo contains defects or not, and sends the result to a web-application. This solution helps to reduce waste of production time and helps to provide the clients with high-quality steel.

100K

Tonnes of additional metal processing per year

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Boris Voskresenskii, Chief Digital Officer, Severstal

About Cloudera

At Cloudera, we believe that data can make what is impossible today, possible tomorrow. We empower people to transform complex data into clear and actionable insights. Cloudera delivers an enterprise data cloud for any data, anywhere, from the Edge to AI. Powered by the relentless innovation of the open source community, Cloudera advances digital transformation for the world's largest enterprises.
Learn more at cloudera.com

Using NiFi and MiNiFi, Severstal started collecting millions of messages per minute from IoT devices and sensor data from the machinery producing the steel. The data lake stores data collected from transmitters on industrial equipment (IoT), process management information system servers, and MES-systems. This vast amount of data makes it possible to use advanced analytic techniques for operations optimization.

Severstal uses historical data stored in CDH, ranging from several months to five years, to train the ML models. Moreover, using data from Kafka models can retrain and work on a real-time basis. In total, it takes between 0.7-1.5 seconds for data to go through the solution. For example, this approach has been used for implementing a solution that automatically controls the speed of the continuous pickling line.

Results

With its data lake built on Cloudera, Severstal can significantly improve manufacturing processes and productivity. The stored data supports development of advanced digital solutions, which provide cost reduction, supplies of steel products with high quality and increasing production volume.

Within the continuous pickling line use case alone, performance has increased by more than 6.5%, which provides more than 100 thousand tonnes of additional metal processing per year.

Severstal is planning to move to CDP at some point, and this should open up additional opportunities to gain further flexibility and improve processes.

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