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Improving Reliability and Profitability
Supply Chain with Simu

Supply Chains Manufacturing

Problem

Today, many steel manufacturers are in need of lean manufacturing tools that will improve their return on investment and service levels. The minimum 80% reliability level most steel companies are struggling to achieve is nowhere near what today's customers and investors want to deal with.

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supply chain because it had a high degree of fragility to external changes, low profitability and ROI.

At the time, the company's management couldn't make any effective changes because the supply chain was very complex. It was very difficult and risky to decide on any new rules, as the outcomes were hardly predictable. The static decision support tools like ERP (enterprise resource planning software) or Excel spreadsheets were not able to help because they were never designed to support decision-making within such a complex environment.

To fully consider all the interdependencies, constraints, dynamics, and variability in the system it was decided to employ simulation modeling. With manufacturing process simulation, engineers could capture all the complex details of the manufacturing supply chain, determine causes of performance gaps, and test possible solutions in a safe digital environment. Simulation modeling was supposed to help management make faster, better decisions and predictions, so that they could turn these predictions into reliable manufacturing optimization commitments to investors and customers.

Solution

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the models. This made it possible to reflect all the components, processes, and interdependencies. All the models had the functionality of showing the outcomes for single scenarios, sensitivity analysis for various parameters, and direct scenario comparison.

The data for the models (more than 70 Excel worksheets) was collected from ERP and EMS. AnyLogic ability to create self-configurable models from external data helped cut development time significantly.

The manufacturing process simulation models has detailed 2D and 3D animation. The AnyLogic platform provides easy-to-use interfaces and the ability to export models as a standalone application, and run the models on any computer without special software. Mobile work and collaboration, being crucial for fast and efficient decision making today, were facilitated by AnyLogic Cloud. This web service enables users to run demanding models online in a web browser on any device, including mobile phones and tablets, share models, discuss scenarios, and provide simulation analytics to customers.

Hot Coil Finishing Simulation Model

The hot coil finishing area had a great number of congestions and there was a permanent coil movement in order to dig out the coil needed.
Even the car parking was filled up with coils, which indicated the system was working ineffectively. New

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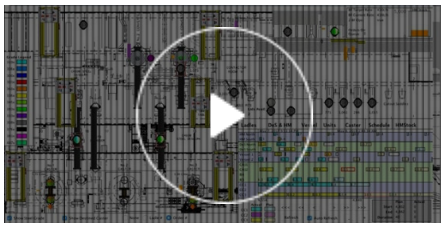
inventory, and cost impact. Operational changes, including increasing hot strip mill output and coil width doubling, were tested for better production planning and control. The model also helped find the best way to upgrade and optimize wagon fleet. In the future, the model may be used for testing new operational rules that allow for full automation of the hot coil management process.

Steel and Slab Simulation Model



The steel operations and their scheduling are both very complex. It is very difficult to predict the impact of changes in product mixes or operational rules. To test them and improve efficiency, a specific model was needed.

This model enabled the developers to grasp all the elements of the manufacturing system. Within the detailed 2D animation, a user can click on any crane or product to see its status and on-going operations. The heart of the model is the logic which supports the production planning and scheduling of all operations. Required product mix and other parameters can be set and altered, and manual scheduling is available if needed.

The steel and slab production simulation model made it possible to:

- Capture and digitize the scheduling and operating rules that different plant operators used. These rules had never been verbalized before and could

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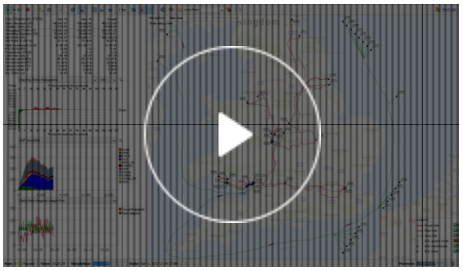
products, which could negatively affect workflows.

Steel Supply Chain Model



As mentioned above, the company was experiencing great congestion on the factory floor and low reliability. The company had lots of inventory and couldn't manage it properly. It was necessary to determine the main causes of such situations, identify new global optima rules to be implemented, and quantify their operational and financial benefits. Goldratt Research was tasked to provide a production optimization and decision support tool which managers could use when developing production planning and scheduling.

The model represents every part of the supply chain in detail. The user can click on a link in the supply chain and see the processes inside. Model statistics presents information on stock levels, processing units, financials, etc.

As a result, it was discovered that problems were primarily caused by the management always choosing the lowest cost-per-ton option for manufacturing and distribution. The other problem was permanent balancing of capacities. The model may be helpful in:

- The development of new "Low WIP/Max Flow" rules.
- Forecasting cost-per-ton, if the company shifted to a more demand-driven approach.

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and low reliability the company was experiencing over the last years.

When the time came, the models provided a safe, low cost, and very quick way to test the impact of any changes on both operational and financial performance. The models were also used to validate each other's results.

In the future, the models can be used on a weekly, monthly, or annual base to analyze workflows and make critical decisions and reliable commitments.

Project presentation by Dr. Alan Barnard and Jaco-Ben Vosloo from Goldratt Research Labs

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