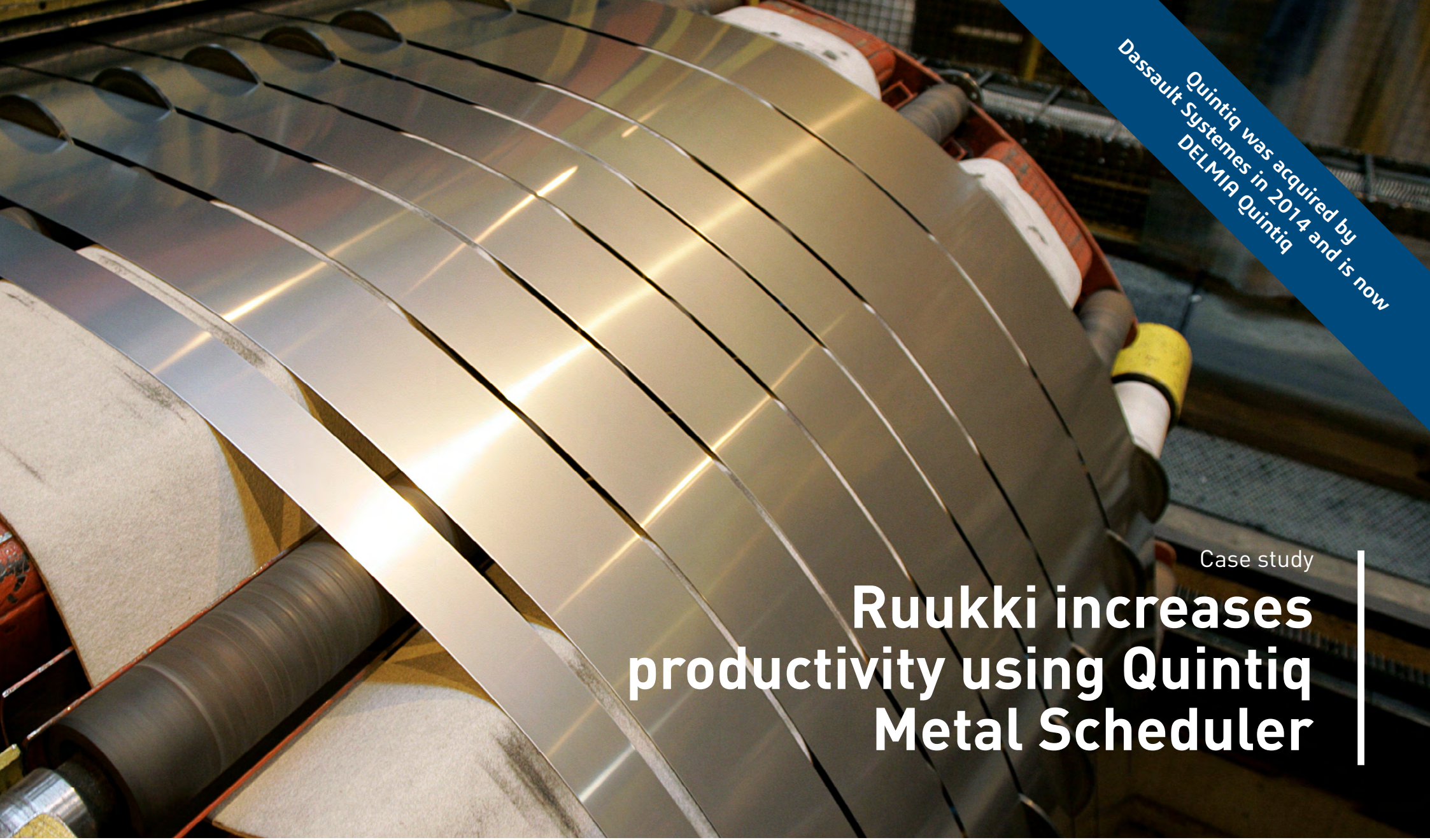

Quintiq was acquired by Dassault Systemes in 2014 and is now DELMIA Quintiq

Case study

Ruukki increases productivity using Quintiq Metal Scheduler

RUUKKI

QUINTIQ

"Planning support has been improved dramatically and we are now in a position to be able to measure the production impacts."

– Pasi Rajala, Development Engineer, Ruukki

The company

Rautaruukki Oyj, best known as Ruukki, is a leading supplier of metal-based components, systems and integrated systems to the construction and mechanical engineering industries.

The company has a wide portfolio of metal products and services with operations in 23 countries and 12,000 employees. Net sales in 2005 totaled €3.7 billion (U.S.$4.5 billion).

The business process

One central feature of the production process at Ruukki's production facility in Raahe, Finland, is the continuous casting of slabs for heavy plate and strip products. Fed from two mixers, three casters are available and produce approximately 8,500 tons per day. After mixing but before casting, metallurgical treatment is provided by a desulphurization station, three converters, a stirring station for composition and temperature adjustment, a ladle furnace and a vacuum degasser. The casting is planned every shift for the next shift period, taking into account the casting orders, the slabs stocked in the slab yard and knowledge about the status of the casters and the upstream facilities. Casting orders always detail material specification (grade, thickness, quality), a required amount (tons and number of slabs) and a due date for the casting. The width specification of an order consists of a required width, but also alternative widths are defined, allowing the optimization of width jumps within a sequence. The planning exercise can be broken down into the following decision areas which, in turn, depend on each other:

Material reservation
If existing slabs in stock match an order specification, they can be used, thus reducing the number of slabs that need to be cast.

Strand creation
Slabs that need to be cast must be arranged into a specific sequence known as a strand. Many detailed rules (width jumps, quality changes) have to be taken into account in order to determine whether a strand can be produced.

Sequencing of strands
In order to check whether the ladles are available at the right time, the strands need to be assigned to casters and put into a sequence on each caster.

The challenge

There are many possibilities available in planning the sequencing of slabs into strands, and hence a variety of possible solutions. In order to stay competitive, Ruukki set the following related goals:

Reduced inventory
Inventory is impacted by casting because the cast slabs are sometimes not immediately required and therefore need to be stocked. Sometimes slabs are cast too early, other times slabs are produced when no order exists. Ruukki needed to minimize inventory in order to minimize costs.

High productivity
Given the usual mix of slab qualities ordered, casting creates a bottleneck. The company has therefore set clear goals to produce long strands in order to maintain high productivity, short and infrequent downtimes and zero waiting time for ladles.

On-Time Delivery Performance
The deadlines for all orders - customer orders and orders contracted by other plants - must be maintained as tightly as possible. In addition, the deadlines related to the casting itself are important and must be kept. The tactical planning process at Ruukki determines those due dates according to customer deadline and balanced workload objectives.

The solution

The planning solution developed at Ruukki is an implementation of Quintiq Metal Scheduler and takes into consideration customer-specific constraints, logic and algorithms. Material reservation is supported with a highly interactive form, provided by the Quintiq software, supplemented with Ruukki-specific rules to locate suitable slabs efficiently. Additional support is provided by an automatic assignment optimizer. The two basic ideas here are:

- Detailed information concerning which slabs can be used for which order and vice versa must be available in the model and take all constraints into account

- The planner must be able to quickly identify slab reservation information and revise the decision if necessary. Next to material reservation, strand creation is supported using a graphical representation of slab sequences and a strand optimizer; also scheduling of sequences on the casters is supported using a Gantt chart and a simulation of the upstream resources.

The results

"The system must be able to be modified according to changing realities in the plant; any other solution would not meet our needs."

– Jaakko Koistinen, IT System Designer, Ruukki

Pasi Rajala, a Development Engineer at Ruukki, explains that it is now possible to fulfill orders more precisely. "Planning support has been improved dramatically, and we are now in a position to be able to measure the production impacts," she said. "Although not every bit of improvement can be attributed to Quintiq, it's clear to us that the amount of planned stock slabs went down by 15% to 20%, making room for more casting on order. Casting efficiency has also been increased. The average length of strands also went up from approximately 3.5 ladles per strand to over four."

The flexibility of the solution is recognized as an added benefit. According to Jaakko Koistinen, IT System Designer at Ruukki, "The system must be able to be modified according to changing realities in the plant; any other solution would not meet our needs. It's much better now because we can immediately see the effects of planning actions on the on-time fulfillment of casting orders."

As in many industries, key performance indicators (KPIs) are typically used to measure performance on a monthly basis. They are used in order to determine if planning decisions meet quality standards and if production goals were achieved. Although KPIs are an important measure, they do not directly help the planner in daily operations other than answering the question, "How well did we do last month?" The more astute question is, "How well will we perform if we execute today's plan?" Thus, measuring KPIs related to scheduling can be beneficial. They can measure those aspects of the planning process that can be directly influenced by the planner – and with the Quintiq solution, they are measured online.

> "Thanks to Quintiq, our way of working has been developed considerably. Now it is possible to respond to the continuously changing requirements of process and customers."
>
> – Jaakko Koistinen, IT System Designer, Ruukki

Next steps

Typically, implementing a Quintiq solution is not an isolated, one-time action. "It's a development process," said Koistinen. "It's rather a continuous process of improvement. Thanks to Quintiq, our way of working has been developed considerably. Now it is possible to respond to the continuously changing requirements of process and customers."

Based on the Raahe casting project, Ruukki has decided to take the next step. Subsequently, Ruukki signed a corporate agreement with Quintiq aimed at utilizing Quintiq technology to optimize both production and logistics processes within Ruukki's supply chain.

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