



**JANUARY 2016** 

# **New Generation Planning**

at steelworks of







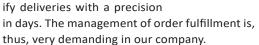
# **Continuous Improvement based on Advanced Planning**

Continuous improvement at TZ, thanks to the advanced planning system, improves Operational **Efficiency and Customer Delivery Performance** 

Some time ago (at the turn of the millennium), TZ decided for a dramatic change in its corporate strategy: to focus on demanding markets, in particular the automotive industry, and transfer the core of the product portfolio into special steel. This change, along with the remaining ones, had a significant impact on the requirements of the Delivery Performance of the company. This article demonstrates that the enforcement of the new corporate strategy was greatly facilitated by the new scheduling system built on the basis of Advanced Planning and Scheduling technologies (APS).

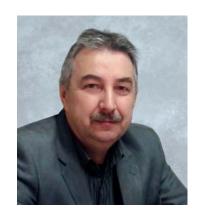
Bohuslav Sikora, Production Manager, TŘINECKÉ ŽELEZÁRNY, a. s.

Our company is a metallurgical company with an enclosed production cycle. Our range of products is focused on special steel (SBQ). We work with approximately 1,000 steel grades, differing in chemical composition. This leads to a considerable diversity in the composition of orders: there are many of them for not-sohigh volumes, and with different requirements on steel quality. Our typical customer also requires a high due date performance, wishing to spec-



The main objectives we focus on, in relation to the Order Fulfillment Process, are Customer Delivery Performance and Operational Efficiency. Actually, these goals do not support each other -- on the contrary; if we concentrate on improving one of them, it will easily lead to a deterioration of the other. Therefore, achieving improvements in both respects, in this demanding planning environment, is anything but simple.

Our company searched for a way to promote the new corporate strategy and to improve its competitiveness. It was necessary to increase the Delivery Performance. In particular, to focus on achieving high due date performance while quoting supplies with an accuracy of one day. This was the critical impetus for the decision of TZ to use Advanced Planning and Scheduling technologies to control the Order Fulfillment Process - to build a powerful planning system. In this article, however, we do not want to return



**Bohuslav Sikora** Production Manager, Trinecke zelezarny

in detail to the reasons, to the system of supplier selection, to course of the project implementation and the results achieved in the first period after deploying the system in 2007 - all of this has already been sufficiently described. Instead, we would like to focus on the benefit which the planning system has brought to our enterprise in the long term.

Our efforts to increase the efficiency of our enterprise in managing the Order Fulfillment Process using the plan-

ning system did not end with what had been achieved by the implementation, and in the first

which we relied in the ongoing fine-tuning of the planning system. For the purposes of this article, it was necessary to select those parameters that will well illustrate the increased efficiency of the Order Fulfillment Process. Because due date performance has always been our major priority, the selection of the first representative parameter was simple; we will show you how we have managed to reduce the volume of delayed orders over the years. To illustrate the improved management efficiency, we have also decided to introduce the improvements to the parameter "Proportion of orders completed within the last ten days before the quoted day". I would like to add a few comments to this parameter.

It is natural that the economic goal of a company is to immediately ship any product completed in

### **Project Goals**

#### **Customer Delivery Performance**

- Improved Due Date Performance
- Reduced Delivery Lead Times
- Increased Flexibility
- Improved Information Service

### **Operational Excellence**

- Increased Throughput
- Increased Inventory Turns
- Specific Economic Effects
- Improved Visibility

period after deploying the system into routine operation. In the long term, we have been trying, we believe successfully, to use the planning system as a tool for continuous improvement. The basic goals are still the same; we just gradually placed our bar higher and higher over time.

During our works, we measured a set of parameters that we used for our work analyses and on the production, so that the costs of production can be paid as soon as possible. Every day by which the company completes an order before the agreed deadline, extends the period for which the manufacturer mortifies his capital in the product (and the company thus cannot use this money for other activities), not to mention the fact that even the actual storage results in an additional expense for the company. The ideal situation is therefore, to complete and finalize the production exactly on the promised

lurgical enterprises (campaigns on campaign resources, heats and many others), it is not objectively possible to achieve such an ideal situation. Finalizing of orders is thus usually spread over some time period, which can take weeks when dealing with steel-producing companies. Even so, our efforts to manage the Order Fulfillment Process must be aimed at having the greatest possible proportion of orders finished as close to the promised date as possible.

However, due to constraints present in metal-

### Focus of this issue: **Success of the Czech Steelmaking Company**

Trinecke Zelezarny, the largest steel producer in Czech Republic, carried out a project in 2005 – 2006, implementing a planning system based on APS technologies. LOGIS had the honor of being the one who designed the system, carried out its implementation and also provided support to the routine operation of the system afterwards.

The results achieved during the first period after deploying the system into routine operation (2007) exceeded the expectations and the published information regarding the achieved results attracted major interest of the professional public (sometimes even suspicion - we sometimes even met doubts at conferences; people thinking that we might be making things up: after all, how could something like this be even possible?!). The project was prestigiously awarded when it was nominated as laureate of Computer-World Honors Program in 2007 as the only European project in manufactur-

The topics of implementing the project and the first period of routine operation were subjects of several publications already. We dedicated a single issue of LOGIS News to them ourselves (see LOGIS News, June 2009) which is available at www.logis.cz.

However, the story of the planning system at TZ did not end by its deployment into operation. In the following years, the scope of the planning system was extended to several additional metallurgical operations even beyond the main facility in Trinec. Besides that, TZ made the decision to attempt to utilize the system as a tool for continuous improvement. Additionally, the results achieved in TZ - thanks to the planning system during the first almost 10 years command respect, and I believe that they could also be an inspiration for those considering ways to improve Operational Efficiency and Customer Delivery Performance.

esides providing inspiration to other steelmakers, this issue of LOGIS News is a 'thankyou' to all people who contributed to achieving the results described here. Whether those were people from TZ or from LOGIS, they managed pull this through together and their efforts have led to very valuable results.

> LOGIS CEO & Chairman, Dalibor Konvicka





SOURCE: Třinecké železárny



# **Continuous Improvement** based on Advanced Planning

continued from page 1

Now a few comments on the diagrams on this page: the due date performance is shown by means of the Delayed Orders diagram (it is therefore a reciprocal diagram - the lower the value achieved, the better the result). Please note that the results for the years 2009 and

Number of Late Orders
(all TZ mills)

6 5.7%

2 2.5%
2 1 1.1% 1.4% 1.2%
1 0.7% 0.7% 0.7% 0.2012 Ø 2013

2010, over the period of the relatively significant crisis, cannot be considered results obtained on terms comparable with other years (see also on the following page). Furthermore, if we look at the results achieved in the "regular" years 2011 - 2013, we can conclude that the results are not bad at all. We do not know of any similar metallurgical enterprise in the world that would quote its deliveries with a one-day accuracy and still reach similar due date performance.

In the diagram of the share of orders completed in the last 10 days before the promised date, which illustrates the results of improving management efficiency, we omit the period of the crisis years of 2009 and 2010, since they could give the diagram a disturbing impression. The diagram shows that also in this regard, we have made considerable progress during the monitored period. While only about 1/3rd of the orders was completed in the last 10 days at

the beginning, it is full 2/3rd at the end of this period. Achieving this result was based on the gradual improvement of our ability to use the planning system as an essential tool for managing the Order Fulfillment Process.

Both of the above parameters themselves appear to be fairly isolated - they say nothing about other circumstances; they just rather give the idea that there is an increased management efficiency behind the achieved improvements.

In order to give a better picture of the increasing management efficiency and the gradual improvement of these two parameters in their interrelation, and in addition to these summary diagrams, we also present a commented set of diagrams showing the finishing of orders in time against the promised date of the order delivery, year by year (see on page 3).

To illustrate the gradual improvement, we have shown that a good planning system can be of considerable benefit for a metallurgical enterprise, and that it can significantly contribute to the promotion of corporate strategy and increased competitiveness. Achieving valuable results, however, is not a matter of course. In order for a company to make use of an investment in the planning sys-

tem as successfully as in our company, certain conditions must be met. We mention at least some of them:

# High-quality team of employees providing for planning

Metallurgical enterprise is a highly complex system with many different constraints. Obviously, the planning system also cannot be regarded as something simple. If the members of the team that ensures planning in an enterprise are to be able to achieve very good results, they have to build the necessary knowledge for their work. A crucial opportunity for this is the period of implementation of the planning system – the business implementation team brings in knowledge about the company, it not only obtains knowledge of the planning system in the creation of which it is involved, but also deepens the knowledge about its own business.



The continuous improvement requires the team members to be proactive (it is a matter of suitable selection of people in the team), and to also have the opportunity in the new periods to use their knowledge to the maximum and gain experience from previous periods — this is associated with an emphasis on the long-term stability of the team. Our team was lucky that its members proved to be very well selected and that the composition of the team has not undergone any serious interventions over the years.

### Highly efficient, understandable and flexible planning system

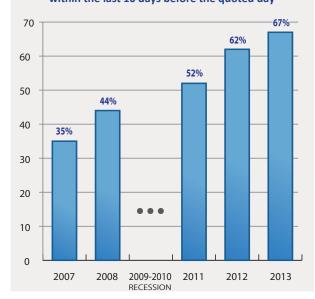
Even the best team would hardly reach top results if it did not have a high-performance planning system to rely on. This is related mainly to the fact that the planning model of the system must reflect the reality of the enterprise in all material respects. The reality of the enterprise is continuously evolving, and consequently, changing. If we would not be able to respond to changes on the part of the planning system, the result of its operation would not be an improvement, but a decline (the decline rate would match the extent of changes that were not reflected in the planning system). The planning system, therefore, must not be a black box, but an understandable and constantly evolving organism.

# Very good level of continuous support by the planning system supplier

The development of planning technology (planning software) undoubtedly belongs to the most challenging topics in software development. This is probably the reason why a relatively low number of companies worldwide are engaged in the development of software for planning of metallurgical enterprises, and why even fewer are able to provide truly valuable planning tools.

But providing planning technologies alone would not be enough. As we mentioned in the previous paragraph, the planning system has to be an understandable and continuously evolving organism even after its deployment (after implementation). That can hardly be imagined without cooperation with the software producer and the implementer of the planning system. If we want to continuously improve the planning system, we need to make sure the supplier understands our needs. The supplier must be in continuous

Finishing of Demand Orders within the last 10 days before the quoted day

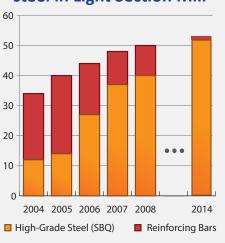


contact with us, so that we can discuss our ideas and wishes together, and also so that we can entrust the supplier with the respective steps when we need to make changes which we cannot do on our own. Understandably, that cannot be done without additional costs. Nevertheless, based on the information about the continuous improvement which we incorporated into this material, it is clear that such costs have their purpose.

#### **Motivation supporting change**

Change of the process was not only a matter Change of the process was not only a matter of the new planning technology. It had to be accomFor those who would like to get a good picture of the conditions under which those improvements were achieved, we also add one more comment about the ongoing increase of the complexity of the conditions during the period under evaluation. As we already mentioned above, the main reason for the deployment of APS was the support of the enforcement of the new corporate strategy. Here, it should be understood that the change of situation did not occur at once, but gradually. It is well illustrated by the following diagram, which shows how the percentage of SBQ steel gradually increased in our Light Section Mill over the years. The proportion of SBQ steel was proportionally associated with the increase of the overall complexity of the production / Order Fulfillment Process. And thus, the achievement of improvements in each subsequent year required mastering of ever more complex conditions than in the previous years.

# Growth of share of SBQ steel in Light Section Mill



panied by the change in the mindset and motivation of people. In the past, our company's top priority was achieving the maximum production volume. The current top priority is customer satisfaction (and thus, e.g., the minimization of delayed orders). Promoting this change would not be possible without the new rules of involvement of our employees.

Changing the planning process was a part of a strategy change throughout the company. The focus on the automotive industry, the supplies being made

directly to end customers, the dynamic development of the portfolio of the produced steel grades, and so on – all this generated significantly higher requirements in terms of quality of Delivery Performance. We had no chance to succeed without the ability to deliver on time. Therefore, logically, we put the greatest emphasis on the Delivery Performance, which is the biggest change throughout the company, a change in corporate culture, which cannot do without changing the key competencies.

But despite all these facts, we never let internal Operational Efficiency out of sight. And we have achieved significant success in this field as well. For example, as seen in the chart illustrating the use of tundish for continuous casting, we significantly improved it already in 2007. In fact, even during the difficult conditions in the critical years 2009 and

2010, we did considerably better than in the period before starting the new planning system.

In this paper, we have summarized the results of gradual improvement over the period of 2007 to 2013. During this period, our company underwent a change of the Order Fulfillment Process management system. Our work does not stop there, of course. We are asking questions about how far it is possible to go using the planning technology. In addition, the company, and its surroundings, are constantly evolving, and the changes have an impact on the needs of the enterprise. And the changing needs bring new challenges. I do not think there is a risk of falling into a stereotype.

LOGIS a.s.

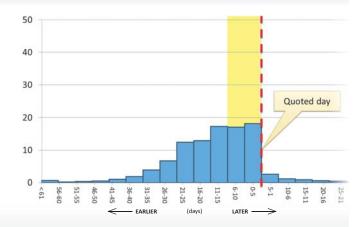
#### 2007

The result of the first year in which the order fulfillment process was managed by the new planning system, was a great success (it certainly significantly exceeded the general expectations). It was a year in which we made the fundamental change in order quoting when we switched from the original quoting of deliveries with a month precision to quoting with a one-day accuracy. While this was happening, our task was to make sure that the due date performance does not drop below 80%. The achieved due date performance of 94.3% was a very nice result.

The diagram shows the proportion of finishing of orders in time (%). Five-day periods were selected for display. It can be seen that the finalizing of orders was spread quite significantly, especially over the last 25 days before the promised date.

The diagram depicts the initial silhouette; on which we can well illustrate the gradual year-to-year improvement of our ability to efficiently use the planning system. At the same time, we can monitor both, the gradual increase in the volume of finalized orders closer to the promised date, and the improving of Customer Delivery Performance (gradual year-to-year decrease in the volume of orders completed late).

Note: The presented results are for the second half of 2007. In the first half, the start-up and stabilization of the entire planning system were still being carried out. A comparison with the years before 2007 is not possible due to the incompatibility of data (it is not possible to determine the promised date when dealing with supplies promised to a certain month).



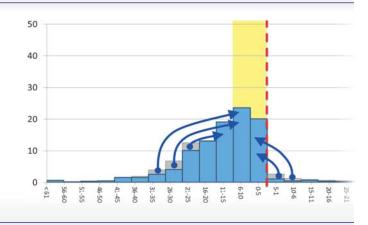
### 2008

Also, for 2008, the management of the company stated that the paramount priority is to try to further improve the due date performance of supplies. We managed to achieve this goal by succeeding to reduce the number of delayed orders to a mere 2.5%. In pursuit of this objective, however, we have not let drop our sight of the improvement of the operational efficiency, i.e., the objectives with direct economic effects.

But let's take a look at the diagram. In the background of the diagram for 2008, there is a gray silhouette of the diagram for 2007. It is clear that the volume of delayed orders dropped — we could figuratively say that compared to the previous year, we succeeded in "moving"

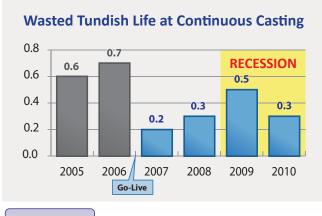
the finishing of a considerable volume of late orders before the promised date (see arrows on the right).

Similarly, the arrows on the left emphasize that the finishing of a certain volume of orders which were completed early was successfully moved closer to the promised date. We can also clearly see both, the improvement of due date performance (reduction in the volume of delayed deliveries), and a reduction of volume of orders completed early. Note that reducing the volume of orders completed early was the result of a properly configured system without us focusing specifically on this parameter.



2009 + 2010

**RECESSION PERIOD** 



Further monitoring the development of situation, we skip the years 2009 and 2010. We have a good reason for that – that period was a period of economic crisis with a significant impact on steelmakers. Of course, it had its impact on our business as well. Conditions have changed so much that it would be pointless to try to follow up on previous development and to mention the relevant diagrams here. It would be comparing the incomparable.

Even in this difficult period, we have remained faithful to the principal emphasis on due date performance. The result was an improvement of this parameter, even over the limit of 99%. This strategy has paid off for us; the fall in orders was not as deep as in other European ironworks. APS helped us in this very difficult period a great deal.

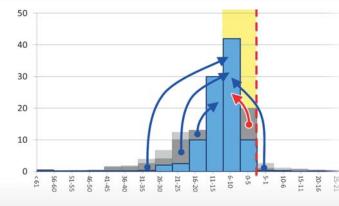
However, the priority placed on the highest possible delivery performance did not do without an impact on Operational Efficiency. Here is an example to illustrate the efficiency of tundish life utilization. Each steelworker knows that the cost of tundishes is significant, and its insufficient use significantly reflects in the economic efficiency of steel production. The Wasted Tundish Life at Continuous Casting diagram shows how we have succeeded in the first few years after the deployment of the planning system in improving the efficiency of utilization of tundishes, and thus, how we reduced losses in their usage (note: only to remind you – the planning system was launched in the first half of 2007). Nevertheless, there has been some deterioration in the previously achieved parameters in the period of crisis (even with this deterioration, the achieved values were still significantly better than those achieved in TZ before starting APS). In this case, we can see the interdependence of Operational Efficiency and Delivery Performance.

#### 2011

We got back to the normal conditions in 2011. We will, therefore, continue illustrating our journey for continuous improvement. The due date performance continues to be our paramount priority. Although we greatly accentuated this aspect, a well-adjusted system also had a positive impact on the orders completed early.

We therefore, managed to further reduce the proportion of orders finished late. As emphasized by the blue arrows in the diagram, we were also able to continue the previous trend by further moving a portion of early-finished orders closer to the promised date.

Although there was a further increase in management efficiency overall, our rigid focus on the maximum due date performance also had a partial negative impact. The red arrow indicates that a certain portion of the orders that we were finishing in the previous period in the last five days before the promised date, was finished sooner. It is a manifestation of caution; in planning aimed at maximizing due date performance, the planners realized that when dealing with orders with planned completion within the last five days before the promised date, they operate with a relatively high risk, when an order completed in time may become a delayed one because of even a small complication in its fulfillment.



### 2012

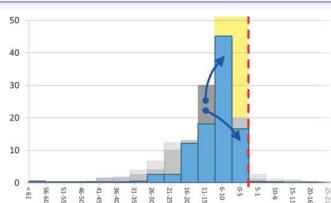
Our results for 2011 were very good. Nevertheless, we felt the opportunity to continue to improve further.

We especially saw the opportunity in maintaining a very high level of due date performance and in further increasing the share of orders completed in the last ten days before the promised date. The diagram shows that we were successful. We kept a very low level of late-finished orders. In addition, we have moved the finishing of a relatively significant part of orders which were previously finalized within 11 to 15 days before the promised date, into a time slot of the last 10 days before the promised date.

We adopted certain measures concerning the methods of planning. For example, we slightly reduced the earliness before the promised date, which we use in planning as an internal working date to which the actual finishing

of orders is aimed. As a result, we managed to increase the proportion of orders completed within the last five days (which was a parameter in the previous year 2011, with which we were not satisfied).

Note: In terms of due date performance, the outcome of this year was slightly worse than in the previous year. We might speculate that it could be a sign of the fact that we have increased the share of orders completed within the last five days and thus that we have not exposed ourselves to an increased risk that during fulfillment, some of the planned orders could move to delayed orders due to a slight shift. Surely it cannot be ruled out, but as the situation in the metallurgical enterprise is undergoing changes, and when dealing with such a small volume of delayed orders, we can hardly attribute the cause to a single effect, for example only to a particular aspect in settings of the planning system. We should verify these considerations in the following year.



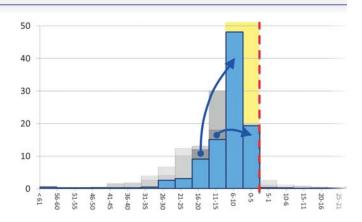
#### 2013

This time we will conclude our tour of the process of continuous improvement of utilization of the planning system in the Order Fulfillment Process with the year 2013

We achieved further success this year as well. We managed to bring due date performance, which has always been greatly accentuated, to the record level of 98.8% (we exclude the crisis years of 2009 and 2010 from the comparison). Taking it into consideration that our company is a manufacturer of specialty steel products, and that orders are quoted with accuracy in days, it is undoubtedly a very good result

Concerning the dates of finishing of orders, we were able to move a certain volume of orders completed in the previous period "11 to 20" days before the promised date, to the last 10 days before the promised date. We believe that the results of 2013 further demonstrate the increase in the efficiency of management and its utilization to meet the business objectives.

We hope that we succeeded in illustrating the value that can be obtained by continuously, gradually tuning the planning system, its utilization and by careful consdideration of all the factors that make for a true Operational



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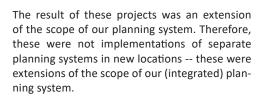
### Success is not a matter of course

Mr. Bogdan Konderla was one of the key members of the TZ team during the planning system implementation in the main plant. After deploying the system into operation, he worked as Chief Planner at the Light Section Mill, which belongs to the most challenging parts of the material flow at the main plant in Trinec. At the beginning of 2014, he was commissioned to ensure efficient operation of a new planning system at the Billet Mill in Kladno, where the local team was encountering serious problems with the ability to utilize this new system. In this article, Mr. Bogdan Konderla describes this interesting story and shares his insights with the readers.

Bogdan Konderla, Production Planning Manager, TŘINECKÉ ŽELEZÁRNY, a. s.

After implementing APS to manage the production flow in the main plant (Trinec) and its deployment in 2007, we gradually implemented two projects extending the planning system:

- 2009 Tube Mill, location: Ostrava Vitkovice
   (about 30 miles from the main plant in Trinec)
- 2013 Billet Mill, location: Kladno (about 250 miles from the main plant in Trinec)





The project at Tube Mill was carried out during the period of economic recession, in a situation when there was no excessive number of orders. Considering the short distance from the main plant, we had already sent one of the key members of the original project into the implementation team in Vitkovice at the beginning of the project. We were unable to fully appreciate the significance of this decision at that time.

Regarding the scope of effectiveness, this project was much smaller than the original project in the main plant. Still, the duration of the implementation was about one year. What caused this?

#### 1. Building a local team

The planning system of a steel company will always be a complex system. This adds considerable requirements on the abilities of the team of planners. The ideal way for planners to acquire the needed knowledge and abilities would be direct involvement in the implementation of the planning system. Thus, the team of planners has an opportunity to simultaneously familiarize itself step by step, with everything related to the planning system during the implementation.

### 2. New modifications of the existing and operational planning system

The planning system of the main plant was fairly extensive. In 2009, when we were launching the Tube Mil project, the system was already settled in and tuned well.



**Bogdan Konderla** Production Planning Manager, Trinecke zelezarny

Carrying out new modifications of an already existing and complex planning system used to be quite difficult. Finding ways to implement

When the first project in the

main plant was implemented,

we were building a complete-

ly new system, so to speak, from scratch — unlike the

extension of the planning

system for Tube Mill which

was already being carried out

with the necessity in mind

that any new modifications

of the planning system must

have no impact on the routine

operation of the base system.

new requirements into an existing and routinely operational system is demanding, and requires a great deal of precision.

Still, the project was successful. We managed to add Tube Mill into our integrated planning system without any major issues.

#### II.BILLET MILL PROJECT, KLADNO, 2013

#### COMPLETELY DIFFERENT SITUATION ON THE MARKET COMPARED TO 2009 PROJECT

In comparison to the Tube Mil, the Billet Mill project was being carried out in a completely different situation. Firstly, this was a period of a fairly high demand. The key capacities were fully loaded for 2-3 months in advance. Furthermore, organizing order fulfillment was complicated by intensive utilization of external cooperation for heat treatment. This fact increased the management difficulty on its own.

# MAJOR INCREASE IN COMPLEXITY

Considering the steel grades, the product portfolio of the billet mill belongs to the most various ones within the entire TZ. In combination with the problematic geometry of the products (cross-sections, lengths), it puts high demands on the management of suitable batches in the direction from the steel plant (continuous casting) of our main plant. The goal of the project was ensuring quality of elaborate management of the material flow; for example, similar to the one that existed in the main plant between the steel plant and the Light Section Mill, in terms of steel grades. Besides that, we were also solving some new tasks (like considering crystallizer renewals in relation to material flows in Kladno, and so forth).

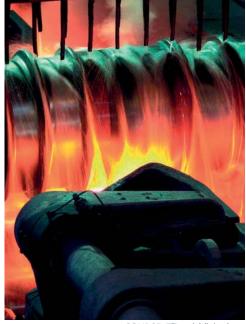


SOURCE: Třinecké železárny

As a consequence, the demands on the sophistication of the integration with the planning system of the main plant were very high. During each phase of the planning process, the planning activities of the team in Kladno are fully synchronized with the planning process of the main plant. The production process in Kladno is driven by a plan with such detailed relations to the material flow, that makes you think it has to be a direct part of the same areal and not something that is hundreds of miles away.

The above-stated also implies the high demands on material allocations. In order for the requirements put on this domain to be fulfilled, a highly efficient tool LOGIS Material Allocator was deployed.

Note: Compared to the preceding Tube Mill project: in the case of the Tube Mill, it was not necessary to ensure such detailed integration of the planning model and synchronization of the process of plan creation. The demands on the execution of material allocations were also not so high in the case of the Tube Mill—thanks to that, no special software tools needed to be deployed.



SOURCE: Třinecké železárny

However, a "bad atmosphere" emerged between the original and the new team. The original team not only did not support the work of the new team in any way, but instead, tried to make it more difficult. It began spreading information that the planning system is useless, and that it is only trouble and will never really work. The new team, that did not know the sophisticated issues of the Billet Mill in detail, could not provide sufficient information service to the sales department, or even to manufacturing. It is obvious that given the situation, active management was above the powers of the new team as well, which hence, could not enforce



# PERSONAL READINESS AND DISTANCE OF THE PLANT IN KLADNO

Personal readiness proved to be an absolutely critical difference. Due to the great distance of the Billet Mill from the main plant, we did not send any of the main plant's planners to Kladno in the beginning. For the duration of the implementation of the planning system (2013), we limited supervision of the Billet Mill project to be carried out by the main plant's team, only to checkup days and steering committees. As was seen later, this was the thing that proved to be most troublesome for us.

In order for an implementation of a planning system to result in the needed improvements, changes of processes have to take place, meaning that people have to start doing a lot of things in new ways. Still, not every team welcomes change. On the contrary, people often reject it.

It was already during preparation of the project when it became obvious that it won't be possible to implement the project with the original team of planners. We therefore agreed to create a new, special team, with which we will carry out the implementation project and which could afterwards take over the planning in the billet mill. When selecting the team members, we were looking for proactivity, and the ability to work within a team. However, most of these employees (except one of them), had no prior experience with planning and order confirmations.

plan-driven management as a base management approach.

This was the exact moment that proved to be the biggest issue of the project implementation. The local team of the Kladno plant could not get its knowledge and abilities to the needed level during the project. After the planning system was deployed to operation in the Billet Mill (beginning of 2014), it became clear that the team of planners and managers in Kladno was unable to enforce usage of the planning system as an effective tool for management. Due date performance of order fulfillment did not improve. People started making excuses, saying the planning system is unfit.

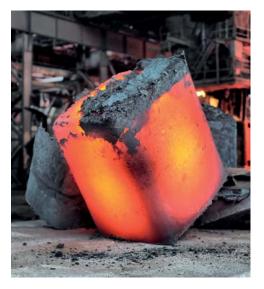
That is why we could not be happy with the results after the implementation was finished and after the planning system was deployed into routine operation (beginning of 2014). It was, therefore, decided on the level of the main plant that I will be temporarily sent out to the Billet Mill with the task of enforcing the needed changes in the management of the Billet Mill.

It was clear to me that the first step we must focus on would be to achieve a state where the plan that is the result of the planning process is feasible, and that the creation of a feasible plan will be sustainable in the long term. It would also be needed to create the conditions for continuous evaluation of the results achieved while driving management by the plan. Only then would it be possible to focus on enforcing the usage of the plan as a base tool for management.



#### A. Feasible and sustainable plan

In the first half of 2014, we focused on achieving the state when the plan is feasible, and its application in management is sustainable in the long term. This is what we did in this regard:



#### 1. Revision of the planning system

We verified the properties of the We verified the properties of the implemented system and had to state that LOGIS did a good job. The planning system did not show any flaws. All its parameters were in accordance with the specification.

#### 2. Analysis and simplification of the model

Based on the analysis, we came to the conclusion that the sustainability of the plan was complicated by the fact that the plan got into too much detail in some regards. We therefore decided to simplify the planning model in various places. We cancelled batching or scheduling on some resources. We carried out some simplifying measures regarding allocations of batches and their orders. All that, with the goal of achieving feasibility and sustainability in planning.

I would like to make the following remark here – a team without experience can easily get the impression that the more detailed the planning carried out by the planning system, the more certain the success of its operation. That is why suppliers of planning systems are often asked to additionally consider a number of detailed constraints which relate more to the issues of scheduling than of planning. However, these details are often not important for managing the main material flow, and become an unpleasant burden in the end.

#### B. The system of measuring the KPIs

The quality of management cannot be improved without quality feedback and its systematic evaluation. That is why we also dedicated time to introduce a system of measuring KPIs in the first half of 2014.

The methods of the measurements had to be built with great demands, not so that it is easy to achieve nice numbers, but so that the results of the measurements allow for finding weak spots, analyzing the causes and accepting countermeasures. The measures have to be uncompromising — that is the only way they can push us to perform better.

In order for us to be able to improve the efficiency of the internal material flows, we

introduced a number of measurements. Some of them related to the performance of the entire process (like Due Date Performance of finishing orders), others were oriented locally (for example; monitoring the performance of resources and their utilization over time, measuring volume of various unplanned operations which disrupt our plan, and so forth). We adopted a number of parameters and measurement methods from the main plant.

#### C. Enforcing plan-driven management

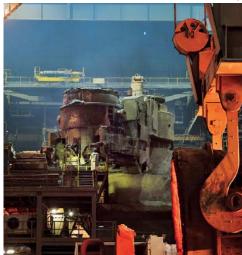
We finally could focus on enforcing plan-driven management in the second half of 2014. We started measuring Due Date Performance. Until then, it was evaluated by the "make it look good" methodology. However, as soon as we applied the methodology used by the main plant in Trinec, it became clear how bad the situation actually was in the Kladno plant. The result of the measurement of late-finished orders in the first month was 44% -- the only way I could evaluate that was calling it a catastrophe (I was used to values between 1% and 2% from the main plant). We created a team of about 15 people together with the management of the plant (workcenter leaders, technologists, planners, etc.), and we worked with them on consolidating the situation three times a week. This included education of both, the team and the operational management. We explained how a planning system works and how we have to work in order to make use of it efficiently. Of course, we were also solving operational problems in the beginning (like "the order was supposed to be supplied three months ago and it's not even rolled yet"). However, after months of work, we gradually started seeing into the future; for example, what we should watch out for this month, so that we don't delay an order that is due, say, in one month from now.

#### THE RESULTS

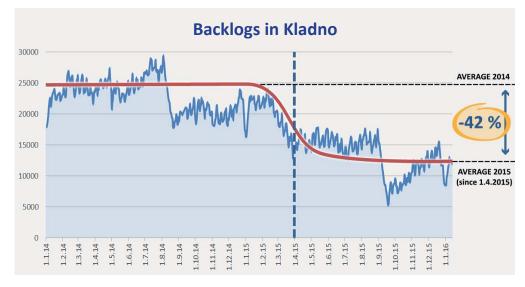
After several months, results started appearing one by one. Long-term employees expressed their belief that the production process of the Billet Mill was so complex that considering Due Date Performance, they didn't think it would be likely to achieve less than 10% of delayed orders. It would not go below that, they said. However, what proved to be possible in the end, exceeded these estimates by far.

The results of our efforts can be seen on the chart. In the second half of 2015, the average share of delayed orders was on the level of 2% (therefore, from another point of view — Due Date Performance = 98%).

Note: The negative results at the beginning of 2015, which broke the preceding trend, did not relate to the planning system, but to internal personal problems – at that time, we had really serious issues ensuring the needed workers for our straightening presses.



We can be happy about the results. Still, I would like to mention one more thing, without which it would be difficult to imagine any nice ending. That is management support. Whether it was cooperation with the management of the Billet Mill or the

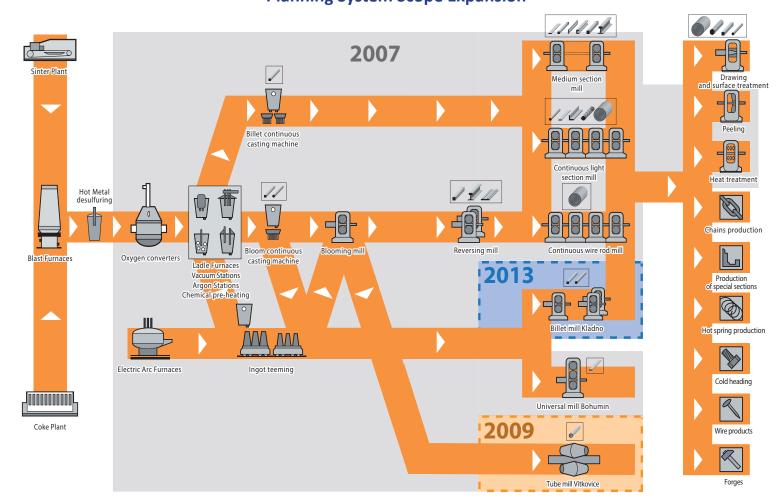


TZ is focused on high Due Date Performance of order fulfillment in the long term and it is a priority goal for the company. However, that doesn't mean that we will fulfill this goal at the cost of the economic goals. For example, I can illustrate that by lowering the volume of WIP inventory on the treatment plant. Considering this, I would also like to point out that I consider April 1, 2015 the "start date", following which, we can say that all the principles of management of logistics of the plant were enforced already and also that the problems related to staffing our presses were gone. If I compare the average WIP volume for 2015 (period April 1 – Dec 31, 2015) to the average for 2014, I find out that there's been a decrease of WIP volume by 42%.

support we received from the main plant (especially from the production manager and from the chief of production planning), it definitely had a major effect on the success of our efforts.

The project in Kladno demonstrated that when dealing with demanding projects like this one, it is needed to dedicate especially strong attention to working with the teams. The assumption, that the planning technologies have proven repeatedly themselves already, that there's no danger, and that success is guaranteed, is simply not true.

### **Planning System Scope Expansion**



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# Additional information on project achievements

A new planning system focused on efficient management of the Order Fulfillment process was deployed into routine operation in TZ in 2007. More detailed information regarding the project implementation and the first period after deployment can be found for example in LOGIS News, June 2009. For the purposes of this article, we decided to choose information regarding the first results achieved within the first two years, thanks to deploying the APS system. This look back, thematically adds to the information about the improvements achieved in TZ, thanks to the planning system – the focus of this issue.

An implementation of a new planning system, based on advanced planning technologies (APS) took place in 2005 and 2006, with the goal of supporting the corporate strategy of TZ. The planning sys-

3500

3000

2000

1500

1000

500

We must say that the achieved results not only fulfilled the expectations, they even exceeded them. There was an especially significant improvement of customer Due Date Performance, despite the

Late Orders at the End of Month

(2007-2008)

anth

Annual averages

Monthly values

tem was deployed into operation during the first months of 2007.

During the first months of the system operation, the teams in TZ focused on the tuning of the system and its stabilization. Introducing new management methods was tightly linked to changing the related processes. This was a major change: a shift from the focus on achieving the maximum production volume to the focus on customer satisfaction (and therefore, to proper fulfillment of orders of the customers). Of course, that did not take place without changes in the behavior of people - many employees had to change their existing working practices and workflows, they had to accept changes, and change their thinking. And that is no easy task.

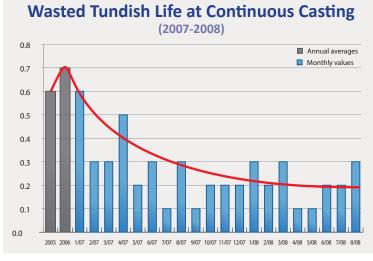
The works on deploying the APS into operation were declared to be completed in about half of 2007 and it was time to start evaluating how the expectations that the company put on the planning system were being fulfilled.

fact that the company was going through the change of quoting the delivery dates of customer orders with a one-month precision to a one-day precision. This makes the results we see on the chart command even more respect.

Although customer Due Date Performance was the main priority, it didn't mean that the high level of customer satisfaction was achieved at the price of lowered economic efficiency. The economy of utilizing tundish life at the steel plant is a good example of that. Considering the variability of the assortment TZ is working with (around 1.000 steel grades), it is especially challenging to achieve the best possible utilization of tundish life. However, the second diagram shows that there was also a significant decrease in the insufficient utilization of tundish life.

Besides the stated results, the ability to move the finishing of orders closer to the needed date of finishing became already obvious during the first period after deploying the planning system. More detailed information on this topic and in much longer time horizon can be seen on page 3 of this issue of LOGIS News, so we won't include it here again.

The results achieved in the TZ project were so attractive to an independent consulting company (Deloitte) which was carrying out other works in TZ at that time, that it decided to nominate the project in a worldwide prestigious contest, in which the nominated project succeeded (see the diploma and the commentary on this page).







### **A Prestigious Award**

As the only European project from the manufacturing category, the Project "Advanced Planning of Metallurgic Production in Třinecké Železárny, a.s." became the "Laureate" of the Computerworld Honors Program for 2007 (Washington, D.C., 4. 6. 2007).

### The Computerworld Honors Program Honoring those who use Information Technology to benefit society

LOCATION:

ORGANIZATION: Trinecke Zelezarny a.s.

YEAR:

PROJECT NAME:

2007 STATUS:

Advanced planning of metallurgic production in

Trinecke zelezarny a.s

CATEGORY: Manufacturing

NOMINATING COMPANY:

Short Summary
The company realized a project of advanced planning in a demanding environment of a metallurgic company with an outstanding variability in the parameters of final products (up to several hundred thousand) and multilevel mode of production.
The planning deals with the orders for finished goods, where the number of

combinations of demanded parameters reaches several hundred thousand, orders for multistage production of intermediate products as well as the production of liquid steel and its continuous casting. At the same time the order requirements with the volume from several tons to thousand of tons are lined to melts of 180 tons in sequences for continuous casting of steel so that they are chemically compatible and utilizable. The planning system manage all the material and production capacities in the process of the different cycles of production with taking into account the chemical composition and other properties given the demands of customers.

A project of planning production of such a comprehensiveness is unprecedented in

A project of planning production of such a comprehensiveness is unprecedented in Europe.

