LOGIS
PLANNING FOR EFFICIENCY

News

MAY 2014

New Generation Planning
at steelworks of
TIMKENSTEEL

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TimkenSteel On-Time Reliability Improvements Help Drive Higher Customer Delivery Performance

In January 2011, TimkenSteel registered on-time delivery performance results around 50 percent. Two years later, those results are now above 90 percent. The LOGIS Company, with our new generation planning project, helped TimkenSteel achieve these dramatic results for TimkenSteel customers worldwide.

TimkenSteel, a global industrial technology leader that engineers high-performance steel, sought an innovative planning system.

The TimkenSteel business produces custom alloy steels that are recognized among the highest quality, highest performing air-melted products in the form of specialty bar, seamless tubing, value-add components, billets and bottom-poured ingots. You find TimkenSteel in bearing races and rolling elements, heavyweight drill pipe, drill bits and collars, stator tubes, wind energy gears and shafts, axles, crankshafts and connecting rods and much more.

William P. Bryan

Executive Vice President, Supply Chain & IT, TimkenSteel

TimkenSteel customers – working in prestigious fields of expertise such as aerospace, automotive, energy, mining and rail – have a common denominator. They are under growing competitive pressure – and not just in terms of technical quality. Recently, TimkenSteel saw increased pressure on customer delivery performance, particularly on-time reliability and delivery speed. In order for TimkenSteel customers to improve their performance, they must work with their suppliers to improve how reliably and quickly they can fill orders.

How can TimkenSteel achieve this for its customers? Not by taking a "let us have everything ready and on stock" approach. That's something no manufacturer of engineered steel can afford.

Such projects are not new to TimkenSteel. The company's Steel business worked in the early 1990s on advanced planning system efforts to increase operational excellence using emerging advanced planning software. The project produced good results, including a significant increase in volume, reduction in inventory days, decrease in cycle times and improvements in on-time delivery.

Yet, over time, the need for an updated solution for TimkenSteel emerged. Because of the successful run of the first LOGIS solution, TimkenSteel wanted a solution that offered similar longevity. Working with LOGIS, TimkenSteel completely redesigned its production planning system.

The result? While the TimkenSteel on-time delivery number of more than 90 percent speaks for itself, LOGIS has just started. Our mission for higher customer delivery performance continues. We have only passed the first stage. Our work continues to improve operational excellence. Most importantly, we do not feel the constraints of the software or supplier as we continue helping TimkenSteel make the world more productive by improving the efficiency of the machinery that keeps industry in motion.

"At TimkenSteel, we remain focused on our customer service model so our on-time delivery numbers will remain at record high levels and our lead times will keep meeting customer expectations," said Bill Bryan, TimkenSteel vice president – Steel supply chain and economics. "This is where LOGIS continues to help us deliver high performance and give our customers peace of mind."

Source: TimkenSteel

TimkenSteel believes that improving the reliability and speed of the production process is the answer. If TimkenSteel focuses on this while trying to achieve the most favorable costs at the same time, they can then talk about improving operational excellence and, ultimately, management efficiency.

FOCUS OF THIS ISSUE:

New Generation Advanced Planning era started

I am very pleased that we can introduce this new issue of LOGIS News to you. It is again dedicated to the topic of Advanced Production Planning and the project, which was implemented in TimkenSteel (USA).

The so-called Advanced Planning has fairly deep roots in TimkenSteel. That is why we met a very experienced team there. Already the early nineties were marked the stellar beginning of i2 Technologies, now a legend in the area of Advanced Planning and Scheduling and Supply Chain Management. Its first historically successful product, i2 Factory Planner was developed and first deployed in the very same TimkenSteel.

Now, twenty years later, the people in TimkenSteel decided to build a new generation planning system. They did not let themselves limit by anything while formulating their requirements and wishes. They did not let themselves limit by what is available in the market, they did not let themselves get stopped by arguments such as "nobody has ever seen it anywhere, is it even possible?" It was a challenge for us. We prepared suggestions for TimkenSteel and placed in them the best that we could offer. Never before have we offered something so ambitious. We will also never cease to appreciate the confidence that we enjoyed when TimkenSteel entrusted us with the project implementation.

The existing cooperation on the project that bears the name New Generation Planning was a great experience. The implementation of the project was everything except easy. It was just the opposite. But the fact that we met with people who understand their work, are focused on the good result, do not see enemies in their suppliers, and are willing to work really hard - all this gave the project wings and together we managed to successfully navigate through all the pitfalls. We owe a compliment to all the TimkenSteel team members, and want to thank them for a wonderful experience, which this project was to us.

Twenty years ago, TimkenSteel started the era of Advanced Planning and Scheduling in the world of steel producers. Now it is TimkenSteel again that launched its new generation.

Dalibor Konvička
Chairman of the Board,
LOGIS

The Story

The story of our way to the New Generation Planning Project: why we decided on a new planning system, how we searched for a partner, what our initial expectations were, by what initial steps did we get all the way to the New Generation Planning Project.

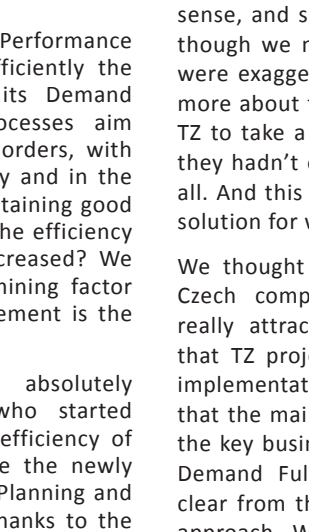
William P. Bryan, Executive Vice President, Supply Chain & IT, TimkenSteel
Ronald K. Host, Manager, Demand Planning and Fulfillment, TimkenSteel
William J. Kerr, Project Manager, Supply Chain Systems, TimkenSteel

THE AMBITION OF TIMKENSTEEL: A HIGH LEVEL OF CUSTOMER DELIVERY PERFORMANCE

TimkenSteel is a producer of specialty steel, whose quality is extraordinary. This quality is based on the long-term efforts of TimkenSteel, whose team works on the continuous development of know-how, and on making TimkenSteel able to offer additional, even higher quality goods.

TimkenSteel supplies its steel to businesses which operate in a highly competitive environment. The speed, reliability and efficiency of supply chains in such environments significantly influences the competitiveness of all participants.

TimkenSteel is therefore very well aware that besides the technical quality of its products, one of the value-added factors it can offer to its clients is the ability to supply its products with a high level of on-time reliability, with quick and flexible responses, and also with good information service (taken together we speak about Customer Delivery Performance). This is why TimkenSteel is systematically working on improving its Customer Delivery Performance, in addition to its efforts in the development of quality products.



Ronald K. Host

Manager, Demand Planning and Fulfillment, TimkenSteel

THE PATH TO MEETING THE OBJECTIVES

The level of Customer Delivery Performance depends, above all, on how efficiently the company is able to manage its Demand Fulfillment Process. These processes aim to satisfy the most demanding orders, with a high level of on-time reliability and in the shortest time period, while maintaining good economic efficiency. How can the efficiency of managing such a process be increased? We have long known that a determining factor for the level of efficient management is the quality of planning.

TimkenSteel is probably the absolutely first manufacturer of steel who started using software to increase the efficiency of planning, as it helped to create the newly emerging category of Advanced Planning and Scheduling, in the early 90s. Thanks to the project of those days, we achieved significant improvements (significant increase in volume, reduction in inventory days, reduction in cycle times, improvements in on-time delivery). Therefore, we are convinced that quality production planning is a key factor in increasing the efficiency of the Demand Fulfillment Process.

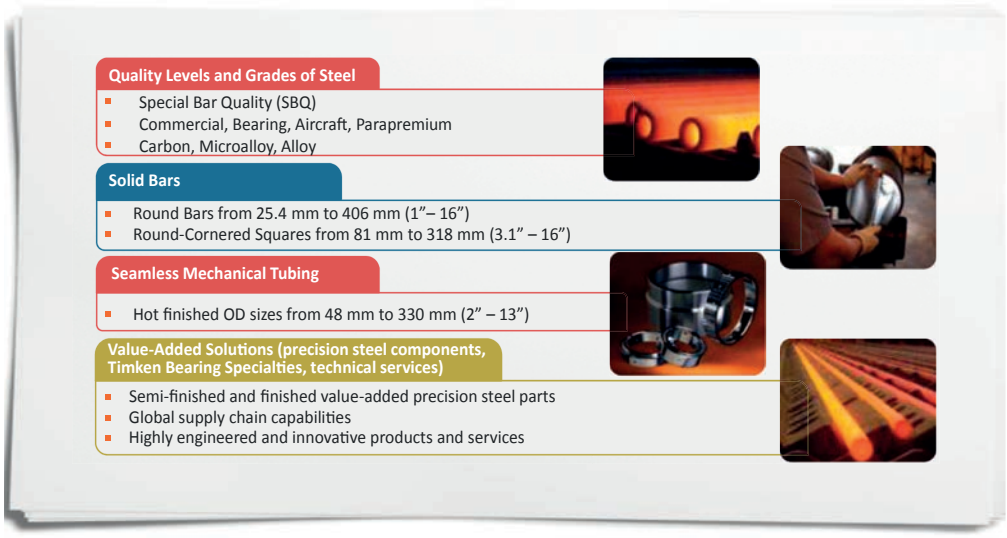
In spite of the very interesting results of the original project, we discovered, after some time, that we weren't able to sufficiently develop the efficiency of our planning system. All the while, market demands were growing every year, and we weren't able to adequately increase the capability of our planning system. The need for improvement grew until it was finally clear that the system of the early 90s was unbearably restrictive, and that the time had come for a new cycle of innovation.

SELECTING A PARTNER

We were actually looking for a partner for several years. We travelled the world and saw a number of planning systems. Some of them were even very interesting. But even the most interesting had us run into a BUT. And because we realized that we were looking for a partner on whose solution we will want to build for a number of years, we said that such a solution shouldn't have any fundamental BUT; it shouldn't be a compromise from the start.

Then, at an industry conference, we heard a report from the TZ (Trinecke Zelezarny, steel producer, Czech Republic) advanced planning project that TZ had implemented with LOGIS company. We listened with considerable incredulity; it seemed to us that the results of the planning project that TZ claims were so unbelievable that they just couldn't be true. All of what they said, however, made sense, and so we said to ourselves that even though we might find that the people at TZ were exaggerating, it will be fruitful to learn more about their project. So, we travelled to TZ to take a look. The results impressed us; they hadn't exaggerated about the project at all. And this was the first time we had seen a solution for which we could not find any BUT.

We thought about it. The results that the Czech company LOGIS had attained were really attractive. We really liked the fact that TZ project was not just some technical implementation of planning software, but that the main focus of the project was in fact the key business processes (Planning Process, Demand Fulfillment Process) -- and it was clear from the results that this was the right approach. Was it even possible, however, that TimkenSteel, a US company, would actually use a supplier all the way from the Czech Republic for innovation of its planning system? Would we find common ground? We decided we would look them over. We invited people from LOGIS to visit us, and presented them with our current state and where our interests lie.



TimkenSteel Products Overview
Source: TimkenSteel

We openly stated that the results of our current planning had been an unstable, but at least partially sufficient quality plan that only covered a short planning horizon. For correct order processing, a quality long-term plan was needed. In addition, our process was burdened by the very manually intensive planning of critically overloaded work centers, and we weren't able to organize a team of planners in such a way that they work efficiently. But we considered customer delivery performance to be of the utmost importance, and dreamed of having delivery reliability of 90% or higher, while not negatively affecting other key performance indicators like asset utilization and inventory control.

EXPECTATIONS AT THE STARTING LINE

We found that we understood each other well during the discussions. The people at LOGIS were quickly able to name the causes of why we weren't able to plan in a better and more efficient way. We agreed with their conclusions. Together we formulated some main points and opportunities for increasing the performance of the planning process, which later became the basic requirements for our new Production Planning System. They were the following:

1. Don't Ignore any significant constraint while Planning

If any significant constraint isn't taken into consideration during planning, it will significantly limit the quality of the plan. We knew that the key constraints had been especially capacity, campaign management and heat formation (due to the sizeable heterogeneity of the chemical composition of our steel). Our current planning software didn't especially support our work with campaigns and was practically blind to the chemical composition of steel.

TimkenSteel is the producer of specialty steel; its production includes over 500 steel grades, which vary in their chemical composition. The chemical composition of steel, therefore, plays a key role during formulating a plan for melting and casting. And if the plan for melting and casting wasn't incorporated when formulating the production plan, the plan wasn't useable without very extensive additional manual operations by the planners.

2. Create Conditions for Team Planning

In the article named „Why Team Planning is Essential", found in this issue, colleague Bill Kerr explains the reasons why we believe that for a complex metallurgical plant with a closed production loop, one planner isn't enough, and why we need to work with a team of planners.

If we are to work with a team, it is important to create conditions, such that the team can attain better results as a whole. This sentence sounds self-evident. So, it can sound all the more surprising that, at least according to our findings, existing planning software products practically didn't address this aspect at all. This was a serious problem for planning.

Because the issue of effective support for team planning hasn't yet been addressed much (maybe due to that fact that there hasn't been any striking solution offered), we dedicate a few extra lines to explaining this topic.

The first point worth considering is called unsolved conflicts between the planning actions of various planners.

We feel that the makers of earlier planning software products supposed that as long as their planning software enabled so-called multi-user connecting (which can be attained fairly easily as long as their software architecture is client/server), and an arbitrary number of currently connected/working planners can then engage in the creation of the plan, that their team work support is sufficient. When manufacturing process steps are closely connected, as in metals plants, it can easily happen that if one planner undertakes some planning action in the interest of addressing some situation, another planner can later perform a different planning action, which cancels the decision of the first planner, unknown to both. In cases where the importance of the first measure was high, this can lead to lowering the value of the plan. The first planner, who was convinced that he performed necessary measures for treating a certain situation, was unpleasantly surprised that after completing planning, the resulting plan didn't contain the measures that he implemented. The level of resulting nervousness on the part of the planning team can be understood. Although we tried various types of organizational measures, we didn't manage to resolve this problem.

Unresolved conflicts between the planning actions of various planners mutually complicated the possibility of developing a quality plan. We couldn't imagine designing a new planning system that would be burdened by this unpleasant shortcoming. What we had hoped for, however, was to have a planning

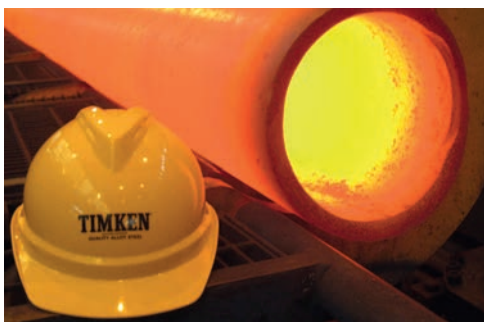
environment at our disposal, in which any eventual conflicts among planning actions are identified and resolved systematically.

The second point we'd like to mention is **efficient support for the management of the planning team** (support of the Chief Planner's managing role). As with all teams, the team of planners must be manageable. It is important that the one to whom the management was entrusted (typically the Chief Planner), can effectively organize the team's work, and also direct and evaluate the work of individual members. If the basic tool of planners is planning software, then the requirement for the planning software to also provide effective support for managing a team of planners is a key requirement.

3. Providing Each Planner with a Highly Effective Planning Environment

Another significant requirement of ours was that each Planner had a work environment at their disposal that enabled them to work truly effectively. As with the preceding point, many things can obviously be imagined here. Everyone will probably immediately think of a high level of automation. Yes, automation is important, but it's not all. Let's have a short look at two more examples.

The first relates to how strenuous and complicated it is for the Planner to get the necessary information to resolve a certain problem, e.g. how many times he'll have to click, how many screens to pass, how lucid the provided information is, etc. It means that the planning software must be designed for a specific industry (otherwise it would be necessary to pay taxes for universality in the form of less comfortable controls and lucidity). It should also be highly configurable, in order to satisfy the individual needs of planners.



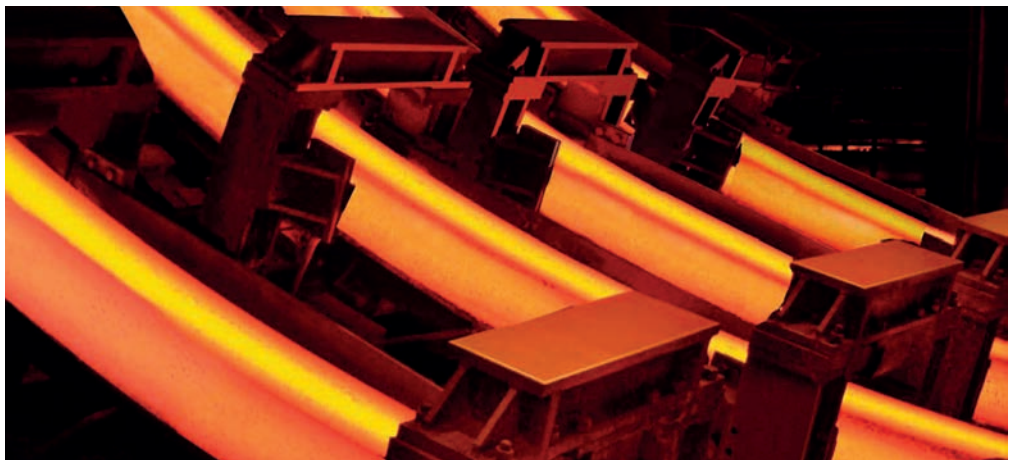
Source: TimkenSteel

The second example relates to the effective support of what-if. If Planners wish to attain the best results, they can't avoid what-if analysis. Planning software generally reacts to manual planning action by automatic recalculation of plan details in order to ensure feasibility of the plan (e.g. after a manual change of the time allotted to performing certain operation, automatic recalculation by the planning software is done so that the times of preceding and the subsequent related operations are modified, respectively recalculating the whole network of operations) This is definitely a very valuable function that cannot be avoided during planning. However, even this initially inconsequential Planning action can cause changes to hundreds and thousands of details of the plan. If a planner would at that point wish to return to the state before the planning action, whether to try an alternative, or e.g. because of a "goof", it isn't within the means of the planner to manually reinstate the original plan. That is why we suppose that what-if planning actions require functional support, similar to the MS Office UNDO function.

PILOT PROJECT

We had a good feeling about the results of our familiarization activities. The people of LOGIS didn't speak about their software, but about how the planning process should look. We got the impression that the LOGIS team had a good understanding of our problems. We therefore agreed that we would try choosing some part of the overall solution and conduct a pilot project. As was mentioned above, our planning system was blind to the chemical

Source: TimkenSteel



composition of steel. We felt that it was a serious deficiency. Planning and scheduling for the metallurgic plant (and thereby especially planning of melting and casting) was probably the weakest link of our planning process. We decided that we would, therefore, focus a pilot project on that area.

The pilot project focused on melt-shop planning and scheduling was planned for 7 months. The project culminated on time and its results were very positive. The tool LOGIS Caster Scheduler proved to be very effective technology; an automatically generated plan for heats in a period lasting 9 months requires about 1-2 minutes (about 10,000 orders, 500+ brands of steel), while it isn't necessary to manually adjust the resulting plan much at all. Configuring the schedule for the plant for a period of one month is also comparably rapid and of high quality. We were wholly satisfied. We found that the results of the work of LOGIS that we had seen at TZ, wasn't a mere coincidence.

The Pilot project proved to be very important for our coming cooperation with LOGIS. This wasn't only due to the fact that its result truly and significantly increased the quality of our planning, but also because we could see how well we cooperated with the LOGIS team. Time spent on teamwork during our 7 month project enabled the LOGIS team to do a very good job of familiarizing themselves with the whole Demand Fulfillment Process at our company, and to understand our situation and our needs much better. It was also important for the success of our coming teamwork.

NEW GENERATION PLANNING PROJECT

The Pilot project finished as a total success; we decided that we would therefore continue with the innovation of our Production Planning process to the full extent. We decided to call the project **"New Generation Planning"**. This was because it was the first major innovation of our planning system in twenty years, and because we expected that, during its course, key new technologies that amount to milestones in the world Advanced Planning and Scheduling would be implemented.

You can learn of the results of this new project in other articles of this issue.

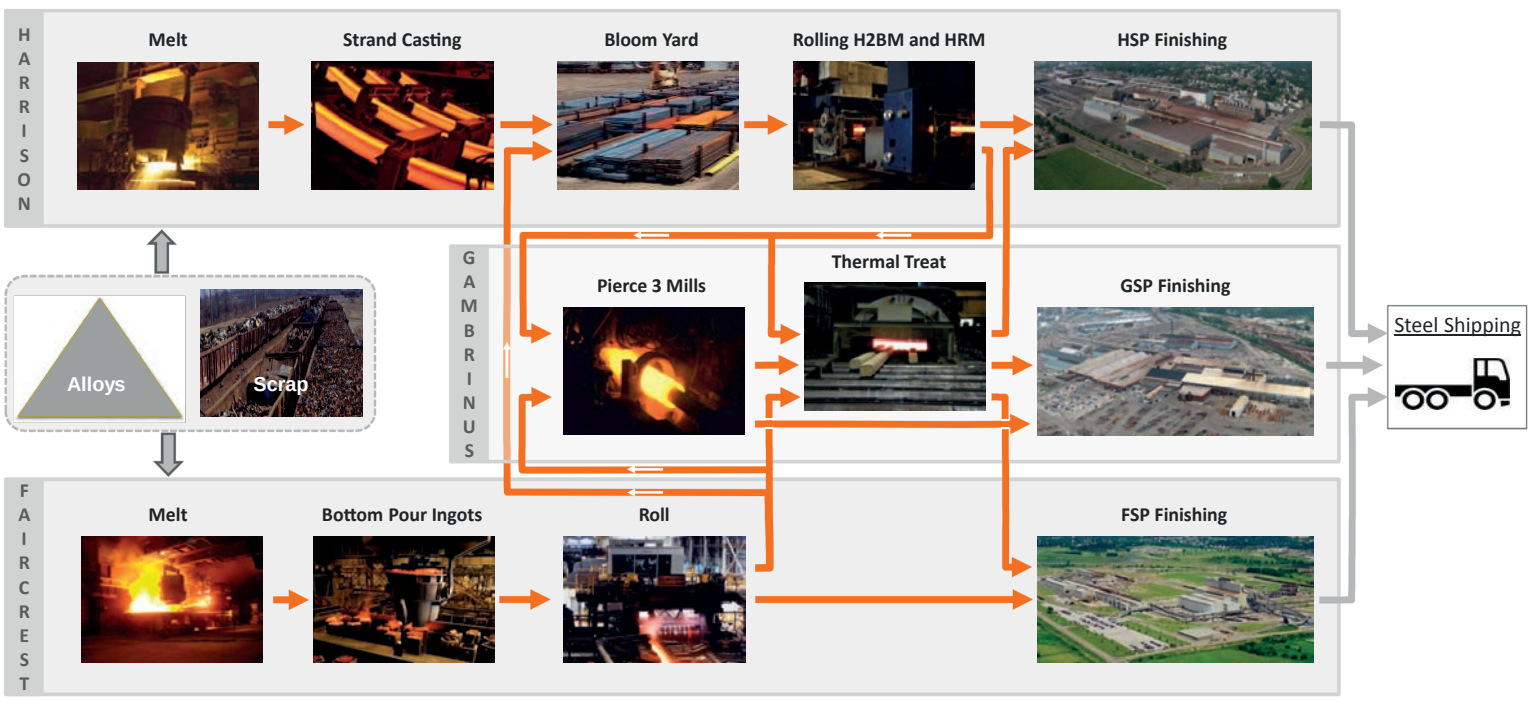
The realization of the New Generation Planning project is among the great experiences of our professional lives. The result has been not only a valuable and highly efficient planning process, but also the feeling of pride that we achieved it together.

Project Scope

William J. Kerr, Project Manager,
Supply Chain Systems, TimkenSteel

The Project Scope includes all production units (see diagram) in the localities of Harrison, Gambrinus and Faircrest.

From the viewpoint of the scope of modelled constraints, the following main sources of constraints are taken into account and harmonized in the process of planning: campaigns, capacity, inventory, and heats. In addition to that, some other specific limitations (e.g. batches for Thermal Treatment) are taken into consideration at many work centers.



SCOPE SPECIFICATION DOCUMENT

The Project Scope Specification has been processed in the document "Scope Specification – New Generation Planning at Timken". The first version of the document was completed before initiating the project. This document became the key document for realizing the project and was a part of the contractual agreement.

The Project Scope Specification describes the basic logic of a projected planning process. More in detail are described processes and constraints related to those processes. Deliverables are described at the level of the properties of processes and the functional features that the planning software must offer (in order to decide whether the given item was completed in the scope of the project's work or not).

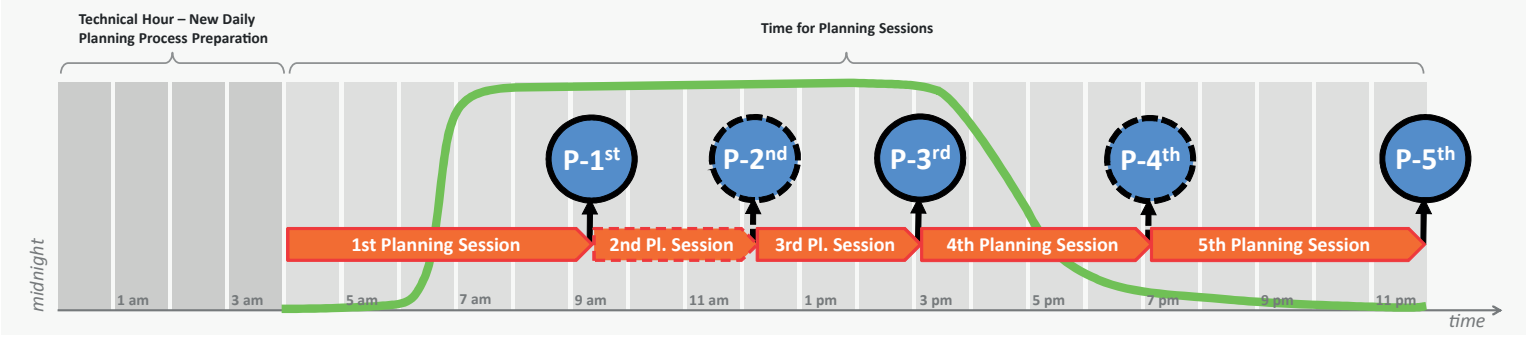
The Project Scope Specification isn't, however, an absolutely detailed specification describing all the details of the solution and design of the planning software (design of the screen, detailed description of functions, description of the data model, description of the planning model, user script, …), so it isn't so detailed a specification as to limit the implementation to the technical realization. Fine tuning is done during the project this way. Otherwise, we doubt that it would be possible to prepare a truly detailed proposal before initiating implementation.

It can happen that during a project a new possibility or new needs arise and the contractual parties agree on appropriate changes to the project. Such situations have also arisen in our case. We resolved them using addendums to the contract, while the basis of such contractual documents was always the updated Scope Specification document. So even during the course of work the Scope Specification document was updated and amended so as to reflect the current situation. It should be noted that the changes never aimed at the reduction of the project objectives, but rather raised project ambitions.

Daily Planning Process

Ronald L. Gill, Supply Chain Manager, TimkenSteel

The production planning process allows continuous activity of production planners every day of the week. Planners are solving different production planning challenges every day so every planning day is unique, but there are also activities that are processed regularly – thanks to this each planning day unfolds within a specific process called the Daily Planning Process.



Daily Planning Process

AUTOMATIC DAILY PLANNING PREPARATION

Complete Refresh of Input Data

Most order and work-center related data are maintained in TimkenSteel information systems that are external to the production planning system. This data required for the production planning process are prepared and provided to the planning system automatically early in the morning. A complete morning input data refresh assures that at least once per day latest status of data is provided to the planning system.

Internal Closed Loop

A specific part of the input data is maintained only within the production planning system utilizing an internal closed loop. The loading process combines both external and internal input data and assures their consistency.

Initial Plan

During the startup procedure, the planning model for the TimkenSteel production plant is generated and the initial plan for each customer order is processed. A significant part of the production plan from the previous planning day is restored in the morning initial plan. This is related especially to work-center unavailability calendars, production campaign plans and order plans in short and mid time horizons. The goal is to maintain production plan stability in the area where order book is relatively stable and not to lose any production planner effort from previous days. The initial plan is replicated for each planning domain and the production planning tool is ready for the planners.

PLANNING SESSIONS

Planning activities are grouped in so-called Production Planning Sessions, during which both automatic and manual planning activities may take place with the purpose of creating a new version of the plan. The scheme illustrates the development of Planning Sessions during a regular daily Production Planning Process.

Production planners have their Planning Environment (or Planning System) available as they come into the office in the morning. They start to prepare the plan during the first planning session of the day. Planners evaluate the situation on assigned work-centers and provide necessary corrections to the plan. They focus on the short time horizon in the morning to solve deviations between the plan and reality on the shop floor, modify campaign plans and unavailability calendars, as those are important constraints that should be propagated to other domains early. Planners also focus on formation of an accurate definition of melt shop demand, especially on rolling and piercing mills.

During Planning Sessions, the Planning System is not isolated from its environment. All data of the Planning System are continuously updated from outside during Planning Sessions, so that it's possible to respond to situation changes as quickly as possible. On the other hand, if needed, some data may be propagated out of the system (for example should the dispatch list based on HRM schedule need immediate propagation to shop floor, then propagation of specific data based on the immediate requirement is also available).

The first planning session takes place in the morning and is typically finalized between 9 -10 am.

Plans and other output data from the production planning process are automatically saved as part of finalization at the end of each planning session. After finishing the Planning Session, the stored data is available for distribution and usage, and production planners may continue with their planning activities, thus working on a next version of the plan.

The Chief Planner usually organizes two (but if necessary more) planning sessions during the working hours. If needed, however, a planning session may be scheduled by Chief Planner based on the actual requirements.

COMMENTS TO THE SCHEME

The Daily Planning Process figure shows a example of daily planning timeline. Between midnight and 4 am, technical data is prepared for use by the planning system. This includes new orders, recent production activity, and current inventory positions.

The first planning sessions is available from early in the morning, and the focus is on the near to intermediate term. The first plan (see P-1st) is usually finished between 9 and 10 am.

In case an unusual need to react to some event arises, an additional new plan version may be created (see plan example P-2nd).

In case there wasn't such an unusual need, then after the first plan (in the morning) the next plan version is usually created around 3 and 4 pm (see P-3rd).

Also during the afternoon, while Chief Planner is not usually available anymore, it is possible to react to possible events by creating one or more new plan versions (see example P-4th).

Anyway, before the technical hours begin, a closing version of the daily plan is fully automatically generated (see P-5th), that reacts to the data obtained by the planning system during the last planning session from the neighbor systems and to possible interventions carried out by the planners at that time.

The green line indicates the typical level of planner's activities intensity over the course of the day.

Demand Fulfillment Planning

Ronald L. Gill, Supply Chain Manager, TimkenSteel
Zbynek Ondryas, Senior Solution Architect, LOGIS

We focus on the management of the Demand Fulfillment Process. Because of that, we call the related planning activities Demand Fulfillment Planning. Since these are long names, in the following text we'll use simply Planning, Planning Process, Planning System and so forth, assuming the context makes it clear they're related to Demand Fulfillment Planning.

Demand Fulfillment Process basic goals are to assure that:

- Promises given to customers are reliable and meet the company strategy
- As soon as promises to customers are given the best possible way of realizing the order is continuously evaluated till the time when order is completely fulfilled

In that sense Demand Fulfillment Process focuses on finding answers to three important questions:

1. Does the demand meet the company strategy declared for sales activities? And what is the reliable shipment date for the request from customer?
   (Order Promising)
2. Is it possible to satisfy the demands of the order or some part of it using unassigned inventory?
   (Material Allocation)
3. What manufacturing operations must be carried out, and when, such that the best possible result is achieved, both in terms of on-time delivery and manufacturing cost?
   (Production Planning and Scheduling).

ORDER PROMISING

Each customer order must be evaluated in the order promising process. This evaluation starts at the moment when technological preparation of the order is finished. Order promising team verifies that received order is consistent with sales and manufacturing directions declared by company. Those directions are enforced by reservation of production capacities for specific business segments or even customers (sales reservations).

The second important task for order promising team is verification of reliability of shipment date requested by customer and proposal of realistic promise date in case requested date is not feasible. Available sales reservations and especially current production plan and inventory availability are utilized for assignment of reliable promise date for an order.

The third important task for order promising team is related to evaluation of order impact on production costs. This evaluation focuses especially on costs related to melt shop production and to order processing in production campaigns on rolling, piercing and thermal treatment operations.

Customer order that successfully completes all steps of order promising workflow is confirmed to the customer and enters the regular daily production planning process.

For more details about Order Promising process, see page 12.

MATERIAL ALLOCATION

Most of the material at TimkenSteel is produced for specific orders and only a relatively small part is produced for forecasted demand from an internal customer to significantly cut production lead times. But it is not always possible to combine orders into full heats, so stock is produced and waits for allocation to future orders. The material allocation process is also used to verify the properties of material that was produced in the melt shop for a specific order, and to confirm the order/material association.

The material allocation process at TimkenSteel is split into several working areas. Each working area has specific logic for evaluating the potential of possible order/material association. Material allocation in most cases fully considers the requirements of an order for material, and weight tolerance is also considered.

All significant order requirements for material like order specific chemistry, test requirements, dimension and quality requirements are considered while available material is evaluated. Each proposed allocation has to be approved prior to its utilization for an order in the production process.

Material allocation to a specific order is immediately propagated to shop floor systems to allow material processing, and it is also propagated back to production planning to influence the production plan for an order so that only operations downstream of the allocation position are planned.

PRODUCTION PLANNING AND SCHEDULING

Orders not fully satisfied by stock applied in the material allocation process enter the melt shop planning and scheduling process. Proper grouping of orders with compatible characteristics into heats and their sequencing on casters and bottom pouring stands is a very important aspect of the production plan at TIMKEN. It is so important that a specific process for melt shop planning and scheduling was established. The initial plan for melt shop work-centers is prepared as a part of production planning activities. The goal is rough evaluation of available melt shop capacities and detailed evaluation of downstream operations constraints to determine accurate melt shop requirements. Melt shop requirements based on the production plan are processed in detail in a tool specialized for melt shop planning and scheduling. The melt shop plan is organized into several planning horizons. Long term horizon orders are grouped into heats based on predefined rules and order requirements. Those heats are released on the next planning day and generated again, as it is a completely automated process (no manual efforts are lost) and situation within the long term horizon is very dynamic. Planned heats are preserved, and additional orders are added to unallocated material from a heat in the mid-term horizon. Planners are primarily focused on this horizon, where an executable melt shop plan and schedule is generated. The melt plan and casting schedule are locked in the short term horizon. Melt shop production is prepared and managed based on this plan and schedule.

There are three basic constraint resources at TimkenSteel plant that must be primarily considered during daily production planning:

- Heats, routings and the casting sequence in the melt shop
- Finite production capacities and availability of scheduled units
- Production campaign constraints on important work-centers

Although the melt shop plan and schedule was prepared while considering production plan requirements, it is still probable that in some aspects there might be contradictions with the production plan. Therefore the melt shop plan has to be reconciled with the current production plan during Planning sessions, and those plans have to be synchronized with the goals of customer delivery performance, asset utilization, and inventory control. During planning, the quality of plans and schedules is further improved by taking more constraint sources into account (e.g. order batching for thermal treatment, cell dependencies, etc.).

EVERYDAY ORDER LIFECYCLE IN THE PLANNING SYSTEM

The manufacturing order is not evaluated just once at some specific time but continuously during the daily planning process. In this way we ensure immediate response to all changes that have an impact on the order plan and related schedules.

The ongoing situation changes (order load, capacity availability and many other) require response in the form of new planning measures. On the level of Production Planning, new planning activities will be carried out and new synchronization of all requirements and constraints will take place, the result of which are new versions of plans and schedules.

A part of the daily planning process is also material allocation, since it may happen, that a change occurred in unassigned inventory, that may satisfy some order whose production we've planned so far from the melt shop– the production (or some part of it) therefore won't need to be realized and the freed resources can be made available for other orders.

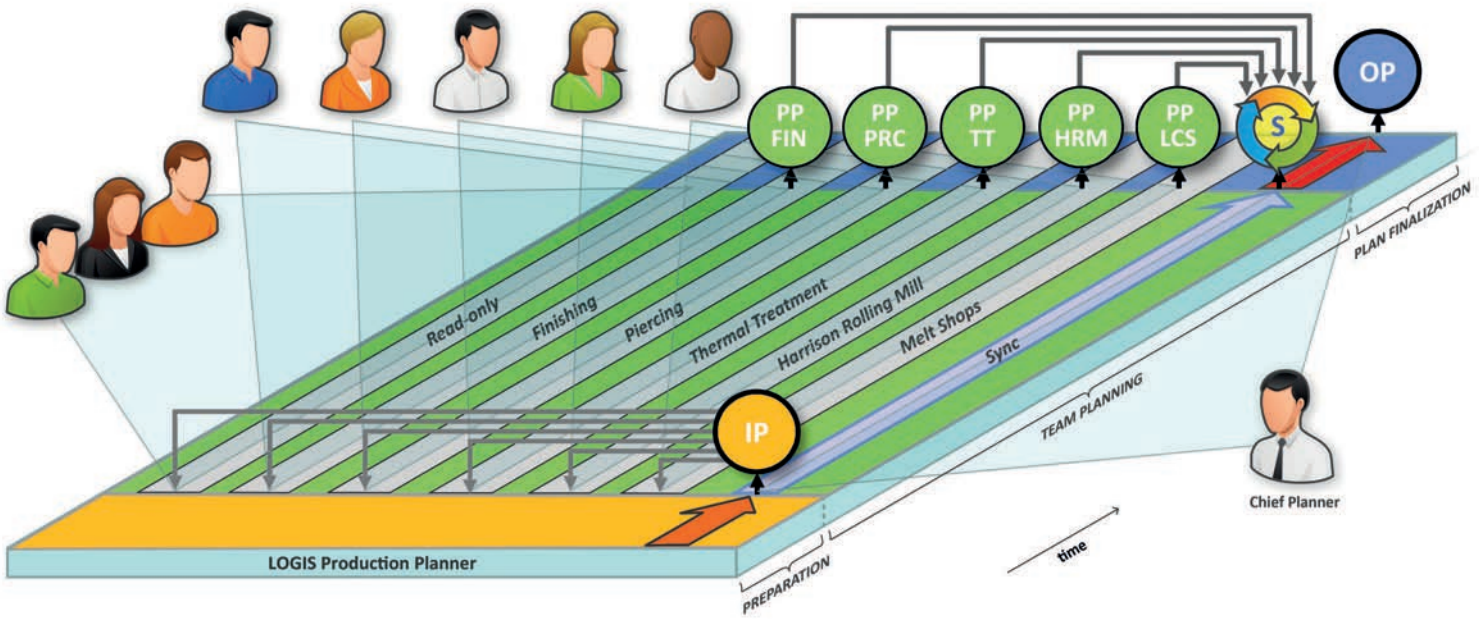
All processes related to production planning like order promising, (general) order planning, material allocation, melt shop planning and scheduling, are working in parallel. Unavailability of the planning environment caused by technical reasons occurs infrequently. In most cases the users can thus work with the Planning System according to their time needs.

Team Planning

Ronald L. Gill, Supply Chain Manager, TimkenSteel
Zbynek Ondryas, Senior Solution Architect, LOGIS

The Production Planning process at TimkenSteel covers a relatively complex set of material flows with many work-centers which have specific planning requirements. It would not be possible for a single planner to have sufficient detailed knowledge of the entire plant to be able to produce a quality plan. A team consisting of 10 planners is involved in production planning at TimkenSteel.

Among the results of our project that we value most is the fact that we managed to achieve a solution where planners, with the support of the planning system, work as a real team, a team where people don't stand in each other's way, where they are on the contrary able to find synergies and benefit from each other. We are therefore convinced that the system of team planning based on the so-called Planning Domains and Synchronization in amount the most significant characteristics of our new Planning System.



Team Planning Session Scheme

PLANNING DOMAINS

Multi-user plannning with multiple working spaces

A specific feature of our Planning Software is the ability to provide a working environment for planning that we refer to as Planning Domains. Planning Domains are temporarily independent workspaces, and their number is driven by the complexity of the plant. The figure depicts how Planning Domains are used during planning sessions at TimkenSteel.

TimkenSteel team decided to split the production plant into 5 planning domains: melt shops (LCS), Harrison rolling mill (HRM), pierce mills (PRC), thermal treatment (TT) and finishing (FIN). One or several planners are responsible for preparation of the production plan in the specific planning domain. Besides that, there is one special planning domain (read-only), dedicated to those users, who only need to view the plan.

It is possible to develop a specific plan proposal in each of the 5 planning domains. No planner from any Planning Domain has to worry that any other planner from another planning domain could damage the results of his/her work in any way.

The working environment provided by the Planning Domains for planning is highly efficient. The planners can have all relevant information available on the so-called Planning Desk – an exceptionally configurable user interface, where the planner may evaluate the plan details, adjust the plan in any way and concurrently see the effects of his/her planning actions not only on the tactical level (e.g. capacity load, campaign plan), but also on the level of the plan quality KPIs.

Each planning domain also provides a detailed history record for each planning action. One of the ways the history records are used is the UNDO/REDO feature – the planners don't have to worry about using what-if planning actions, they also don't have to worry about misclicking. Rolling back to the original state is a trivial matter.

The basic planning requirements for each domain are the same or very similar and they are covered by standard functionality related to planning domains. But each domain may also have specific requirements. Here are some examples of specific requirements that were implemented into our planning domains:

- Very tight cooperation of LCS planning domain with specialized melt shop planning and scheduling tool (LOGIS Caster Scheduler)
- 3 levels of production campaigns and detailed scheduling requirements in Harrison hot rolling mill area (HRM planning domain)
- Many detailed production campaigns and work-center alternates in piercing mills area (PRC planning domain)
- Dynamic campaign planning based on the current order book, many alternate work-center options and batching requirements for batch car furnaces (TT planning domain)
- Many alternate work-center options with cell type dependencies.

PRODUCTION PLANNING SESSION

Now let's take a look at how Production Planning Sessions takes place.

Domain Planning Activities

The basic production planning activity within the planning day is done by production planners in planning domains. Planners are evaluating the initial plan for orders loaded onto work-centers in the area of planning domain responsibility, and combining automated and manual approaches they generate the plan for a specific domain. Planners in a specific domain can see the impact of their activities to other upstream and downstream domains, but are not impacted by planning decisions in those domains.

Chief Planner's working Environment

A specialized working environment is provided by the planning system to the Chief Planner. This environment is available to this Chief Planner at any time during the daily planning process, not only during domain planning. From this environment, the Chief Planner may schedule planning sessions, designate time for domain planning, observe events within planning domains, observe the arising conflicts, initiate synchronizations (see below for both) and so forth.

Conflicts between Domain Plans

Within their Planning Domains, Planners may work with information the Planning System provides them with. This information is of course not the only information source for planning. Another important information source is the information the planner brings in on his own (especially in his head, on paper, or those he can obtain through calls, emails or otherwise). This Planner's information may differ significantly planner by planner. And it's the specifics of the Planner's information that lead to individual planners focusing on various detailed problems, leading to various individual planning decisions.

Thanks to tight coherence of the plan throughout the entire material flow (through all work-centers), a usual result of the planners' work in domains is that contradictions arise among some details of the plans resulting from their planning actions – we call these 'conflicts'.

At first it seems conflicts are an unpleasant problem of planning. We however have to say that when planning by teams, conflicts are a way to achieve better plan quality. Namely, the existence of conflicts offers the possibility to evaluate the reasons leading different planners to their different proposals and finding a solution most valuable from the global perspective. No valuable proposal thus has to be lost, as is usual in classic planning systems. The situation is therefore excluded, that is known from classic planning systems for multiple users, when a certain plan detail setting carried out by one planner could later be easily modified by another planner, pursuing another goal, without the possibility to compare the significance or utility of the first or second measure and find an optimal solution.

The new planning system identifies conflicts automatically. The Chief Planner and the planners as well are informed about the conflicts that arise as they work. They can thus react, if they see a way to avoid the conflict, or can wait for the synchronization, a system process with the purpose of conflicts resolution.

Synchronization

The result of planning must be an unambiguous plan with no internal contradictions. The plans of the individual domains therefore have to be synchronized. During synchronization, details of the various domain plans are evaluated and harmonized.

It is chief planner's responsibility to schedule synchronizations during the planning day. The Synchronization process initiated by the chief planner takes all domain plans and combines them into one synchronized version of a plan. It also applies all order changes processed in the external environment and the latest update of the melt shop plan and schedule if it is available. The Synchronization process detects the conflicts among the planning decisions from different domains and provides a conflict resolution based on the predefined conflict resolution rules and domain priorities.

The Synchronization process provides visibility to all orders modified during the planning activities, the detected conflicts, and proposals for their resolution. Synchronization also ranks order changes by criticality, allowing the Chief Planner to focus on the most important changes. The Chief planner can modify the synchronized plan by himself, or can organize a short meeting to better understand the motivation of domain planners or clarify planning decisions (see picture "Synchronization meeting at Chief Planner")

The TimkenSteel team realized that clear visibility to planning decisions and their impact on order plans helped to improve the planning skills of planners with a lower level of experience.

Synchronization steps can also be scheduled to execute automatically, so that the planning process can continue when the Chief Planner is unavailable.

Evaluation of Plan Quality

It is important for the Chief Planner to understand the quality of the current version of the synchronized plan. Plan quality can be evaluated on several levels. Global Key Performance Indicators (KPIs) provide an evaluation of the production plan from the global perspective. This set of predefined KPIs also enables comparison with previous plans to help visualize the trend of plan quality. Detailed visibility of plan quality for selected key performance indicators is provided in both graphical and tabular form. KPIs can be customized according to the specific requirements of the company.

Plan quality is evaluated not only on global level but also on the level of selected work-center and on the level of selected customer orders. This allows Chief Planner and the domain planners to quickly detect issues with production plan quality, and opportunity for improvements.

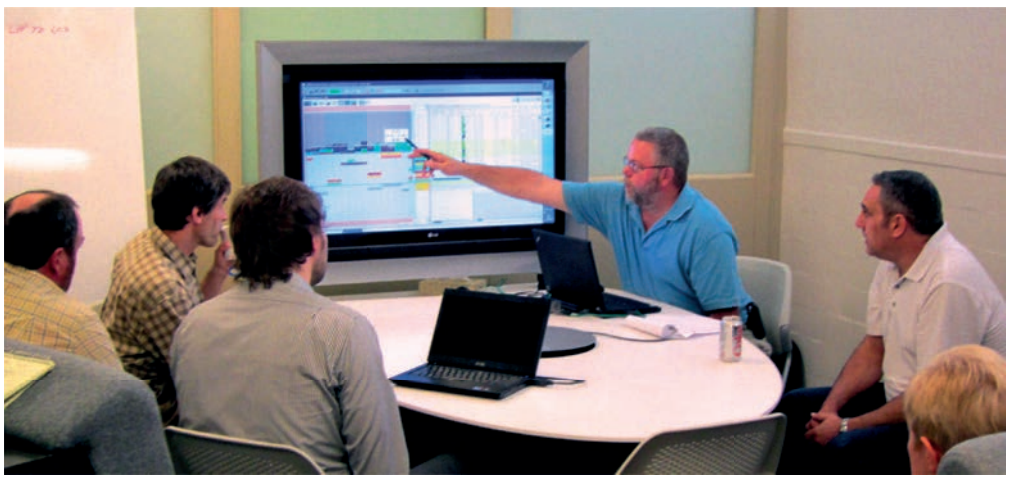
Plan Finalization / Planning Session Finishing

The decision of how much time to provide the team of planners for their Domain Planning is entirely up to the Chief Planner. The current amount of time planners have for domain planning is visible at all time through the planning system (the time-counter in the screen header).

The process of plan finalization begins with synchronization. The Chief Planner then evaluates the achieved results and decides whether the plan should be accepted as a new plan version. The Chief Planner can modify the plan in any way, and can also decide to issue specific tasks to some planners and provide extra time for their domain planning, after which he returns to plan finalization.

As soon as the Chief Planner is satisfied with the plan, he activates the function of the planning system that saves the new plan version, makes the information within it available, and makes its distribution possible.

While saving the new plan version, information within each Planning Domain is updated as well, so that after plan finalizing, Planners may continue with their planning sessions, working on subsequent version of the plan.



Synchronization with Chief Planner

Project Management

How does the project manager leading the project team evaluate this exceptionally demanding project?

William J. Kerr, Project Manager, New Generation Planning, TimkenSteel

SUPPLIER FROM DIFFERENT CONTINENT

We were a bit surprised when, after years of looking for a partner, we discovered that the one we had found doesn't come from the USA, but from Europe, a different continent. Will we find a suitable way of working together? Will we even find common ground? Can something like that even work?

During our pilot project, which was focused on Caster scheduling, our doubts had already dissipated. It worked better than we had expected. The melt shop planning and scheduling project (we called it the Caster scheduling project) wasn't an extremely difficult project though, because it still didn't seriously disrupt the foundation of our planning system. But despite this, at that time we already knew it would work. But the hardest part was still ahead.

WORK MODE

The work mode that we settled into was as follows: an on-site visit took place every month. During the on-site, teams work together very intensively. Their time was planned in detail for each hour, often with parallel meetings occurring. The most common themes were analytical meetings, project management, on-site trainings, group testing. Time is strictly utilized, so it requires discipline, but on the other hand, each team member may well plan their own activities.. First we planned on-site visits lasting about 6 workdays, and quickly found that on-site can be shorter, so the average length then settled to about 4 workdays a month.

Work, naturally, was done even outside of the on-site period. This work is not, however, as restricted by the timeframe of meetings as during on-site work. This time is mainly dedicated to the successive fulfilment of tasks. Members of the team working on their tasks can more easily organize their time in such a way as to be able to work on their operational tasks during this period (most members of the team are not 100% tasked with project work, but are still assigned to tasks related to their usual job).

There is also a set of weekly meetings scheduled in approx. 3-4 hour blocks in the period outside of on-site. The agenda of these meetings is very carefully planned. They take place over the internet, which means that no one has to travel anywhere, and people can attend from their own offices, or from some conference room, where the appropriate team assembles. Internet meetings have proven to be wholly sufficient for our needs. We hear each other, see each other, we can share anyone's screen and discuss what we see on it. It is possible to easily make a video record of any part of the meeting. It lowers expenses and it is very flexible (if necessary, we can arrange such an internet meeting even without a meeting room necessity, if it is not available for the scheduled time).

Members of the team can, naturally, according to their needs, and whenever they need, agree on individual meetings. They also have the technology of internet meetings at their disposal to support them.

Yes, and naturally steering committees. A steering committee is scheduled about every 2-3 months. It usually occurs during the on-site and has a standard agenda, like evaluation of the work progress, a plan for the coming period, risk analysis, occasionally a change in detail project plan is agreed on.

We also took a somewhat unusual approach to meetings with LOGIS, which proved quite effective. About every 3 or 4 months, on-site work took place at the supplier's headquaters. That means several members of our team (typically around 4) travelled to the Czech Republic. For these on-sites we dedicated our time to key analytical problems, which demanded full attention, which would be difficult to do on our home turf (when at your place of work, operational problems seem to always catch you, and you'll have to address them whether you like it or not). That's not all; on-sites at LOGIS were also beneficial for building team spirit.

FIX PRICE AND METHODOLOGY

LOGIS was happy to accept responsibility for a fixed price and a set project deadline. They just stated that as long as binding rules for project completion are agreed upon, and as long as we are able to meet our project obligations, then any delay or increased workload would be their problem.

LOGIS uses its own methodology for managing projects, which defines rules for completing projects in such a way that the project has the best chance for success. It forces both sides to make project execution highly transparent, so that imminent risks are soon identified and resolved, so that no one can hide behind anything. It forces the supplier to properly manage the project, and forces the client to provide the supplier with proper cooperation. The methodology is a part of our contractual documents; it is thereby binding for both sides.

However good the methodology might be, it would be useless unless the team worked responsibly, in full dedication and commitment. This brings us to the most important aspect, people.

CRITICAL SITUATIONS

It's similar with partners on projects as with partners in your personal life; you really get to know your partner only in critical situations. For projects such as this one, those must be expected; it would be more than miraculous if no critical situation appeared. This is due to familiar project management issues: very low mutual interchangeability among members of the team on both sides (and the associated threats in the case of more serious health problems), or the inability to prepare the project's assignment to the smallest detail, which in turn can lead to surprising complications along the way.

If the parties are able to maintain mutual reverence and respect even in critical situations, if even then there is an attempt to understand the other, while retaining high expectations for the other and staying focused on delivering value, then the project is in good hands. And our project was in such hands.

THEORY AND REALITY IN PROJECT MANAGEMENT VERSUS PEOPLE

You can read a ton of literature on project management, undergo all the various schooling on this matter, have years of experience. If, however, you do not have luck in people in the team on your project, if you are not lucky to have all who "want" to do all that they can, then your theoretical preparation is all for nought, and when some critical moment that always comes arrives, the project will run into a wall (and you'll accomplish just part of the original goals), or it'll even collapse completely.

And so we're glad we had a good team. Not that all went like clockwork. You'll sweat. But you can feel good about it, a winning feeling. It's something like climbing Mt. Everest. We learned that we can rely on each other. Besides the feeling of overcoming the eight thousand meter mountain, you also gain new friendships with people you'll always want to meet.

Project Schedule

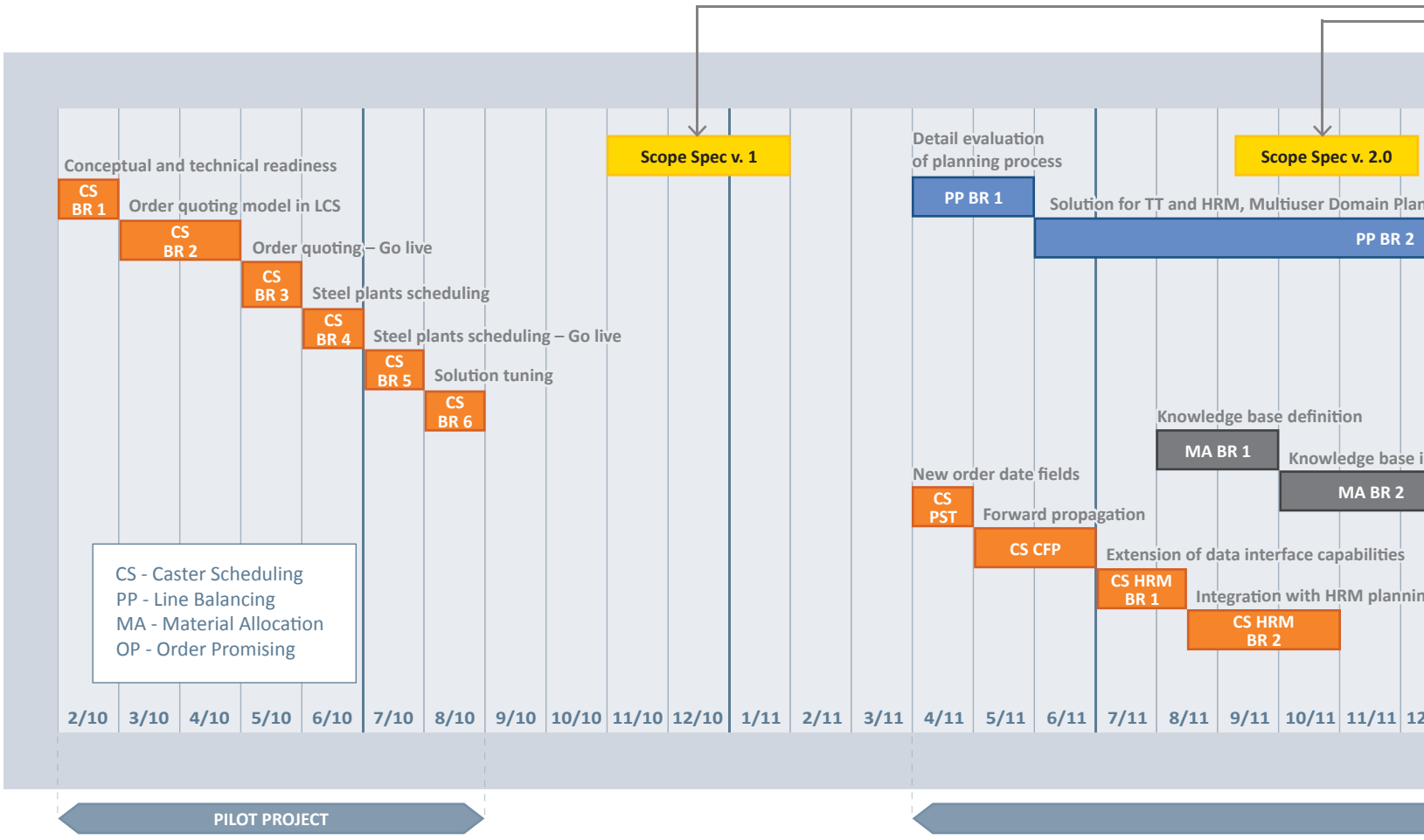
The New Generation Planning project was preceded by a pilot project focused on steel plant planning and scheduling. *(more on the Pilot Project on top of page 3)*

During the pilot project, the teams on both sides found out that they can work together as a single team focused on common goals. Besides that, LOGIS made use of the opportunity to get orientated well in the production planning process of TimkenSteel. It was obvious that a number of opportunities exist in TimkenSteel to substantially improve the efficiency of planning.

TimkenSteel and LOGIS consequently agreed to elaborate a document specifying the possible project so that it can be used not only for decision-making regarding the possible implementation, but also so that such document can be used as a specification addendum of the implementation contract. This document, as well as the related project, was named Scope Specification.

Based on the results of Scope Specification, TimkenSteel actually decided about realizing a project that was, with regard to its ambitions, called "New Generation Planning" project.

Ideas matured even during the project implementation and new opportunities emerged to increase the value of the resulting planning system. Two new updates of project Scope Specification are related to that. Although each new version increased the demands on the implementation, the continuous successes of the



Why Team Planning is Essential

William J. Kerr, Project Manager, Supply Chain Systems, TimkenSteel

ESSENTIAL ROLES OF PLANNERS

When we were considering the development of planning systems in the nineties, we liked the vision of our partner at that time, in which the planning system shortly thereafter wouldn't require the manual work of planners because all would be automated (and planners wouldn't be able to compete with a quick and optimizing system, regarding quality and speed of work, anyway). Although it seemed an attractive idea, after twenty years of experience, we now know otherwise.

William J. Kerr

Project Manager, Supply Chain Systems, TimkenSteel

Our current partner, LOGIS, presents an opinion that may seem less appealing, but to the same extent is much more practical and effective. We are convinced that it'll really be many years until some planning system is prepared for any situation in such a way as to resolve it automatically and properly, in our profession.

It will be really necessary to keep in mind for the long foreseeable future that information will exist that either:

- isn't available for the planning system, though for a given situation it is important to take it into account during the plan development (this can occur when, e.g. the given information isn't part of the planning model - so for such information the planning system is blind - or the information just didn't get to the planning system), or
- is available for the planning system, but due to the given situation, the planning system isn't able to adequately process or address it.

In these cases, we are dealing with deficiencies in the planning system. This is exactly where the Planner plays a key role. His task during planning is to take into account information that the Planning System doesn't have available, or isn't able to properly process. It is up to the Planner to utilize his knowledge and ability so as to contribute to reaching the highest quality plan, i.e. to create a better Plan than would be created by just utilizing the auto-mated planning functions (algorithms).

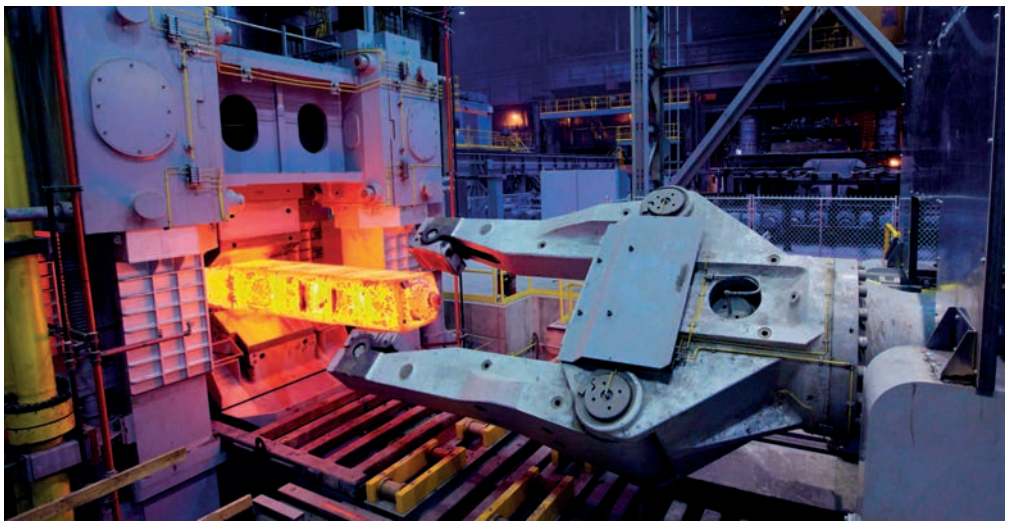
The secondary role of a good planner is to be a repository of planning know-how, which includes not just a good knowledge of the abilities of the planning system, but also knowledge of the manufacturing and business system constraints that are part of the process to be driven by the plan (in our case the demand fulfillment process). And this know-how is a key value for the company's business. The idea of enthusiasts and dreamers that Planners won't be needed because planning software will resolve everything itself is, at least in our view, not only naïve, but even quite dangerous. With the dissolution of the Planners, also comes the dissolution of planning know-how. And without planning know-how, the planning system becomes a simply black box. There would be no one there who would be a source of informed input for the general development of and improvements to the company's planning system. And if an acute need for a fundamental overhaul of the planning system emerged, there wouldn't be anyone able to specify the requirements for its innovated qualities. Likewise, the fact, that something is amiss and that it is necessary to innovate the planning system is determined by such a business, only after a long period of falling KPI values in the areas of Operation Efficiency or Customer Delivery Performance.

It need not be stressed that such a situation is a threat to the competitiveness of a company and that to recover from such a painful situation can be a long-term and expensive affair.

PLANNING SOFTWARE VERSUS PLANNER

Planning software is here to take over the routine planning operations, those that can be automated in some beneficial fashion in the interest of the best possible increase of efficiency of the plan creation process. Planning software serves to enable Planners to develop the most valuable plans, and supports growth of their Planning know-how, which is definitely one of the sources of growth in competitiveness for a company. As the level of sophistication in planning automation grows , the position of Planner(s) is more and more significantly going to evolve from routine operators to creators of value.

Source: TimkenSteel



DEMANDING PLANNING ENVIRONMENTS (i.e.: Where One Planner doesn't Suffice)

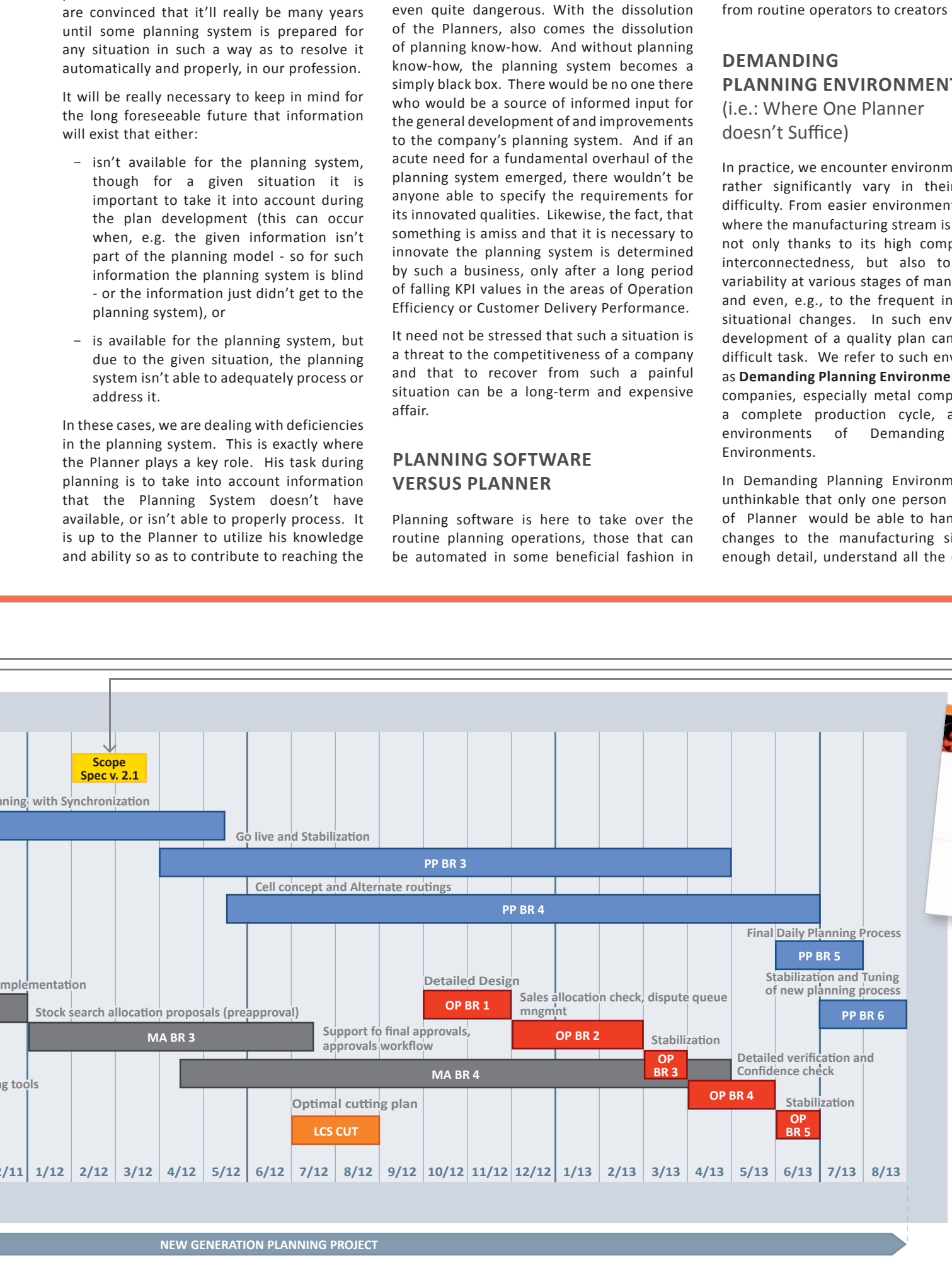
In practice, we encounter environments which rather significantly vary in their planning difficulty. From easier environments to those where the manufacturing stream is expansive, not only thanks to its high complexity and interconnectedness, but also to the high variability at various stages of manufacturing, and even, e.g., to the frequent incidence of situational changes. In such environments, development of a quality plan can be a very difficult task. We refer to such environments as **Demanding Planning Environments**. Metals companies, especially metal companies with a complete production cycle, are typical environments of Demanding Planning Environments.

In Demanding Planning Environments, it is unthinkable that only one person in the role of Planner would be able to handle all the changes to the manufacturing situation in enough detail, understand all the constraints and relations in the scope of the whole production, even to the extent of the diversity of problems at each production stage, and would be able to apply all of that to the creation of the best plan. In such environments, it is common that a larger number of Planners with specific roles are involved in the planning process, otherwise the quality of the plan suffers.

It is therefore typical, for complex Metals plants with Demanding Planning Environments that a team of planners is involved in the daily planning process.

PLANNING SOFTWARE FOR TEAMS OF PLANNERS

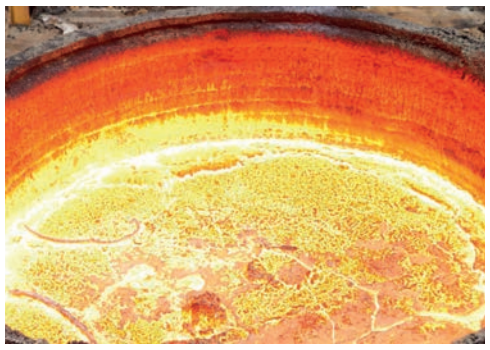
If we know that we can't do without a team of Planners in our Demanding Planning Environment, it is logical to request that the Planning System, with which this team is to work, supports the teamwork of the Planners. It will therefore be natural to want the planning software to be able to ensure that the planners don't interfere with each other during work, but, on the contrary, that their activity can provide for positive synergistic effects. It will also be useful to have the opportunity to differentiate between and address the specific roles of individual planners in the plan development process. Likewise, we expect that good planning software will support the effective management of the team of planners, not only at the level of operational management during the planning process itself, but also during the control and evaluation of individual members of the planning team.



project encouraged both sides to shift the bar even higher.

During the last year of our project, besides the implementation of the Order Promising module, an especially tight integration of all the planning system components was also carried out – not only among themselves, but also with other components of the enterprise information system.

Key Result:
Due Date Delivery Performance Improvement



The decision of the management of TimkenSteel to substantially increase Due Date Delivery Performance was the starting impulse to realize the New Generation Planning project. This article describes the steps taken by the implementation team and explains which factors had major effects on meeting the objective.

William J. Kerr, Project Manager, Supply Chain Systems, TimkenSteel

In 2010 as the economy was growing, so was our order book and the challenges that come along with that. Challenges such as ramping up manufacturing, controlling inventories, managing lead times and maintaining delivery performance to our customers.

As our order book increased, so did our past due. Soon our delivery performance declined to unacceptable levels and senior management issued a directive to correct the issue. And they weren't just looking for a quick fix. We were challenged to implement fundamental changes that would produce sustainable improvements.

We launched into an effort to right the ship. We took immediate action to stem the decline. Concurrently, we reviewed our demand planning processes and implemented new practices that would enable us to return performance levels to desired levels.

We had previously identified that one of the key limiting factors in our order dating process was related to our lack of clarity on when a particular order would melt. We are a make-to-order shop and the majority of our customer orders are for less than full heat quantities. These orders have to be combined into heats. With the array of grades that we make, that often requires combining orders with melt requirements in multiple weeks.

To adequately see the melt load in any given week, you have to first build the orders into heats. Our heat building application was limited to only being able to process a few weeks worth of orders. Consequently, while we could see the number of tons required in a week, we didn't know how that fit in terms of heats. It was also difficult to see when the first available melt was.

In 2010 we implemented the LOGIS Caster Scheduler (LCS). This solution provided us with the ability to group all orders on our books into heats. We could thus see our melt load in terms of heats and could better determine when we had open melt capacity. We attempted to build order quoting functionality into this solution but soon realized that it was insufficient for that purpose. We had more work to do.

Through the LCS project we were able to see the expertise and keen insights in planning and scheduling in the primary metals arena that LOGIS brings to the table. So, we enlisted their services to evaluate our demand planning and fulfillment processes and systems and to propose improvements. One of the three main business goals that we asked them to focus on was providing a significant increase in customer delivery performance.

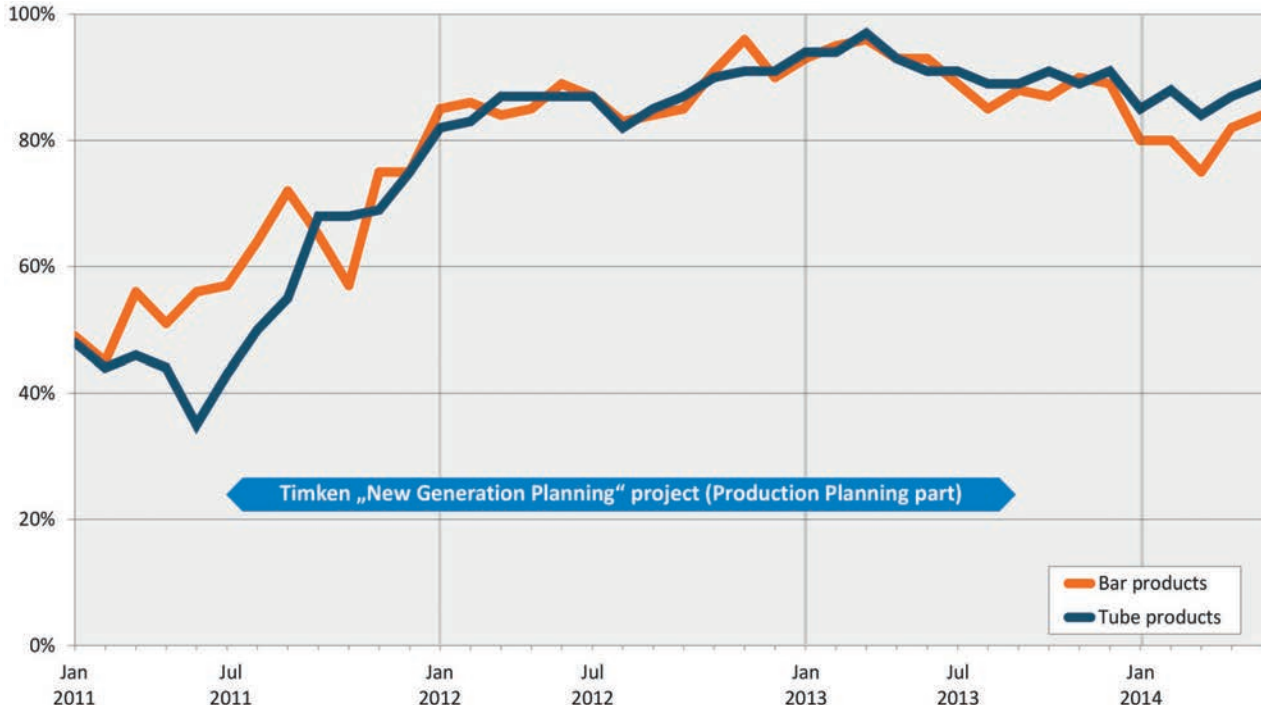
LOGIS completed their study and identified opportunities in the areas of production planning, material allocation, demand planning and order promising. We laid out a project plan that would first address the production planning and material allocation areas. This, along with the heat building and sequencing work that we had already completed would provide a good foundation for the order promising solution to follow.

The project was broken into business releases that were installed sequentially over the course of the project. This enabled us to incrementally reap the benefits as new functionality was put into place instead of having to wait until the end of the project to capture the value. Consequently, we were able to start seeing improvements very early in the project.

By the end of 2011 delivery performance had made a significant recovery. We were able to hold those levels going forward even through changing business conditions. The combination of the new process that we put in place along with the improved flexibility, efficiency and visibility that these new tools afforded allowed us to achieve and maintain these service levels.

I should also point out one thing that it not immediately apparent in the accompanying diagram. Toward the beginning of 2014 we encountered a similar set of circumstances that we had seen in the period leading into 2011. And although there was a slight downturn in delivery performance associated with this it was nothing like we had experienced in the earlier time period. This is a testament to how the new planning system helps us to manage our order fulfillment processes through varying business conditions.

Due Date Delivery Performance Improvement



Demand Fulfillment Manager's viewpoint of project results

One of the main priorities of the project was increasing the order fulfillment process performance. How does the owner of this process evaluate the results - Demand Fulfillment Manager.

Ronald K. Host, Manager, Demand Planning and Fulfillment, TimkenSteel

OBJECTIVE: DELIVER QUICKLY, RELIABLY AND FLEXIBLY, WITH GOOD INFORMATION SERVICE

With increasing globalization, competitive pressure grows. Besides technical and price parameters of products, customers are more and more concerned with how quickly, reliably and flexibly suppliers are able to deliver their products, when choosing their suppliers. For producers it is therefore increasingly important to be able to promise a delivery date so that it suits the client, is most probably achievable, and likewise so that the cost of the execution of such a promised order was minimized. Manufacturers are thereby increasingly forced to search for reserves in their systems, and find ways to increase their competitiveness by increasing Operation Efficiency and Customer Satisfaction.

OBSTACLES: COMPLEXITY, UNCERTAINTY, AND THE HOST OF CONSTRAINTS

Producing steel is burdened by many unique features of the Metals industry, which bring complexity into the Demand Fulfillment process and make quality planning a challange. Each step in the routing is a unique manufacturing process, with its own rules and constraints. The planning model must comprehend all of these key constraints in order to produce a quality plan with the orders available each day..

Steel production is also burdened by much uncertainty, more so in cases, like ours, regarding specialty steel. Surprises here are on each day's menu (e.g. unexpected shutdowns, changes in the performance of the rolling mill, deviations from planned production volumes, etc.). Each such surprise can mean a threat to our ability to properly execute orders. It is therefore important that the demand fulfilment process be able to react quickly to situational changes. So we use our planning process to resolve these unexpected occurrences. We can say that a quality plan shows us the way to eliminate the effects of unexpected occurrences, or at least lessen such effects, and thereby keep the best possible Due Date Delivery Performance, and also the best possible economics associated with executing orders.

RESULT

Thanks to our project, we have again realized that the most effective tool for helping reach our stated objectives is the improvement in the quality of the planning process. So if a plan is of quality, we can lean on it when setting a suitable delivery period, and while focusing on making the economics of the execution of given orders the best. If a plan is of quality, we can also have a very high degree of certainty that we will be able to meet the promised delivery period. And finally, if something expected should happen, we are able to quickly provide reliable information about what the customer should expect.

One of the main goals of our project is to significantly increase Due Date Delivery Performance (while improving or at least sustaining the economic effectiveness, of course).Our new planning system has been in operation for a relatively short time, and a number of things are being tuned as we go, but we can now say that we have reached a very significant improvement in that we have been able to get our Due Date Delivery Performance above the magical level of 90%. When comparing to the period of just a few years ago, we have achieved an improvement of 40 percentage points. That means that there were significant opportunities to improve our Demand Fulfillment process that we were able to exploit during the project.

While working with LOGIS, we have done a really good amount of work on our Demand Fulfillment process. Improvisation has sharply decreased, with decisions more based on the results of quality planning. And we can see that its development continues. While working with LOGIS, we have identified a number of opportunities for improving the Demand Fulfillment process and I believe that we will have the opportunity to improve it even more.

Source: TimkenSteel

Chief Planner's viewpoint of project results

Ronald L. Gill, Supply Chain Manager, TimkenSteel

EFFICIENT PLANNING PROCESS AND VALUABLE PLAN

The new planning process is highly effective; if necessary, we can develop a new high quality version of the plan several times a day, and thereby react intelligently to the changing situation. All the essential limitations are now taken into consideration in the scope of our planning. The work efficiency of the whole team of planners has also grown significantly. A more efficient plan is prepared with a relatively small team in a short amount of time, with lower labour intensity, and over a much longer time horizon than was ever possible before. As a result, the quality of the plan has significantly increased, which has manifested in a strong improvement in timely delivery of our products to TimkenSteel customers.

In addition, we have reached a fundamentally new level of flexibility, being able to react by updating the plan in a span of tens of minutes, even for significant situational changes.

MANAGING THE PROCESS OF PLANNING

The Planning Process isn't burdened with chaos anymore. Due to the technology of planning domains, the planners don't interfere with each other; they don't have to worry about hidden and unresolved conflicts caused by the planning actions of other planners. Planners can fully concentrate on their work, without worrying about any of their important measures being changed without serious reason. Should conflicts arise, they are resolved systematically in the framework of so-called synchronization. Synchronization can be carried out automatically, and also manually. Resolving conflicts is a common theme for meetings of planners with the chief planner, before plan finalization. These meetings also strengthen the total know-how and skills of individual planners, facilitate cross-training, and contribute to their effectiveness and professional satisfaction.

Ronald L. Gill

Supply Chain Manager, TimkenSteel

MANAGING THE TEAM OF PLANNERS

The Team of Planners is easily managed now; I can organize planning sessions, monitor the work of whichever planner, or observe arising conflicts and attend to their resolution if necessary, I can organize planners' meetings. Planning software has become my tool for management of the planning team.

It is possible to return to the analysis of a planning process even after finalizing a planning session: to study the work of individual members of the team, return to the course of planning activities of any of them and observe how they proceeded during their work. So I can easily confer with them on why they chose to take a given step, to discuss other possible solutions to the problem together. This all helps me not only to better develop the abilities of the planning team members, but also to better evaluate their work.

THE QUALITY OF SUPPORT PROVIDED BY THE SUPPLIER

If we encounter a problem, LOGIS team solves it quickly. It is as if they were here with us, instead of on another continent in another time zone. The average period for resolving a problem is not counted in days, often not even in hours.

CRM Manager's Experience

Stacy R. Adamski, Demand Manager, TimkenSteel
Gregory C. Stranan, Manager – Supply Chain – Industrial, TimkenSteel

New order promising process allows us to achieve the goals declared for this implementation project. Reaching high level of on-time delivery is influenced positive way by very systematic evaluation of each new and changed order. Utilization of sales reservations for proper positioning of orders for specific products and specific customers into weekly bucket with available sales reservation prevents consumption of important production capacities by low priority orders and later moves of orders when high priority orders come. So sales reservations help us to improve on-time delivery performance and at the same time it assures that our promising is consistent with the strategic directions of our company declared through master plan and sales plan. On-time delivery improvement is related also to introduction of detail verification process that is focused on high level of accuracy and reliability of promised due date.

Improved environment for promising orders allows higher efficiency and better visibility of actual situation for master planners who are the key users of order promising process. It also supports very well communication to sales department as well as to production planning area and manufacturing areas.

Level of information provided by new order promising process to customer relationship managers allows them to efficiently manage the communication to customers. They understand the actual status of fulfillment for already confirmed order, the position of evaluated new or changed orders in promising workflow and also the opportunities for future orders. And what is very important all that information is available immediately in the form that is easy to understand for those users.

Stacy R. Adamski

Demand Manager, TimkenSteel

We were able to verify that this process supports us well also in situation of changing business conditions. Last change of business conditions was so fast that forecasts were not very accurate. But new process helped us to prevent significant decrease of on-time delivery performance while efficiently utilizing the increased potential in business. It is really good to have a solution that provides consistent performance in any time independent from the business conditions.

Planners' Experience

The new planning system brought substantial changes to the order fulfillment process. While several other articles in this issue cover the insights of the managers of the New Generation Planning project, in this article, it is the planners, the key users of the planning system who share their experience:

Jack Haddad

Principal Demand Fulfillment Analyst, TimkenSteel

My main responsibilities include the issues of material allocation and planning and scheduling of the Harrison Rolling Mill.

LPP[1] has greatly improved the planning and scheduling process of the Harrison Rolling Mill. What used to take hours to create and stabilize a schedule now takes less than 5 minutes. This allows me to focus more on the planning phase of my job. The way LOGIS built the logic behind campaigns allows great flexibility and ease when smoothing loads across many weeks. Many great features have been included that improves filtering out unwanted data, formatting your screen the way you want it to look, as well as providing statistical data with the simple click of a button. There isn't anything that I don't like about LPP.

LMA[2] is another application that has greatly reduced the amount of time it takes to allocate material to orders. Many algorithms that have been written have replaced the many steps it used to take to humanly determine if material would be suitable to satisfy customer requirements for their order. The entire process of searching for material, allocating the material and getting approval from our metallurgical team used to take approximately 3 hours. With LMA, it virtually takes a few seconds to find and allocate material that matches an order and it significantly has reduced the amount of time for our metallurgical team to approve the orders to roll to our customer's requirements.

Both applications have greatly reduced the time it used to take me to perform the duties of my job. This allows me to provide greater service to my customers because it gives me the opportunity to focus on other aspects of my job that I wasn't able to before using these LOGIS tools. The simplicity of the tools gives me the ability to easily train others.

The LOGIS staff of professionals has made my job so much easier and they are always willing to help improve on an already great planning and scheduling tool.

Jeannie Farber

Principal Demand Fulfillment Analyst, TimkenSteel

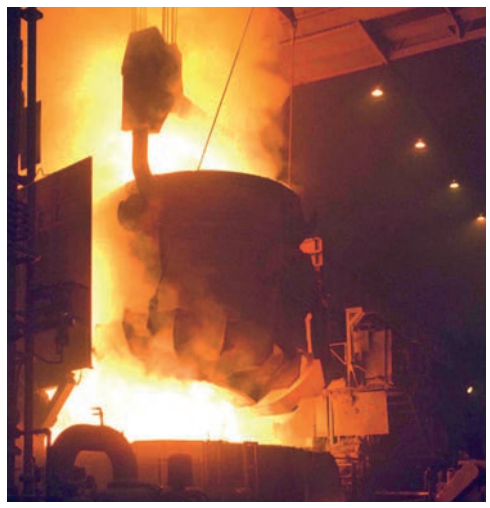
It would be demanding – both on time and the volume of text – to describe all that we gained with the new Planning System. But let me mention at least some of the features that I'm excited about using in LPP as they occur to me.

For example - I love that routing changes that are done in our Order Management system (elsewhere in our corporate systems, outside of Planning System) are now visible in LPP for use in planning. The changes come in every ½ hour. In the past, I would have to wait for the next day to make sure my loads were balanced. Now I can continue to keep working at getting loads correct as opposed to the "wait and see how it looks" that happened the next day.

Or: Having the ability to make workcenter changes in the new Planning System rather than our Order Management system is so much faster. In some cases, I'm able to do multiple orders at once. This saves so much time. Even when changing workcenters that make up a "cell", the time it takes to do these changes in new Planning System vs. our Order Management system is so much faster. This is a great feature.

I am not the most proficient Access query writer. And so I also like the fact that now I can do filtering and sorting of data within LPP that normally I don't need to do queries. I can then take this information, put it into an Excel sheet and pass along to others as necessary. The other added benefit is that I'm not slowing down other systems by trying to retrieve the information from the database in a query.

And I should certainly not forget about this: there are more planners involved in our planning process; each of them takes care of a particular part of the production process. We had problems in the past related to the fact that the measures of the individual planners were in conflict and we were unable to discover these problems sooner than the day after. Only then could we find out what problem occurred and try to resolve it. But while we were working on that, new problems could arise, and again, we learned about those the day after. We called it ping-pong and it was quite stressful. Of course, the planning results of different planners can get into conflict even now within our new Planning System. However, the new Planning System is capable of identifying those conflicts so that we learn about them easily. And not only that, we can also do a sync and all of us can immediately see what impact it will have on us. Not having to wait until the next day to see results, is a great asset. We can see immediately – will this plan work or do we need to come up with a different option.



These are just a few of the things that I have experienced in using this system.

Dale Brigger

Senior Demand Fulfillment Analyst, TimkenSteel

During the project, I was responsible for planning and scheduling of our thermal treatment. Briefly, here are my insights:

LOGIS Production Planner has made planning a much easier task in my day to day workload. It gives tremendous visibility to the planning process and allows me to see upstream and downstream operations much more in depth.

The Sync option allows us to see up to the minutes changes and allows everyone's plans to match up with one another.

The use of campaigns contributes to a much more detailed plan for thermal treat operations, allowing us to schedule 20 thermal treat furnaces much smoother. It allows moves between furnaces easy and allows instant visibility when moves are made.

[1] LPP is the abbreviation for the product name LOGIS Production Planner, which is one of the components of the new Planning System of TimkenSteel

[2] LMA is the abbreviation for the product name LOGIS Material Allocator

New Generation APS technologies

- systems even for demanding planning environments

Why do environments still exist where deploying conventional APS technologies brings only limited results? What are the causes of this state? And what requirements should be met by planning technologies in order for them to be well usable in demanding planning environments as well?

We will start the quest for finding the answers to the above stated with the current APS systems; for our purposes, let's call them „first generation APS".

FIRST GENERATION APS

If we would take a look at what Wikipedia says about APS, (http://en.wikipedia.org/wiki/Advanced_planning_and_scheduling, 14.5.2014), we would find, that:

> **Unlike previous systems, APS simultaneously plans and schedules production based on available materials, labor and plant capacity.**

The wiki paragraph has a good grasp on the characteristics of APS systems as we know them. Let's just note, that it is possible to see labor force as a capacity as well – so it could be said, that it's planning while simultaneously considering available materials and capacities. Let's also note, that in the sentence above, the word "simultaneously" is mainly related to considering material and capacity and not so much to planning and scheduling.

But what about APS environments where it is not enough to consider available material and capacity? For example, how about environments, where a significant role is also played by other specific constraints, whether they might be technological or of another nature. The first generation APS technologies are simply blind to them and the more significant the given constraint is, the less valuable the created plan will be (meaning the feasibility and the related benefits will suffer) without taking such constraint into account.

Example: Special steel producers work with hundreds of various steel grades, which differ by their chemical composition. The chemical composition of steel is consequently a major constraint for them, with major impact on the planning of the entire material flow, which is significantly affected by the heat plan. If such a company would only consider the material availability and capacity, the plan would be insufficiently usable as a management material without further finalizing.

Working with specific constraints is not the only weakness of first generation APS systems. Let's

now call **demanding planning environments** such environments, where the first generation APS systems did not achieve very convincing results. Leaving the „subjective" aspect of the given case aside (given especially by the readiness of the relevant company for process changes, the quality of a specific APS product, and the abilities of implementation teams of the investor and the supplier), these will be manufacturing environments with the following characteristics:

1. High uniqueness

Environments, where besides the material availability and/or capacities, a major role is also played by other constrains. These are environments where the requirements on the calculations carried out by an APS system are so unique, that it cannot be reasonably assumed that it would be possible to solve them by parameterizing the planning algorithms the APS system is equipped with and therefore it must be possible to modify the planning algorithms or even create new ones. We thusly identified the first need related to demanding planning environments, which is:

⚠ **The need for ability to carry out significant modifications of the planning algorithms and/or to create new, specific algorithms**

Another complication occurs if the nature of the specific constraints requires more than one solver.

⚠ **The need for employing more than one planning solver in the plan/schedule calculation**

2. High Complexity and Scope

As a consequence of high complexity and scope of the environment, a need may arise to involve more than one planner (and thus for multiuser planning to be supported), especially when it could be hardly assumed that one planner would be able to orchestrate the full complexity and/or scope. This also applies if the planner brings a significant portion of specific information, abilities and know-how into the planning process (which could not be taken into account without this planner).

⚠ **The need for efficient involvement of multiple planners in planning**

3. Limited Ability to describe and Low predictability

The consequence of a limited ability to describe and of low predictability is necessarily increased amount of manual planning. The ability to achieve high automation level is thus limited and the planner's role increases, as does the number of the planning actions he/she performs. A need thus increases for an efficient support of the planner's activities with the emphasis on the customizability, dynamics and the efficiency of the planner's working environment.

⚠ **The need for highly customizable and efficient planner's working environment**

4. High Volatility and Change sensitivity

The result of high volatility and sensitivity to changes will be especially the need for fast replanning. However, fast replanning is conditioned by achieving a fairly high level of detail of the planning model (the ability to include specific constraints of the environment in the

model is needed here – see no. 1 above) and a high level of integration of the planning activities. In cases where besides this, a need exists for involving multiple planners, an ability to efficiently manage such team is needed as well.

⚠ **The need for high level of automation and integration of the planning process**

⚠ **The need for efficient management of a team of planners** (if dealing with a team of planners)

The table (2nd column) presents short comments on how the above-stated needs are addressed by conventional APS systems in demanding planning environments.

It seems the more characteristics of demanding planning environments (1 – 4) are bound to the given planning environment, the more limited results can be achieved in the given environment by deploying first generation APS.

NEW GENERATION APS AND APS DEFINITION UPDATE

Before we ask whether the needs of demanding planning environments can be satisfied, let's take a look at the definition of APS as it was presented in the introduction of this article. Let's see if it isn't appropriate to somehow modify the definition in the interests of the needs of demanding planning environments.

Let's assume that the world of APS will keep evolving and that APS will remain to be the term used for planning technologies which are now distinguished by their efficiency. However, in order for the term „APS" to continue to be used for the most powerful planning systems, it won't do without offering more than its first generation predecessors. We are convinced this has to be manifested in the fact that new generation APS should be able to provide really **efficient planning technologies even for demanding planning environments**. They should be able to provide technologies that satisfy the needs of demanding planning environments.

Besides that, we also believe the time comes for the generational changes to be reflected in the base definition of APS as well. We'll therefore attempt to present such updated draft now. Let's follow-up to the today's characteristic of APS from Wikipedia, and try to formulate the characteristics of APS systems of new generation. We propose the following:

> **Unlike first generation of APS, New Generation APS are supporting efficient planning and scheduling of demand fulfillment process, taking into account significant constraints.**

It looks almost the same, doesn't it? Yes, the definition above may look very close to the definition of first generation APS at first glance. Is there really a reason to speak about a new generation APS? Let's take a look at the meaning of the changes:

A) **Significant constraints** instead of **available materials and capacity**

We start from the end. The phrase **„plans ... available materials, labor and plant capacity"** is replaced by **„taking into account significant constraints"**. Although it could be said that material and capacities are constraints present in most manufacturing processes, many enterprises are also burdened by a number of other constraints, while some of them may be so significant, that unless they are taken into account during planning, they can render the resulting plan infeasible.

„Significance" is in fact a relative term. One cannot define objectively what is significant and what is not. However it is true, that the more perfect the planning result should be, the more complete set of existing constraints has to be considered, from the major to the minor.

B) **Efficient** instead of **simultaneously**

The word *simultaneously* really is a major characteristic of first generation APS. Still, it illustrates more of the technical side of planning than the value. It assumes, that planning in a way that considers the constrains simultaneously is a guarantee of the best achievable result.

Still, the goal is to efficiently create the most valuable plan. And other factors may help besides the way constraints are handled. Ways to more valuable results may, for example, lay in more efficient utilization of information resources, or in stronger what-if support, and so forth. But even if we'd look for an opportu-

nity to improve in the way how constraints are considered, strict adherence to the principle of simultaneous considering of constraints doesn't always have to lead to the best possible result – for example in environments with heterogeneous problems (problems that cannot be solved with simple applying of some of the known modelled methods), better results would be achieved by a solution based on several cooperating solvers and iterations, which also means suppressing the simultaneous constraint considering.

C) **Demand Fulfillment Process** instead of **production**

Although production often dominates the process of satisfying the demand, it is rarely the only factor included. In many enterprises, material needs to be purchased in the interest of fulfilling the order, as do semifinished products and various components. It is certainly clear that managing purchasing is different from production management, although both of these are closely related. In other companies, a significant role in demand fulfillment may be played, for example, by MTO construction and technology. Specifics like these may have a very important role affecting how efficiently the company can satisfy demand.

Compared to the preceding two changes, this may seem to be an almost formal modification, but nevertheless, we still recommend to relate APS not only to production, but to the demand fulfillment process.

Need of demanding planning environment	How the need uses to be addressed by conventional APS	How the need is addressed in *LOGIS New Generation APS*
⚠ **Ability to carry out significant modifications of the planning algorithms and/or to create new, specific algorithms**	☹ Modifying algorithms or developing algorithms is usually not possible.	☺ **LOGIS Advanced Customization** allows modifying algorithms, or even developing own algorithms – the planning software itself contains the needed development environment. Using this method allows achieving a very detailed and realistic planning model (all at once or by gradual development steps).
⚠ **Employing more than one planning solver in the plan/schedule calculation**	☹ Such ability is not common, APS systems use to have a single solver suitable for solving only a specific type of problems (e.g. planning material and capacity according to their availability).	☺ **LOGIS Collaborative Planning Solvers** is a concept enabling cooperation of a larger number of various solvers on solving a planning problem, however different they may be.
⚠ **Efficient involvement of multiple planners in planning**	☹ If the APS does allow for multiuser mode, it usually leads to hidden conflicts in planning and thus to reducing the plan value.	☺ **LOGIS True Multiuser Planning** prevents hidden conflicts from emerging – is able of identifying and resolving conflicts between planning sessions of individual planners.
⚠ **Highly customizable and efficient planner's working environment**	☹ Customization (of the given installation or planner's) uses to be limited to parameterizing. A significant modification of the tools or even building in additional individual tools is usually not possible.	☺ The technologies of **LOGIS New Generation Planning** provide planners with a customizable and highly efficient working environment, a tailor fit for the needs of each planner.
⚠ **Ability to achieve a high level of automation and integration of the planning process**	☹ In demanding planning environments where a single planning product cannot suffice, the concept of building a planning system from several specialized planning and/or scheduling products is used; however, this concept is limited significantly by the achievable level of automation and integration.	☺ The technologies of **LOGIS New Generation Planning** allow developing planning software with the ability to achieve a high level of automation and integration. An example of such application is **LOGIS Production Planner**.
⚠ **Efficient management of a team of planners**	☹ Conventional APS systems simply did not address managing teams of planners in any way.	☺ **LOGIS Team Planning** supports managing the activities of a planning team, including supervision and evaluation of the work of planners.

Comparison table

Planning technologies and their sufficiency for efficient management

As mentioned above, deploying first generation APS in some environments resulted in good or event excellent results; in other, however, the results were not so convincing. In this sense, we demonstrated the major importance of how demanding is the given planning environment.

Let's try to make a simple comparison of the *value of planning technologies* depending on the *demands of the given planning environment*.

As we stated above, **demanding planning environments** are characterized by the following attributes: uniqueness, complexity, scope, volatility, change sensitivity, predictability, ability to describe. Let's also assume, that for the purposes of this article, the 0 coordinate on the planning environment demands axis will be related to an environment, where only capacity and material availability is sufficient to consider to achieve a very realistic planning model (note: the degree of how realistic the model is represents a limitation of the achievable quality of the plan for the given planning system).

Let's now take a look at what we will consider to be a value for management purposes when comparing planning technologies. For our purposes, we propose the value for management purposes to be comprised of the following aspects:

- **Feasibility** of the plan that we can acquire using the given technology

  If the plan can be realized in all its details (regardless how advantageous it is) without any objective facts standing in the way, it is fully feasible. The more details of the plan cannot be realized due to objective reasons (e.g. due to too large capacity overload in some moment in time), the less feasible it is.

- **Advantage** resulting from using the plan

  The degree of how advantageous the plan is relates to how the plan makes use of the objective facts in the given situation in order to meet the goals of the company in the most efficient way (in the given case, the best possible customer service and the best possible operational efficiency).

- **Sufficiency** of the given technology for creating the plan

  Sufficiency increases with our ability to manage with the results acquired using the planning systems without the need to further finalize them outside the system (e.g. manually, using Excel or other tools, ...).

Let's start with the **MRP II** concept (Manufacturing Resource Planning) used practically in every today's ERP system (a system supporting the corporate administration). The value of MRP II is limited by often very low feasibility (not respecting capacity availability or planning into the past) or by limited advantage resulting from the plan (MRP II considers no viewpoints of how advantageous the plan is when planning). Consequently, MRP II is sufficient only for an enterprise with a very undemanding planning environment, which is, in addition, under no noticeable competetive pressure. As soon as the environment complicates even by the simplest thing, the value of MRP II for the purposes of planning decreases rapidly; plans have to be finalized laboriously, in most cases using table calculator tools. Already in planning environments with average complexity, the value of MRP II is very little and speaking of a value of MRP II in really demanding planning environments practically loses any sense.[1]

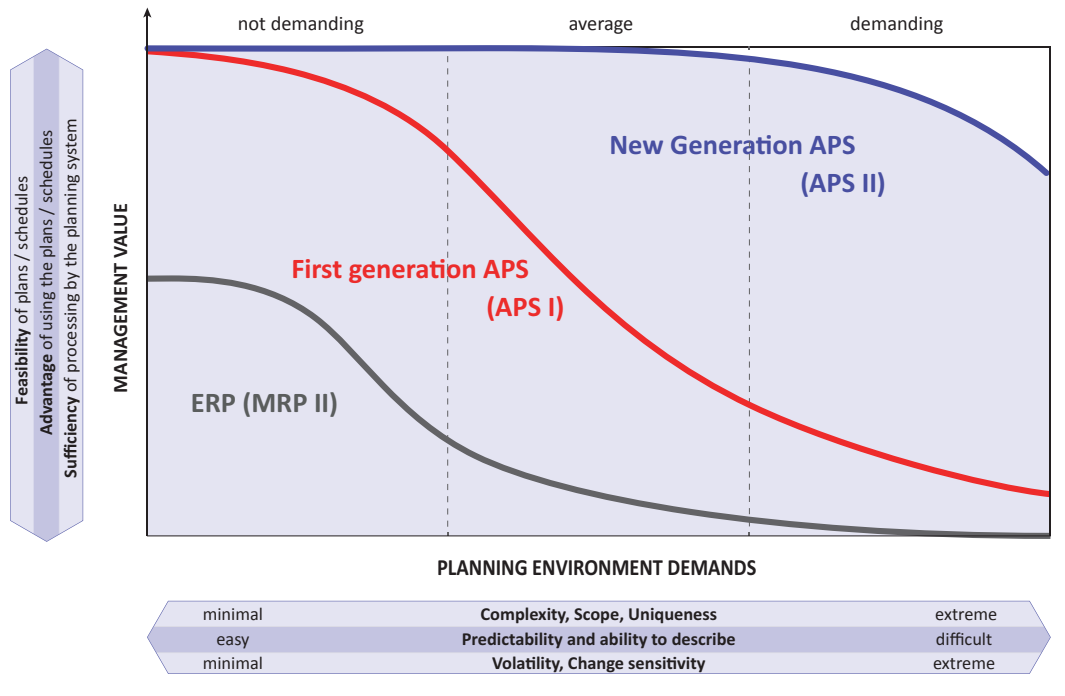
First generation APS (further also **APS I**) deals incomparably better with undemanding planning environments. Thanks to its characteristics, in 0 on the planning environment demands axis, it can reach the full management value. As the environment demands increase, meaning as demanding attributes come into effect (uniqueness, and so forth), APS I starts to lose value. This is caused by the fact that APS I is not able to deal with demanding problems – it uses to be blind to unique constraints, insufficient in environments with high complexity and scope and so on (see comparison table, column „How the need uses to be addressed by conventional APS"). The value of APS I thus declines rapidly as we get closer and closer to the really demanding environments – such environments, where the demanding attributes apply strongly or even extremely.

The value of new generation APS (further also **APS II**) will be very high. Because of the fact that APS II is able to consider almost all attributes of demanding planning environment uniqueness, complexity, ...), it will provide the higher value the more other technologies lose in the given environment. Naturally, this will result in only small differences in undemanding environments, but as the environment demands increase, the difference between other technologies, including APS I, will increase significantly. APS II will thus be the only technology able to provide outputs of high value even in demanding planning environments.

Note: Let's note, that the only attribute APS II doesn't satisfy is the insufficient ability to describe. Understandably, that cannot be considered to be a drawback of the given technology. Describing constraints in any environment is something a human must do. And so even our own practical experience shows that people are not always able to sufficiently describe the rules present in the given environment. It may be difficult to get the needed information in the given enterprise (more people would have to meet that have the needed knowledge but may not even know about each other) or such information simply does not exist yet in the company (the knowledge is insufficient, the given matter is a black box).

But since we are speaking about manufacturing enterprises, we're assuming that the unknown is limited, even in extremely demanding environments – that is also the reason why the blue curve in the diagram does not decline to zero in extremely demanding environments.

Take into account that this diagram is based on no exact values and is only approximate based on the above described abilities of planning technologies, illustrating the sufficiency of their usage for management purposes. The variables (value for management, planning environment demands) are not exactly measurable and can only be used to compare the lower/higher, more demanding/simpler levels and so on. Let's also note that the specific planning products can provide different value in their categories (MRP II, APS I, APS II).



[1] We won't further analyze the reasons why MRP II failed to fulfill its historical role despite its noble goals. Let's just state that the list of material and capacity needs takes place separately, limit of the real capacity available is ignored in most cases and the systems often do not hesitate to plan into the past and the SQL technology used to manipulate with the data is absolutely unfit for the intense calculations with very large data at once: this results in plans which are not feasible and it often does not even have sense to attempt to use them as a basis for further finalizing.

LOGIS NEW GENERATION APS

In recent years, the LOGIS company focused on developing planning technologies, that are well usable even in demanding planning environments. Not only did we develop these technologies, but we also applied and proved them in practical use – the largest deployment of **LOGIS New Generation APS** is at TimkenSteel. TimkenSteel is a special steel producer – and undoubtedly operates in a demanding planning environment. In the past, TimkenSteel used to run an A-grade first generation APS. We thus had a very good opportunity for comparing the two generations of APS technologies (which was even more special thanks to the fact that Timken's team in our project comprised of the same people that used to work with the preceding system). The results are very convincing (see article „New Generation Planning at TimkenSteel" in this issue).

You can get a rough idea about **LOGIS New Generation APS** by taking a look at the following table and by comparing it to what the conventional APS systems are able to offer to demanding planning environments.

We are pleased we've been able to develop technologies thanks to which even **companies with demanding planning environments** can increase the efficiency of planning their order fulfillment process and thusly improve their **Operational Excellence** and **Customer Service**. LOGIS New Generation APS represents planning technologies that are significantly shifting the boundaries of what planning software can offer to companies to increase their competetiveness.

Order Promising

Ronald K. Host, Manager, Demand Planning and Fulfillment, TimkenSteel
Stacy R. Adamski, Demand Manager, TimkenSteel
Zbynek Ondryas, Senior Solution Architect, LOGIS

Our new order promising process is designed to provide stable quality of results in various business conditions with focus on the three basic areas:

- Maintenance of sales reservations
- Promising workflow
- Info-service support

New order promising process supports primarily order promising team which is responsible for promising orders, but provides support also to customer relationship managers who declare inputs and requirements from sales departments.

Very important part of new order promising process design and implementation was related to tight integration and consistency with other related company processes.

MAINTENANCE OF SALES RESERVATIONS

There are multiple reasons why it is important for our company to reserve production capacities through product groups for specific business segments, divisions or even customers. Those reasons are related to our strategy in different market segments, long time relationships with customers and profitability of our production. Reservations also enable to propagate our master plan into the order promising process. This should allow us to declare for sufficiently long time period what, where, when and for whom we will produce.

Sales reservations are declared in three dimensions: product – customer – time. There is a hierarchy declared for each dimension. This allows us to declare the level of detail for sales reservations that we want to maintain and very high flexibility in visualization, utilization and reporting related to sales reservations.

We utilize several basic options for sales allocation maintenance:

- mass-update of sales reservations based on the latest master plan: this scenario is utilized for extension of order promising horizon covered by sales reservations and for update of already declared sales reservations due to the modified master plan
- tuning of specific sales reservations: this scenario is used mostly by customer relationship managers for tuning of already declared sales reservations within selected business segment

Maintenance of sales reservations allows us to assure that their definition is consistent with our company directions in sales as well as with our production capabilities.

PROMISING WORKFLOW

There are several promising workflows supported within new order promising process. Those workflows cover typical requirements like

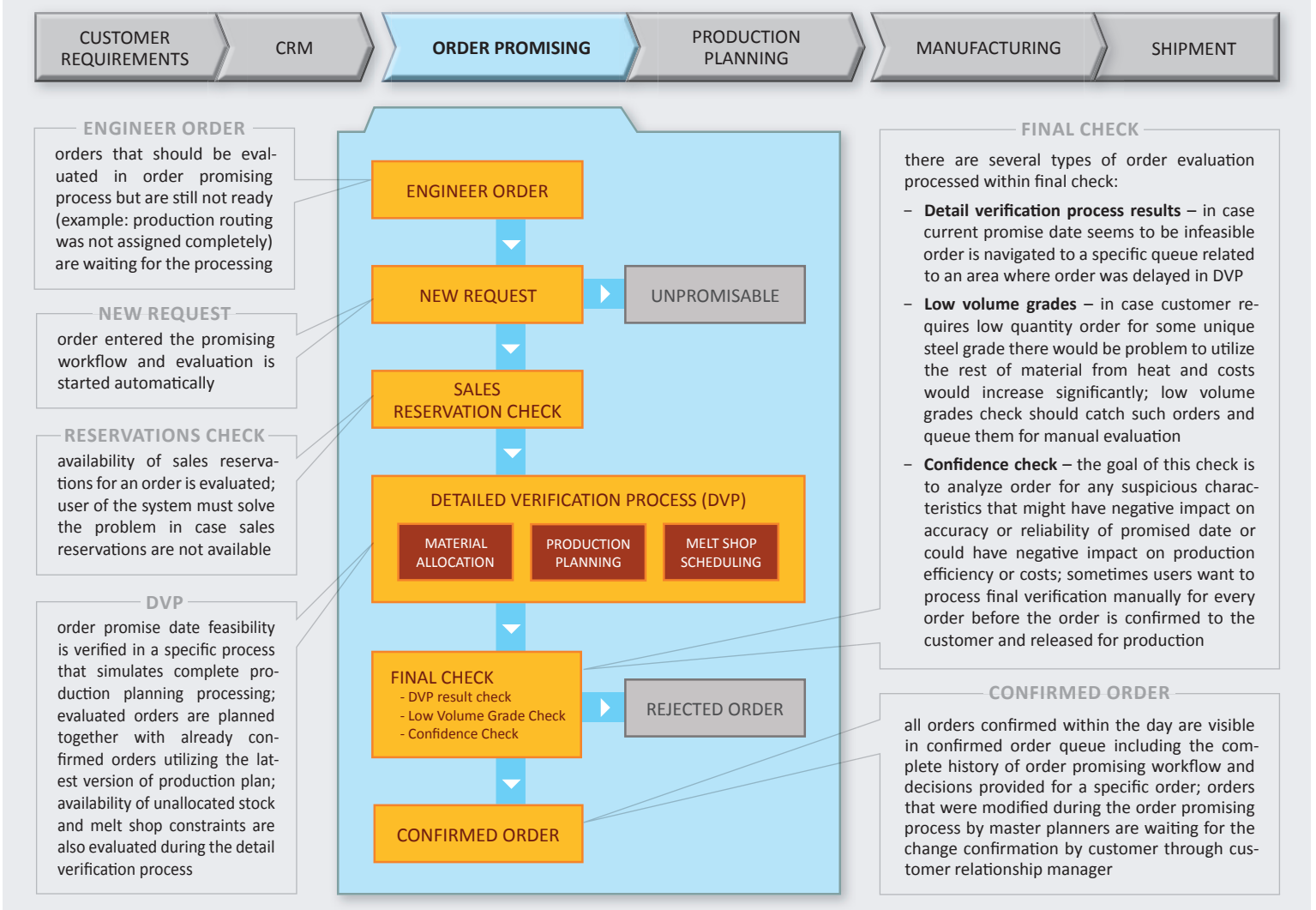
- **Request for proposal**
  - several scenarios for evaluation of request for proposal are available
  - specific scenario is selected based on the level of detail provided by the customer, time available for reaction or type of product required (already produced product vs new product)
- **New customer order**
  - new order promising is the core of order promising process
  - promising workflow is designed for highly efficient, accurate and reliable evaluation of new orders
  - efficient communication of order modifications proposed by master planners to customer relationship managers is also important part of the workflow
- **Changed promised orders**
  - customers relatively often ask for changes on order that was already promised and confirmed for production
  - one scenario is designed for fast change of order attributes that are changed most frequently like due date or volume; change can be done for single order or set of selected orders
  - the second scenario supports orders swap; pulling in orders into already fully loaded capacities could be done only when some other orders of similar characteristics are releasing necessary capacities

Most of the requirements initiate complete promising workflow that is visualized on the picture.

HIGH LEVEL OF INFO-SERVICE FOR CUSTOMERS

Customer relationship managers (CRM) are key contact persons to customers so they have to respond to many questions or requirements from customers regarding future, current and historical demand. CRM should be also pro-active and should inform customer that there is some serious problem with an important demand order to negotiate possible solutions on both sides. Availability of up-to-date and complex information provided in form that could be easily utilized by customer relationship managers is very important for efficient and accurate communication with customers. This should cover info-service in any stage of sales process from request for proposal through order promising to readiness for shipment.

It is also important to have some environment that would improve significantly the communication between sales department and demand fulfillment department, especially in situation when business conditions are unstable.



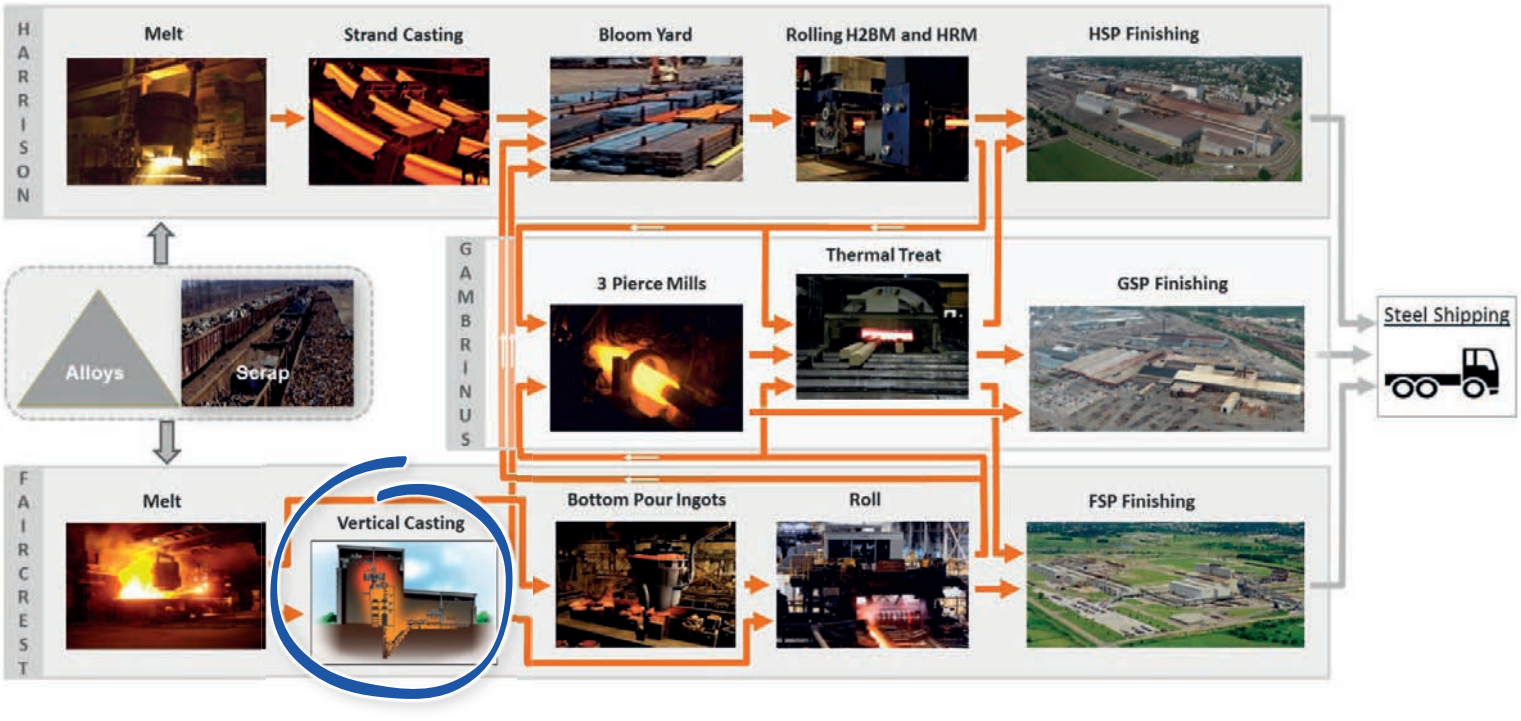
Order Promising workflow

Current Activities

William J. Kerr, Project Manager,
Supply Chain Systems, TimkenSteel

Finishing the project doesn't mean that our team stopped seeing or hearing from each other. Our currently largest investment is the jumbo Vertical Bloom Caster, which will become a part of our capacities in Faircrest. TimkenSteel now finishes preparations for launching this new facility, which is planned for this year's August.

It is obvious that introducing such facility into operation is related to a need of significant modifications of the planning system. Most of the new understandably relates to the steel mill, meaning the assembly of the plan of heats and schedules for the steel mill in Faircrest. Due to the fact that our planning system is a very strongly integrated component, the works have a strong influence on the management of the entire material flow (line balancing), and of course also on material allocation.



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