

## Advanced Planning and Scheduling

Advanced Planning and Scheduling (APS) has been a buzzword in the ERP scene for a number of years. proALPHA<sup>®</sup> demonstrates how APS should be applied by production planners and process engineers and why set goals can only be achieved through tight integration with ERP.

Production planning departments have worked according to the same MRP philosophies for the past thirty years. Everyone agrees these are no longer adequate for today's business environment. Increased demand for customisation and shorter lead times are conflicting goals in reducing inventory and optimising capacity utilisation. System based constraints prevent optimal planning.

Almost all manufacturers see these problems. There are cures available for some individual symptoms, but existing approaches cannot offer a comprehensive solution.

### What is APS capable of?

APS plans completely. Existing systems, including Manufacturing Execution Systems (MES), define routings to manufacture a component as a pre-defined sequence of operations. With APS, we will be looking at order networks. The process of manufacturing a component does not have to be a sequence. APS uses the concept of multi-resource planning. That is, all the resources needed for the production of all orders over the entire planning horizon are taken into account. The different planning phases of MRP and MES are performed in one single planning step.

This sounds simple and logical but requires a complex and collective planning. Resources such as employees, machines, tools, materials and transport equipment involved with one order within the planning horizon have to be assigned to that order and considered when planning all the steps of another order that is competing for the same resources. This results in a considerable decrease in "priority" orders. Even rush orders can be processed in the normal production cycle without a panic.

### Fast and correct delivery information

Sales and production managers find the ad-hoc information on promise dates to be most useful. The fact that the APS server holds the entire order network in memory enables every query to be answered rapidly and reliably after checking all resources for availability and reserving them for the expected order. This process includes all orders and all business processes- even the delivery date of required purchased parts is taken into account. Planning is carried out within order networks, not in discrete production steps.

If the order cannot be completed on time because one or more required resources is not available, the system will calculate the earliest delivery date possible, and, this date can be met. Humans not computers still make the final decisions and the APS planner has different approaches at his disposal to resolve delivery issues. For example, allocate overtime to one manufacturing process and observe the influence it has on the entire production chain and all orders in progress. Now you can avoid that costly extra shift to complete an operation or that backlog of assembly components waiting for two days because of a capacity bottleneck.

## **Real APS has to be an integral part of the ERP system**

APS is much more than just elaborate planning. APS influences other functions within the business, like material management and order entry and how purchasing acquires parts. It is not possible to see APS as a separate module. Planning algorithms have consequences for other modules and, in the end, affect the goals of the entire enterprise. Goals and objectives can be defined that restrict use of resources. Depending on the specific conditions, run times and delivery schedules can be planned to optimise the downtimes of individual machines. All of these improvements are made possible by the loose linkage of product to process structure. It is not optimisation of single process steps but the optimum co-operation of the entire production process, including all resources and all production steps.

The close integration required with many other functions within the enterprise cannot be achieved by means of plug-in specialised solutions. Those ERP systems without an integrated APS may find a plug-in module able to provide more detail but certainly not able to improve the basic system which makes the data available. If the planning model in place is based on MRP, data structures might not match and the access to and storage of the modified data into the planning logic will not be possible. In addition, the batch-philosophy of these other systems precludes real-time data and complete data transparency.

## **Who effectively employs APS? Who can gain most from using APS?**

Make to Order manufacturers have been searching intensively for years for a way to improve capacity planning to ensure more efficient and faster production. Today, even repetitive manufacturing demands a faster and more flexible response to customer requirements. Production planning is now a differentiator. Technologically less complex products now have to compete and find an edge over competitors in the market. They can win if they can deliver the goods faster and are more focused on their customers' needs. Inevitably, repetitive producers will have to develop strategies that permit them to plan at least some of their operations based on order requirements. An integrated APS function helps them; just as it helps the make to order company, achieve this aim.

## Case Study

### Tools and Services

#### **proALPHA® - Multiple Resource Planning and Real Time Optimisation**

#### **WOLF Group's Successful Implementation of Advanced Planning and Scheduling**

#### **Background and Customer Profile**

Founded in 1985, WOLF Group's original focus was the design, manufacture and sharpening of custom made solid carbide cutting tools, particularly complex milling tools, in lot sizes from one to several thousand. From a single company the WOLF Group has expanded to four separate business units: WOLF Tool Technology (its oldest business unit and core revenue generator), WOLF Coating Technology, WOLF Moulding and Tool Manufacturing and WOLF Information Systems.

Back in 1999, the German trade magazine IS Report visited the WOLF Group to report on the successful implementation of their newly acquired ERP System. WOLF had installed proALPHA® throughout what was already a well-structured organisation. WOLF's processes have to be lightning-quick given that orders often move between several WOLF subsidiaries before completion. Even though all WOLF companies maintain separate financial entities, they are all running on one, single proALPHA® system. In order to minimize administrative tasks, all inter-company transactions such as shipping, receiving, invoicing and work order transfers between business units, are paperless and fully automated.

Since then, WOLF's technological infrastructure and organisation have evolved and expanded considerably. Although WOLF achieved immediate major benefits from implementing proALPHA®, they still struggled to find ways to efficiently manage resource utilisation across the enterprise. They viewed this as their most critical business "pain point"; one that directly affected their ability to cut costs, reduce order lead-times and improve overall customer satisfaction.

Entering new markets is not a new concept for mid-sized companies striving to maintain and create new competitive advantage and grow their businesses faster than their rivals. At the same time, investments in advanced capabilities and leading-edge technology are equally important as contributing factors in reaching those goals. Few companies have combined these strategies and goals as efficiently and successfully as the WOLF Group against a background where each WOLF company inherited responsibilities, tasks and customers from their previous company framework during a time of innovation and expansion.

#### **The Solution: proALPHA® Advanced Planning and Scheduling (APS)**

As a result of proALPHA and WOLF's tight partnership a joint project was created to evaluate how WOLF could achieve their most important strategic business goals. After reviewing all the potential options and impacts, it was determined that implementing proALPHA's Advanced Planning and Scheduling (APS) system would be the perfect solution to provide the tangible results WOLF was striving for - to dramatically improve their resource utilisation and further reduce production throughput time. Given that APS with its Multi-Resource Planning and Real-Time Optimisation would increase the speed of producing and coating complex tools, WOLF was eager to take advantage of this new technology and planning philosophy as quickly as possible.

proALPHA has replaced WOLF's MRP II based planning system (that has been the basis for planning and scheduling in almost all manufacturing systems for the last 30 years) with APS. Companies using APS can accurately plan **ALL** those resources involved in producing their products in real-time and on an ad-hoc basis. Since WOLF generally takes orders with short lead times and small lot sizes down to one, and with unique configurations, the planning methods used in other systems didn't support their unique business environment. WOLF's production schedulers have to be able to plan new orders or change current orders quickly and flexibly without bringing the entire order flow to a standstill. In addition, WOLF cannot afford to resolve increased customer demand by adding extra shifts or expediting on a regular basis, because that would increase the cost and ultimately the price of their products. Horst Wolf, Managing Partner of WOLF Group, summed it up by saying; "I need exact schedules right now, not in three days. I don't have a big team in the company that can manually create these results."

The multi-resource planning capability of APS provides realistic production schedules. APS not only schedules machines and their operators, but also incorporates an operator's skill profile for performing specific functions. After all, you cannot maintain an effective schedule across three machines if there is only one person qualified to set them up. Nor does it make sense to pull out all the stops to push orders through production as quickly as possible if they are going to end up sitting on the loading dock for days because the shipping schedule was not included in the overall production strategy. This could then require making special deliveries or delaying other orders on the schedule, which exposes you to the risk of increased costs, decreased profitability and reduced customer satisfaction.

APS factors in **ALL** company resources and enables you to re-schedule **ALL** operations of **ALL** current orders when any change or shift in priorities occur. With APS, it is possible to quickly give a capable-to-promise/available-to-promise date to your customer. It is even possible to re-schedule all the orders in real-time if planners have to make room for urgent priority orders. "However, that doesn't mean that we've stripped our foremen or production managers of their responsibilities," noted Gunter Jung, CEO of the WOLF Group. "They have to be able to react to minor problems independently. Using APS enables you to plan to a high degree of accuracy - 90 to 95 percent in our case. The resulting "buffer" still leaves our employees considerable room for optimisation in a manageable area."

### **Manufacturing Planning: Where does the data come from?**

Since planning according to the APS philosophy is different from conventional planning, data structures have to be designed and configured differently. WOLF's database was already well maintained. Their routings, production times and other master files were accurate, current and complete. WOLF had only to split some operations and then associate all necessary resources.

In workshops with supervisors, shop floor employees were grouped according to similar qualifications and work schedules. Similar machines were grouped and rules for individual operations defined. For example, the scheduling system has to consider characteristics such as the relationship between the number of employees in a shift or on a workday and maximum production lot sizes. Now, capacity planning could correctly consider the low-manpower and operator-less shifts of the CNC grinding machines with loader technology that WOLF uses. The planning system can reserve a resource from a group and assign it to individual orders. Existing routings were converted in an almost entirely automated process.

To make the transition as smooth as possible, WOLF arranged for APS to be running in the background while the “old” system continued to handle day-to-day operations. The planners consulted the APS results to maximise the use of bottleneck capacities. Even at this early stage, it was clear that APS worked and areas where further fine-tuning was possible became apparent.

Horst Wolf noted, “With APS the structure of the entire company improves. The goals and requirements of so many certification processes can now be realised because all of our data and information has to come from our organisation - and that means it has to be structured for APS. You could almost say that if you work with APS, you are structured for the future.”

### **Investments have to pay off:**

WOLF did not decide to implement APS because it was fashionable, a current trend to follow, but because it made business sense. The goal was to simultaneously increase customer satisfaction and reduce costs. WOLF receives five to ten requests for a quote each day. While cost is important, most of them focus on the delivery date. “Our customers often order tools only after they themselves have received an order from their customers. In that situation our ability to quickly make an accurate delivery date commitment is critical for achieving customer loyalty. If it takes us three days to provide customers with a quote, they've probably already gone to the competition. That would be a real problem for us. Also, if we don't deliver on time, then our customer has a serious problem,” explained Frank Stenzhorn, Operations Manager at WOLF Tool Technology. “APS enables us to calculate an exact delivery date.”

“Depending on product complexity, a capable-to-promise enquiry takes between a few seconds and one minute. We can now handle critical requests for quote with confidence,” explained Mathias Schmidt, CTO of WOLF Group. “If a customer can't accept an eight week delivery deadline, we can now find out whether we can deliver in five weeks. It takes us a few seconds to see how other orders that are competing for the same resources would be affected. It gives us all the information we need to make the most informed decision, including the impact on cost.”

Apart from satisfying customers by providing the best possible delivery dates, WOLF is also focusing on cutting costs. Instead of buying new machines, APS will help Wolf become more efficient by “fine tuning” the organisation. “Thanks to this tool,” said Frank Stenzhorn, “we can accept more orders without adding staff or purchasing more machinery. We increased our capacity utilisation with a minimal investment. Although we were already good, I am expecting a productivity increase of five to ten percent.” Horst Wolf noted, “At an early stage, it became clear that shop floor employees would benefit from the new system as well. With higher utilisation and less disruptions, our performance based incentive system enabled them to make more money. We are certain that this project will achieve a positive ROI in less than a year.”

### **Is APS for everybody?**

At first glance, APS seems to be most useful to companies that manufacture to order in small quantities. Typically, most repetitive manufacturers have already optimised their processes fairly well. However, they can still benefit enormously from the ability to schedule reliably and synchronise simultaneous production processes. Furthermore, external resources, such as purchasing parts and cooperating with suppliers, can be planned as an "extended workbench" more reliably, timely and easily.

**The Result: In becoming faster and more efficient, WOLF achieved Successful Cost Reductions and Improved Customer Satisfaction**

With the partnership and help of proALPHA, WOLF Group's decision to switch to APS has proven successful and enabled WOLF to improve its market position, in part through its products and in part by offering new and better services. "We have been able to reduce costs significantly by improving the utilisation of our expensive resources. APS has improved our customer relationships by 100% enabling us to show customers that we plan intelligently and meet our deadlines. When we supply them with a quote, we already have their order scheduled. In the tool manufacturing industry that boils down to one thing: saving time and money." "And that," summed up Gunter Jung, "is a good survival strategy in a very competitive market."