

# White Paper Planning & Scheduling

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Thank you for downloading this white paper.

Planning and scheduling is a topic that concerns and affects many companies. This white paper will help you to better understand what planning and scheduling is, why these two processes are so important and critical in many industries and how they can quickly become a valuable asset to your company.

This white paper is based in part on ***“The Little Blue Book on Scheduling”*** written by Mike Liddell, an expert in planning and scheduling theory and implementation. It includes selective extracts from the book (chapters 1, 2 & 3) as well as a variety of other information including a number of success stories from a wide range of manufacturing sectors.

***“The Little Blue Book on Scheduling”*** has become the pocket bible for planning and scheduling. If you are interested in purchasing the book please click on the link below.

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## About Preactor International

Preactor International (PI) is an independent company whose headquarters are based in the UK. PI has been providing planning and scheduling solutions for more than 16 years. The company was formed following a management buyout from its parent company, BTR (now merged with Siebe and renamed Invensys) in 1993. Its founders, CEO, Mike Novels, Technical Director, Graham Hackwell and Finance Director, Zena Wren are still at the centre of the group with employees located in the USA, Asia and Europe.

The company is consistently profitable, does not rely on external funding or support for its growth, and has the largest install base of any of its competitors around the world (more than 3,000 companies).

Preactor is used by small, medium sized and large corporations. It has a family of solutions that offer different feature sets and have appropriate price points. So there is a solution for every company no matter what the size or complexity of the planning and scheduling problem.

Preactor International works with an extended network of more than 400 partners and resellers around the world, implementing solutions locally and managing world-wide company roll-outs. Preactor has also been translated into more than 30 languages.

Preactor has been the recipient of several awards, specifically for its ability to cover many different types of projects, from simple scheduling rules, to more complex environments such as aerospace, pharmaceuticals, food & beverage and machinery.

The current trends in manufacturing are leaning towards lowering inventory levels to reduce costs yet still be able to respond to shorter lead times to satisfy customer demand. This conflict in objectives forces companies to find ways to optimize production operations, reduce or eliminate non value added activities such as setup and waiting time, and highlight potential problems in advance so that action can be taken to balance demand and capacity. Recent independent studies have shown that „Best in Class“ manufacturing companies looking to reduce costs are using lean scheduling software often linked to ERP and real time data collection systems to meet their objectives of on-time delivery performance >95%, increased throughput by 92% and reduction in manufacturing cycle time by >79%.

Preactor solutions provide lean planning and scheduling software and are helping companies to reach „Best in Class“. Preactor has been integrated with the majority of ERP systems available on the market today, including various certifications with the principal ERP & MES solutions.

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## Introduction

My name is Mike Liddell, and I am the CEO of Lean Scheduling International LLC. Since 1990 I have devoted all my time to helping my clients solve their planning and scheduling problems.

I make no apologies for the passion that I bring to the subject of scheduling. It appears to me that the world is moving faster every day and that this is the great challenge faced by manufacturers in the new century.

The bulk manufacturing of commodity items to a large extent has moved offshore, so I have come to the conclusion that the future of manufacturing in the U.S. and Europe belongs to those companies that are built to handle change. Manufacturers in the future must consistently process change quicker and smarter than their competitors. I believe that the best way to do this is by building better planning and scheduling systems.

It is fair to say that I have been significantly influenced by the writings of Eli Goldratt as laid out in “The Goal” and “The Theory of Constraints”. I feel that Goldratt has done a great job helping people to understand the nature of capacity constraints. Goldratt’s ideas have paved the way for new technologies that are capable of delivering very creative and exciting solutions to problems that have plagued manufacturers for years.

I admit that I have spent many years battling the teachings and the far-reaching influence of APICS (now known as the Association for Operations Management). I am convinced that, despite their best intentions, when it comes to production planning and scheduling, APICS has been slow to grasp the real issues. I strongly believe that most of the ERP systems in use today do not have the tools or the technology required to manage finite capacities. The good news is that, in most cases, these capabilities can be easily added to any ERP system so there is usually no need to “throw the baby out with the bathwater.”

I think that the APICS approach to managing change has often been too rigid and structured. There is no doubt that ERP systems can turn into monsters that need more and more data. One of the basic premises of this book is that most ERP systems were designed to address the needs of the make-to-stock (MTS) manufacturer but many businesses are now moving to a make-to-order (MTO) model.

I will argue that the needs of the make-to-order manufacturer are very different and that generally there is a growing need to be more agile and lean. This can only happen if production planning and scheduling systems can handle cause and effect. Without this capability a company will never have the information needed to make smart decisions about their capacity.

A repetitive theme of this book is the observation that by stripping away the buffers of excess time and inventory we start to expose some major limitations of ERP systems. Put simply, make-to-order manufacturers are in the business of managing and selling their capacity, which means that they need a better set of tools than most ERP vendors are providing them today.

By reacting like Pavlov's dog to the squeaky wheel, make-to-order manufacturers can easily clog up their plants with low priority orders so what they need is better ways to help them prioritize their work so that they can concentrate on servicing their key customers.

Everywhere I look I see companies who do not take steps to address this issue starting to lose their key clients. I can guarantee that losing key clients will have a significant impact on their bottom line. This book is all about helping those companies and individuals who recognize the problem and who want to know how to fix it.

## Preface

This book is written for those who work in today's manufacturing industry and who struggle every day building better, faster, and more innovative products while trying simultaneously to reduce their costs.

Companies compete because they have no choice and the reality is that ultimately competition produces winners and losers.

Competition is what threatens our jobs and security, but it is also the driving force behind innovation and progress. This book shows companies how they can, and in fact must, compete if they want to win.

In today's shrinking world, competition can come from anywhere. For larger, established manufacturers competition comes from smaller more nimble companies. For all U.S. and European companies competition comes from low cost emerging nations such as Mexico, China, and India.

This book talks about change, not only how it impacts businesses every day, but also how the rate of change will continue to increase as it has done for the last 100 years or more. My intention is that after finishing this book, the reader will understand how to manage change so that it becomes a competitive advantage.

Given enough time anyone can create a great plan, but the reality is that most plans are obsolete before they leave the drawing board. Mike Tyson, surprisingly enough, says it best, "*Everyone has a plan until they get hit!*" A great plan isn't good enough; a better process is also needed, a process that is able to react systematically, intelligently and quickly to the barrage of changes coming from the market, from suppliers, and even from the activities within one's own organization.

Lean manufacturing has provided a mechanism that can help smart companies become more nimble by reducing non-value added processes. One of the biggest non-value added components can be found in excess inventories of finished goods, sub parts and raw materials.

By manufacturing only what their customers have ordered, companies are suddenly faced with the startling realization that they no longer have any buffers to hide bad decisions. Changes have an immediate and cascading effect and they don't have the data they need to make intelligent decisions about what they can and cannot promise their customers.

I would like to apologize in advance for the incessant use of acronyms such as MRP (Material Requirements Planning), ERP (Enterprise Resource Planning) and CRP (Capacity Requirements Planning). For better or worse these acronyms are used throughout the world and are part of the everyday language of manufacturing.

Having said that and at the risk of confusing readers even more, I use the terms scheduling, finite scheduling, and APS interchangeably. APS is an acronym for Advanced Planning and Scheduling, and in most cases it is just a fancy name given to finite scheduling software.

The last point I want to make at this stage is that this is not a book about lean manufacturing; however I must point out that, contrary to what many lean experts think, APS systems are an excellent tool for those who want to reduce waste.

## Chapter 1

### Understanding the limitations of ERP

I would imagine that many readers of this book have been through the acquisition and implementation of one or more ERP systems. ERP vendors will confidently assert that their system will do anything and everything except maybe make the coffee. *I know this first hand because I was one of those making that presentation.* These claims are usually not made with the intention of misleading anyone but with the honest belief that they are accurate.

In my defense I started to ask questions or more accurately my customers started to ask questions that sent me on a path of discovery that was reinforced after I read a book called “The Goal” by Eli Goldratt.

My Eureka moment came back in late 1990 when I finally realized that there was no way on God’s Earth that ERP systems could actually do everything managers and executives expected them to do. I immediately resigned from the ERP software company I was working for and started my own business that was dedicated to helping companies overcome the scheduling limitations of their ERP systems.

This Eureka moment presented many challenges. First of all my conclusion was very different from what APICS was saying and some APICS members would get almost violent if anyone had the nerve to disagree with them. In fairness to APICS they have slowly softened their opinions over the last few years.

In the early years a gap existed between understanding the problem and knowing how to fix it. Early solutions were only partially effective and it was hard to convince people to take a chance. Currently this is no longer the case and there are a few powerful software packages that can be customized to fit the needs of companies small and large. This is, however, not an easy task. Saying that finite scheduling is just another software module is like saying Tiger Woods is just another golfer, Michael Phelps is just another swimmer, and that the brain is just another body part.

Implementing a finite scheduling module is similar to going on a blind date and finding that the date is a beautiful woman. So you fall in love with her and after the wedding you discover that she is an heiress worth millions.

What I am saying is that the most powerful long-term benefits of an APS system may not be initially apparent.

For clarification purposes: Manufacturers almost certainly need an ERP system. ERP systems do a fantastic job of creating transactions, storing data and instantly sharing information. Companies who are smart enough to adapt them by building smart customized processes around them are able to achieve astonishing results.

The temptation for companies to throw out their current ERP system and put in a new one should be the last resort. If they are not careful they will spend large amounts of money only to end up years later with the same problems. This does not even take into consideration the time spent by employees and the frustration and confusion experienced by their customers. Many companies never recover from this. There is often a better alternative. If business problems are related to poor customer service, poor on-time deliveries, the loss of key clients, and the frustrations of long lead times then there is definitely another path that is much simpler, much less expensive, and much more likely to produce results.

Without going into too much detail, this book explains some of the surprising limitations of most ERP systems and what to do about it. The next chapter journeys through the evolution of ERP systems and in very simple terms explains how they work and why they are limited. It will be evident that these limitations are inherently built into most ERP systems on the market today. Although these constraints impact most companies they can be debilitating for the make-to-order manufacturer.

This book provides alternatives to companies who think that they must replace their existing ERP system. Those who recognize the importance of keeping key clients happy and winning new clients will see how to turn change from a problem into a competitive advantage.

## A simplified history of ERP systems

Before ERP there was MRP. MRP stands for Material Resource Planning and was popularized in the 1970's by Ollie Wight. MRP was nothing more than a technique for exploding a multi-level Bill of Material (BOM) to determine the materials a company would need to purchase or the sub parts they would need to make in order to manufacture a finished product.

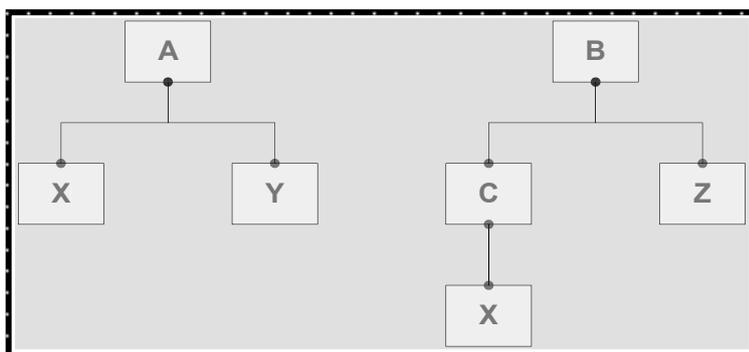
The intent of this chapter is to give readers a thorough but simplified understanding about the basics of Enterprise Resource Planning (ERP), Materials Requirement Planning (MRP), Master Production Scheduling (MPS), Manufacturing Execution Systems (MES), Capacity Resource Planning (CRP), (Bills of Material (BOM), and Routings.

Simply stated, the reason MRP works better for a make-to-stock manufacturer is that it was designed to achieve production efficiencies by grouping demand into long runs wherever possible. It can do this because it keeps inventory buffers of purchased parts and sub parts.

The make-to-order manufacturer, however, has an entirely different set of problems. Every minute he spends making excess inventory consumes the materials and the capacity he needs to deliver customer orders on time.

The make-to-stock manufacturer is selling inventories and the make-to-order manufacturer is selling capacity. In reality of course everyone is limited by capacity at some level, so even make-to-stock manufacturers can improve their profitability by improving their ability to plan and schedule.

The very simple example below shows the sub parts needed to make a finished part A and a finished part B.



If a make-to-stock manufacturer wanted to make 10 A's and 10 B's then Materials Requirement Planning (MRP) would explode the BOM Bill of Material (BOM) and group the demand for each of the sub parts:

20 of part X (because both parts need an X)  
 10 of part Y  
 10 of part C  
 10 of part Z

It would then check the inventory levels of each of these sub parts and determine to either purchase or create work orders for any sub parts that were getting low on inventory. Usually there would be a minimum order quantity for each sub part.

Because of stock levels, the company would probably have enough of each sub part to manufacture the 10 A's and the 10 B's immediately. If there were a real shortage of any of the sub parts then MRP would create an exception message and a work order would be launched to fill that shortage. This work order would have to be completed before anyone could start the work orders for the A's and the B's.

In the make-to-order world, however, there would probably be no inventories of sub parts. So before the work order for 10 B's could begin, the work order for 20 X's would have to be completed and put back into inventory. Then, the work order for 10 C's and 10 Z's must be completed and put back into inventory. Only then could the work order for the 10 B's begin.

Planning and scheduling all these work orders is much more complex; this is the price a company must pay if they want to reduce inventories.

Does it have to be this way? In this situation I recommend that the make-to-order manufacturer follow one of two options:

Option 1 is to find a scheduling system that can handle the pegging of one work order to another. This is a good idea if the company has a complex, multi-level BOM or if inventories of some sub parts are kept because MRP takes this into consideration when it suggest work orders.

Option 2 is to flatten the BOM and the routing. Below is an example of what the work orders would look like if the BOM and the Routing are flattened for finished part B.

Op 10	make sub part X
Op 20	make sub part C
Op 30	make sub part Y
Op 40	assemble finished part B

Unfortunately this option is only available to those manufacturers who have a relatively simple BOM. For the many companies who fit this bill there are some very attractive benefits:

- It simplifies the process.
  - No pegging multiple work orders together
  - One to one relationship between the sales order and work order
  - Easier to track progress of customer orders
- Group orders together for plant efficiencies -- with a scheduling system that handles sequencing rules
- Simplify and reduce the number of transactions required -- no need to keep moving sub parts into and out of inventory

Early MRP systems were simple, and they provided manufacturers with a powerful tool to manage their inventories and their purchasing. Some software companies recognized an opportunity and by the early 1980's they had created something that they initially called MRPII and eventually called Enterprise Resource Planning (ERP). In order to live up to its billing the ERP vendors added a great deal of functionality such as order entry, inventory management, purchasing, and accounting. In many ways this made a great deal of sense, because it integrated most of the data within a company. This meant that information could be maintained in one place but made available to anyone on the system.

The problem was that the term "Enterprise Resource Planning" was misleading to say the least because ERP systems provided very little functionality for manufacturers who actually needed to plan and schedule resources such as machines, people, and tooling.

During the late 1970's MRPII and then ERP systems started to use the concept of Master Production Scheduling (MPS), which was supposed to give planners a tool to help them time phase and prioritize their work. To this day most ERP systems still use MPS and MRP. MPS groups the actual demand (customer orders) and the forecast demand for finished goods SKU's or major assemblies; it nets this against the available finished goods stock and the scheduled expected receipts from the production plan. This is done using the concept of time buckets (usually weekly). In its simplest form an MPS report looks like this (See the following table).

SKU: XYZ	Starting	Month 1			
	Balance	Week 1	Week 2	Week 3	Week 4
Projected Gross Requirements		250	250	300	300
Scheduled Receipts		350	200	100	100
Projected Available Balance	100	200	150	-50	-250

Any shortages identified in this process are used to tell the planner when they need to create new work orders. MRP then uses these work orders to explode and group the demand for sub components and purchased parts using BOM's and Routings as explained earlier.

Unfortunately there is a major problem with MPS:

*It assumes that purchase orders and work orders will be completed at the date that they are planned and has no mechanism for adjusting to anything that happens in the real world such as a late shipment from a supplier or a work center that is scheduled to more than 100% of capacity.*

In an attempt to address the issue of one or more capacity constraints, ERP vendors introduced another new module that they called the Capacity Requirements Planning (CRP) module.

Obviously some sort of reality check was needed to see if there would be enough capacity available to complete all the work orders, and the CRP module was definitely not the answer. Many of the limitations of ERP systems were tied directly to the limitations of the CRP module.

The CRP module is unable to accurately calculate the projected demand and utilization of capacities because it uses a number of techniques that have severe limitations such as:

- Infinite capacity
- Backward scheduling
- Time buckets

Below is further explanation of how these techniques cause inaccuracies:

- Because it uses the concept of infinite capacity there is no way for the CRP module to calculate the projected impact of an overloaded work center on the projected capacity of downstream work centers.
- Because it uses backward scheduling, the CRP module does not provide a mechanism to calculate the cause and effect of any change on either the available capacity or on the scheduled completion dates of orders. The best that CRP can do in this case is to give companies an exception message, which tells them that they have a problem.
- The Routing data in most ERP systems usually identifies the required resources at the work center level. In reality this is often not enough information because all products may not be able to run on all machines in that work center.
- Routing data usually holds work center run times, but in reality each machine could run at a different speed. This could cause a distortion in the way that capacity is consumed so there may be a constraint at the machine level even if there is no constraint at the work center level.
- The CRP module uses the concept of time buckets to calculate the projected demand for capacity. Time buckets can be a useful way of summarizing and reporting data but,

they are hopelessly inadequate when it comes to calculating available capacity or for scheduling orders for the following reasons:

- Time buckets don't know or care if an event takes place at the start or the end of the time bucket, so the impact on downstream resources cannot be predicted.
- Time buckets have difficulty managing events that span from one time bucket to another.
- Time buckets do not allow you to schedule more than one operation for an order in the same time bucket.
- There is no easy way to modify the capacity of a time bucket due to calendar events like overtime, holidays and planned maintenance.
- Time buckets do not take into consideration the impact that the sequencing of orders can have on capacity (see "*The Power of Sequencing*" section for more explanation).
- Time buckets cannot accurately calculate the time an order will wait in a queue, so they must use the concept of average queue times. The trouble with average queue times is that even if a person could calculate it accurately, it is a totally useless piece of information.
- Time buckets cannot calculate sequence dependent setup time so they have no option but to use the concept of average setup times.
- There is no mechanism to determine the effect on the capacity or on the scheduled completion date of an order when raw materials are shipped late or a machine goes down.
- If there is a delay in the first step of a work order then there is no way to calculate how that delay would affect the timing of downstream operations and the scheduled completion date of that order or any other order.

As I mentioned earlier, even if the capacity calculation was accurate and it determined that a resource was overloaded what can be done with that information?

The available capacity of that resource could be changed by adding overtime but there is no guarantee that this would solve the problem or just make it worse by increasing costs. Another option is to keep modifying the planned dates of your work orders in an attempt to balance your capacity utilization. This becomes a game of trial and error that could take days at best to resolve.

Manufacturing managers and executives need to understand that the CRP and scheduling tools provided by ERP systems have only a very limited ability to predict downstream consequences of a change of any kind. For example they have no tools to help them intelligently prioritize their workload, they have no ability to accurately estimate the promise date of a new order and they have no way to synchronize material and capacity constraints.

This is analogous to driving a car with your eyes closed. The only time you know you have a problem is when you hit something.

For years nobody seemed to grasp the significance of these limitations. Nobody actually came out and said, “The King has no clothes!” That is until Eli Goldratt started writing books like *The Goal* and *The Theory of Constraints* and even then there were few that really understood the implications of what he was saying.

There is a great quote from Winston Churchill, which I think is very appropriate. “We occasionally stumble over the truth but most of us pick ourselves up and hurry off as if nothing had happened”.

So how does anyone survive with such a system? That’s a good question but if you have ever worked in a plant like this you actually know the answer.

What usually happens is that a customer calls in a panic to see why his order is late. Someone is then sent to expedite that order. Expediting means that another person has to go into the plant and physically locate the order in question, assuming the order can actually be found (which is sometimes a big assumption). At this point the late order gets a red tag and becomes a high priority order, which sets off a whole chain of unexpected consequences. It’s like playing with a Rubik’s cube in that a simple change can have many unintended consequences.

One cosmetics manufacturer we worked with and who shall remain nameless had twenty people with the title “Expediter.” These expeditors were very powerful, and they were put on a pedestal because without them nothing would happen. All they did all day was put out fires because the entire production facility was in react mode. The schedule was put together on a weekly basis, and by the time it was signed off on by all departments it was already useless. On-time deliveries were never measured or discussed.

The good news is that because ERP systems are not able to predict the likely consequences of making a change nobody is aware of the catastrophic cascading consequences until the next poor, confused customer calls in and complains that his order is also late. And so it goes from day to day, chaos to chaos with no hope of ever getting control of the situation.

It is my experience in working with hundreds of manufacturers over the years that very few of them accurately measure their on-time delivery performance. This is somewhat surprising given the critical relationship between delivering on-time and keeping customers happy.

One assessment my company did for a client identified the fact that they had over 4,000 open order line items that were already late. What was really surprising was that nobody actually tracked the number of late orders and even more stunning was that nobody was even remotely surprised.

Within three months of implementing a new scheduling system, the number of late orders was reduced to less than fifty. It seems that human nature discourages us from measuring what we know we can’t control.

The next question then is how do companies stay in business operating this way? The only way that most manufacturers can survive in such a world is to build in huge buffers of materials, finished goods and lead times that are designed to counter the fact that you have zero control over what is going on in your plant. These buffers, of course have a massive impact on costs and on the bottom line.

Now along comes a brilliant consultant who says that he can reduce costs and make them more efficient by adopting lean manufacturing techniques. So they start to remove all these non-value added buffers from their process. They actually start to reduce costs but guess deliveries...BOOM!!!...CHAOS!!!

What I am suggesting (actually suggesting is not the right word) is that if a business is moving towards a make-to-order, lean business model then chances are it will need to change the way it plans and schedules.

Back in the mid 1980's it was recognized that ERP systems were not providing manufacturers with the tools they needed to send information to the shop floor and to track what was going on in the shop floor. This opened the door for software vendors to provide what they called Manufacturing Execution Systems (MES).

This was another recognition that despite having their roots in MRP, ERP companies provided limited functionality for the people who actually did the day-to-day work of manufacturing.

The reality is that although MES systems filled a huge hole for the chemical industry, the pharmaceutical industry and other process industries, in general discrete manufacturers have not adopted them. I think there are two reasons for this.

- Unlike APS systems, this was something that could be added to ERP systems and as a result many ERP vendors did add MES capabilities to their offerings.
- Many discrete manufacturers thought that MES systems were too complex for their needs and either used the ERP module or they opted for simpler, less expensive ways of collecting data from the plant.

The main reason that I mention MES systems is to point out what is not always obvious and that is that they do not do scheduling. Most of the larger MES systems work in partnership with APS companies to provide scheduling.

There is one last point I want to make about today's ERP systems that needs to be clearly understood because it has very serious consequences. In order to compete, ERP vendors are constantly being pressured by their competitors and by their customers to be all things to all people.

This forces them to constantly expand the number of integrated modules that they offer and support. For example many ERP vendors have recently added a Customer Relations Management (CRM) module.

To make things worse they have additional pressure to create customized versions of their basic modules to address the unique needs of specific industries.

As we all know, complexity has its problems and in my opinion many ERP vendors have lost sight of the basics. Apart from confusing their users, there are other, even more serious consequences to this strategy.

The very thing that makes an integrated ERP system attractive becomes its worst nightmare. What I mean is that because of the tight integration between each of the modules, there are thousands of touch points.

Every time a change is made to one module it can have unintended consequences on several other modules. This makes it progressively more difficult and more expensive to make improvements and fix bugs. Given this reality, it is easy to see that it quickly becomes virtually impossible for one ERP vendor to claim to have the best solution in every area and this opens the door.

Many ERP vendors are being stretched to the limit to meet the ever-changing needs of their clients and the market place.

Smart ERP vendors recognize this reality and take the time to invest in developing partnerships designed to fill in the holes in their offerings. They spend the time needed to provide these partners with tools that help them do the difficult integration work.

Many manufacturers have become frustrated with ERP vendors and this has opened the door for software vendors to step in and create “Best of Breed” solutions. It is obviously much easier to keep a solution on the leading edge if that is the only thing that company does. Best of Breed solutions and the fact that integration tools are getting better is changing the way that manufacturers are looking at their options.

As we mentioned earlier, some ERP vendors have recognized the problem and have added APS modules to their offerings. Most of these companies did so by purchasing APS technology from third party software developers and some of them were able to even integrate it into their manufacturing modules.

I think it is important here to explain why the ERP vendors did not just build their own APS modules. APS systems are difficult to develop because they must manage time constraints without using time buckets. The only way to do this is to create something called a scheduling engine. The power and flexibility of an APS system is directly related to the effectiveness of its scheduling engine and scheduling engines are very complex. In short they cannot be built quickly or with just database technology.

Unfortunately for the unsuspecting manufacturer, some of the third party software developers were more than happy to sell their APS systems because they were struggling to survive financially on the merits of their technology. This meant that some ERP vendors had integrated technology that was not that good to start with and any time and money

invested in trying to implement these systems would more than likely be wasted because they would not be able to grow as their needs changed.

The few ERP vendors who were able to integrate APS modules into their offerings were initially able to gain a competitive advantage by demonstrating this attractive functionality. On the surface it was somewhat puzzling to figure out why this approach did not produce many success stories.

The obvious reasons that these attempts to implement cookie cutter scheduling solutions failed is that most ERP vendors probably did not have the skill set needed to continue developing new functionality and they almost certainly did not have the skill set needed to understand the clients' needs and how to match the software to those needs.

It is my conclusion that there is another far more important reason that these scheduling systems don't work. I believe that unless a scheduling system has the built in logic to model real world business constraints, it is of no use because it will give faulty information. It is not possible to consistently make good decisions from faulty information. *That means that even if you have an APS system it does not mean that you are getting any of the significant benefits that are outlined in this book.*

Although I will discuss this subject in much more detail, I wanted to finish this chapter by saying that APS systems should have three characteristics that make them very different from other ERP module such as Accounts Payable.

- They must handle the level of detail needed to model real world constraints such as operators and tooling or the ability to calculate sequence dependent setup times based on multiple product attributes that may be unique to each company.
- They must be able to provide advanced functionality, such as custom sequencing rules, for schedulers who want to get additional benefits from their systems.
- They need to be easily customized and modified (think Excel) so that they can meet the changing requirements of a business without being orphaned when new versions are released.

My conclusion is that planning and scheduling systems should reflect the things that make a business unique including strategic objectives.

If a system can't grow and change to meet the changing needs of a company, then it becomes a burden that will have little or no value.

Since change is one of the few things in life a company can count on, it makes a great deal of sense to start with a system that can grow and change also.

## Chapter 2

### A very simplified history of lean manufacturing

It is important to connect the dots here. The concept of Lean manufacturing was introduced and made popular by great successes achieved by companies like Toyota.

One reason that many others rushed to adopt lean manufacturing is because of the frustrations they were having trying to plan and operate their plants with ERP systems.

They wanted something simpler, they wanted to cut waste from their processes instead of adding layers of complexity, they wanted to be agile and less structured and they wanted to remove the buffers of excess time and stock that they had built into their processes and systems.

Unfortunately, in some cases they threw out the baby with the bath water. They soon realized that although Kanban had some great advantages, in most cases it severely limited their view of what was going on from a planning perspective.

What many followers didn't understand was that companies like Toyota were not just getting rid of their old software systems they were replacing them with newer, smarter and better systems.

Another problem was that some of the companies that adopted lean concepts did quite well at first but as they started to get squeezed by the market to reduce lead times they found that they did not have the systems in place to give them the information they needed to manage their capacity.

Because lean means eliminating waste, the biggest waste is making products that nobody buys so moving towards make-to-order (MTO) is a natural evolution of Lean manufacturing and MTO manufacturers need to manage their capacities in a very different way.

There is one other very important area where an APS system can help you reduce non-value added waste in your process. At one time it was thought that the average discrete manufacturer only spent about 10% of the time adding value to an order and the rest of the time was spent sitting in a queue just waiting for something to happen.

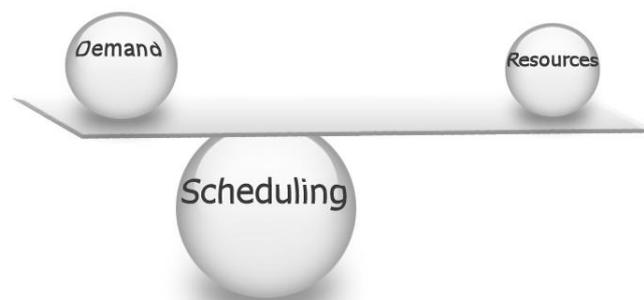
Obviously this number varies from company to company but it turns out that in most cases this number is closer to 5% and in some cases it is actually less than 1%.

This can easily be calculated by selecting a couple of products, adding up their routing times and dividing it by the time it takes to complete that order once it has been started.

APS systems can address this problem because time spent waiting in queues is the result of the way that orders are sequenced.

Setup times and queue times are controlled by the way that orders are sequenced. Companies that have the tools that allow them to control sequencing are able initiate strategies that help them improve on-time deliveries, reduce waste, improve plant efficiencies and reduce WIP although not necessarily all at the same time. What I mean by this is that there is often a trade off. For example improving plant efficiencies could increase queue times, which could increase WIP.

### Why is scheduling so critical?



As the diagram above shows, scheduling is the process of balancing demand for products with a company's available resources for the purpose of creating a valid action plan.

*Demand* would include customer orders, stock replenishment orders and samples, while *Resources* includes machines, operators, tooling, and inventories of raw materials, sub parts, and finished goods.

As I mentioned earlier in the book, I use the terms scheduling and APS interchangeably. APS is an acronym for Advanced Planning and Scheduling and in most cases it is just a fancy name given to finite scheduling software.

I sincerely believe that scheduling is the brain center that drives the operations side of a manufacturing company. As such the schedule should be able to absorb the constant barrage of changes that impact a business and quickly create a new action plan. This plan should reflect the strategic direction of a business.

I am not saying that this process should be completely automated but you should be able to reschedule your plant in a few seconds or at worst a few minutes. To be useful, your scheduling system must be able to realistically model real world constraints so that it can provide management with the information needed to make important decisions.

This includes the ability to use cause and effect logic to evaluate multiple what-if scenarios before deciding the best course of action

Once a sound schedule has been created a scheduling system needs to be able to synchronize every key activity that needs to be performed from making sure raw materials are available to communicating a precise sequence of events to the shop floor.

One way to look at scheduling is as a way to answer the question, "What should I make next?" This is actually a critical question because every minute a manufacturer spends

making the wrong stuff not only increases costs, it takes away from his ability to deliver what the clients actually need.

As I will explain later, planning systems should also have a major impact on how a company answers that question. It is the ability to quickly create a smart schedule, and have that schedule automatically synchronize all the other critical activities that is the big missing link in most off the shelf ERP systems.

Without a coherent scheduling system companies can easily start down a path that gets progressively more self-destructive. Mass confusion and panic set in when decisions about changing priorities are made in a vacuum or by multiple people (including executives). Mass confusion results in low productivity and poor customer service and ultimately the loss of key customers. All of these factors have a massive impact on your bottom line.

Anyone who has ever been down this path knows the hopeless feeling in the pit of their stomach that comes when you realize that the chances of getting out of this mess are quite small.

Don't give up because all is not lost. Adding a smart scheduling system to an existing ERP system may be the answer. Scheduling is where the "rubber meets the road" and implementing a good scheduling system should have an immediate and lasting impact on a company's ability to service its clients and improve the bottom line.

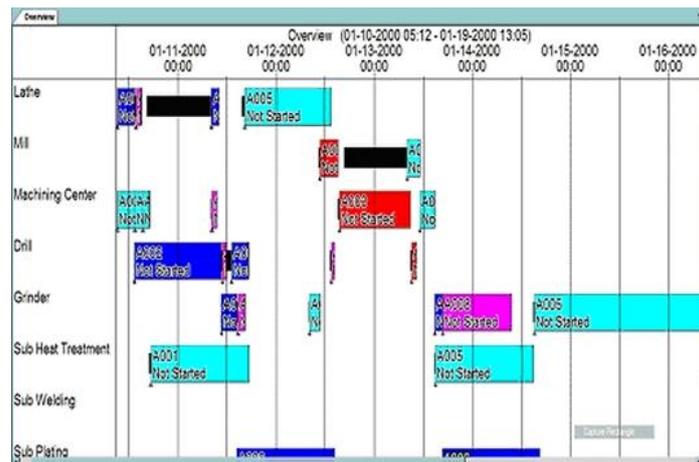
I will devote several pages to how companies can get from where they are to where they want to be. One secret is to add new software and new processes to leverage the systems and data that are already in place. At the risk of repeating myself, in the world of scheduling every company is unique and the only way that a scheduling system will work well is if the system can model real world constraints. Adapting the way a company works to fit the limitations of a scheduling system is guaranteed to fail.

Lastly it is important to point out that a good scheduling system not only automates the process of creating smart schedules, it immediately eliminates 80% of the manual effort currently wasted on just keeping the schedule up-to-date. This in turn means that the role of a scheduler must change from being reactive to being proactive. This frees up the scheduler to spend more time solving problems before they actually happen.

I always talk about this in my seminars because in many organizations, the scheduler is very powerful. Without an APS system the scheduler gets and uses his power by putting out fires and they often have absolute control over who gets priority. Managers and executives soon learn that they must bow to this reality or face the consequences. Those schedulers who are unable to give up their power trip must be replaced sooner or later. My strong recommendation is that they be replaced sooner.

Of course the top-notch scheduler, driven by the need to improve, is thrilled to have a new set of tools.

One great way to view a schedule is in the form of a Gantt chart (see below). The Gantt chart shows how each of the resources (machines or subcontractors) is loaded over a selected time-period. Believe it or not, a good scheduling system will create a complex schedule within a few seconds or minutes.



### Basic scheduling functionality

A quick review of the limitations of ERP systems as described in the previous chapter gives us a pretty good starting list of the functionality that will be needed in a scheduling system. I say starting point because there is so much more that can be done once a scheduling system has been implemented.

In other words, a good scheduling system should deliver all the functionality missing from an ERP system. Below is a list of the basic functionality that is needed in a scheduling system.

1. The ability to schedule more accurately at the machine level as opposed to the work center level and to assign different shifts and run speeds for each machine.
2. The ability to schedule each machine finitely or infinitely.
3. The ability to schedule using multiple constraints (such as tooling and operators).
4. The ability to calculate sequence dependent setup times.
5. The ability to schedule precisely (minutes or seconds) as opposed to time buckets (usually days or weeks).
6. The ability to integrate easily with other systems like ERP and Shop Floor Data Collection (SFDC).
7. The ability to sequence orders based on due date, priority or some other attribute.
8. The ability to schedule quickly (minutes or seconds) and maintain a real-time view of the schedule.
9. The ability to easily make changes such as adding new orders, changing priorities, adding machine downtimes or completing operations.
10. The ability to synchronize the schedule with material constraints.

## Excel, the false Messiah

Schedulers, as a rule, are not stupid. In fact, because of the responsibility they have to keep things running, they are usually quite bright. Once they realize that their ERP system is not going to help them create and maintain a valid schedule, they look for an alternate solution that will prevent their life from becoming unbearable.

Because most people are comfortable with Excel and it usually doesn't cost anything, it often becomes the "drug of choice." Like so many other drugs, however, the side effects can make things much worse and sometimes even fatal.

What I am about to say is so obvious that it will immediately make sense but most people still don't get it. There is no doubt that, given enough time, Excel can create a valid schedule. For that matter a patient person can put together a valid schedule using cards and a wall.

The big problem is the enormous output of time and energy it takes to update that schedule every time something changes because, as we know, things change all day and every day. When a change happens in manufacturing it is not possible to calculate the downstream ripple effect without a system designed to do that. Once a company is able to quickly and intelligently reschedule their plant, they will have an immediate advantage over their slower moving competitors.

To the legion of schedulers out there using Excel, let me just say that I understand, and it doesn't have to be that way. There is no doubt that a valid schedule can be created with Excel, or Access or even with a project management system, but due to the time and effort it takes to keep up-to-date those will never be anymore than Band-aids.

It is important to understand that the ability to react quickly to change is just the starting point. Once a company has this skill, however, it opens up the door to all the other exciting benefits described in this book.

For readers in the position to make a decision, here are two options.

Option 1: Hire a number of people totally dedicated to manually updating your schedule several times a day to reflect all the new orders, shop transactions, machine breakdowns, sick operators, and late suppliers.

Or Option 2: Buy a system that does all of that in just a few seconds, every day.

Let me put the question another way. Wouldn't it be better for a scheduler to spend more time identifying and resolving problems before they actually happen?

Of course this is a trick question. *If you got it wrong, you are not allowed to read the rest of this book, which means you will miss all the other great things you can do with an APS system.*

## The power of sequencing

Explaining the wonders of sequencing is one of the fun things I get to do in my seminars. I have described the basics of a good scheduling system. Now I need to prove that there is a whole new world out there to explore. That world is the world of sequencing.

A simple way to understand sequencing is to think of two cars going down a single lane highway. One can go at 120 mph and the other can go at 30 mph. If we assume that they can't overtake each other how long does it take them to drive 30 miles? Of course the answer is easy, the fast car can drive 30 miles in 15 minutes, or can it? If it is behind the slow car then it will take the same time as the slow car, which is 1 hour.

When it comes to sequencing

$$1 + 2 + 3 \neq 3 + 2 + 1$$

This is one of the reasons that scheduling in buckets doesn't work.

The ability to manipulate the way that operations are sequenced at a machine not only impacts setup times, it impacts on-time deliveries and work in progress (WIP).

The following is a simplistic example that highlights how a simple change in the way orders are sequenced can have a significant impact on a manufacturer's ability to deliver those orders on time.

In this example, a manufacturer has three machines -- Machine A, Machine B, and Machine C. Assume that the plant has one Eight-hour shift and that it is open seven days per week.

This company manufactures three products with routings as shown below.

Product X	Operation	Machine	Rate
	10	Machine A	24 hrs
	20	Machine B	16 hrs
	30	Machine C	8 hrs
Product Y	Operation	Machine	Rate
	10	Machine A	8 hrs
	20	Machine B	8 hrs
	30	Machine C	8 hrs
Product Z	Operation	Machine	Rate
	10	Machine A	8 hrs
	20	Machine B	16 hrs
	30	Machine C	24 hrs

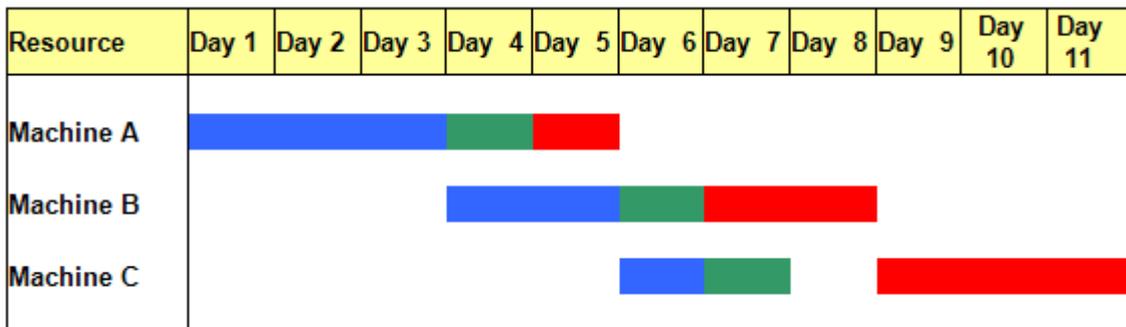
For the sake of simplicity, assume that this company has no other orders in the pipeline and that it gets an order for each of these three products.

- 1) What date can each order be promised?
- 2) What date can all 3 orders be promised?

**Scenario 1:**

Order 1 Product X
Order 2 Product Y
Order 3 Product Z

In scenario 1 the orders are sequenced X then Y then Z.

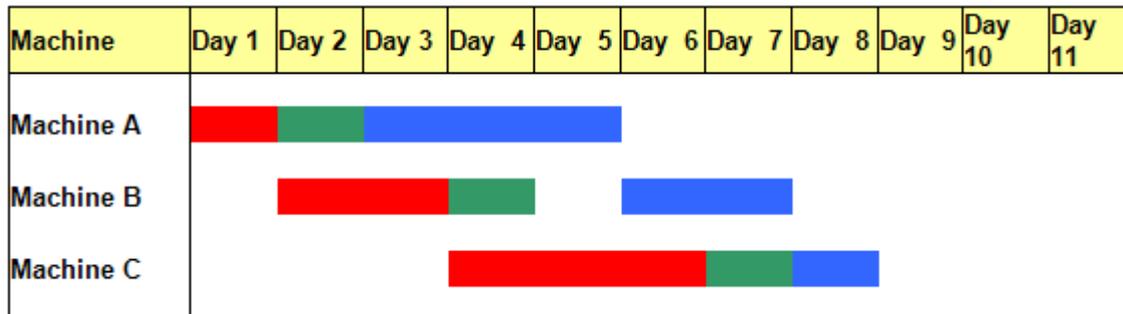


The Gantt chart above shows that X can be completed on day 6, Y can be completed on day 7 and Z can be completed on day 11.

**Scenario 2:**

Order 1 Product Z
Order 2 Product Y
Order 3 Product X

In scenario 2 the sequence of the orders is changed to Z then Y then X



Now the Gantt chart shows that this small change has consequences that would be very difficult to anticipate without an APS system. X can now be completed on day 8, Y can now be completed on day 7 and Z can now be completed on day 6.

This example shows effectively that the time it takes to deliver all three orders has been reduced by **three days** or **27%** and simply by changing the sequence of events.

The purpose of this exercise is to demonstrate that the ability to manipulate the sequencing of orders and operations can have a significant impact on the way a plant performs. APS systems should have a number of advanced sequencing rules and the ability to create new rules to address unique requirements.

At this point I think I need to give a warning. Some scheduling systems promise optimized schedules, which means that the system uses advanced algorithms to evaluate billions of possible solutions to determine the optimal sequence (a process that can take hours). Although there are clearly situations where optimization makes sense, generally this kind of system produces results that are too nervous (the schedule shifts around too much) and too confusing for the scheduler and consequently they tend not to work.

Sometimes these systems are referred to as black box solutions because it all seems like magic and the scheduler has very little control. One big problem with a black box solution is that any attempt by the scheduler or the shop floor operator to manually change the schedule could completely ruin the optimization. In fact, any time that an operation takes longer or shorter to complete than scheduled, it can ruin the optimization but a scheduler has no way of knowing this.

Our approach is different because putting all the variables into the mix and calculating the perfect schedule is usually unrealistic. I like to use the 80/20 rule, which says that a schedule should be automated to do all the donkey work (the 80%) but allow the scheduler to use his or her experience to fine tune the schedule (the 20%).

This is done by creating rules and letting the scheduler evaluate how well they work. The ability to create rules is only part of what I am talking about when I refer to a scheduling system that is flexible. Scheduling systems almost always need some level of customization so that they can reflect the reality of the way you run your manufacturing operation. This approach is diametrically opposite from the way that ERP systems are implemented, where companies are expected to change the way they run their business

to fit the new system. Anyone wishing to get more information about rules should contact me at my web site, or via email [mliddell@stpartners.net](mailto:mliddell@stpartners.net).

## Ten myths about finite capacity scheduling

This list has been compiled over the last twenty years by a number of seasoned proponents of Finite Capacity Scheduling systems. It has been based on countless success stories and is as valid today as it has ever been. The purpose of reviewing this list is to counter some of the misinformation that has been published over the years about scheduling. Most of these myths have been spread by those who do not understand the nature of either the problem or the solution.

1. ERP systems can handle my scheduling problems.

*Unless your ERP system comes with an APS system this one is dead wrong. Solving scheduling problems with standard ERP/MRP logic is equivalent to trying to solve a three-dimensional problem with two-dimensional logic. In other words, it simply can't be done in a timely manner.*

2. If I buy scheduling software from my ERP vendor I won't have any data integration problems.

*Although this sounds like a good idea it really isn't. This is because very few ERP vendors, if any, had the skill set needed to develop and implement their own scheduling module, so they went out and bought an APS software company.*

*A detailed explanation as to why this approach does not work can be found in the chapter that is titled "A Simplified History of ERP systems."*

*The short answer is that even if they have successfully integrated APS into their ERP offering (and this is not a given), most ERP companies do not have the skill set to continue developing the APS system and they don't have the skill set to implement it properly. ERP companies like to deliver cookie cutter modules with some options. This approach does not work in the APS world where your system needs to work at a level of detail that allows you to model the real world you live in, otherwise your APS system will be of no value to you.*

3. Because I have so many changes, my schedule is usually out of date before it is published.

*That is exactly right because anyone can create a schedule once a week. The main benefit of a good scheduling system is that it is able to reflect priorities that are always changing while providing you with real-time information. This is what enables you to systematically make smart and fast decisions. Being able to understand cause and effect at high speed immediately differentiates you from your competition.*

4. My schedulers know that our ERP software doesn't help them schedule, so they have developed their own homegrown solutions using Excel spreadsheets.

*Once again this sounds like a good idea, but it usually isn't and there is a chapter, titled "Excel, the False Messiah," that gives a full explanation as to why this is not a good idea.*

*The short answer however is that the illusion that Excel gives you some control is quickly offset by the exorbitant amount of time it takes to keep the schedule current without any of the built in benefits that come with a good scheduling system such as a visual schedule, easy data integration, and the ability to use sequencing rules. If the schedule does not reflect current reality then it is of no use to you.*

5. Because we are implementing lean concepts my consultants tell me that we don't need a computer -based scheduling system.

*Replacing complex ERP logic with Kanban and demand-based manual systems is very tempting, but of course it has its limitations. Toyota themselves recognizes the limitations of these techniques in a demand-driven business model. This is because manual systems do not give you the ability to plan around your capacity constraints. This becomes critical once the buffers of time and inventory have been removed from the equation. Generally an APS system will support your lean initiative.*

6. Scheduling systems are too expensive.

*This one of course is true if you have a bad scheduling system that doesn't reflect the reality of your world. Good scheduling systems can pay for themselves almost overnight and are capable of adding millions of dollars to your profit every year. If you are in the business of selling capacity, what other tools do you have to manage this process? If you don't manage this process, you will be tempted to sell your capacity on a first come first served basis, and that is a very good way to lose your key customers.*

7. I can implement my own scheduling system.

*Although there are some out there who can do this, it needs someone with a great deal of knowledge about manufacturing and the software that is being implemented. Ultimately the success of the system depends on your ability to match the capabilities of the software to your business needs. Knowing what works and what doesn't can save you thousands of dollars. The pay back can be ten or even one-hundred times better when the implementation is done well and the schedule is tightly coupled with your business processes and constraints, so the risk is great.*

8. My business is different than anyone else's.

*Yes this is almost certainly true and although the basics and root problems are always the same, the solutions will vary greatly. One of the strengths of a good scheduling system is that it can be easily tailored to meet your needs so you don't have to change the way you do business to fit the system. The trick is to find someone who has the experience to guide you through the process.*

9. I don't want to keep data in two systems.

*Of course this is a valid concern and a good scheduling system will have the ability to smoothly integrate the data with your ERP system, your shop floor data collection system and any other system that it shares data with your scheduling data such as your purchasing system.*

10. What happens when my needs change and I have made major modifications? Will I orphan myself from newer versions of the scheduling software?

*This is really a great question and the answer is that, unlike most ERP systems, the best scheduling systems are designed to be customized just like Excel. This means that upgrades to new versions can be implemented with minimum effort because complex changes can be made without changing the actual core system. If you have selected the right APS system then upgrading to the latest version should be no more difficult than installing a newer version of Excel.*

**To read chapters 4 to 6 please purchase the book:**

**<http://www.stpartners.net/book.html>**

**Chapter 4: Understanding the Need for Planning**

- What is MTO planning?
- The forecast module
- The plan module
- The schedule module
- The track module (the shop floor)

**PART 2: THE RECOMMENDED SOLUTION**

**Chapter 5: The Solution Building Blocks**

- Overview
- The assessment phase
- The design phase
- The development phase
- The testing phase
- The implementation phase

**Chapter 6: The Conclusion**

- The ten biggest mistakes made implementing scheduling systems and how to avoid them
- How much to invest in a new planning and scheduling systems
- How to beat the competition in countries like China, India, and Japan

## Success Stories

With more than 16 years of expertise in the field of planning & scheduling, the Preactor family of solutions has solved many issues in various industries thanks to its unique flexibility and its breakthrough, powerful calculation engine.

The following pages contain a selection of Preactor success stories from different companies who have used Preactor to make their company more competitive, reducing costs and lead times while increasing customer service levels.

These examples have been taken from more than 150 that appear on Preactor's web site. We have selected examples from different manufacturing sectors and where possible quantitative benefits.

Those include here are:-

1. Precision Engineering – Preformtools
2. Plastics Processing - Global EPP
3. Electronics Assembly – Mode Lighting
4. Healthcare Packaging – Enestia
5. Rubber Seals – TRP
6. Chemicals - U.S. Paint
7. Beverages - Highland Spring
8. Small Batch Assembly – Blake
9. Foundry – MTS
10. Book Printing – Opolgraph
11. Sintered Components - Wall Colmonoy
12. Wood Products - SAM Mouldings
13. Food – Ardo
14. Plastics – Silvergate
15. Basic Metals - CST-Arcelor
16. Mechanical Assembly - Cash Bases
17. Project Manufacturing - Wellman Hunt-Graham

These are just a few examples of how Preactor has helped more than 3,000 companies, companies like yours to capture the benefits of advanced planning and scheduling solutions. If your company is not covered by these examples, we have many more.

For any further information please contact, [info@preactor.com](mailto:info@preactor.com)

[www.preactor.com](http://www.preactor.com)

## Precision Engineering - Preformtools



Established in 1975 following the sell off of the Plessey's Tool Room, Preformtools is now widely recognised as a leading solutions provider for companies requiring extremely high quality tools and components in the medical, high pressure fuel and hydraulics sectors. Working down to single micron tolerances,

Preformtools is used at all levels of subcontracting work by its customers yet can also provide a fully managed solution including research and development. Success depends on having the right combination of machine resource and human resource available at the same time which is why Preformtools invested in the award winning Preactor planning and scheduling solution

While technically a low volume engineering company, being 100% Make to Order means that Preformtools has to deal with anything from single process jobs, „one-off“ design and manufacture projects, as well as batches in excess of 15,000 which may form part of an ongoing order spread over several years. In terms of scale, it may be dealing with product details measurable in tenths of millimetres all the way to single billets half a metre by quarter of a metre. To achieve this, the company has a wide range of specialist machine resources that facilitate up to eight key processes and which require an equally wide ranging degree of skill levels in terms of setup and operation. Furthermore different customers demand different testing regimes from low level batch testing through to full process measurement auditing and final certification.

Accurate, co-ordinated and visible production planning and scheduling is therefore essential to the company, as Production Controller Alan Roden explains. "While the theory of having the right product at the right resource with the right operator is relatively straight forward, achieving this means dealing with a huge amount of highly variable factors, at every stage of the process, beginning with the customer!" He continues, "We may quote a six to eight week lead time at the point of first discussion with a customer yet they may take anything up to four weeks to come back and confirm an order while still expecting the original delivery date quoted!"



Even leaving aside times that this happens, there are plenty of planning and scheduling challenges that then must be overcome to ensure the customer gets the exacting quality they demand, and when they need it. An innate challenge lies in the fact that many of the jobs Preformtools undertakes are unique, even if variations on similar jobs and as Roden notes, "Planning can't anticipate problems when you're dealing with unknowns."

"Dealing with a range of exotic materials also creates difficulties as the company has to be able to order sufficient quantity of the appropriate material in the required time frame and this may not all arrive in one batch. In terms of machine resources, the specialist nature of the processes Preformtools can carry out can often result in setup times in excess of a day for an operation that may only last ten minutes. Optimisation is therefore highly desirable where possible with some operations such as freeze fitting with liquid nitrogen actually necessitating a certain batch quantity in order to make them economically viable.

According to Roden one of the greatest challenges lies in matching the required level of skill with the process and machine resource. “Take for example the set up of our CNC Grinder which is an extremely skilled operation. While we look to overlap in areas of training and experience, we only have a very small number of people skilled enough for this and such skills in the industry are like gold dust.



Other machine resources require different skill levels depending on the nature of the work being done and often a resource requires one skill level to set up and a different one to operate.” A corollary of this reliance on highly technical human skill levels is that there is a significant variation of time that any set up may take for reasons outside of any individual’s control. As Roden says, “It’s hard to plan time when the task is so dependent on so many factors.”

This therefore makes it essential to know exactly what job is where on the shopfloor and more importantly, how far through any particular process it may be. Being able to do so enables the company to give quick and accurate information to the customer on the progress of an order as well as to react effectively and accurately to any changes in the outworking of the production plan.

Prior to investing in Preactor, the company had relied on a manufacturing IT solution called Paragon (Job Shop) but this continually failed to deliver the required levels of visibility and control. Roden recalls the situation he walked into when he joined the company in June 2006. “Paragon simply could not give us the information needed to generate an accurate schedule – it was immediately obvious to me the system was primarily designed to give some MRP functionality with any planning being an afterthought.” As an example he cites the fact that while able to plan machine resources, there was no capacity to deal with the availability of the appropriately skilled personnel. It certainly couldn’t cope with the routine scenario whereby one person may actually be working on more than one resource and job at the same time.



The situation was so unsatisfactory that Roden began moving his planning onto spreadsheets which actually offered a greater degree of control and flexibility than the system! For four months he looked to find a solution with Paragon but without success.

Roden already had experience from a former company of Preactor and was so confident this would solve Preformtools' challenges he had actually mentioned the benefits of it during his interview process. The positive reputation of Preactor within the industry had also reached Steve Matheron, the company's Managing Director, so a decision was taken in 2007 to actively investigate how Preactor could help. After attending a Preactor workshop

Roden was put in touch with Preactor Reseller Kudos Solutions which worked with Preformtools on the implementation commencing late 2007.

The first stage of the implementation involved Kudos spending time with Preformtools to fully understand the complexity of the company's planning and scheduling requirements. Given the inherent problems with Paragon, it was decided that a spreadsheet and not Paragon was the best way to actively provide Preactor with the information required. Kudos also developed the all important skills matrix which essentially mapped each process in terms of skill requirements for both setup and operation. This would also form the basis for all future processes that may be required so it was essential to get this right.

After a brief period of parallel running using Preactor and the previous standalone spreadsheet system, Preformtools went fully live with Preactor in January 2008. Though as Roden recalls, it took approximately 6 months for people in the company outside of himself to begin seeing the benefits of the system. "As I used Preactor every day I immediately knew the difference it was making but the reality was that people were so cynical due to the inefficiency of the old system, they would blame Preactor for anything that went wrong – even when it was abundantly clear it had nothing to do with Preactor."

He continues, "However over this time, Preactor consistently kept delivering reliable and accurate plans which made it possible to identify the true nature of where many of our problems were actually coming from." Part of the problem in perception also came from people having to adapt to a live and changing schedule where jobs may have changed overnight. This has been largely alleviated by providing the shop floor supervisor with a rolling two day plan which allows him to provide continual updates to the shop floor when changes occur.

While acknowledging the system is still being fine tuned, Roden is pleased with the fact that the company is now very much relying on Preactor to deliver the visibility and control required. “Preactor has given us far greater confidence when talking with our customers to give accurate and realistic delivery dates as well as the means to keep to these.” He continues, “It has also given us the ability to react quickly to when changes occur and to see the impact these have on the other jobs currently on the shop floor as well as those in the plan. With this information in mind, we can then proactively go back and discuss options with our customers, all of which significantly adds to our customer service.”

Preactor is also providing much improved visibility about the actual state of production on any job which allows for important fine tuning when it comes to maximising the company’s human resources. Instead of a highly skilled operative waiting unnecessarily for a process to be completed in order for them to action the next task which requires their skill level, they can be used on a different process during this time. This visibility also ensures that long lead time jobs don’t slip through the net in favour of more urgent, short lead time ones.

Preactor is also delivering substantial time savings as Roden explains. “In the old system, there were some tasks that might literally take me an entire day physically to schedule given the complexity of processes involved; now with Preactor the same task takes fifteen minutes.” This means that much more of Roden’s time can be proactively put into fine tuning the plan and investigating any wider planning areas of difficulty within the company. And when things don’t go to plan, Preactor is used as a management tool to quickly investigate “what if” scenarios where the impact of any one decision can be seen against all orders. “We know which customers and which orders will be more accommodating to potentially having a minor delay and with Preactor we can move the plan around until we get the result both we and our customers desire.”

Looking to the future, Preformtools has already approved an upgrade to a Preactor P400 APS when possible in addition to a real time plant floor viewer which would provide instant, up to date planning information direct to where it’s needed most, on the shopfloor. The last word however belongs to Roden. “We’ve come a long way from where we spent 90% of our time fire fighting to where we now spend 90% of our time on fire prevention. Preactor gives the full visibility of potential problems as well as the solution to these problems.”

## Plastics Processing - Global EPP



With over thirty years experience in monomer casting and extrusion, Global EPP, previously named Nylacast Materials is synonymous with innovation, quality and technical excellence in relation to cast nylon and extruded semi-finished engineering plastics stock shapes. With three UK sites employing approximately 70 people, Global EPP has a worldwide presence with more than 70% of the product manufactured destined for export.

When the company needed to improve its planning accuracy, it found the Global EPP's three sites comprise casting, extrusion and semi-finishing, each with very different types of machinery and processes and thus their own planning and scheduling challenges they chose Preactor for a perfect blend of flexibility and visibility

In terms of variety of products and production processes as well as a high share of Make To Order (MTO) business, the casting facility is the most complex. Raw materials are melted down and combined with appropriate colours and additives to give the characteristics required by the customer. This „melt“ is then poured via Melt Processing Units (MPUs) into the correct mould and then spun in the case of producing tubes. The material is then left to cool, de-moulded and then annealed where required before moving onto finishing and despatch. The process is highly sequence dependent with considerable set-up, changeover and cleaning times, all of which necessitate meticulous and thorough planning in order to optimise use of the physical resources such as the MPUs, tools, moulds and ovens.

The extrusion plant has a much higher share of Make to Stock (MTS) production. The key requirements for planning here lie in optimizing a highly automated and capital intensive production capacity which processes a large range of polymer resins and different product sizes. One of the challenges here is to be found at the outset of the process with the drying of the raw material. Depending on the grade of material amongst other things, this is highly variable and can take anywhere between four and eight hours.



Once dried, this material is then fed to an extruder where it is heated before being released into the appropriate die and extruded at the correct thickness. As with the casting process, setup and adjustment times which can take up to eight hours are critical, as is sequence dependency concerning colour and size.

After being cut to size, the extruded products are taken to the annealing ovens, which are partly shared with the casting site.



Production Planner Richard Lyon explains why batch optimisation is once again a key priority. “Different materials of different sizes need different lengths of time in the oven. We may have a batch of 100 rods of a certain material type and size but to get the most efficient use of an oven, we may need 1500 rods.” He continues, “We also have to stagger the loading and unloading times of the ovens as having them all complete at the same time would be unmanageable. This requires a degree of versatility as each identical batch may have slightly different characteristics depending on a range of factors which may be out of our control.”

The semi-finishing site is theoretically the least complicated area but some products can require multiple operations in the finishing area and this necessitates planning the flow of product through each resource in the right order. Depending on the destination market, different levels of tolerances may be required, all of which can impact the actual time physically spent on any particular order. This in turn can have a knock on effect on any subsequent orders.

Due to the number of process steps involved and the long throughput times in production, Global EPP has to be able to maintain visibility and control of vast amounts of Work in Progress that can move between its three sites. It also needs to maintain an optimum stock holding in order to meet increasing customer demands for product ex-stock. Lyon states that availability and timeliness of product is the customer’s key consideration in addition to quality of product. Accuracy of delivery dates however depends on visibility and control of the planning process not just at an individual plant level but also at a strategic level where the impact of decisions in one plant can affect those in another.



Resource bottlenecks are therefore a major source of disruption and as Lyon acknowledges, the production processes can be very hard on equipment so managing maintenance is critical. "In addition to damage to tools and moulds which can take several weeks to repair, any unplanned shut down of equipment can sometimes have a dramatic effect on the planning. Even though all key equipment is calibrated and checked on a monthly basis we do have to be able to deal with some shut down and related plan changes." He continues, "If something unexpected happens we have to be quickly able to assess alternative production routes and possible impacts on delivery dates for the customer orders."

Whilst only joining the company as it was actively looking to source a computerised planning and scheduling solution resolve to its difficulties, Lyon recalls that there wasn't an effectual planning in place from a company perspective with each area operating according to its own criteria. Planning aids were in the form of an aging T-Card system and a series of complex Excel spreadsheets. "It was an island mentality where no-one really knew what anyone else was doing or what impact any decision taken had on the rest of the company. This general lack of visibility could result in duplicated or missed orders and all too often a delivery date that wasn't met."



He explains why this was the case. "Both Sales and Planners knew that a product might take a certain time to make, so invariably this was the time quoted to the customers. However, this was with no visibility of what other orders were also needing to be actioned." And, because of the lack of transparency, this standard time took no consideration of the benefits of batch optimisation so even if an order was produced on time, it may well have been done so in a less than efficient manner. Even more worrying was the inability to accurately confirm where any particular order was, which would have been helpful for the instances when a customer called wanting to know where their particular order was.

A search for a more effective and efficient planning solution began in late 2004 with some extensive research that resulted in an on-site interview with a number of shortlisted companies. Global EPP's key requirements were the ability for any solution to provide the necessary control and visibility to plan effectively, for any solution to work tightly and seamlessly with its XKO Enterprise Resource Planning (ERP) system and to be flexible enough to handle the company's unique production processes. Preactor was selected as

it not only met all of the system specifications; it was also very competitively priced. As Lyon remarks, there was a further consideration. “The fact that Kudos Solutions, our local Preactor reseller, was in the same city meant that we knew we would also have the best service right on our own doorstep.”

A decision was made invest in a Preactor Advanced Planning and Scheduling (APS) system in early 2005 with Kudos’ deep understanding of Global EPP’s business being put to good use from the outset. Global EPP had already accurately measured all the relevant time and routing information prior to its selection process and Kudos used this to configure Preactor while also developing the seamless link with the company’s XKO ERP system.



Within weeks, and with minimal disruption to the running of the company, Lyon was using a working version of Preactor in the casting plant and already seeing a marked improvement in planning visibility and control. While noting that the shop floor practices remained the same, he explains that the operators very quickly developed confidence in the work-to lists generated by Preactor. “Historically they knew that they had at times duplicated jobs because of the old Excel-based system – now they knew they could trust the information they were given.”

The Preactor system underwent a series of refinements and modifications over the early months as feedback was gathered and actioned and continued to improve in the benefits it was delivering. So much so that Global EPP decided it was the natural choice for extending this new found planning visibility into the Extrusion plant. Kudos again was responsible for the successful implementation of a Preactor P300 system which added to the benefits already being generated. In order to close the planning loop between planning and the shopfloor, Global EPP integrated Shop Floor Data Capture (SFDC) via bar code scanners so that the start and end time of every process can be accurately captured and fed back in the daily plan.

At the heart of this is the delivery of complete visibility across each plant and across the company as a whole. This in turn has led to much more efficient resource utilisation with a minimal amount of tool changes. All of which had directly benefited the customer as Lyon explains. “When I joined the company, our On Time and In Full (OTIF) delivery rate was

42%, last week it was over 90%. Moreover, we now have complete confidence to give a customer an accurate delivery date and should there be an unforeseen problem, for example a machine breakdown or another issue out of our hands, we can go back and update them right away with an accurate revised date.” In addition to helping with planned and unplanned maintenance issues, this visibility can also help with other strategic and tactical decision making, such as whether to invest in new plant, change shift patterns, or amend stock order levels.

It has also saved a considerable amount of time as a brief review of Lyon’s daily planning activities reveals. Prior to Preactor there were several planners and chasers with planning literally being an all day, every day task. Now Lyon imports all the live MTO job card information from XKO into Preactor every morning, including the previous day’s updated SFDC data. After Preactor automatically sequences the data, this can be fine tuned according to any local information known to Lyon, the Sales team or the production supervisors. Once this is done, the plan is finalised and issued to the supervisors. All together Lyon says this takes a maximum of 3 hours a day with most of that time taken up by the ERP system.

Despite its successes to date, Global EPP believes there is a lot more to come from its Preactor solutions and is working with Kudos Solutions to make some further refinements as well as extending more controlled planning to secondary operations. With this in mind, Lyon’s positive conclusion ought not to come as a surprise. “Through better visibility and better planning, Preactor has made our customers happy which in turn keeps us happy.”

## Electronics Assembly – Mode Lighting



Mode Lighting, part of the TCL group, specialises in the design and manufacture of electronic control systems for the lighting industry. Products include residential and commercial dimming systems, electronic transformers, cold cathode converters, LED lighting solutions and DMX controllers. The £8.5m turnover company has grown from a two man partnership in 1970 to a 120 strong team with offices and manufacturing facilities in the UK and associated companies in the Far East.

Mode also offers a design and manufacturing service for a select group of customers. With an 80/20 split between the manufacture of Mode product and subcontract product, the company prides itself on its quality, service and design capabilities. When it became clear that its existing planning and scheduling capabilities kept the company in the dark, it turned to Preactor to provide its much needed visibility.

Part of Mode Lighting's success rests on its ability to manufacture high mix, low volume products in the UK whilst managing the high volume Far East supply chain. It has a product range including variants of over 400, most of which is available ex-stock on a next day basis. Custom Mode products or subcontract products take up to 3 weeks and batch quantities can vary between 20 and 2000. Orders are managed by the Sales Department; if the items are stocked they are handled and despatched directly from the warehouse. Orders for the manufacture of product are passed to the planning department on a daily basis where they are entered onto the company's Fourth Shift Enterprise Resource Planning (ERP) system, which determines which components, if any, need to be purchased. When all source components are available, a pick-list is generated and the order is then passed to the stores department which fulfils the pick-list and sends it for final preparation prior to production.

Production may start in one of many locations depending on the product and technology used. It might start on the Wave solder line, the Surface Mount line, the Chassis Assembly line or any one of a number of product lines, before being routed to its next operation and subsequently inspection, test and packing.

All of which sounds relatively simple although as General Manager Ian Hodgson explains, the reality is anything but! "Whereas many manufacturers would claim that their greatest asset is their people, we believe this in a very literal way." He continues, "Our success relies very much on the dedication, accuracy and skill of our people due to the labour intensive nature of much of our production. Our high product mix and range of batch quantities means investment in automation has to be selectively targeted. Any machine resource is very much an aid to our people not the other way around. Successful planning means planning manufacturing to be efficient, but with realistic targets".

This again might sound relatively simple but different products require different skill sets at different stages and Mode Lighting's personnel have a diverse multiplicity of skillsets. This allows the company to be highly flexible in its use of human resource but also presents a key planning challenge, especially when taking the company's flexible working patterns into consideration. Hodgson again, "We have many long serving people in the company and people's work arrangements change. Some may only need to work mornings, others afternoons while others may only be able to work 3 days a week. We have younger workers who need time at college – all of which affects the complexity of the production plan. Prior to Preactor this type of working arrangement was a problem, now we find it makes no difference to our plan and delivers benefits."



In addition to this, there are a large number of potential permutations involved in a wide range of products. Depending on the specific customer requirements it might be more appropriate to source components in differing degrees of assembly which has a direct impact on product routing information. As the majority of this information historically tended to be primarily located in the brain of Planning Manager Craig Hastings, this put a huge amount of pressure on Craig and the planning team. Given that Hastings relied exclusively on a series of manually completed Excel Spreadsheets to generate the company's monthly production plan, it is not a surprise that much of this information Hastings describes as "educated guesswork."

Consequently the whole company suffered from what Hastings describes as a complete lack of visibility about what was happening, when, and where. "Sales had to fight hard to get answers to questions, production didn't know anything other than what they were working on, and planning had an approximation which grew increasingly inaccurate as the month progressed. If anyone wanted a definite answer, it involved lots of phone calls, lots of heated conversations and literally lots of running around." The general distrust in the plan had the knock-on effect of planning often being subject to the age-old rule of „He who shouts loudest“. As Hastings continues, "this didn't take into account that the one shouting loudest didn't recognise or see the impact that this would have on existing orders." And as Hodgson adds, "the reality is no-one actually knew the impact of the changes to the plan and decisions could be made that were less than optimal."

This lack of visibility had a direct bearing on manufacturing's ability to keep to its customer delivery dates and higher than necessary stocks were used to buffer poor performance. Hodgson again, "Larger batches of product with the inevitable longer lead-times were being used, as in theory they were easier to control. We might have a batch open for 3 months which would keep getting bumped in terms of priority which meant there was a lot of Work in Progress around the factory. In addition to the cost implications, it wasn't a very flexible way of working."



While noting that the means didn't even exist to monitor „On Time and In Full“ delivery statistics, Hastings guesses it was as low as 50%.

Because the production plan was widely known to be inaccurate, this caused tensions between different departments in the company. Hastings honestly admits to having arguments with the sales department on a daily basis which despite all efforts to the contrary, inevitably spilled over into production meetings. When requests were made of the purchasing department, the purchasing department would often either amend these as they saw fit or point out to the planning department that they already had those parts and have not used them. Despite long meetings each week with the Charge Hands to keep on top of the planning difficulties, it was increasingly clear that Mode Lighting needed to completely rethink its planning and scheduling approach.



The company had already begun looking at computerised planning and scheduling systems, but the experience had been less than positive as Hodgson notes. "Mode had met with several companies who said they could do what was needed. Work had been done to look at various ERP solutions, but an ERP solution could cost £80K or more and might not provide the graphic planning representation wanted by planning. It would require a major change to some, if not all the ways of working in the business and implementation time would be lengthy."

Hastings added "That was too much so we kept on trying to make do with what we had." He continues, "What we needed was some real momentum to get a decision made" and this arrived with Ian Hodgson in January 2008 who was tasked with making the plant work as it should, which in turn meant getting on top of the planning and scheduling difficulties.

Mode Lighting had already been approached by Preactor reseller Adrian Birt of Planning Board but it took Hodgson's arrival to arrange for a demonstration of the Preactor system.

Mode also arranged for a demo from Orchestrate and sent both companies away with a limited amount of live system data with a view to seeing how each company handled the real world challenges Mode faced. Hodgson describes what happened then. "Adrian was back in a matter of days with a working proof of concept and this combined with Preactor's large number of reference sites convinced us that Preactor was the way ahead. The system seemed ready to go and was easily configurable for our type of manufacturing environment."

Following a decision to invest in Preactor in February 2008, Hastings spent a month working with the planning team distilling all his unique planning and routing information into a comprehensive spreadsheet. Every stage was carefully checked with often quite varying results emerging between perceived process times and actual process times. Hastings again, "Much of our potentiality to optimise our human resources rests on the accuracy of the data we use concerning how long every action takes. Because we schedule by human resource, this meant accurately measuring how long each person takes on every task and basing routing times from this."

A key aspect here was programming in the fifteen different calendar permutations that covered every worker in the company and adding this to the other planning information. Mode worked closely with Planning Board to develop a number of custom areas of functionality within its Preactor P200 system, most notably a measure of Staff Utilisation and On Time Delivery through each area. In terms of information flow, Sales Orders would now come across from the Sales department and be entered both into Preactor and Fourth Shift during the trial run period which began in May with the system successfully going live in July 08.

When asked how the new system worked in comparison to the old spreadsheet based method Hastings simply replies, "Beautiful." He goes on to elaborate, "Right from the word go, Sales could see when product was planned to go to stock. It might have taken them several months to believe what the system was telling them but since they have been working with it they are getting product when they want it. The system quickly highlights when we can't make an order when Sales would like it. We can re-plan or renegotiate new dates with Sales. We can bump lesser priority orders and quickly see the effects on the plan."

Hodgson comments that this had a profound transformational effect on the company. "It has brought stability and realism to our planning. Previously, Sales had by and large driven the Planning Department on a priority basis. In some case this lead to inefficient use of staff and high levels of WIP. Now planning can add real value by determining what gets made when and importantly in the most efficient manner. Now when a product is wanted the planner can say with 100% certainty if it is achievable, understand the impact and prove it."

The same impact was felt in the relations with the Purchasing Department. Stabilising the demand on the factory has lead to a stabilising of demand on the purchasing team. In fact, Hodgson is adamant that Preactor has had an integrating and stabilising effect on the company as a whole. "Because each area now has access to accurate, up to the minute data, there is much more appreciation of what any other areas in the company are doing."

The impact of a decision can be immediately seen and there is much greater communication within the company as a result.” He added “in these difficult times of varying demand it is hard to imagine how we could have managed as well as we have without Preactor. It would have been easy to have made a wrong decision.”

The new found visibility has also helped increase staff utilisation levels from a guestimate of 60% to now over 82% which in turn as meant that the company has been able to cope with increases and decreases in demand. The company’s flexibility has also been assisted by being able to handle much smaller batch sizes which in turn have helped reduce stock levels and WIP. The new found confidence in its planning capabilities has helped the manufacturing to take back in-house areas of work that previously it had no alternative but to outsource. Hastings says “manufacturing as a whole has regained a real sense of credibility and this has been recognised by the company as a whole.”

Of course the ultimate beneficiary of this has been the customer. Hodgson is rightfully proud that On Time and In Full delivery dates are now 85% and plans are in place to drive this further. And there’s more to come with Hodgson describing the relatively recent implementation as just, “an excellent start.” The company’s in-house IT department has recently completed an automated link between Preactor and Fourth Shift which will further improve planning efficiencies and Mode Lighting plans to extend the realm of Preactor to include its fabrication operations. It is also considering upgrading to a more powerful Preactor system to take into consideration secondary production constraints and stock forecasting.

Hastings repeats his earlier comment of „beautiful“ when summing up the impact of Preactor on the planning department and the entire company. “Preactor has given us visibility and helped us gain trust and credibility.” With a similar appreciation, Hodgson concludes by saying “Preactor has enabled the business to be more integrated and we can confidently make promises and meet them. We pride ourselves on our ability to keep our promises.

## Healthcare Packaging - Enestia



Enestia specializes in the production and packaging of pharmaceutical and healthcare products. In April 2007 it became part of the Irish company United Drug Plc and was previously known as Budelpack. Enestia, Greek for wellbeing, has operated for more than 50 year in Hamont, Belgium. Enestia's business is based on taking over the responsibility of production and packaging from pharmaceutical and healthcare companies who don't see this as their core business.

In this way Enestia allows companies to fully dedicate themselves to R&D and Sales and Marketing. For Enestia however production and packaging **is** their core-business and for which they have already built up a substantial track-record in the pharmaceutical and healthcare market. A very important prerequisite is to sustain a high level of quality which is as high or even higher than the quality level the customer expects. It is key to Enestia to invest together with key-account customers in the development of very specific, tailor-made solutions which comply with the real needs regarding product/packaging and conditioning.

The most important mission for Enestia is, as Ludwig Bastiaansen, Managing Director of Enestia states, to strengthen its position in the pharmaceutical and healthcare market with the ultimate goal of reaching a market leader position.



The main reason why Enestia chose Preactor for their advanced planning and scheduling system was slightly different than most comparable companies, who don't have one. Enestia already used a similar solution, called Quintiq, for some years. Budelpack's corporate department had already identified the added value of using this type of system and therefore rolled out Quintiq in all their production sites, including Enestia. The acquisition of Enestia by United Drug plc. in April 2007 triggered the management team to reconsider using the current system and started a selection process where, next to Quintiq, three other package/system suppliers were invited to demonstrate their solution.

A key reason to reconsider was the fact that the current package was heavily customized and limited knowledge was available to support the technical systems which led to an added continuity risk. Obviously the new solution would need to replicate the requirements of Enestia working in the pharmaceutical and healthcare market in which complexity and flexibility would need to be increased in the near future. Rudi de Loor, the Enestia Logistics Manager defined three important pre-conditions that had to be covered in choosing the new solution/system.



1. The new package should contain adequate flexibility to fulfill frequent changes in the planning. For that matter additional functional criteria were identified:
  - a. The ability to simulate forecast and planning changes without fixing the production planning on the basis of these simulations.
  - b. The ability to use specific Enestia planning parameters such as for example a matrix containing line change times.
  - c. The ability to use Bill of Material information.
  - d. The ability to configure changes in the setup of the system or parameters by Enestia in an easy and user-friendly way.
  - e. Provide well functioning, automatic interfaces with both the current ERP system used (Navision version 3.7) which also should be (re)usable for the final ERP system solution (Navision Dynamics version 5.0) after upgrading the old version.
2. Knowing the current business dependencies and the continuity risk attached it was also very important to provide trust and reliance on the new solution to be provided by showing knowledge, input and support by the (current) package supplier.
3. Last pre-condition was the necessity to find a good balance between costs of implementing and supporting the new solution and the provided quality and fit of the new solution.

Besides these pre-conditions, and not explicitly mentioned by Enestia, the chosen solution should comply with the pre-conditions set implicitly by using an already implemented system which fulfills part of the system requirements. On basis of test-cases provided by Enestia in July 2007 the four identified Package suppliers conducted their demo's of Microsoft Dynamics, Quintiq, Ortec and Preactor.



After a planned summer recess in August 2007 Enestia finally chose Preactor in September 2007.

Rudi de Loor commented “The most important motivation for choosing Preactor was firstly the good fit with the most important three selection criteria, secondly the very thorough preparation from Evologics the Preactor Network Partner based in the Netherlands, and thirdly the expertise and experience of Arjo Oldenbeuving that gave us a very reassuring impression of the quality of the solution and future support.”

Just after the final choice to go ahead with Preactor in September 2007 Enestia started, together with Evologics, the implementation process. Due to the “fixed” deadline of January 1st 2008, caused by the expiration of the licenses of the old system, it had to be a relatively short period in which the implementation needed to be prepared and finalized. Therefore Enestia also decided to link Preactor in first instance to the currently used ERP system (Navision 3.7). Then after the first implementation of Preactor, Enestia would start with implementing and linking it to Dynamics NAV 5.0. This was eventually implemented and went live in the last quarter of 2008 and is currently in a stable condition.

During the last months of 2007, after finalizing the implementation preparation phase in September, the implementation and preparation for Go-live of Preactor was started including the following phases:

1. The scoping phase by which the project formal started contained the following activities:
  - a. Conducting a reference visit in September 2007
  - b. Defining the “User Requirements Specifications”
  - c. Development of the required bespoke, preparation of a test case to be presented in the steering committee in October 2007
  - d. Further finalization of the development of the bespoke, and fine-tuning the system in November 2007.
  - e. Education or training of the production planner and users of the planning output during the month December 2007. Predefined slack in the planning to absorb potential issues or other setbacks appeared not to be relevant.
2. Subsequently the Execution phase was started with the Go-live on January 1st 2008. During January problem solving activities were executed and relatively few issues were found with limited impact were managed.
3. In April 2008 finally the Aftercare phase was started in which additional requirements were defined to manage the interface with the upgraded ERP system. These new requirements were then developed and tested in September 2008 and finally finished after the Go-live of the upgraded ERP system Microsoft Dynamics NAV version 5.0.



With the last Go-live and the availability of a complete End-to-End solution (Upgraded ERP system and a new Advanced Planning and Scheduling System, Preactor) Enestia is prepared for the future. The new planning system is running very successful and many other indirect departments are already using the output of the system as their basic information source. As Rudi de Loor again. “The organization is very satisfied with the implementation and the current status of the system.”

And the future? With the recent implementation of the final IT landscape including Preactor, Enestia set an important step forward in improving their previously defined criteria which the system has provided:-

1. Improved visibility in projected stock demand and the ability to anticipate issues in the forecast stock situation (such as purchase order delay, stock issues etc.)
2. Improved planning information to both internal Enestia clients (related departments such as sales, procurement etc.) as well as external Enestia contract packaging clients.
3. Improved the visibility on costs in stock maintenance
4. Improved ability to simulate different “what-if” scenario’s, or simulate consequences of changes or disturbances of planning and / or forecasts.

Next to these already currently visible improvements there have been concrete plans identified to further improve and optimize in the following process areas:

- Further reduction of manual transactions to realize more efficiency and effectively in the planning process and preventing faults
- Improve the visibility on the following data entities:
  - Forecast data
  - Make-To-Order data
  - Budget-Order data
- Starting up a pilot to further improve the process to manage specific and unique customer flows and expanding this and fine-tune this on-going.

Enestia has the right instruments and tools to their disposal to be able to better and actively manage new challenges which are foreseen for the future. Furthermore Enestia has a good view on where to further improve in order to fulfil their ambitions set. Their IT Landscape which is a prerequisite to achieve these ambitions is already in place, partly due to the implementation of Preactor. The last word from Mr L.J.T.M Moonen of IBM BeNeLux Global Business Services who managed the project and prepared this case study.

“I really would like to thank everybody for the time and effort they have put into the delivery of the input for this document and especially I would like tot thank Mister Ludwig

Bastiaansen, Managing Director Enestia, and Mister Rudi de Loor, Logistic Manager Enestia, for their hospitality, commitment and willingness to provide me with the Enestia specific information.

## Rubber Seals - TRP



TRP Sealing Systems Ltd has grown from humble origins in 1981 to become the second largest Gasket Plate Heat Exchanger (PHE) manufacturer in the world. Twice awarded the Queens Award for Enterprise, the £20m company headquartered in Hereford has manufacturing partnerships with Dubai and India in addition to finishing sites in Romania and now produces approximately five million gaskets each year.

With 99% of these destined to leading PHE manufacturers overseas, TRP has a global reputation to uphold during continuing growth in the midst of a changing market. When its existing production planning and scheduling approach began to jeopardise this, TRP gave its seal of approval to Preactor International.

At first glance the processes involved at TRP appear to be relatively straight forward. The company buys in its required raw materials which are then extruded before being laid out by hand into the appropriate tool or mould which is then placed into a heating press. Once this is complete, the gasket is removed from the tool, cured, finished, quality assessed and then despatched to the customer.

As is often the case however, appearances can be deceptive and according to TRP's IT Administrator Mike Evans, this is very much the case at TRP. To begin with there is the number of individual resources involved:- 8 extruders, 24 presses and over 700 tools. Then there are the permutations, beginning with the extruders, 2 of which are material specific while the remaining 6 can handle multiple material types. Out of the 24 presses, 4 can accommodate up to 4 tools at a time, 6 can accommodate 2 tools at a time with the remainder handling only one tool. Within this is the further consideration that the type of tool accommodated is determined by the type and size of the individual press. Evans explains that it is therefore the tools that cause the biggest challenge.



“Each tool we use is essentially bespoke to a specific customer but may contain up to 7 possible design variations depending on the final product. The tools are also large and heavy, the largest measuring 3.9m x 1.7 m and weighing up to 2 tonnes, which makes storage and moving them a real issue. Certain tools only work in certain presses and with certain materials and can require either one or two people to operate them. To complicate things further, certain tools may also be located in Dubai.”

For TRP therefore, success depends on having the right tool at the right press at the right time along with the right raw material and the right number of required workers.

But as Evans continues, changes in the business have exacerbated this further. “Our customers are increasingly demanding shorter lead times and quicker, more accurate delivery dates. We now have to keep buffer stock levels of certain products because customers expect these „ex-stock” while others continue to be made-to-order.” This would be easier if orders came regularly and for consistent batch sizes but order sizes can vary from a handful of gaskets up to three to four thousand. Even customers with regular monthly call-offs can move orders forward at short notice. Given that setup times for the larger tools can take 10 hours, achieving a smooth flow with minimum changeovers is also essential to TRP operating efficiently.



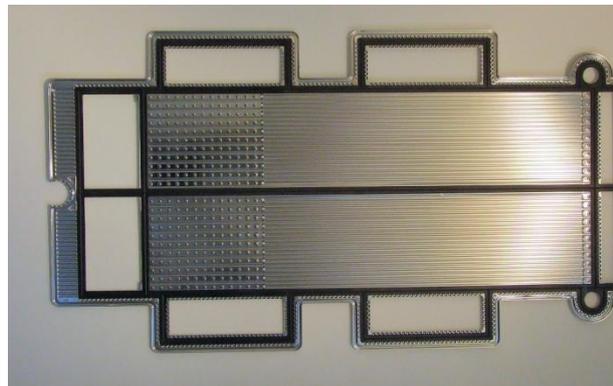
Prior to its investment in Preactor, TRP had relied on its Lakeview Enterprise Resource Planning (ERP) system combined with a huge T-Card system, supplemented by hand written schedules and Excel spreadsheets.

Works Orders were entered into Lakeview and these would be updated at the end of each day with that day’s production data. Lakeview would then simply select the next orders to work on based entirely on due date. As Evans recalls, “There was no consideration for batch optimisation, tool and press availability – it was just a first come, first served basis.”

When it came to actually generating the production schedule, at the end of each week an entire wall of T-Cards covering 12 weeks was manually updated based on information from Lakeview. Alan Lewis, Planning Manager was responsible for manually correlating each order against the required tool based on calculations and information he held in his head. He would then handwrite the entire schedule for the following week by machine before cross-referencing this information onto a complex operator’s timesheet that relied on general time approximations. This schedule was then manually copied and distributed to the shop floor.

Evans recalls the problems associated with this, some obvious, others not so. “It’s less of a case of what was wrong with it, more what was right with it! The planning process essentially took an entire week after which it was time to start it all over again. And the minute any change happened in the schedule for example as a result of a machine failure, tool damage, a customer bringing forward an order etc, the schedule would be out and needing to be reworked all over again.

The system relied very much on the planner’s intimate knowledge of what tool was required for which order which caused problems if the planner wasn’t here. We’d also run the risk of having different versions of the schedule being used by different people and because of the approximations in the timings etc, orders were taking much longer than they needed to be completed.”



In short, there was very little control and even less visibility of what was happening, where and when. As the business continued to grow, this understandably impacted on lead times and delivery dates, so much so that one of TRP’s main customers felt the need to inform the company it would be sending in one of its own consultants to assess TRP’s planning process. TRP knew it was struggling in this area but this very much provided a catalyst for change. One of TRP’s Directors knew someone who had heard of a production planning and scheduling solution called Preactor so in early 2007, TRP contacted Preactor and was referred to Alan Keene at The Scheduling Business Ltd, a Preactor Solution Provider, whom they had already contacted independently the year before, and who had the depth of experience to handle their demanding scheduling problems. After a general demonstration of Preactor, Evans and Keene discussed TRP’s specific challenges which led to Keene recommending a bespoke interface to TRP’s ERP system as well as other key databases. Keene then did a proof of concept demonstration based on a similar set of challenges which led Evans to conclude, “We could see it would do what we needed to do and we knew we needed to do it.”

The decision to invest in Preactor was taken in April 2007 after which followed an intensive 2 month project to identify all the manufacturing metrics involved across the entire product range and systematise these into appropriate databases that could be used by Preactor and Lakeview. The end result was a database for product types, tools, materials, actual products, and presses. The relational links then had to be constructed making use of the expert knowledge contained within key employees in the company,

most notably the planner, in order to derive the required planning and scheduling rules. TRP originally looked to use a Preactor P200 system but very quickly upgraded to a Preactor P400 system in order to fully deal with the complexity of its secondary constraint requirements and has been using this ever since in conjunction with a number of remote viewers. The scalability of the system has proved very helpful to TRP with the upgrade being successfully completed with minimal disruption.

Evans describes the very different planning and scheduling regime at TRP since implementing Preactor. "When orders are received they are checked against stock and if required to manufacture, this is passed to planning via its TSB interface. This allows the planner to allocate the required tool against the order according to when the tool is free.

This is then passed to Preactor as unallocated tool time which can then either be actioned as an automatic or manual schedule update depending on the nature of the order. This is then passed back via the TSB interface where the delivery date can be reviewed in conjunction with TRP's Master Production System (MPS) which determines whether the product is to be trimmed and finished in Romania or on-site. Once the delivery dates have been harmonised, the final Works Order is generated.

What this means in practice is that TRP now has a rolling 15 day schedule that provides instant visibility across the entire production process and which can be extended to a two and a half year planning horizon. This real-time visibility is accessible across the company via the remote viewers meaning that any customer interaction can always be based on completely accurate information. In fact, TRP proactively informed its entire customer base that it had implemented Preactor to assist with its planning and scheduling requirements and received wide ranging and very positive feedback from many customers. So much so that customers began to have the confidence to move away from booking orders to reserving production capacity, secure and confident in the knowledge that with Preactor, TRP would be able to deliver this increased flexibility of service.

And Preactor has certainly helped TRP to deliver. Evans says that On Time Deliveries are now 60% improved with a growing number of customers enjoying rates of 100%. At the heart of this has been the ability to streamline the planning process as a whole and optimise the combination of tools, presses and raw materials while minimising costly changeovers. So flexible and powerful has Preactor proved to be that even the addition of a further 3 presses in 2008 did not impact on its ability to consistently deliver schedules that are both realistic and accurate. Maintenance, planned and unplanned, is now no longer an issue, nor is customer orders unexpectedly pulled forward as Evans explains. "The beauty of Preactor is you can rearrange the schedule in a matter of seconds to take into account the reality of what you have to deal with."

This has been increasingly put to the test in 2008 with the nature of TRP's business having to become much more agile in response to changing customer requirements. "We now have to juggle much more detail than we ever had to – smaller orders and with quicker lead times. It's more vital than ever to know exactly what is happening and when and not rely on approximations. We simply could not have done this before we had Preactor – it's at the very heart of our production planning and scheduling."

## Chemicals - U.S. Paint



U.S. Paint is the market leader in coatings supplied to the power sports market and other OEM industries. U.S. Paint is focused on being the premier supplier of coatings for exterior automotive parts (mirrors, trim, spoilers, molding, bumpers, grills, and other plastic parts). With manufacturing, laboratories and R&D based in St. Louis, Missouri, U.S. Paint has 100 employees with annual sales of \$25M. The facility is 150,000 square feet under one roof, producing 1.5M gallons of coatings a year with batch sizes ranging from 1 to 2,100 gallons. U.S. Paint holds ISO 9001:2000 and ANSI/ISO/ASQ Q9001-2000 certifications.

Founded in 1931, U.S. Paint Lacquer and Chemical, St. Louis, Missouri, specialized in varnishes and lacquers for the carriage market. Over the next 36 years, U.S. Paint expanded into the aerospace industry with revolutionary aliphatic urethane, two-component paint system. In the 1970's, Grow Chemical Corporation, specializing in automotive and anti-corrosive coatings, purchased U.S. Paint Lacquer and Chemical and changed its name to U.S. Paint, Division of Grow Group. Grow Chemical became a licensee for Nippon, Oil & Fats of Tokyo, Japan to support the Japanese Automotive transplants in the U.S.A. U.S. Paint introduced AWLGRIP urethane and epoxy technologies into the marine market. In 1989, Nippon, Oil & Fats, (NOF) purchased U.S. Paint, Division of Grow Group and is incorporated as a free standing U.S. Corporation. U.S. Paint Corporation specializes, develops and manufactures state-of-the-art coatings worldwide for the marine, aerospace and industrial industries.

With over \$50 million in sales, U.S. Paint realized that quality and image were the determining factors for the success of their products in addition to meeting demanding technical requirements. In 1998 U.S. Paint invested \$7 million to renovate and expand its R&D and manufacturing facilities to modern standards to meet customer expectations. NOF Japan made a strategic decision to shift out of the coatings market and focus primarily on biotechnologies. In 2001 U.S. Paint's marine and aerospace markets were sold to Akzo Nobel. U.S. Paint Corporation realigned and focused on the development, manufacture and support of advanced one component and two component coatings for plastics.



In 2003, U.S. Paint management group purchased U.S. Paint Corporation from NOF and shortly thereafter realized growth in the power sports and automotive trim. The success

was the result of providing customer-focused product development and superior technical service support to its customers. At the same time U.S. Paint enters into a licensing agreement with BASF.



Currently the breakdown of U.S. Paint's business is 45% power sports, 40% automotive, and 15% industrial. U.S. Paint's customers include Subaru of America, Honda Motorcycles of America, Yamaha Motor Manufacturing Company, Kawasaki Motor Manufacturing, Nissan, Toyota, and GM-Suzuki joint venture vehicles.

U.S. Paint's commitment to quality is well known with a reputation for the cleanest paints in the industry with products with wide workability windows. The clear coats are easy to finish for difficult applications. U.S. Paint customizes technology and builds products for its customers and yet retains the highest levels of reproducibility and consistency from batch to batch for its products. In 2007, U.S. paint had zero color complaints from its entire customer base. In 2006 and 2007, U.S. Paint had zero customer complaints for dirt or contamination. The focus on customer service and quality is the driving force behind U.S. Paint.

Other examples of their commitment to quality:

- Since 1979 with 2.2M units painted, U.S. Paint has received zero warranty claims from Honda
- Yamaha has filed no warranty claims to U.S. Paint
- Since 1998 Kawasaki has filed no warranty claims against U.S. Paint

It should not come as a surprise that U.S. Paint as an automotive supplier is focused on lean manufacturing, constantly improving the processes to be fast while cost effective. The internal program of constant improvement is what led U.S. Paint to Preactor.

In 2000, it was becoming clear to U.S. Paint that while customer service levels were high, management of the shop floor was increasingly difficult and that higher customer service levels were possible. Increasing work-in-progress levels were choking the shop floor. While morale was high - employees viewed the high levels of WIP as evidence of company stability - the risk of losing agility and the speedy responsiveness of U.S. Paint was of increasing concern. The typical problems in scheduling the shop floor were:

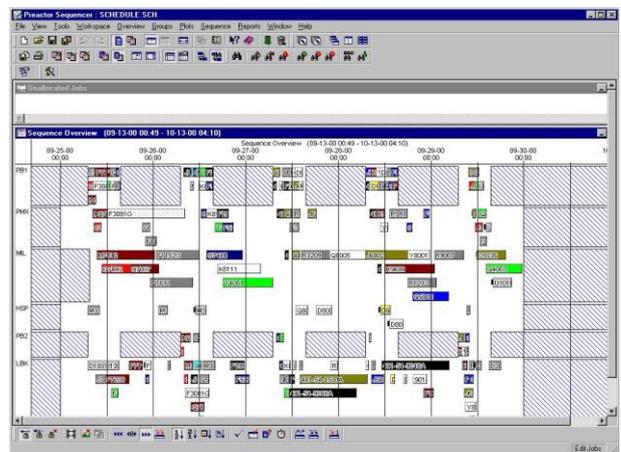
- Manual planning board
- Work load too large to manage manually
- No effective method to manage revisions to the schedule
- Schedule generation using 3-6 various tools, reports and internal systems

All of this resulted in

- Few or no methods to evaluate schedule performance
- Poor shop floor discipline, poor sequencing
- Missed due dates and missed commitments
- Inconsistent resource utilization
- Could not locate, and therefore could not properly manage bottlenecks
- Unable to predict customer service issues

What U.S. Point wanted to achieve was:

- Shorter cycle time
- Ability to commit to customer needs quickly
- Increase due date reliability
- Minimize WIP and WIP inventory valuation
- Ability to effectively react to schedule changes

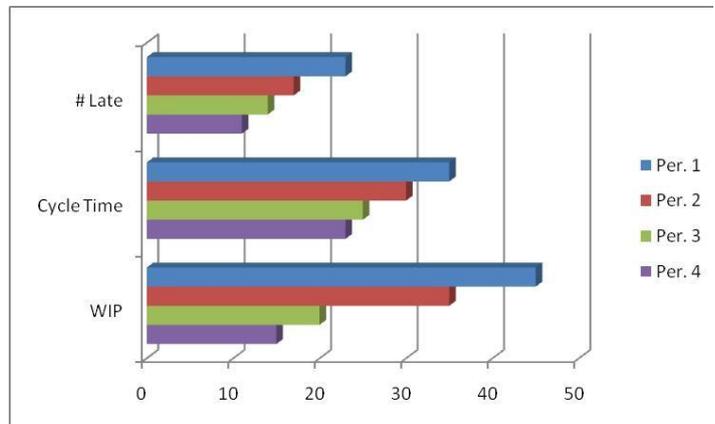


Preactor was found to be a highly effective, electronic finite capacity scheduling package with significant advantages:

- Very flexible and configurable, even by the user
- Low cost installation
- Play “what if” scenarios
- Manage changes by prioritization
- “Early warning” ability to communicate what’s going to be late, how late, and effects of expedites
- Ability to capture key data
- Fast commitment capability
- Better utilization of resources

Some obstacles needed to be overcome before fully exploiting the advantages that Preactor offered. The first was training end users on a package that offered a level of automation that many had not seen before. The next was setting up the hardware by integrating bar-code systems and positioning stations to update information strategically on the shop floor.

Very quickly, U.S. Paint began to realize a return on their Preactor investment through reduced WIP levels. The reduced WIP levels translated to uncovering capacity, as compared to the earlier perception that U.S. paint suffered from a capacity shortage. Cycle times shortened and delivery reliability increased. The visibility provided by the Preactor graphical user interface led to quicker and better resolution of problems in production.



U.S. Paint realized the following benefits from adopting Preactor:

- 50% decrease in work-in-process
- 20% decrease in production lead time
- 20% reduction in total finished goods inventory as a direct result of reduction in WIP and lead times

Also in 2007, U.S. Paint has zero customer complaints for late shipments.

“Breaking each batch up into individual jobs through routing was key,” explains Ryan Lute, materials manager and Preactor project lead. “Being able to schedule each step cleared the way for throughput. We were able to finish the batches that we started. Second, the ability to visualize „finite capacity” increased our communication to the customer. We were able to better balance priorities as it became clear when we began to reach capacity.”

As part of the process improvement initiative, U.S. Paint wanted a more visual and accurate means to chart performance and integrate the process into the daily routine. The goal was to increase throughput by supplying shop floor with reliable tools for measuring performance. Towards that end, U.S. Paint wanted to generate and post cockpit charts, set goals for performance, and identify bottlenecks and make recommendations. This process was to be a continuous loop to monitor and correct problems to increase overall the management of the shop floor.

Luter adds: “Once the reduction in work-in-progress became the norm on the shop floor, the reaction from the shop floor was interesting. Workers came up to me worrying that business had taken a downturn, and I found myself explaining that work flow was going to be smoother because paint batches were scheduled just-in-time by using Preactor.

Gregory Quinn, president of Quinn & Associates, the reseller of Preactor to U.S. Paint, adds: “The value proposition of Preactor for U.S. Paint is powerful. U.S. Paint is yet another long-term user of Preactor which demonstrates that the benefits of Preactor are

not only in fixing short term problems, but the benefits continue year after year. Couple this with the low life cycle cost of Preactor, the return on investment of Preactor is unmatched in the field of scheduling software.”

## Beverages - Highland Spring



Highland Spring is the leading UK produced brand and number one spring water. It is the number two overall brand in the bottled water sector in Britain; number one sparkling water brand and the leading kids' bottled water. Working on a 24x7 basis, at maximum output this equates to up to 90,000 bottles per hour which in 2006 meant that the company bottled around 240 million litres of water.

Every drop of Highland Spring falls on protected land, and was the first bottled water in the UK to have its land certified organic by the soil association. Investment in state of the art production technology and a commitment to the environment ensures that Highland Spring is delivered to the consumer as pure as it can possibly be. When it comes to ensuring an uninterrupted flow of the right product for the right customer, Highland Spring relies on Preactor International.

In order to retain its enviable reputation, Highland Spring has to ensure that the water it collects from a number of springs in the Ochil Hills is of a consistent quality. Yet while the product remains untouched, it can be delivered in a bewildering number of possible configurations. There can be 65 different case configurations which in turn are dependent on the bottle size, shape, colour, and material. To complicate things further, different markets have different labelling requirements which need to be factored in. Promotional campaigns requiring further customisation also have to be taken into consideration.

The actual processes involved from start to finish of the product are in fact relatively simple. The majority of bottles are made from plastic on-site at the company's bottle manufacturing facility which has 4 dedicated production lines. Glass bottles are sourced externally from a dwindling number of suppliers due to consolidation in the glass industry. These are then supplied to the filling/bottling lines which are then labelled and packed accordingly before undergoing a 3 day quarantine process after which they are sent to storage ready for dispatch.

There are however a number of key business challenges involved as Stock Supply Manager Kenny Tannock explains. "Demand for our product can be highly volatile depending on weather and promotional activity. For example, if we have a run of hot weather, demand can spike by 50-60% with little warning. Because we have a 3 day quarantine process, we can't simply produce more water according to demand so we have to keep buffer stocks." This is compounded by the fact that larger customers expect orders to be delivered within 24-48 hours of placing an order. Daniel Muir is Customer Supply and Logistics Manager and explains the problems this causes.

“Big fluctuations in demand cause more than just production difficulties. They also have a big impact on our manufacturing resource at very short notice which can mean using costly agency personnel in addition to our full time employees. They impact on our material suppliers, and they put immense pressure on our warehousing facilities and distribution partners.”



While drawing water from a number of springs, this still requires careful planning to ensure that unnecessary loading isn't placed on any individual spring which is again sensitive to customer demand. This is inevitably linked to basic storage constraints of the water prior to use and the finished products afterwards. Dealing with the scale and throughput of production that Highland Spring does every day, there is simply not enough space to keep endless supplies of finished product so production needs to be kept running as smoothly as possible. Short term promotions and short production runs with different labelling requirements also need careful consideration, as does batch optimisation of bottle size to minimise time consuming and costly changeovers and setup times.

Prior to investing in Preactor's Advanced Planning and Scheduling (APS) production control software, Highland Spring relied on a combination of complex Excel spreadsheets and manually intensive reports extracted from the company's MAX ERP system. Tannock recalls his typical days' planning activities. “Every morning we'd have a meeting to manually update where production was. We'd then amend everything in the system, fine tune and then update the Master Production Schedule (MPS) held in MAX. We would then have to update the works orders accordingly after which we'd generate a series of reports that we'd print out and manually amend during the day as and when any changes occurred - which would then form the basis of what we'd do the next morning.” As Muir remarks, “Production planning used to be a process of continual fire fighting, with Kenny's time being almost completely used just trying to keep everything up to date with little time left to do any longer term or more refined planning or other value-added activity.”

Tannock agrees saying that visibility of „what was actually happening and where“ was practically non-existent with planning being by definition entirely reactive to changes in demand or production difficulties. “Because of this it was difficult to establish a real awareness about the impact of any one planning decision on the rest of the plant. We couldn't see the effects of what we were doing until they were actually occurring or had occurred.” Add to this version control issues to do with multiple spreadsheets and an

inability to have a reliable planning horizon further than a rolling 10 day basis and the problems Highland Spring faced become more than apparent.

It became increasingly obvious that compared to the benefits already being delivered by the company's MAX ERP system, more ought to be able to be done concerning the company's production planning and scheduling capabilities. Organisational changes accelerated this thinking and in 2003 Tannock began looking at a range of systems that would integrate tightly with MAX. In addition any solution would need to have a clear, intuitive planning board, provide company wide visibility whilst also representing strong value for money.

Several companies were quickly identified including Preactor, Agilisys (now Infor SCM) and Simul8, though as Tannock comments, the choice was not difficult. "We soon discovered Preactor was widely used in our industry with both the product and the company having a good reputation." After approaching Preactor for further information, Highland Spring was directed to Preactor Solution Provider RMS Ltd based in Mexborough, South Yorks. Following this a series of site reference visits was organised within the food and drink sector, including Diageo where Tannock was able to see at first hand just how versatile Preactor's production planning and scheduling software really is. "While the feedback was consistently the same in that Preactor was very good, what impressed us the most was the sheer variety of ways that food and drink manufacturers were using the product. This powerfully convinced us of the solutions' flexibility which, when coupled with the support offered by RMS and the experience within Preactor, clearly proved to us that Preactor was a solution we knew we would be able to trust."

Implementation began in January 2004 with Tannock and Muir taking charge of the project with support from RMS. While RMS did all the complex algorithm generation concerning planning and workflow, it was left to Tannock and Muir to begin the process of documenting much of the additional information which was currently held in various spreadsheets or was knowledge that Tannock had acquired during his time in the role. This included essential items such as changeover times, water constraints, product groups, and even localised variances in production line speeds in certain conditions. Tannock again, "Even when we had identified what our key requirements were in terms of how Preactor needed to work, we then had to prioritise these and adapt them if they clashed." An example of this was the need to produce all export products in sync with their UK counterparts while still optimising batches. This necessitated developing a whole series of rules that would allow this to happen, without disrupting wider production concerns.

Highland Spring finally went live with Preactor in April 2005 but this extended implementation timescale was largely due to other projects in progress at the same time within the company and conflicting priorities. Highland Spring knew that when it went live that some ongoing refining of the system would be required as more production data became available. The first noticeable benefit was that it immediately confirmed that with Preactor, there would be no need for an additional production planner to assist Tannock. This was because of the substantial time savings delivered from the outset. Tannock again, "I went from spending the majority of my day simply trying to keep up with generating the plan to being able to have viewed, amended and actioned the plan within

an hour. I could then review this at 3pm to ensure that everything was in place for the next shift.” In real terms this has saved a minimum of half a day, every day and whereas MRP used to be run twice a week, it can now be run every day with a full Preactor update taking a matter of minutes.

Not only did Preactor save time, it also provided the much needed visibility required by Highland Spring. As Muir says, “Not only did we now have the means to easily view what was happening at any point in the business and across the entire plan, the information itself was much more accurate. This meant that the production people saw benefits right away because they now had planning information they knew they could trust.” A consequence of this has been the ability to trim off areas of stock and buffer excess which the company had previously relied on in order to avoid not being able to make a delivery. A further consequence was that the planning horizon went from a rolling 10 days to 4 weeks and beyond. This again benefited the manufacturing teams because they could see what orders were scheduled for the coming days/shifts which enabled them to feedback further fine tuning information into the planning process.

## Small Batch Assembly – Blake



Founded in 1971, Blake UK is the leading UK-based manufacturer of antennas and installation equipment for TV, radio and satellite broadcast reception and radio communications. The £4m turnover company with 55 employees, designs, manufactures and distributes a wide range of quality own-brand and OEM subcontracted products.

With an ever changing product range and an intensively competitive market place, service, quality and availability are vital ingredients to success. When ongoing growth put strain on Blake's existing systems the company turned to Preactor to get a clearer picture of its planning and scheduling capabilities.



The aerial and antenna business is varied, rapidly changing and difficult to predict. In addition to the normal cut-price competition from the Far East and elsewhere within the EU, the imminent switch to a fully digital TV service is adding an extra element of competition. Specifically, other manufacturers are using the UK as a test-bed for their own cut price products for when their own countries switch from analogue to digital TV. As Managing Director Paul Blake says, "the market is consequently flooded with cheap and inferior quality product which is why we have focussed on developing a reputation not just of quality but of ease of assembly and installation. What always matters most however is having the right product in stock at the right time because customers do not expect to have to wait and may well go elsewhere."

When you consider that Blake UK had a product range in excess of 500 distinct items from individual attenuators through to complete aerial assemblies including clamps, brackets and electronics, the scale of the company's challenges starts to become apparent. Add to this individual order sizes which range from £5 to £6000 with long term contracts being in excess of £200,000 requiring monthly call-offs and it's easy to see why

planning for a target 7 day lead time is a key aim. Further complications exist in that Blake UK also selling direct from stock via a trade counter with all the short term variability that this brings. As Paul remarks, “We might have an installer come in and require anywhere between 2 and 10 of a certain type of aerial. We have to ensure we have sufficient stocks levels so he can get all of his order. Given that we supply different products in varying stages of assembly, we have to balance physical storage capacity with the costs associated with keeping significant stock while also being aware that a certain model may suddenly fall out of favour at any time.”



A recent transition to sourcing some components in different stages of sub-assembly has also added to the planning challenges. For example, Blake UK has the full range of in-house facilities to produce a mounting bracket from raw materials. This would typically involve cutting raw materials to size, pressing, drilling, notching, welding then sending out to a 3<sup>rd</sup> party subcontractor for the required finishing.

It could also be received in a largely pre-finished stage just requiring one or two further processes. It's even more varied for aerials which may require different levels of time consuming hand assembly in order to distribute in appropriate assembly kit form.

Again, add to this other considerations like in-house assembled electronic components or complete assemblies supplied from the Far East and it's no wonder that Paul described the previous planning process as reaching a level that, “simply became impossible for a human to manage.”

Prior to investing in Preactor, Blake UK relied on a combination of its CS3 business management system and a collection of custom Excel spreadsheets. While this worked after a fashion, as the business grew it became increasingly difficult to keep track of all the potential variables that could affect the production schedule. While CS3 could manage multiple stock locations, there was a permanent degree of divergence between what stocks were recorded on the system and what stocks the company physically had. This resulted in the need to continually re-check stock levels or potentially run out of a component mid-run which would then disrupt the plan in addition to leading to the customer not getting his order, in full and on time. Supplier deliveries were also less than straightforward to manage. For example, 4 batches of different components could be ordered and they may arrive in staggered amounts, out of sequence, and with no prior warning.

Sales Orders were equally as imprecise. “It's not uncommon for a customer to order X amount of product Y to be delivered by date Z when in reality he may only need half of that amount by the date and be happy to take the rest later.” He continues, “In our busiest

periods, my own detailed knowledge of our customers was often called upon to determine those customers we could part-supply to and those we couldn't. As our customer numbers increased, we recognised the need to systematize a lot of this knowledge and to automate it because it was no longer possible to track this level of information."

As if this wasn't enough, Blake UK had to deal with the familiar manufacturing constraints of machine and human resource optimization, avoiding bottlenecks and responding to last minute changes in production. The final consideration was maximising the potential of its own delivery fleet as orders very rarely conveniently fitted a full van load. "Looking after our customers has always been our key concern," explains Paul, "so when we saw our lead times stretching at times to 12 weeks we knew we had to do something different." He continues, "We had also invested heavily in developing an online ordering and tracking system which meant that our customers had high expectations. The lack of visibility about where a customer order was meant that we were also struggling to give our customers the information they needed to plan accordingly."



The solution was provided in 2003 by Steven Littlewood of TSP, an IT consultant that had been responsible for working with Blake UK to develop its in-house scanning system. Steve was also TSP's expert on an automated planning and scheduling solution called Preactor from Preactor International so when he became aware of Blake's situation, he introduced Paul to the system. Paul candidly recalls his first impressions of Preactor. "To be honest, I didn't understand it at all because it was so different from the way we'd been trying to run our own planning requirements. What I did know however was that if Steve said it would work for us, this was the system we needed to have."

Implementation began soon afterwards with the first task being to identify the data required by Preactor that already existed within CS3 and that which would need to be added from elsewhere. A decision was taken to work on a Just In Time (JIT) manufacturing basis with everything therefore being backwards scheduled from the order due date. A rolling 7 day planning horizon was agreed on with this being updated daily each morning. This involves CS3 passing all the relevant data into Preactor which then generates a live and updated works order schedule that can be amended and fine tuned. Once this is confirmed this is passed back to CS3. Actual progress of each order is fed directly back into CS3 in real time by the company's scanning system which ensures that Preactor has completely accurate data to work with for the following day.

Unsurprisingly the benefits have been considerable although impossible to quantify as is often the case when having little accurate visibility of previous performance levels. For example, Blake UK now has complete visibility of not just its daily production plan but also its next 7 days projected workload. It also has the ability to manually adjust this plan and immediately see the impact of any changes made which can be invaluable when optimising delivery levels that comprise multiple parts. Paul is adamant that as a result the company is in better shape than before. “Preactor has allowed to us to sizeably reduce our stock levels and improve our Just in Time capabilities which is why our lead time has been reduced from a number of weeks to just 7 days.”



Cavin Carver is the company’s Works Director and comments from this perspective on how Preactor has benefited Blake UK. “We use Preactor to both make to order and allow us to carry stock on critical lines. As a result of using the Preactor scheduling system our production planning has been reduced from two days a week to half an hour a day. We have also improved next day delivery ability to approx 85% and have also reduced backorders. Before we installed Preactor we were backordering certain items seven or eight times when we were busy. Now it is very unusual to see anything backordered more than twice and when this happens, it is due to a stock error, failed manufacturing plan or failed delivery.

We now have full visibility of the manufacturing plan for a week ahead on a rolling basis. This makes it much easier to adapt to changing requirements and assess knock on effects of changing the plan. We can also review and change the plan completely every 24 hours if necessary.”

As for the future, the company is contemplating further refinements to the way it uses Preactor in order to get even greater levels of control. Specifically it is investigating ways to split large orders within Preactor but not in CS3 in order to further optimise delivery efficiencies. The final word belongs to Paul. “There’s more that we can do with the system but one thing’s for sure, we simply couldn’t have grown in the way we have as a company without Preactor.”

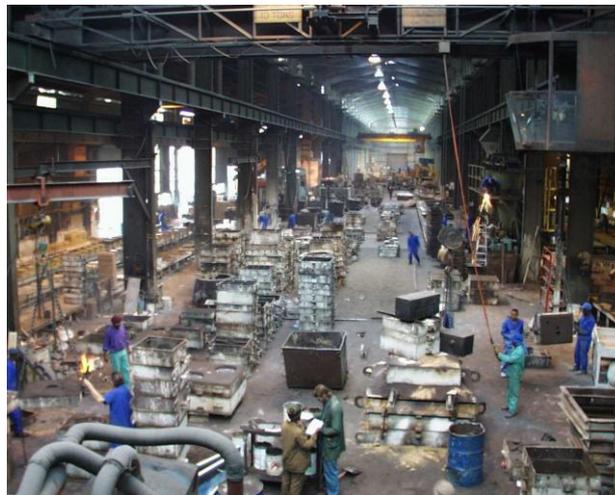
## Foundry - MTS



MIS Engineering (Pty) Ltd, trading as MITAK, is a general heavy engineers and founders based in Johannesburg, South Africa. They are one of the leading manufacturers of wear-resistant alloys used in crushing, grinding, pumping & materials handling equipment in South Africa. They produce in excess of 10,000 Tons per annum from four Furnaces and ten Moulding Bays. Operations include moulding, casting, fettling, heat treatment and machining.

With 25,000 different items registered in their SYSPRO system, seven operations defined per item on average, 2500 live customer orders at any point and a backlog in excess of six months on some processes MIS Engineering recognised that they needed a better way of scheduling their business. In particular they needed a more accurate way of promising realistic delivery dates to customers.

The scheduling process needed to take into account different moulding processes, constraints on floor space, manpower, moulding boxes and patterns and the importance of select customers and the prioritisation of part orders to cater for scrap discovered during a later process. The need for the scheduling system to integrate with their Syspro ERP system was also a key requirement.



Scheduling Solutions, the Network Partner for Preactor International in Africa, met with MIS Engineering to better understand their needs. After a customised demonstration of the Preactor functionality showing how Preactor could meet their scheduling requirements, MIS Engineering selected the Preactor 400 APS version as ideal for their requirements.

Scheduling Solutions worked with MIS Engineering to develop a model of their business which included special rules to prioritise scrap and apply special scheduling sequences based on customer importance.



Due to the number of order operations that needed to be scheduled, it was decided to split the scheduling model into two. The first model catered for all orders in, and about to start, production.

The second model only scheduled the moulding operations for all orders in the scheduling horizon.

Preactor Viewers are used to give operations staff and management visibility of the production schedule.

The implementation and use of Preactor has resulted in a number of benefits:-

- Planning now takes minutes not days.
- MIS Engineering has complete visibility of the load by area across the whole factory.
- MIS Engineering are now able to make accurate delivery promises months in advance of actual delivery.
- As all areas are now using the same accurate schedule; departments are better co-ordinated and the tonnage produced per month has increased.
- As all areas are working on jobs in the correct sequence the manufacturing lead time has reduced.
- The delivery performance against dates promised has increased significantly compared to pre Preactor days.

Shaun Naidoo the Production Manager described the main benefits. "Preactor gives me the visibility to make accurate delivery promises and meet these in a changing environment". Chris Mollison of Scheduling Solutions commented "MIS Engineering is another example of a company whose management has recognised the need for and obtained significant benefits from implementing a Preactor scheduling solution".



## Book Printing - Opolgraf



Mitsubishi 1F-13000 printing machine

Opolgraf S.A. is a book printing and binding company located in Opole, Poland, which employs about 150 people, with approximately 8 million books under 1,700 titles produced annually.

Opolgraf is acknowledged as one of the best companies of its type in the country. The co-operation with the biggest and best-known Polish and West-European publishers proves that Opolgraf is ready to fulfil the most stringent criteria required.

Flexibility, openness, reliability, delivery-on-time and timely communication with customers are Opolgraf's strengths and targets of its continuous improvement policy.

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Opolgraf Printing House specialises in printing full-colour books and monochrome printouts on a wide range of paper, with high quality binding (carton or "hard"), with binding options such as sewing, hot-melt and PUR splicing. The covers may be both simple (one-sided) or with folded wings, varnished, foil covered, etc. They also produce periodicals (full colour) and job-printings (fliers, posters, commercial catalogues).

Preactor FCS200 version was chosen by Opolgraf S.A. in March 2006 to help in scheduling the complex book printing process. Implementation was carried out together with Pretczynski, Preactor Network Partner which supports Preactor systems in Poland.

Jerzy Nagórski (former Managing Director of Opolgraf S.A.) describes why he selected Preactor.

“It offers unrivalled functionalities, flexibility and user friendly interface while enabling planning capabilities that can handle very complex scheduling tasks. Imagine the complexity of having to schedule 100 book production cycles to be run simultaneously, each being in one of approximately 60 various fabrication phases, taking into account the number of 30 machines used, with up to 30 people per shift, 24 hour, 6 days a week operation!”



Recently installed Heidelberg Eurobind 4000 binding machine

Jerzy continues, “the number of likely combinations can be daunting for even the most skilful crew. What I can achieve now is an ability to answer a customer as to when they are likely to receive a printed book from the moment they’d have provided me with their file while taking all variables into account such as paper availability or customer blueprints approval phases, for instance. “

“Believe it or not: Preactor can handle such a job in minutes. It’s really has an outstanding capability. Also, it provides very important feature; it allows insertion, modifying or deleting any operation step manually if there is no clear rule available since it doesn’t necessarily have to do the whole job automatically”.

The crucial factor has been the integration between Preactor and Opolgraf’s own system.

Presently Preactor works as the scheduling engine with 2-way data flow. It is fed with new orders issued on Opolgraf’s triggered by customers demands. It also receives updates on all the status of each job from several terminals.

“Thus the workflow displayed in Preactor can be updated every moment within minutes”, says Opolgraf’s Production Process Analyst in charge of each application related to the calculations, reporting and scheduling.

The production analyst, who is responsible for overseeing production planning processes in Opolgraf S.A., describes how Preactor helps the company in his everyday job.

“Every day the C.E.O. provides an update on present priorities with the key production and account managers. The actual workflow and forecasts together with new or urgent orders arriving as well as order changes and quality issues are discussed. These multi-level sessions are used to control production queues on the printing and binding machines with Preactor. Preactor displays current and incoming orders and allows the managers to change the production order freely where needed, divide orders if required,

and displays recently completed orders too. The schedules are displayed on a large screen to let all the staff see and discuss with no constraint. Each member of the team and the executive have prompt and continuous visibility of the situation in a fast changing environment. As the result, we are able to respond to customers' queries without delay and react quickly to all that happens in the company's processes".

He also comments on a change of approach that was taken after first part of implementation was finished.

"By the end of 2007 we realised Preactor contained a tremendous amount of data we never used. Some processes did not need detailed scheduling. Some process steps took a very short time such as work in the CtP studio or other manual processes. On those processes we do not need to plan the forecasted order of operations, especially when we update the data in the terminals only twice a day."

This is why Opolgraf proposed to simplify the scheduling in Preactor by excluding part of the processes from detailed digital planning.

Michał Prętczyński, who was in charge of the implementation process described the modifications he made. "We modified the model to manage which processes are, and which are not shown and are editable/schedulable in Preactor. Those, which we let go to the terminals "as is" from the calculation system, are transferred through a parallel, supporting data base with no additional operations required. They appear in a terminal like Preactor was transparent – with no order changed, no timetable edited, and no feedback shown in Preactor as feedback works for reporting only with the scheduled operations. "

The production analyst continued. "Thanks to this simplification we achieved an immediate improvement in scheduling speed compared to before. It contains "only" several hundreds of operations instead of a few thousand before, and keeps fewer relationships between those operations. This has made working with Preactor even more effective, faster, and user-friendly. When we need to schedule additional processes back in Preactor, there will be no need to involve Prętczyński to assist us. This will be possible to be done within minutes, and by ourselves."

Michał Prętczyński explained the wider context of work that was done together with Opolgraf.

"It is important to understand that it was not an implementation that was finished at any particular point. We started with an aim to provide an interactive planning board, where scheduling rules were available, but people responsible for planning would schedule critical process manually at will. In this step we also integrated Preactor with the Opolgraf S.A. system. Then company invested in expanding their IT infrastructure and added changes into their own system, so Preactor could receive updates from terminals and in the end additional reporting capabilities were added. We could implement those changes quickly because Preactor is a flexible system that allows essential modifications without the need to change core code. Step by step, as company is progressing, we are moving into full automated scheduling."

In 2007 a poll conducted by “Wydawca” – a prominent industry publication – among Polish publishers voted Opolgraf Poland’s best printing house. This was possible thanks to using advanced tools for calculating and production scheduling by Preactor.

## Sintered Components - Wall Colmonoy



Wall Colmonoy Ltd is a world leader in the fields of high temperature brazing and surface engineering providing solutions to complex metal joining and wear problems. The company's technology is based around nickel and cobalt alloy systems and used in products across demanding engineering industries including glass container manufacture, automotive, heat recovery and recycling (heat exchangers), packaging equipment, food processing equipment, energy including steam, gas and water turbine equipment, railway, aerospace (civil

and military) and plastics. Sales have grown strongly over recent years with 80% of production supplied to customers outside the UK, and has been based on product performance, quality and delivery - the latter becoming critical over recent years. Wall Colmonoy therefore selected Preactor International to provide a production planning, scheduling and costing system as a key tool to success in this key area.

### Overview

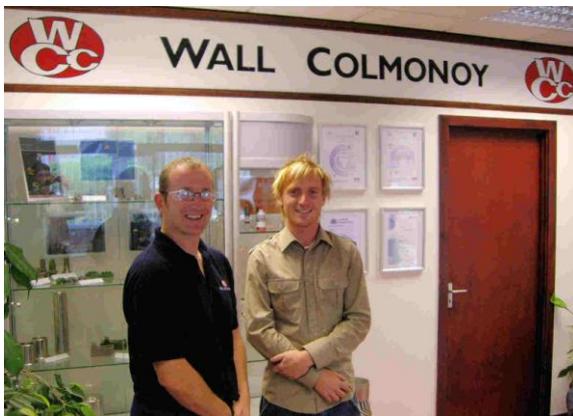
There are three manufacturing businesses under one roof at Wall Colmonoy Ltd. The Alloy Products Division comprises atomized powders, continuous cast rods and high temperature brazing products while the Components Division covers cobalt & nickel base castings, investment castings, centrifugal castings, sand castings, machining, and a range of comprehensive machine shops including CAD-CAM, CNC, EDM, CMM Inspection. The final business is the Process Division which contains vacuum & protective atmosphere furnaces for brazing, heat treatment, and coating in addition to welded overlays and thermal and HVOF spraying.



### Key Challenges

Each of these divisions requires efficient accurate planning and scheduling but the Components Division presents by far the greatest challenges. Within this division, achieving reliable, short and on time delivery from machining is key to successfully improving results. The nature of the product (wear resistant alloys) compounds the problem of scheduling because of inherent difficulty in machining. Add to this a range of possible process steps from 2 through to 15, a myriad of potential sequence dependent process routings with some of the larger products requiring a number of weeks work on a single machine and the scale of planning challenge becomes clearer.

Machine changeover times can be considerable, ranging from 30 minutes through to 2 hours, and complicated by certain products being susceptible to possible cross contamination from other products which can add an extra cleaning time consideration. In addition to the 57 machining centres, there is a large collection of individual tools which can be used on a range of individual machines resulting in a machine potentially being free but with the tool required for the next process step being used elsewhere. Another level of complexity comes from taking human skill levels into consideration as only certain workers have experience with certain machines and certain products.



Wall Colmonoy's Planning Supervisor Scott Powell explains that even this doesn't give the true extent of the difficulties. "We also have ever increasing pressure from customers to decrease lead times and work with an average of 6-8 weeks. Yet our Processing division also makes use of our machining resources yet they are often working to lead times of only 3 weeks."

Moreover, because of the interlinked nature of the areas within the company, any problems further upstream – for example in the casting area which has its own planning and scheduling constraints – have a direct impact on the flow of raw material we have to work with."

Rhodri John, Systems Analyst, describes how the company used to try and manage such a huge amount of variables. "In short we did our best with a range of different systems We had a Micross order management system, a range of custom Access databases, a variety of Excel spreadsheets, a vast manual T Card system and an awful lot of paperwork." He describes the inevitable consequences, "because all the systems were separate, they all had the potential to retain different data and therefore say different things. Updating was inconsistent with some areas being overlooked leading to many decisions being taken based upon someone's opinion as opposed to accurate knowledge of what had to be done, when, and at what stage things actually were in the process."

The result was a planning culture based largely on fire fighting, with orders being processed sequentially from a list of late running orders which extended to over 6 A4 pages. A contributing factor to the number of late orders lay in the fact that T Cards were processed very simplistically by due date, with no consideration of the actual job time involved. As Scott comments, "In addition to no real planning, there was no real visibility of what was happening which meant we had Work In Progress (WIP) all over the machining area. We had 21 racks of WIP simply to try and ensure we had enough part finished product for people to work on at any time."

The practical unmanageability of the system became exacerbated by the rapid growth of the business - an increase in turnover within the machining area itself of 50% within 15 months. At this stage Wall Colmonoy's management tasked Rhodri to specify a range of

business objectives for a replacement system to achieve. These were to provide more accurate delivery dates, increased real time visibility across the entire area in order to generate business intelligence to improve customer and sales service levels, and to streamline the entire planning process thereby reducing WIP and maximising resource utilisation.

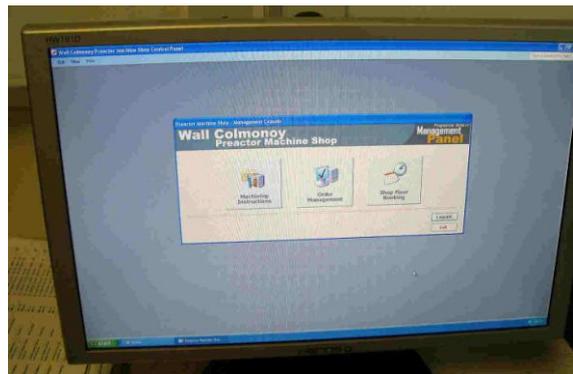
### **Search for a solution: Preactor from The Scheduling Business**

Rhodri was further tasked to determine how best to achieve these goals. He began with a thorough familiarisation of the way the machining area worked and identifying the key processes involved. As he recalls, “It was immediately obvious that what we needed was a powerful and versatile production planning and scheduling solution, one we could integrate with our existing sales system.” The decision to invest in Preactor was influenced by positive recommendations from within the industry and from contacts associated with Cardiff University. Rhodri therefore approached Alan Keene of The Scheduling Business after evaluating a Preactor demo CD.

Within the first meeting held in August 06, any concerns Rhodri had about the integration capabilities of Preactor with Micross had been assuaged by Alan and by virtue that The Scheduling Business could provide some bespoke functionality that would allow integration with a database backend. Rhodri again, “It was clear that Alan had a solid grasp not just of the challenges to be overcome, but also the nature of the business as a whole. We were therefore able to discuss and explore the potential of Preactor beyond our initial expectations.” So productive was that meeting that a decision was taken that day to invest in a Preactor P200 system complete with Alan’s bespoke work.

### **Implementation and Go-Live**

Implementation began almost as quickly with Rhodri, Scott and Wall Colmonoy’s estimator attending a Preactor course less than 2 weeks later. Rhodri and Alan then set about the actual work required to configure Preactor and link it with the Micross sales systems; once this was complete Rhodri undertook the task of developing several bespoke front end systems for the shop floor and planning department.



The result of this was to create in effect a Master Production System which would take sales order information from Micross and generate Machine Instruction lists per order, taking into account preferred routes and driven accurately by delivery date. Preactor would be updated 3-4 times daily with revised order information from Micross with Preactor then being used to feed back actual production data provided by the shop floor and planners to various reports.

An element of flexibility and manual control was retained in the system due to a number of the steps having significant levels of potential variance which could be fine tuned

depending on the operator using a specific resource. After several weeks of parallel running to familiarise people with the new system in a semi-live environment, Wall Colmonoy went completely live with Preactor in January 07. As Rhodri explains, “We ripped down the T Card boards and got rid of all redundant systems – sometimes you just have to jump in and put your trust fully in a system.”

### **A wide range of benefits**

This trust was very quickly repaid with a comprehensive range of significant benefits, the first of which was an almost instantaneous increase from zero to complete visibility of what was happening on the shop floor. Whereas previously there was simply no way to know what order was on which machine and at what stage in any process route, now Wall Colmonoy could trace every order and where it was in the plan. It could also compare actual progress with predicted progress and make informed decisions on the basis of this.



Scott notes an interesting side effect of this increased visibility. “We knew it was working and that people trusted the system because they began to ask questions about how they could get more out of the system. This became the driving force behind generating management reports that provided meaningful information that impacted the entire business.”

Rhodri continues, “An example of this would be Preactor being able to show us where we might need to invest in a new machine in order to capitalise on a run of a particular type of product. Since Preactor went live it has directly contributed to the decision to successfully invest in 3 different machine centres which in turn has contributed to a significant increase in sales.”

This is related to another wider business benefit. The accuracy of current and projected capacity utilisation provided valuable information for production to feedback to the Sales team. For example, production can now identify a specific window when it knows it can comfortably beat the industry average for a certain product, and for how long. This then gives the Sales team a very definite sales strategy about which customers to target in order to bring in extra business, which again has directly contributed to business turnover.

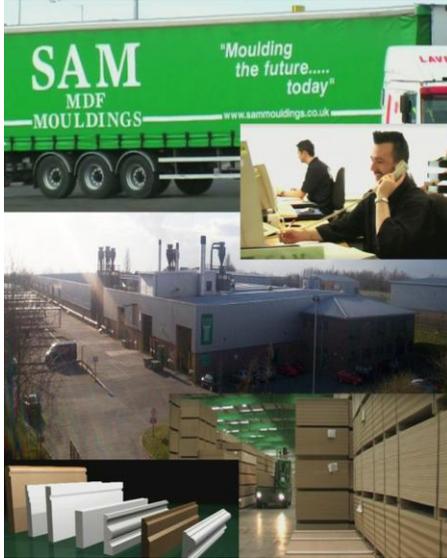
Other key quantifiable benefits include an improvement in on time delivery performance up from 80% to 95% while machine utilisation has been increased from 75 to 92%. These gains result from better allocation and utilisation of the workforce including how and when to use differing shift patterns, optimised product routings, and a removal of machining bottlenecks.

WIP has been reduced sevenfold while late deliveries have been reduced to a handful only arising from technical (manufacturing) or other reasons outside of Wall Colmonoy’s control.

**Future plans:**

So impressive have been the benefits achieved within the machining area that Wall Colmonoy is imminently looking to complete the roll out of Preactor into the casting area. As with machining, Preactor will handle all the routing information through casting, including furnace and machine centre use and sequencing. This will be interconnected with the machining area streamlining the supply of materials from casting into the machining area which itself will provide further cumulative time and cost savings. “Perhaps the greatest thing about Preactor”, concludes Rhodri “is that it isn’t an end in itself. It’s a terrific means to the end of Wall Colmonoy ultimately moving towards a Leaner, Just in Time (JIT) manufacturing environment.”

## Wood Products - SAM Mouldings



A family company, SAM Mouldings is the UK's leading manufacturer of MDF architectural mouldings for the construction and home improvement industries. Recognised as the best in Europe, it has purpose-built manufacturing and distribution facility spanning an 8 acre site that allows the company to meet the growing demand for its product, a cost effective top quality alternative to traditional timber mouldings. Employing over 140 staff, SAM Mouldings is now producing and shipping up to £500,000 worth of orders every week and aims to increase market share and turnover in 2007. When the company recognized the need to improve its planning and scheduling capabilities, it found the perfect partnership to build on with Kudos Solutions and Preactor International.

SAM Mouldings manufacture a wide range of MDF product including Skirting, Architrave, Door Frames, Window Boards, Stair Threads and Veneer Wrapped products. SAM Mouldings also manufacture moulds for Picture Frames and Kitchen Industries. The nature of manufacturing is on a large scale with products being split between 100 standard range styles, and 1400 special lines which in turn can then be varied by size, finish or material grade. The situation is further complicated because of the Make To Order (MTO) environment of the company which can result in any given order from a customer potentially leading to the creation of a new product.

There are three main production processes in that all orders undergo: cutting, moulding and painting. Boards are first cut to the required length for the product before being moulded according to the requested profile. Depending on the specific product in question, this then receives one or two coats of primer depending on the customer's requirements. However, as Tim Patton, ICT Controller at SAM Mouldings comments, this can often be much more complex.



"There is a number of additional value-add steps which may be applied, depending on the specific product. These include cross cutting of the product into door sets, stair treads or window boards. Products may also be then wrapped with wood veneer or paper. Some of these are obviously sequence dependent. For example, cutting a certain number of boards to produce a door frame can only start once the initial product has been processed through the factory."

Given the scale and nature of manufacture, bottlenecks were clearly a very real concern for SAM Mouldings. However, as Patton explains, there was an even more fundamental scheduling concern. “With 4 saws, 7 moulders, 3 paint lines, a cross cut area and a veneer wrapper, there were clearly constraint issues. More significantly, it was actually becoming impossible to produce working schedules for all these machines in the time between the finish of one shift and the start of the next. As we produce most of our products to order, and hold only a small stock range, we needed a scheduling system to be able to understand and schedule works orders from our ERP system to ensure despatch on time was adhered to as closely as possible.”



The company’s existing scheduling system was struggling in a number of key ways. To begin with, it was taking up to 4 hours per day to generate a production schedule. The process was incredibly labour intensive. This related to the factories operation, personnel info, tooling constraints, raw material availability - all of which and more had to be processed during a maximum scheduling window of 3 hours. Worse still, when orders exceeded a certain level, it simply became a physical impossibility to generate a meaningful scheduling.

Even when a schedule, meaningful or otherwise was finally completed, it was out of date in the time taken from the user collecting it from the office to walk to their machine for the day.

The final complication was that drawings of specific designs were situated in a folder on the factory floor which the user would then have to manually look through. With approximately 2000 drawings on file, this represented a significant time constraint and one which was hard to plan for because a particular set of drawings might be located quickly, or only after a long search.

As Patton remarks, “Whatever solution we chose, one of our key objectives was to ensure that all of these obstacles would be overcome, allowing the company to sustain its ongoing growth.” He continues, “It was clear to us that the installation would allow us to improve the availability of the tooling that may be required on any given job, which would allow the tool-room to be run more efficiently.”

A decision was therefore taken in the summer of 2005 to source an automated scheduling system. After a thorough investigation lasting several months, SAM Mouldings had a shortlist of two possible products, Preactor and Job Shop. According to Patton, there was no real competition. "The final decision was based simply in terms of the flexibility and in-house control available through Preactor."



The Preactor implementation was to be undertaken in conjunction with the installation of a new ERP system, EFACS E/8 from Exel. To provide a seamless link a link between EFACS and Preactor a custom link was written which automates the transfer of orders into Preactor and subsequently down date's raw material stock upon completion of jobs through the Factory. To provide maximum control and flexibility, this link has been written in such a way to allow SAM Mouldings to maintain it internally on an ongoing basis without the need to refer back to the supplier.

Patton reflects on the implementation. "Everything was reasonably smooth and reflected the preparation undertaken by the SAM Mouldings team. The planned implementation period was exceeded by a large degree but this reflected the substantial difference between our existing system on which the plan was based, and the potential planning capabilities in Preactor which gave us new areas for development which we had to then roll out as we went along; for example the integration of constraint information on tooling availability and product movement around the factory has also now been dramatically improved. The only ongoing element is the training of our operatives on the use of the system. This has been quite protracted and much re-designing of viewer screens has been necessary as we learn to harness the capabilities of Preactor."

Yet the system is already delivering huge benefits for SAM Mouldings. As Patton concludes, "Preactor has enabled us to push forward with our growth plans, and development of information systems in the factory. We have also been able to schedule our factory for the busiest months in the company's history, a task which would not have been possible with our old system

## Food - Ardo



Ardo UK Limited, has been a Kent based subsidiary of the Ardo Group since 1994 and supplies high quality frozen fruit and vegetables to over 400 key customers in the Retail and Food Services sector including Tesco, Sainsbury, Morrisons, Whitbread, Wetherspoons, and Aldi. The Belgian based, family run Ardo group is a key player in Europe with 14 processing units in 8 countries and has a turnover over £300 million. When Ardo UK needed to move to a modern, flexible production scheduling system to work seamlessly with its other proven business systems, it put its trust in Preactor scheduling technology.

### The Challenge

On one level, Ardo's business model is relatively simple. Bulk frozen goods are received at the company's Headcorn packing site from the relevant Ardo growing/freezing centres worldwide. Here they are mixed and packed accordingly, before being sent to the administration/sales site at Charing where they are placed in cold storage prior to distribution. However, as Ardo's Production Planner Patricia Speakman explains, there are a number of major complications. "Our first challenge is the scale of business we do. We typically process over 400 orders a week which equates to 110,000 cases, 85% of which are full pallets with the rest being individual case pick. This means our Headcorn facility is receiving a 20 tonne lorry load every hour from our 3 primary sites in Europe, resulting in over 100 tonnes of packing being handled every day, with the finished products then being transported back to Charing."



Another complication comes from the variety of products that Ardo packs and their reliance on dedicated packing lines. Ardo has five packing lines which between them can handle straight packing of individual products right up to mixed packing of 6 items into either bags or punnets. As Patricia elaborates, “Balancing the load level on each line and maximising each resource is therefore central to our planning requirements. One of our lines is dedicated to multi-packing, another can handle multi or single packing but only up to 4 items, another is oriented to larger products such as broccoli, cauliflower while another deals primarily with particulates such as peas and rice. While there is a degree of interchangeability, we need to minimise disruption, avoid wasteful changeover times, and keep the lines flowing as smoothly as possible. Clear and accurate planning is central to this.”

Storage and space issues can also be critical considerations, especially given the seasonal nature of many of the vegetables and fruit Ardo supplies. Sweetcorn for instance has a growing season between June and September but Ardo will need to store enough for the coming year, in this case up to 700 tonnes during a very tightly defined time period. Patricia highlights a related issue. “Some materials come from much further afield and take variable lengths of time to arrive. China for example takes 12 weeks, the US takes 4. We have to factor in when shipments are supposed to arrive but also be able to deal with world reality that with delivery times this long, goods may arrive early or late, both of which can create not just production issues but also storage issues. That’s not even taking into account the economic instability of some supplying regions and the very real prospect that at times, entire crops may be wiped out by disease or freak weather conditions.”

Other challenges that Ardo faces include the inherent variation of customer demand, itself influenced by unexpected weather conditions, product mentions in the media and such like. While historical product sales forecasts provide a relatively accurate pattern, sales forecasts from individual account managers may prove to be less accurate, for a variety of reasons. Patricia again, “Add to this the fact that Ardo has to buy its packaging materials significantly in advance and the complexities of the planning process become even more pronounced. We regularly have to pre-order 2-3 million sleeves 3 months in advance although we don’t have to specify designs until nearer delivery time. Film is bought on a group basis but again is still done so 12 weeks in advance so it’s important we get our planning right.”

Prior to investing in Preactor, Ardo had been using a combination of spreadsheets and an antiquated manual board. Ingredients were written by hand on one side of the board before individual columns of products and orders were added. The totals were then manually calculated before being typed into a spreadsheet from which a Plan was produced which could be issued to the packing plant. The Coldstore Warehouse at the time was also run entirely on a manual T-card system which added to the difficulties, invariably relying on the manual confirmation of the location and stock levels of a particular product.

“The most amazing thing,” comments Patricia “is not that it actually worked at all, but that it worked quite well after a fashion. It was however completely prone to human error at

every stage, took great quantities of time to produce, and provided very little in terms of the visibility and flexibility we now completely take for granted with Preactor. In many ways, it's only since we've been using Preactor that people have been able to see just how hard work the old way of doing things actually was."

### **The Solution**



The decision to invest in a much more efficient, powerful and flexible production planning solution was part of the Ardo's ongoing drive to improve efficiency on a group wide basis. Part of Patricia's role when she joined the company in 2000 was to help source such a solution, as she had had previous experience using Manugistics and SAP. This also coincided with the company's investment in a Ramesys solution (now New Look) for its MRP/ERP and a Vendor Management System called Complete with a requirement that any suitable planning system would have to be able to work seamlessly with both. The choice quickly came down to between Manugistics and Preactor with Preactor ultimately being chosen for a number of reasons, as Patricia explains. "Manugistics and Preactor were the only real considerations because they both offered very similar levels of functionality and performance, both of which met our criteria in full. Ultimately, Preactor was simply considerably less expensive than Manugistics to do the same job, while also providing a solid upgrade route should we ever need it."

### **Implementation**

Implementation began in Autumn 2001 and was a close team effort involving resource from Ardo and Preactor reseller Kudos Solutions. "Kudos were wonderful to work with," comments Patricia. "They provided training both on-site and off-site and were invaluable during the entire setup. We would tell them what we wanted; they would say what we could and could not do but then also offered us different ways of achieving the results we ultimately wanted. Everything went very smoothly, including the go-live in April 2002."

### **Overcoming Cultural Resistance**

In fact, the only real issue Ardo had with the implementation came in the form of internal cultural resistance to change but this was overcome within the first two weeks of going live when Preactor was being run in parallel with the old manual system. For the first time in the company's history, a whole week's plan could be issued to the production teams and this had a dramatic impact, as Patricia elaborates. "No one had ever seen anything

like it. Not only could everyone see at a glance what was happening and where, in the present, people could also see what lay ahead. This actually enabled the production staff to channel their experience into making positive suggestions about how to fine tune the schedule and brought them much more into the actual process while giving them increased independence and responsibility. In a very real way, Preactor has helped to create a very positive relationship between the planning and production sides of the business.”

### **Further Benefits**

Planning is now unrecognisable compared to the old manual days prior to Ardo’s investment in manufacturing IT including Preactor. Orders are received on a daily basis via EDI access to Ardo’s complete system on a typical „order day 1/deliver day 3” basis. Stock levels and goods in/out is handled by New Look with Preactor being used to generate a weekly schedule and individual daily plans on a three day rolling basis. Each day there is a planning meeting at 12.30pm to discuss the plan for 3 days time which is then finalised. From this finalised plan, all the Bill of Materials (BOM) requirements are generated, with each system being updated accordingly.

In addition to helping overcome the initial resistance to change, the other benefits of Preactor were quickly seen. “Even just the ease of using the system makes my job so much simpler,” comments Patricia. She continues, “Nothing is hidden from you, everything is very visible and reflects the logical way that planning has to work. In that sense it’s a very intuitive system to use which makes it that much easier to make it work harder for you. Because of that, I now have much more time to concentrate on other areas of the planning process and ensuring we are getting the best possible use of our packing and storage capacity. A lot of this time I can use to maintain the positive relationship with the production personnel and ensure that everyone genuinely believes that they are able to bring their best to their job.”

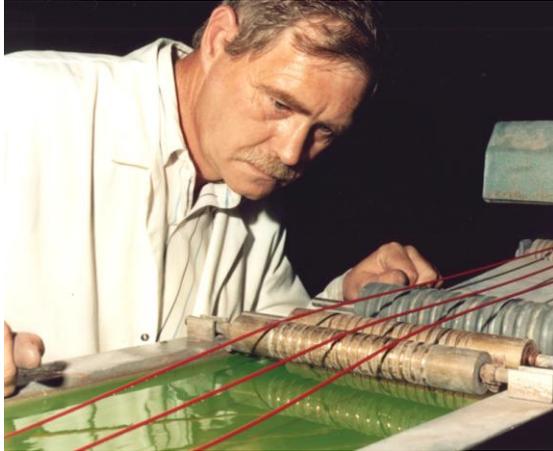
The system has also brought levels of flexibility that were simply impossible before. Patricia again, “We now have the ability to run „What If” scenarios which are invaluable should we have a problem with a delivery or on a production line. We know instantly the impact of an event on the entire plan and from that use Preactor to judge how best to react.” This „What If” capacity also helps Ardo plan for customer promotions, advise customers on the best times for such promotions as well as providing critical wider business information when it comes to deciding whether to accept increased orders or not. The information from Preactor is even proving to be strategically important in helping Ardo plan for a major company expansion in the short-medium term.

### **Future Plans**

As for the future, Patricia can see the potential additional automation that Preactor APS will bring to the company, especially in terms of communication with New Look and Complete when the planned company expansion is complete. She concludes her comments on the value of Preactor by emphasising the proven benefits of the system to the entire company. “As a professional planner I need the right tools to do the job. Preactor is that tool and has proved itself to everyone with the entire company benefiting

from the way it has helped us work more efficiently together. The production team especially have got so much out of it; we could not imagine doing our jobs now without it.”

## Plastics - Silvergate



Silvergate Plastics, established in 1985 and purchased in 1997 by British Vita, is a specialist provider of colour matched polymer solutions to end users both inside and outside the Vita group. Now part of the Vita Thermoplastic Compound Division, the company supplies solid colour concentrates for plastics in the form of pellets that provide absolute consistency of colour, when these are later processed by customers into brand sensitive, final polymer products such as packaging, films, and mouldings.

With 20 million possible colour permutations and where the customer is always right, there is no margin for error. When Silvergate began its evolution towards an automated planning and scheduling solution, it found the perfect match in Preactor.

With a product range in excess of 40,000 live colours, Silvergate operates on a 100% Make to Order basis, handling an average of 1000 orders per month ranging in size from 2 kilograms to over 30 tonnes. The company also is totally customer-centric, believing in a philosophy of getting it right, first time, and exceeding customer requirements. In a business context of every decreasing lead times and ever increasing flexibility, Silvergate has a unique attitude towards delivery times: it doesn't specify any. Tony Bestall is Business Manager at Silvergate Plastics and VTC Synco in Italy and he explains how and why. "Historically we operated on a 5-7 day lead time with a premium service where we provided an absolute guarantee to deliver in either 48 or 72 hours.



If we didn't, we would credit back to the customer from 50 to 100% of the order value. This generated a sense of trust with our customers that they knew they could rely on us."

He continues, "We all know that most companies will do whatever it takes to keep delivery promises to its leading customers, with this usually at the expense of the smaller customers. We took a deliberate decision that we would treat all our customers equally, and meet the delivery times they themselves specify." Amazingly, this has not created an unworkable situation with every customer demanding their order tomorrow. Bestall sees this as a result of the trust Silvergate has earned from its customers. "Because they know we will deliver when necessary, if a customer doesn't need an order for 2 weeks, they will say so. If they need it by tomorrow, they'll say so. Either way, we will make that delivery."

Perhaps surprisingly, the most pressing business challenge that Silvergate faces is the sheer pace of business that the company has to deal with, processing 1000 orders per month, all of which can have entirely variable delivery dates. This is exacerbated by the MTO nature of the business that means the company carries no finished goods stock. Visibility is critical; especially the means to accurately know how any job is progressing at any one time. As Bestall remarks, “Nothing’s static, everything’s always changing, and keeping track of what’s happening, where and when can be a full time job.”



A full time job is precisely what the planning and scheduling used to be before Silvergate invested in Preactor. It was a completely manual process which began with moving coloured plaques around a large rubber mat. These would be shuffled around, along with the accompanying paperwork to get a rough working schedule, which would then be typed into a spreadsheet. Once complete, the spreadsheet would be photocopied and manually distributed around the production facility.

Bestall understates the point when he says, “It wasn’t very efficient, and to make matters worse, it would be out of date within 5 minutes as soon as the next order came in.”

It was Bestall’s appointment as Business Manager that brought about the beginnings of change at Silvergate. “We had to do something because we couldn’t adopt the manufacturing and sales strategy that we wanted without changing how we did our planning and scheduling.” The first step on this evolutionary journey was a drive to improve internal business processes by first mapping them accurately. This led to Bestall identifying 30 individual steps to process an order and a total of up to 60 steps from receipt of an order through to the order being delivered. This equated to 8 hours of time and represented a major point of waste within the company.

Analysing these tasks soon identified a number of non essential steps which were quickly removed. Other important but repetitive tasks were identified and it was at this time that Bestall became aware of a potential automated planning and scheduling tool called Preactor running elsewhere within the Vita group. This led to initial discussions with Preactor Solution Provider RMS about the possibilities of using Preactor at Silvergate. In addition to RMS showing a genuine understanding of Silvergate’s business requirements, it also arranged for Bestall to see the product working in a live context in a similar business situation.

Convinced by this, and by the fact that both RMS and Preactor were trusted elsewhere within the Vita group, Silvergate invested in a Preactor 200 FCS system. Bestall is typically down to earth when he explains his reasons why. “We knew it wouldn’t fall over, and our initial plans were to simply use Preactor as a means of reducing the number of

spreadsheets in our business processes and by doing so, create a quicker and more accurate way of communicating information to the shop floor.”

Implementation primarily consisted of 6 days of consultation where Silvergate’s Bernard Nolan worked with RMS’s Warren Roberts to work out the protocols of information exchange between Preactor and Silvergate’s business management system, an internal group system called Vita soft. This would be a key step in reducing the significant paper chase that hindered Silvergate’s operating efficiency. It also involved a significant amount of work in setting up the operating parameters required for each product, including Order References, Product References, Customer References, Quantity, Colour Group, Raw Material Requirements etc.

After 9 months of development and tuning, the system went live in October 2005. Nolan describes how the system worked at this stage. “We deliberately wanted to control each step so someone pressed a button to send information from Vitasoft to Preactor. Someone then had to press a button in Preactor to read the information and make any adjustments to the generated schedule. Once the schedule had been finalised, the process happened in reverse, with someone manually sending the schedule back to Vitasoft and someone manually receiving it back into Vitasoft.”

Whilst looking quite a manual process, Nolan is quick to point out that Silvergate wasn’t looking to fully automate the system at this stage. “We deliberately set about using Preactor as a means of evolution, not revolution. We wanted to enable our planners to do their job more efficiently and effectively. We also knew that we had a large cultural change to effect, both in terms of getting people to trust a piece of software as opposed to their own experience or gut feeling. This shift is essential because people often plan according to what they want to make, whereas we needed to plan purely according to our customer requirements.”

The benefits were noticeable right away, most noticeably in the area of increased visibility. Silvergate could now see all the orders in the system in real time, and how each was progressing. When a new order was received, the impact of this could be seen, and Preactor could re-order the schedule right away as required. The time savings were also significant as the company moved from a service level of 79% for delivering in full and on time with a 5-7 day lead time, to 96-99% in full and on time, with no lead time. This demonstrable improvement also helped encourage a greater sense of trust in the system about what needed to be made, and when. As Bestall observes, “It helped expose the difference between what people thought was required, and what actually was required in order to meet our customer service levels.” Another benefit directly resulting from the time savings brought about by Preactor was the ability to remove the need for 1 of the 3 full time planners.

A commitment to ongoing continuous improvement didn’t let the system remain as it was, in spite of the impressive benefits already achieved. The company was now looking at ways of automatically updating the schedule in real time whenever an order came in either directly from a customer or from within the company, with the updated schedule being pushed out to the shop floor. The existing P200 couldn’t cope with the levels of automation required so Silvergate investigated the Preactor APS 400 system, again from

RMS. Nolan worked with RMS to identify the information exchange protocols and an ambitious go live date of late July 2006 was set. It was also recognised that this would be a completion to the cultural change already achieved because people would have to trust completely in the system. A standalone advanced planning and scheduling system on a separate PC allowed some final fine tuning before the main system went live, successfully, and on time.



Both Nolan and Bestall recall the go-live very clearly, both describing it in terms of “taking their hands off the system for the first time”, with Bestall going on to describe “feeling a huge weight lift from my shoulders.” Now Silvergate has a system which automatically updates when a new order is received with this information being pushed immediately to the shop floor via the company’s intranet to be displayed either on a monitor or via a large plasma screen. This has freed up the planner’s time considerably, which prior to moving to Preactor APS 400, represented between 30 and 50% of the planners total work load. Now they are able to be much more actively involved in the actual production management side of the business which is bringing further efficiency benefits.

Silvergate has ambitious plans for the future in the ongoing evolution of its Preactor APS system. These includes a move to a total hands off, paper free scheduling process within the company, and extending the use of Preactor APS 400 into like businesses across a number of other sites.. Plans are already in process of implementing Preactor in Silvergate’s Italian plant and then running the planning and scheduling of the plant remotely from the UK. As Bestall concludes, “It is our passion and commitment to delivering what our customers want, when they want it, which drives our business. In addition to continually reviewing our internal business processes, Preactor has become an integral part of our ability to achieve our business model.”

## Basic Metals - CST-Arcelor



Located in Espírito Santo, Brazil, Companhia Siderúrgica de Tubarão (CST) is a world leader in the semi-finished steel market and is part of the Arcelor Group, one of the largest steel makers in the world. CST-Arcelor Brazil is the 11th largest Brazilian exporter and is responsible for 12% of worldwide sales volume for steel slabs. In 2004 alone they produced more than 2.94 million metric tons of slab and 1.90 million metric tons of hot steel coil. Since operations began in 1983, almost 70 million metric tons have been produced 92% of which was exported.

Today the company employs more than 4,000 people and boasts one of the lowest production costs in world, due mainly to its operational excellence and strategic location. However they wanted to increase their market share further and so they embarked on an ambitious project to expand their slab capacity by 50% and hot coil from 5 million tons per year to 7.5 million.

Starting in 2004 the project included the building of new production units such as a third blast furnace, a new system of injection of pulverised coal (PCI), a third converter unit, a new coking plant, a new thermo power plant (CTE) and a third continuous casting machine. The total cost is expected to be more that 1 billion US\$ and will be completed in Q2 2006.

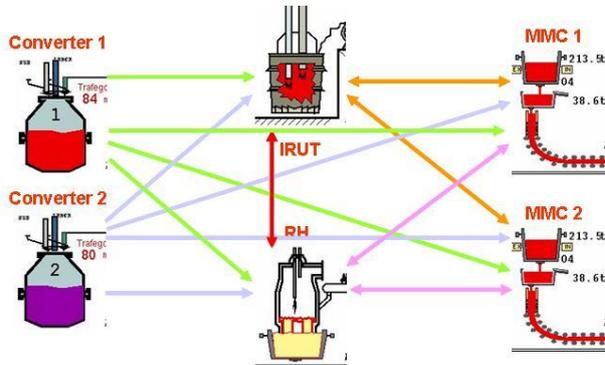
### The Challenge

One of the main challenges was to complete the project without disturbing the existing production capacity. It required more than just new equipment and infrastructure, it needed systems and procedures to synchronize production and optimise processes. This is where Preactor became fundamental to the success of the investment.

To understand the problem, let's go back to 1995, when CST-Arcelor Brazil had developed in-house a production scheduling system to handle its casting machine production process. At that time, the system was not too difficult to handle.



However when the second casting machine was installed, it became much more complex to manage.

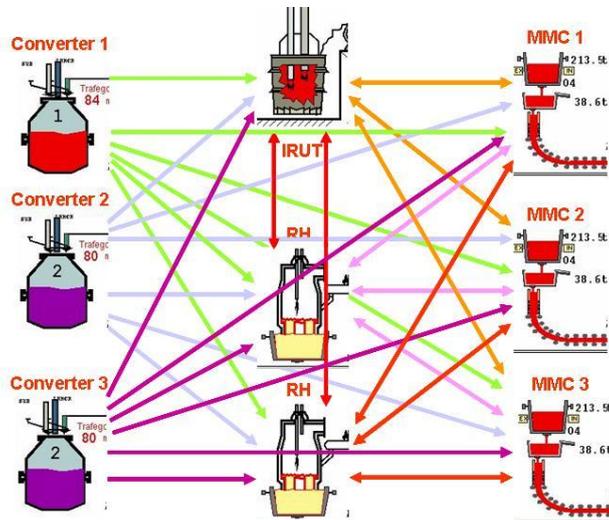


The design team had already realised the limitations so when the installation of a third casting machine appeared on the horizon they made an assessment on whether a rewrite of their existing package that could handle the complexity was feasible.

Having decided that the in-house solution would require a huge effort to

rewrite, they decided to search for an alternative. This involved a multi-skilled team from Automation (IEC) and Metallurgy and Production Planning (IDM) divisions visiting several steel companies around the world to establish their needs. The process whereby liquid steel is made into slabs is a continuous one. It is important that the casting machines are fed with a continuous supply of hot metal. Converters convert the pig iron delivered from blast furnaces into steel. This is delivered to the continuous casting machines using a giant 350 tons capacity ladle.

A 5 minute delay in refilling a casting machine can mean a one hour interruption in production. A single ladle of steel represents \$200,000 in revenues yet making the steel too early can represent huge additional energy costs in maintaining the required temperatures while it waits to be loaded. Synchronisation of demand and capacity is key, just as any other lean manufacturing initiative attempts to do.



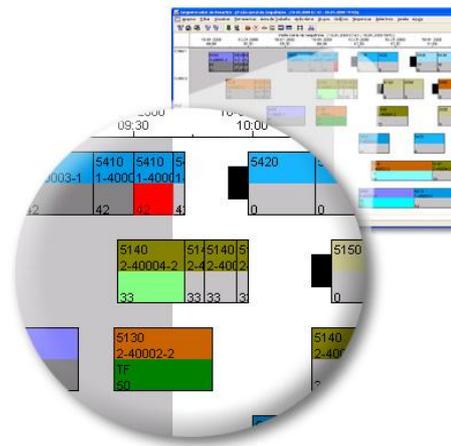
Sergio Mendes, automation specialist from CST, commented on the project. "We visited many companies around the world to identify the functionality we needed but didn't find what we wanted. We almost went back to the internal development option when by chance we found a Preactor folder in a University just a few miles away".

### The Solution

It was at this stage that Tecmaran, the Preactor Master Reseller for South America, became involved. Along with the CST team they were able to provide a solution that they believe is unique anywhere in the world. The Preactor solution is being used in the main production area of the CST-Arcelor Brazil, scheduling and synchronizing all the stages of

production, starting from the converters, through secondary refining and finally the continuous casting machines. The pig iron transportation is also monitored in Preactor as any delay in delivery by the torpedo cars can impact the production process. The schedule is generated in accordance with several parameters, rules and strategies of production, using the orders to be satisfied as the input of the requirements. Some parameters are fixed while others can be modified. For example it is possible to take into account the expected availability Pig Iron to modify the speed of steel production.

Sergio Mendes again. “I believe we have implemented a unique state-of-the-art scheduling system here. And it was not an option. The planning department needed a tool that could work 24x7 because the casting machines cannot stop. Any delay must be analysed and enable a fast response to meet our production goal. For example the Preactor Sequencer receives real-time events information and the bars in the Gantt Chart change automatically to red if there is any delay compared to the released schedule. Usually a new production sequence is generated every 20 minutes”.



Rafael Abreu, Director of the Tecmaran, who developed the sequencing rules, explains. "We used a very different Preactor model and structure. We created some special interfaces to make Preactor even easier to use in this application. However I have no doubt that the customised sequencing rule is at the heart of the success of the system. With just a few clicks users can generate schedules with different scenarios in seconds so they can test different production strategies before releasing a new schedule."

The rule has 3 main objectives.

1. Balance the orders to keep the casting machines working continuously – the user can assign priorities for the machines.
2. Minimize the work in progress.
3. Balance the converter machines with casting machines depending on the defined strategy.

“However the rule needed to handle several other constraints, transportation times and real-time events. It was really challenging but Preactor allows us to be imaginative and create solutions to meet unique needs such as this” added Rafael.

## The Benefits



The Preactor system, based on Preactor 400 APS has been in continuous use since December 2004 and CST-Arcelor Brazil has already reported some impressive benefits. The specialist in planning and scheduling there, Rogério Teodoro, explained. “Preactor has given us two kinds of benefit. We have been able to speed up production giving a saving of a few minutes on each production cycle. This amounts to 48 minutes per day which is equivalent to one an additional ladle load.

The second benefit results from the production visibility that Preactor can offer, because we can „see“ the best time to stop the casting machines or even plan maintenance on specific resources.” If we convert this gain in time into money, it reveals the huge savings that are being made.

Rogério Teodoro again. “Considering just the first benefit, we have estimated that the additional ladle per day delivered by Preactor, can result in an extra US\$ 70 million per year on our annual revenue. We all are very happy with this.”

In addition he pointed out that with the new system of synchronisation the company had obtained a significant improvement in their production management due to faster and better decision making on staff allocation and planned maintenance cycles.



“The ability to quickly create several production scenarios with different alternative planned maintenance periods has given us an extraordinary gain in terms of plant management. Additionally, we are more confident with the process and it has allowed us to reduce drastically the buffer time used in the past to minimise the impact of small delays in the production process”. His views are echoed by supervisor Jorge Maioli. “Now we really spend our time trying to find the best strategy to reach our daily goals. The automatic sequencing rule can deliver optimised sequences based on different strategies and we can create many scenarios before we commit and release it”. He continued. “Despite the system being very easy to use and maintain, we count on the excellent support service from Tecmaran. It gives us more confidence to improve the system and our procedures in the future”.

And what is that Future? Today Preactor is a strategic tool for CST-Arcelor Brazil. The

outstanding results of the project has given confidence to the team to extend its use to cover the scheduling and control of the entire production process from the blast furnaces producing pig iron right the way through to the hot steel coil lines.

## Mechanical Assembly - Cash Bases



Cash Bases is the leading supplier of cash handling solutions in the form of custom designed cash drawers to the majority of the largest global names in retailing. Sectors range from Food Process through to Hospitality, Leisure and Speciality Retail.

The company sells to distributors for tier three retailers but principally through all the global POS integrators Wincor Nixdorf, NCR and IBM.

Working closely with the retailer, Cash Bases designs drawers to meet the customer's individual cash handling requirements and specifications. Cash Bases produces a range of high-quality cash drawers that are durable, ergonomic, space saving and available in a range of colours, while at the same time able to hold high volumes of cash. These designs offer retailers the opportunity to improve their POS efficiency.

The company manufactures all parts, although fixtures such as locks, hinges and plastics parts are bought in. In 2003 an unprecedented three-fold increase in orders meant that the current production volumes and control systems were inadequate to deal with the influx. This caused lead times to customer to go very rapidly from 4 to 16 weeks.



With the objective of returning to a 4-week lead time at the new volumes, Cash Bases began to reappraise its planning and scheduling requirements. It then formed its highly beneficial partnership with Preactor and SFJ Systems.

Paul Lambert, Cash Bases's Improvements Manager, outlined some of the historic problems: "The main setback was the level of production backlogs. This resulted in a number of late deliveries, with resultant customer dissatisfaction and far too much WIP on the shop floor. Planning used to be done on an Excel spreadsheet, with Bills of Materials information being extracted direct from a legacy EFACS ERP system. There was no real account taken of capacity to speak of, when planning or scheduling activity. Naturally, the management realised that it needed to look for a method of planning production in a more efficient way."

Because of the production backlog, the primary driver was to ensure Preactor could inform management and supervision the production activities, timings and sequence to

ensure that customers' requested delivery (CRD) dates would be maintained, whilst reducing WIP. Prior to Preactor there was no visibility of how to achieve CRD. As a consequence there was a random approach by which orders were prioritised on the shop floor, mainly driven from who shouted loudest or what job staff preferred to work on first, planning & WIP was out of control. Management of the shop floor required a tool that would give focus to customer service and maintaining CRDs.

Lambert recommended SFJ as the supplier based on his dealings with the reseller at his previous company. It was decided to place an order for Preactor APS with SFJ Systems in January 2004.

### **Implementation**

Preactor APS took about six months to implement, largely due to the level of customisation involved. "One of the things that took up much of the time was the bespoke database, which was specially written and configured by SFJ," explained Lambert. "However the benefits we are now gaining through having the database at the heart of our infrastructure far outweigh any time delays in getting the system up and running."

SFJ also spent a large amount of the implementation period refining the loading algorithms which indicate under and over capacity and when it is necessary or advisable to sub-contract. "Ironically, because Preactor's scheduling functionality proved so effective in ensuring we kept on top of orders, within a couple of months of going live the algorithms weren't really required to any great extent," said Lambert. "They certainly helped in the early stages however," he added.



### **Training**

SFJ came on site to conduct five day-long training sessions over a two-month period while Preactor APS was being installed. This was mainly for the production planner and the sales office manager. Cash Bases then took over training responsibilities for the production planning back-up personnel and other relevant members of staff. "As we changed the specifications of Preactor during implementation we had to schedule some additional training. SFJ came back on site for this purpose," said Lambert. "Also, our team visited SFJ's premises both in order to wrap up all our training requirements and to finalise certain points regarding Preactor re-specifications."

### **The system**

The new system went live in early July 2004, slightly over time but on budget. In terms of procedure, once the Bills of Materials data is ready in EFACS this is transferred to the bespoke database, which generates the structure of how a particular product is manufactured, and puts the data into a useable format to be transferred to Preactor APS. The information from the database is then transferred to Preactor for scheduling on the shop floor in accordance with customers' due dates.

## Benefits

Since going live with Preactor APS, Cash Bases has reduced its Work in Progress from 30 to 10 days, and this figure is continuing to drop. Indeed, the company has reduced its Work in Progress costs by around £150,000 to £200,000 since using Preactor APS. “In implementing Preactor, our main aim was to improve our on-time-deliveries, as defined by the customer-required dates,” said Lambert. “And Preactor has certainly delivered in this respect. On-time delivery has increased from 34% (which gave a backlog of orders of 19 days production) to 94% (giving a backlog of less than 1 days production). We now enjoy better overall control and synchronisation over departments.



Preactor has also improved visibility of the order book. In addition, we can utilise our existing production capacity more effectively, and can now conduct all our capacity planning in Preactor. In fact we have just completed all our capacity planning for 2005 on the system. Another major advantage of Preactor is that we have seen an improvement in productivity of around 15-20%, in terms of build-hours per cash drawer. This finite capacity planning has enabled supervisors to understand their role and activities better. It has also negated the need to employ around 14 temporary members of staff.” Because of the huge backlog and the amount of new orders coming in all the time, one of the first requirements of Preactor APS needed to be guidance as to what needed to be subcontracted to alleviate some of the capacity constraints.

“Interestingly, since Preactor came on stream we have become so much more efficient at scheduling production that we have been able to move a lot of our outsourced operations back in house,” enthused Lambert. “Also, most of our materials and fixtures stock has been moved from purchased stock to Kanban. All these benefits have, of course, proved to be enormous cost savers and have resulted in a very fast ROI on the software investment.”

In terms of user friendliness, Lambert has been a convert since using the system at his previous company. “I find that through the use of Preactor just about everyone involved in production enjoys a raft of benefits, from easy access of information, to effective planning and scheduling and the peace of mind of knowing customer due dates are more likely to be met. I know that Shaun Kelly our assembly manager is a total convert to the system. Also, just prior to Preactor going live we created a kit marshaller for the machine shop. He also finds Preactor extremely useful. In fact he uses the database screen more than anything else. Both he and the assembly manager can now find all required data

regarding Bill of Materials and work in progress on the database screen without needing to access EFACS direct.”

When the new system first went live Cash Bases had a short period where it would take anything up to a full day to interrogate the Bills of Materials in EFACS, run through the database, import into and run Preactor APS then transfer back to the database. “This whole process has now been massively refined,” said Lambert. “In fact the whole process now only takes less than 20 minutes from interrogating EFACS to generating work-to lists for the shop floor. This is getting close to the real time system we require.”

Holistically, Preactor APS is of major benefit for most of Cash Bases’s production operations, from the shaping, pressing and bending areas to spinning (studding), spot welding, Kit marshalling and finishing at assembly, sub-assembly, testing and packing. “The only area where we don’t employ Preactor is raw materials,” said Lambert.

### **Ongoing projects**

In terms of ongoing projects, we are currently moving the design department to Preactor scheduling. When this is completed we will be able to create work-to lists for the design engineers and track project progress. Despatch will also go over to Preactor soon. This is so that we will be able to collate despatch by customer and delivery area code, so we can make best use of transport. The repairs area is also soon to move to Preactor. We used to sub-contract most of our repairs operations. However, because of the scope of functionality within Preactor we will now be able to move most of our repairs back in house, and provide a fast turn-round for our customers, mostly within 5 days.

Lambert summed up the success of the project: “Throughout the implementation period, during training, and in terms of ongoing support, SFJ have always been highly professional and extremely helpful. Since using the system Cash Bases has gained so many benefits, both financially and in terms of overall efficiency. And those benefits will continue to develop as more departments within the company move to Preactor.”

Mike Novels, Managing Director of Preactor International, commented on the application: “It’s interesting to see how this company is gradually extending the use of Preactor both upstream of the machining and assembly shop, to design, as well as downstream to dispatch. The use of Kanbans and Lean principles also shows how effective IT combined with these techniques can provide very impressive benefits for the company’s bottom line.”

Stan Jonik of SFJ found that the production and technical staff at Cash Bases were on board right from the start. “This was an enormous benefit in designing and implementing the system as we had positive feedback immediately any work was done. We put a lot of effort in Pre-Processing the data from EFACS, as the raw data was not in the format Cash Bases required for use within Preactor. We used an Access Database to hold and manipulate the information; this proved an added benefit when we exported to Preactor as we were guaranteed a successful schedule.”

## Project Manufacturing - Wellman Hunt-Graham



Wellman Hunt-Graham was formed by the merger of Hunt Thermal Engineering Limited and Wellman Graham Limited in 2005 and is now the largest manufacturer of shell and tube heat exchangers in the UK. Working from a state-of-the-art manufacturing facility in Dukinfield, Cheshire, the 75+ strong workforce achieved a turnover of almost £11m in the past year with approximately 40% of all goods produced being destined for export to a diverse range of worldwide markets. When the company recognised it needed to improve its delivery date accuracy, it exchanged its obsolete and ineffectual planning system for a state-of-the-art production planning and scheduling solution from Preactor.

The manufacturing at Wellman is diverse, unique and done on a massive scale. Even the smallest orders have lead times of 6 weeks and these can extend to 18 months for larger orders which can have a value of several millions of pounds. A typical order can comprise around 110 different tasks, with the shortest measured in hours and the longest measured in weeks. Given the potential for catastrophe should any component fail, every process and task is meticulously tested and recorded to provide full traceability. And, to add to the complexity of planning the effective utilisation of the company's 9 primary resource groups, there can be up to 50 live orders physically in production at any one time.

However, according to Operations Director Chris Clarke, the planning challenges for the company begin before any order even makes it to plant floor. "Accuracy of delivery date is the primary concern of our customers as this often has to coincide with having a skilled team of installation specialists on site and the planned shutdown of very costly equipment. Failure to do so can incur cost penalties of up to 10% of the order value which on a multi-million pound order are understandably very significant!"



It is essential therefore that the company knows right from the Sales stage of an order that it can accurately deliver the required product in time. Ideally this means knowing how long the bespoke order will take to design and build, having visibility of exactly what is

already on shop floor as well as accurate data as to the progress of each job. While a specialist estimating package provides an overview of the time and tasks required to design and build the order, it cannot provide any information on when this may be possible within the finite constraints of the company's production capabilities – especially taking into consideration there may be up to another 49 jobs in progress.



Prior to investing in Preactor, the company had used a UNIX based planning package which was highly bespoke and ran on a separate UNIX partition. In addition to being highly time and resource intensive in terms of operating and maintaining, because the program worked on an infinite capacity basis it was incapable of delivering anything like the visibility and accuracy that Wellman needed. Clarke recalls his first impressions of the system when he joined the company in June 2007. "Basically, the only time it could tell you anything of remote usefulness about when a job would be ready was if that was the only job being worked on at the time."

The consequence of this was a large amount of human resource to generate a plan which was of no use and an On Time and In Full (OITF) rate which Clarke estimates as around 50%. Needless to say, within his first month of working with this "rolling problem", Clarke had recommended that the company urgently look elsewhere for a better solution.

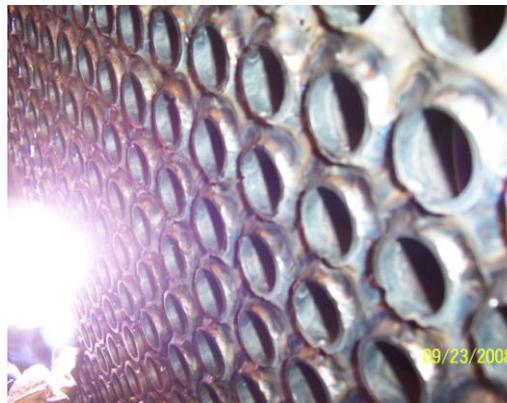


After being given the go ahead, Clarke spent time doing detailed research on the internet and evaluating product demos from several vendors. These initially proved less the positive as he recalls. "All the systems we were shown were narrow in approach and not very configurable. Every time we asked whether a system could do this or that, the answer was „No.“ A search of more complex systems proved equally frustrating for these were both very expensive and contained a large excess of functionality that Clarke knew he would never use.

In June 2008, Wellman began its discussions with Preactor Reseller RMS and as Clarke explains, it was immediately a very different experience. “RMS didn’t spend time trying to sell us a system – they spent a lot of time learning to understand what we did, what our problems were, and discussing how they thought Preactor could help.” He continues, “At key stages throughout these discussions, Warren from RMS would explain to us that they had done something similar and then show us a working demo so we could see for ourselves. We had confidence in the Preactor product and its upgrade potential as well as in RMS’ experience to help us get the best from the system.”

Implementation commenced shortly afterwards with RMS implementing a standard Preactor configuration to evaluate with Wellman how this would work. Within a week it was clear that a different approach was needed and again RMS’ flexibility was central to arriving at what has proved to be a highly successful system, as Clarke explains. “We have no need for an MRP (Materials Requirements Planning) or ERP (Enterprise Resource Planning) system as everything is bespoke and takes place over a very long time so we really need to keep as much production data as possible outside of Preactor and accessible to people in the company.” Consequently, a system was developed where all the production data is retained in a master spreadsheet which calculates duration of tasks, progress updates etc. Preactor is then used to schedule what needs to be done next, and where, with this data then being exported back into the master spreadsheet.

Again, given the significant production timescales involved, this allows Wellman to quickly generate progress graphs for its customers in the exact format that they can best relate to. Clarke again, “RMS provided us with the essential Preactor framework that would work with our business and left us with full control over the development of the spreadsheets and associated reports. Because of this, we have a system we can tailor very quickly for our business and one we implemented in a matter of weeks.”



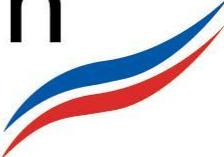
The benefits became evident in an equally short time even though they initially appeared to be anything but! Whereas the previous system had provided no real visibility, it became immediately apparent just how inaccurate and over optimistic its planning capabilities had actually been. “For the first time ever, we could actually see completely where the company was as well as the real progress of each order” recalls Clarke. He continues, “This was a real eye opener. For example, Preactor flagged up orders which according to the old system were progressing on time that in reality were weeks late. The initial response within the company was disbelief!” These were not isolated examples and there was an initial period of time when people simply couldn’t believe what Preactor was telling them. Yet time and time again, the information from Preactor proved itself correct.

So much so that the company has gone from an OTIF delivery rate of less than 50% to 85-90% since implementing Preactor. Not only does it generate what needs to be done next for every order across the entire production floor, it can also quantify the reasons

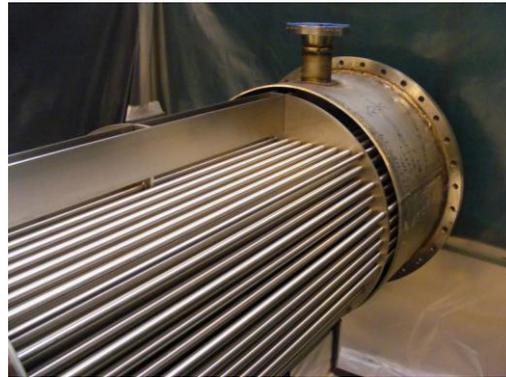
why as well showing the impact of not doing so. “In this sense, Preactor is very much a management tool for us”, explains Clarke, “because it allows us the flexibility to do what we need to do for our customers. If we do have a problem which means an order might run late, we can see these weeks away and make the necessary decisions internally about how to respond.”

# Wellman

## HUNT - GRAHAM



Another area that Preactor has benefitted Wellman is in the time and cost savings in actually using the system compared to the old UNIX program.



Not only has Preactor freed up half of the planner’s time, it has allowed other less specialised personnel within the company to use Preactor. This has allowed the planner to put much more time into the growing role of Customer Contract Manager which in turn is having a direct benefit across the company in terms of focussing on delivering even greater levels of customer care. Preactor has also helped reduce bottlenecks by highlighting the need to subcontract operations; this is estimated to be around 20% which in turn has reduced Work in Progress (WIP) on the plant floor.

Since implementing Preactor, Wellman has added a Shop Floor Data Collection (SFDC) system which allows the start and finish times of each task to be recorded. This in turn is being fed back into the company’s bespoke estimating system allowing that to generate shorter and more accurate lead time estimates for customers which strengthens Wellman’s position in the marketplace. Looking to the future, Wellman is currently investigating using Preactor to also help plan the company’s complicated testing requirements as well as in the design department. As for now, Clarke summarises the value of Preactor to Wellman as follows. “Preactor hasn’t helped us work harder, but it has helped us work a lot smarter. It has benefitted the primary area of the business it was intended to and this has helped benefit the way the company as a whole performs.”

