

Our Services:

Manufacturing Systems

- Quality
- Datasheets
- Formulations
- Laboratory
- Stock
- Production Management
- SPC

Production Scheduling

- Benefit Analysis
- System Specification
- System Selection
- Implementation

Business Process Modelling

- Re-Engineering
- Technology Impact
- Information Systems

Events

- Seminars
- Conferences
- Workshops

Our Clients:

- ABB
- AEA Technology
- Arthur D Little
- British Paper & Board
- Bridon
- Cambridge Consultants
- DTI
- Eli Lilly
- GlaxoSmithKline
- Hickson
- Humber Chemical Focus
- ICI
- J R Crompton
- Manro
- Newcastle University
- Norsk Hydro
- Roche
- Scott Bader
- Severn Trent Water
- SIRA
- Stepan
- The Carbon Trust
- Yorkshire Forward

(Partial List)

Paper Mill Scheduling System

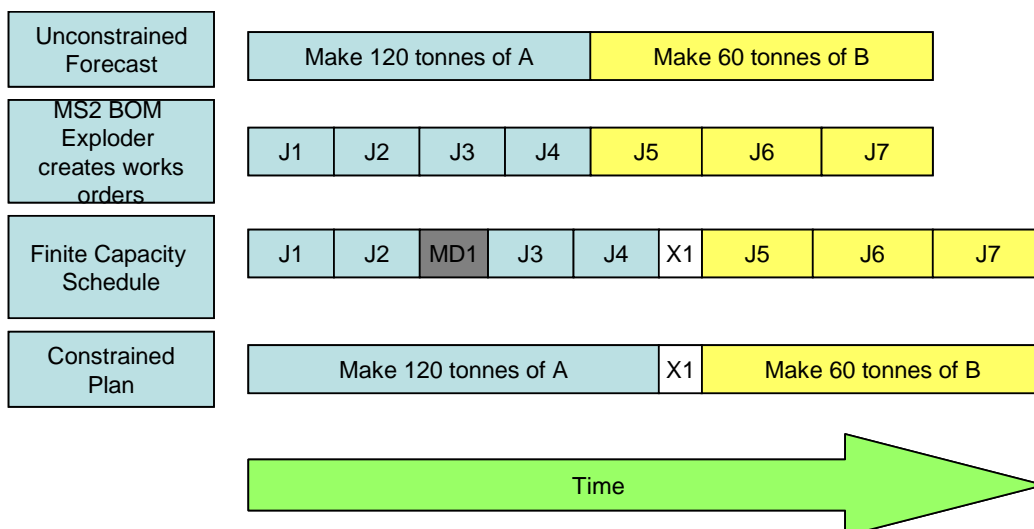
The client is one of the world's leading manufacturers of speciality long fibre papers. It operates several production sites throughout the UK, and produces a very wide range of paper types cut into many sizes. With a very large range of products serving a virtually world-wide customer base the planning and scheduling is complex.



In 2003 the company commissioned AJM Consulting to design and build a system to handle this complexity, and in particular to balance the long term plan for bulk paper manufacture with short term cut reel orders. One of the major features of scheduling in the paper industry is that it is a mixed process/discrete manufacturing operation. Typically the industry works on semi-continuous tonnage, yet the output of both papermaking and reeling machines is actually discrete rolls or reels. This was addressed by developing two system components which work together - AJM Consulting Services's MS2 manufacturing support system and the Preactor finite capacity scheduler developed by Preactor International.

Scheduling the Manufacturing Process

The bulk paper production plan is expressed in tonnes, for instance 120 tonnes of paper type A as shown in the diagram below. This is converted into identities for the individual bulk rolls (or "jumbos") which the paper machine produces; J1 to J4 in the example. These are then scheduled by Preactor, taking into account the processing rate of the machine, planned maintenance ("MD1"), changeover time ("X1") and so on. The resulting finite capacity schedule is then processed to produce the finite capacity plan which shows when the bulk paper will be made.

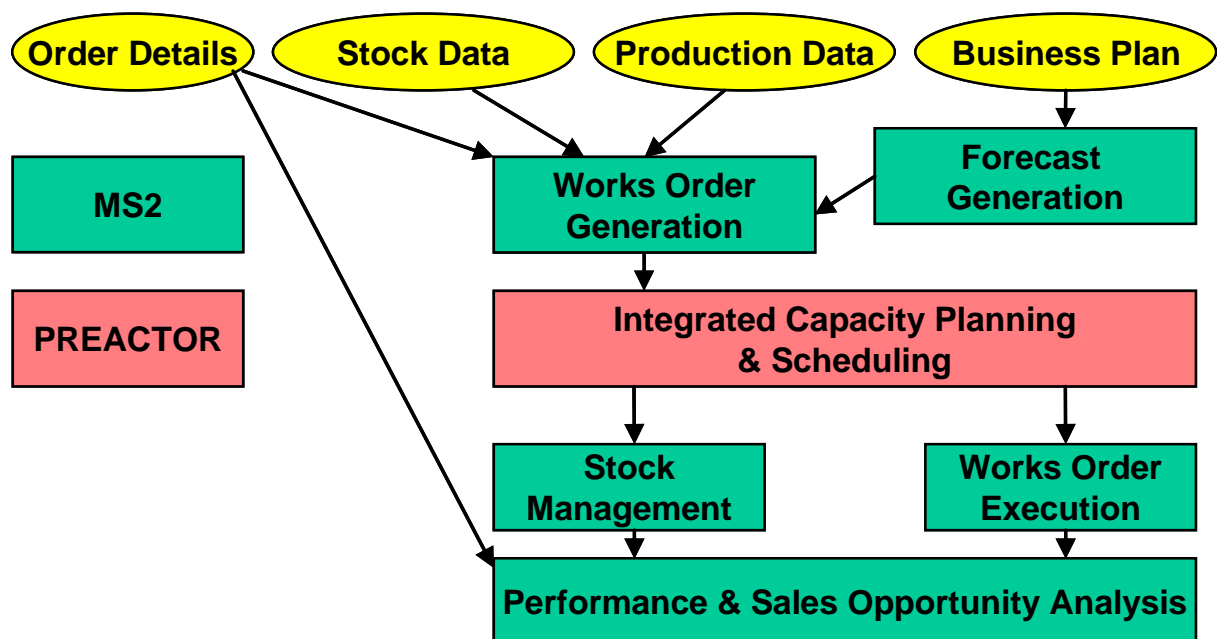


continued overleaf...

The individual jumbo rolls can then be scheduled for cutting into reels as they become available. This leads to a highly complex scheduling requirement with thousands of jumbo roll and reeling operation orders. Once the schedule has been calculated, it must then be further processed to remove the complexity prior to creating the instructions for the plant personnel.

System Architecture

The overall planning and scheduling system has two components, the MS2 manufacturing support system and the Preactor scheduler. MS2 is responsible for generating the bulk paper plan for, typically, a three month forward period. It analyses existing stock data and sales orders for finished reels, and creates the identities of the individual rolls and reeling operations together with the bill of material information which describes how the various stages of the process must be linked. These are then passed to Preactor which calculates the detailed schedule and exports the results back to MS2. This complex data is further processed to reduce the complexity and convert the schedule into familiar works orders. The overall architecture is shown below:



Scheduling Complexity

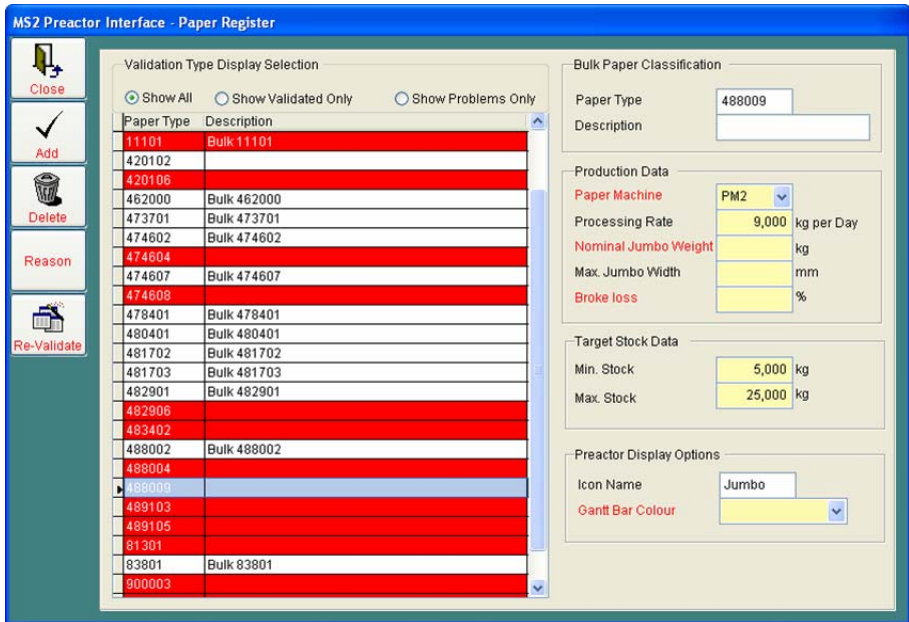
The schedule calculation requires considerable information which includes:

- Jumbo roll width and weight
- Weight of a set of cut reels
- Permitted machines for each paper
- Processing rates
- Wastage (“Broke”)
- Changeover times
- Stock details
- Planned maintenance
- Repair time estimates
- Sales order quantities
- Due dates
- Earliest start dates
- Reel dimensions
- Bill of materials



Validation

It is critical that all information is available to the Preactor scheduler. If a jumbo roll did not have its processing rate defined, for example, it could not calculate how long it would take the machine to produce it. This validation is part of the MS2 system which analyses each sales order, prevents any which could not be processed because of missing



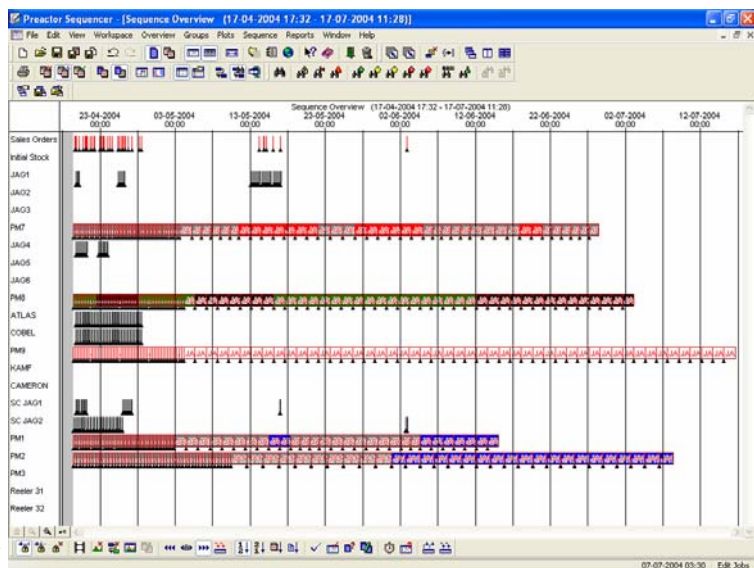
data from proceeding and alerts the user accordingly. Validation is applied to all aspects of the schedule - including the sales order itself, the operation of the papermaking machines, the reel cutting operations and stock. It is designed to simplify the use of the system and provide meaningful information on any errors which would preclude a comprehensive schedule from being calculated.

Aggregation

The overall system produces both a short term schedule and a long term plan simultaneously. In the short term, individual sales orders need to meet due dates and times, so a great deal of detail is required. In the longer term, future availability of material for sales needs to be identified. This is handled by aggregation - the user can instruct the system to schedule the first 50 jumbos individually, for example, and thereafter process larger aggregated quantities. This reduces the overall complexity (and therefore processing time) whilst providing both short term and long term information.

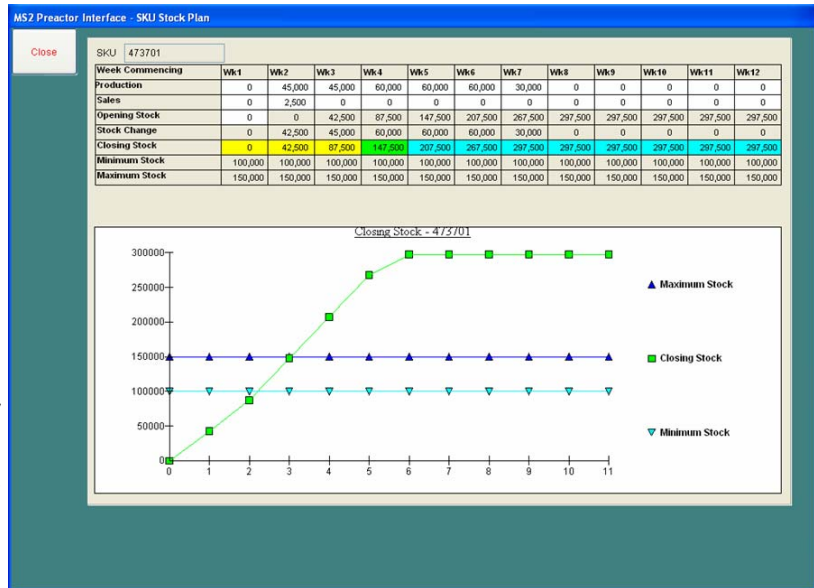
Planning and Scheduling

Once validation, aggregation and all other processes have been completed the resulting set of item orders is passed to Preactor. This takes the bill of material data provided by MS2 and links the various levels (sales orders to cut reels, cut reels to jumbo rolls and so on). Each item is then scheduled taking into account all relevant factors and enabling the user to make changes such as planned maintenance. The start and end time of each item is calculated together with details of the machine to which the item has been allocated. Finally Preactor exports this detailed data back to MS2.



Schedule Visibility

MS2 is a multi-user system and one of its functions is to make schedule information available throughout the organisation. This includes works instructions for both papermaking machines and reel cutters, information on sales order fulfilment and final stock levels, enabling the sales department to identify the optimum opportunities for further sales over time. MS2 processes the complex data calculated by Preactor and presents it in both graphical and tabular form.



Preactor

Preactor International, PI, is an independent company based in the UK. First formed in 1984 the company is one of the fastest growing companies specializing in advanced planning and scheduling software and, through its partnerships with other software vendors and system suppliers, offers implementation and software support all over the world. In partnership with Preactor we have developed integration tools which enable bi-directional communication between Preactor and MS2.



Its flagship product, Preactor, was developed during an extensive joint development project (FORCAST, Flexible Operational Real-time Control And Scheduling Tools) under the European EUREKA initiative during the period 1991-1993. Now in version 9.2, this suite of scaleable, flexible and configurable advanced planning and scheduling tools has become the price/performance leader in every market that it has a presence and is setting the standard by which other packages are measured.

Our Capability

AJM Consulting has developed the MS² suite of applications specifically for the process and related downstream industries. Its great flexibility allows it to be applied in situations as diverse as an industry support agency like Humber Chemical Focus, a government-funded information dissemination programme, a complex batch chemical plant and management of a Belgian factory operating the world's largest Chemithon continuous reactor. It is designed to provide functions which are not commonly available but which add value to the organisation, and to do so in a highly cost-effective way. Its power can be increased further by integration with other systems such as production scheduling or process monitoring and control.

With our background in process sector consulting we understand many issues which the industry faces and can apply that understanding to the design of specific solutions, further increasing the speed of implementation and the benefits of those solutions.



AJM Consulting Services Ltd
 Europarc Innovation Centre
 Europarc, Grimsby
 N E Lincs DN37 9TT
 Tel: 01472 500306 Fax: 01472 500307
 Email: info@ajm.co.uk

www.ajm.co.uk