Scheduling Success

Optimizing material and labor resources by scheduling against capacity can certainly bear on financial considerations. An automated scheduling system allows this manufacturer of personal care products to save in its packaging operations as well as to integrate information throughout other departments.

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Schering-Plough's Personal Care Group is responsible for the manufacture of sun care products, various proprietary medicines, a line of ethnic hair care items and other toiletries-products which racked up $252 million worth of sales last year.

Coppertone sun care products, Correctol laxatives, Di-Gel antacids, St. Joseph aspirin and Duration nasal spray are just some of the products produced and packaged at the company's Memphis, TN, operation. The variety of products-in liquid, tablet, gum, pill and powder forms; various packaging types--blister packs, bottles and boxes; and number of sizes-4 ounce, 8 ounce, and so forth, makes scheduling of packaging operations a complex proposition, to say the least.

To complicate the process even more are such variables as seasonal requirements-as in the case of sun care products; products that can run on a number of the 38 packaging lines of varied capacity; and a range of production rates at which the work centers can operate. The work centers for liquids, for example, range in production rate from 750 dozen to 5,000 dozen per eight-hour shift. Other factors that bear on scheduling include changes in packaging art, market fluctuations, and the nature of a product's compound. An element in the Di-Gel formula, for example, requires that the compound be bottled and sealed within 24 hours after production.

In liquids alone, there could be as many as 100 variables. These variables pose big challenges to efficiencies and cost considerations when scheduling material, labor and packaging lines.

Pieces of paper

Having worked in manufacturing and other areas of Plough for 19 years, Becky Collins was asked to take the position of Manager of Production Scheduling and Control, in February 1988, because, as she explains, "At that time all scheduling was done manually. It was written down on pieces of paper, and each work center was scheduled only one time per month. There was no quick way to change the schedule and review it for capacity restraints. You just didn't have time because you were doing all the scheduling manually.

"Customer service takes top priority at Plough," continues Collins. "If that means we have to make an immediate schedule change to satisfy unexpected orders, we'll do it, and this impacts the scheduling function." Using the manual system, Collins recalls we could still control inventory by work center and by product. But our problem was that we had no way of bringing all requirements for work centers together, collecting the data and seeing labor requirements over time."

A union shop, the Personal Care Group employs chemical workers on its packaging lines, specifically operators, mechanics and service workers. Activity in its 38 work centers consists of about 650 jobs and 3500 tasks being scheduled each week over a K-month scheduling horizon, and crew sizes vary greatly depending on the product being run.

"Even if you put all these manual schedules in a PC on spreadsheets, you'd still have to write a program to group all the data together to show what your total labor requirements would be. This has to be done by day and by shift for every day of the scheduling horizon," says Collins. "But that's not the end of it."

Level labor

"Manual scheduling might tell you that this week you need 30 people, next week you need 100 and the next 70, because you've scheduled all the work centers individually," explains Collins.

"You have no way of taking into consideration the total number of people versus what you can really do.

Gum products are packaged in one of the 38 work centers at Plough's Memphis. TN manufacturing facility

"You have to bring the peaks down and the low periods up so you're not laying off people every week and calling them back too often. That's not the type of business Plough wants to be in. We don't want to put people out of jobs, but on the other hand, we want to keep as many people busy as we can and not have excess idle labor, which we call 'diverted' labor'.

"A key objective was to find a way to meet our needs for customer service, also minimize inventories, but at the same time level the requirements for labor. We wanted to minimize that call-back/lay-off cycle, but we had no way of finding out how many people were really required. We needed a system that would allow us to quickly reschedule to level the labor; something you could turn around in less time than the two weeks of manual calculations, because, in two-weeks time everything will have changed."

In August 1988, Plough began looking for an automated scheduling system. After a presentation of its system, JobTime Systems, Inc. of San Mateo, CA, was selected to supply its JobTime Plus software. A finite-capacity scheduling package for use on a PC computer, the system uses event-based simulation techniques to provide precise, to-the-minute task scheduling, and planned equipment and personnel utilization.

Smooth scheduling

The software was installed in November 1988, and after six months it met Collins' requirements for smooth scheduling. Work center capacity and working calendars are entered into the system. Jobs data include quantities, product due dates, production rates, setup times and crew sizes. The system determines work center and date combinations to meet production demands from market forecasts and orders. Templates are used within the system to provide standard labor and task information within parameters for individual products. Each job is based on a template (also called a standard routing). The template includes tasks, each using a specific type and quantity of resource for a stated length of time (see *Figure 1).*

"Unlike most companies, our scheduling starts in this very room," says Collins, while seated at her office PC. "The final responsibility for scheduling also ends here." It used to take each packaging manager approximately four hours per week to calculate how much labor was needed for the following week, and this didn't take into consideration how much labor was currently available. A single scheduler now does it each week in the same amount of time, and most of that time is spent updating and printing "I'm telling them how much labor we need over time by day, by shift by department," she says. Collins' colleagues are included, in the scheduling planning through active communication and weekly meetings. Following release of the schedule, the packaging, compounding, engineering, maintenance and quality control staff together with Collins to discuss the schedule and do any late fine tuning that may be needed as a result of last minute changes. "If they see a better way of doing something, like reversing two products on a work center to save time, I'll make the change as long as it still meets our customer service requirement. "We have a performance meeting every week where we discuss how production did the previous week. If they deviated from the schedule, they explain why. There is also

a report issued to the packaging managers and up through the organization to the VP of operations. Everyone is committed to seeing that the schedule is followed, and we have been experiencing an average performance level of approximately 102 percent."

Information impact Besides scheduling and prioritizing jobs for packaging lines, Collins' scheduling system has an impact

in the event of job rescheduling. Information pertaining to formulas needed to execute packaging jobs helps compounding gear up for batch and process operations. Inventory is kept apprised of stocking information, and run-out and release dates.

The ability to generate custom re-ports quickly is one of the benefits Collins finds helpful. "I run a

about a" hour to do. In the same time, I am able to do an activity level report for finance that's saving them about 24 man hours per month. That's just impressive to me! There is so much data in the system, and I'm trying to get as much information from it for as many different people as I can."

Although the system user can write programs to create reports to individual specification, the

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BELOW:
JobTime Plus provides information to schedule labor for setup and production activities.

Barchart Display of Typical Job

SEQ	RESOURCE	R	TASK	10/02	10/03	10/04	10/05
100	Prod Line	1	S P	====	==============		
110	Mechanic	3	S	====			
120	Service Wrk	2	S	====			
210	Mechanic	1	P		==============		
220	Operator	8	P		==============		
230	Service Wrk	5	P				

S=Setup P=Production R=Resources Required

on other operations within the org-anization. Information is provided to the material requirements planning system, aiding material planners in their ordering func-tions. Here it is particularly useful

report at the end of each month that tells the planning managers how much inventory they're adding every month. That saves them about 24 man hours per month, and that report takes me

soft-ware does offer a number of standard reports. The basic ones are:
· Work center capacity require-ments;
· Work center status report;
· Work center to-do list;
· WIP data collection form;
· 100 percent scaled time chart by
work center and by job/task;
· Template task status report;
· Job and task status reports;
· Job/task route sheet;
· Simulation scheduling scores;
· Task technical fields reports; and
· Additional management reports.

Figure 1
A typical standard routing model used at Plough

SEQ NO	RESOURCE	QTY OF RESOURCE	CHANGEOVER TIME	PROCESSING TIME
100	WORK CENTER 1		2 HRS	26 HRS
110	MECHANICS	2	2 HRS	
120	SERVICEWORKERS	1	2 HRS	
210	MECHANICS	1		26 HRS
220	OPERATORS	4		26 HRS
230	SERVICEWORKERS	2		26 HRS

A guideline

The package promises precision, and according to Collins, it delivers. "This system schedules by the minute and that's one thing that's so nice about it," she reports. "It calculates setup time and packaging time separately, so the schedule indicates dates and times to start both actions. Maintenance can quickly review the times and determine how much time they are allowed to set up the line. The date is important, but the time gives them a guideline to shoot for within the day.

"Changeovers are minimized because the system recognizes jobs with the same packaging configuration and will schedule these to run consecutively. This can save anywhere from 8 to 22 hours in setup time. And it tells packaging, based on the rate, when they should finish. The system takes the finish date, compares it to the due date and tells us how many days early or late we are." The system also provides the capability to look at work center activity to compare labor assignments. "One work center might be scheduled to start a job at 9:30 in the morning and another one might start at 3:30 in the afternoon, so I can transfer people from one to another," Collins explains. "I can go into the system and look at total labor, see what it looks like over time, and determine how I can shift people to level peak labor requirements. The system gives me the data I need to shift labor to fine tune the leveling."

Collins can use labor to do fill-in work via transfer to other lines or shifts, or performance of miscellaneous tasks such as off-line rework. "The biggest benefit of this system is what we're better able to deal with labor," she says. "Idle labor has decreased since this system has been installed.

"When we first started installing the system. I did a matrix of each work center, showing all the product and package types that are run on that work center. I gave it to the maintenance department and let them define the changeover hours required and that's what I use in the system. However, if I see that we are actually changing over the lines in less-or more-time, I will discuss it with them and we will come to an agreement as to whether the changeover rates should be changed. I want everyone who uses the schedule to be as involved as possible so they know that it is meetable.

"I have not had any problems with anyone not accepting the new system and schedule format," reports Collins. "Everyone really seems to like it and that makes life a lot easier!"
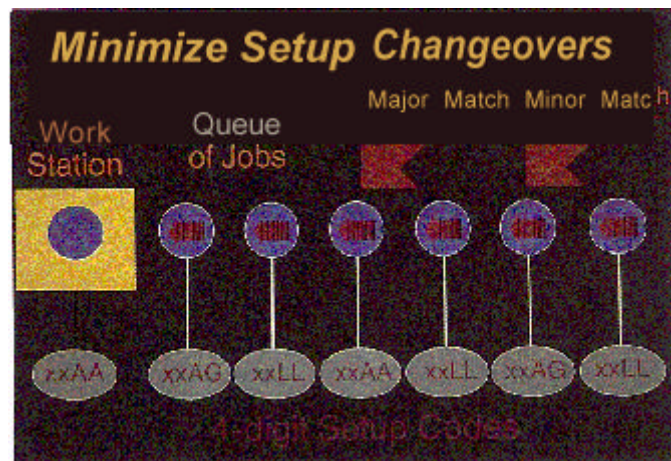
JobTime Plus schedules jobs with the same packaging configuration to run consecutively minimizing changeovers.