Advanced Finite Capacity Planning and Scheduling Helps SMC Improve Customer Service

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Introduction

SMC Pneumatics, headquartered in Japan, is the world's largest manufacturer of pneumatic components. The company's philosophy is "the closer we get to our customers, the better we can serve them". This philosophy has significant impact on the way SMC manufactures its product. Partially to be near its customers, the company has located its facilities around the globe, with manufacturing, engineering and administration facilities located in four continents, and subsidiaries in all of the world's industrialized countries.

SMC structures and operates its plants so that they can provide maximum customer service and responsiveness, making use of manufacturing methods perfected over the company's 33 year history. For instance, SMC has made worldwide use of techniques popularized in Japan, such as cellular manufacturing and U-Line assembly. However, SMC has not allowed tradition to prevent operations from modifying procedures to suit local conditions. As long as overall company goals are met, local operations have the freedom to try innovative, customized solutions. This article describes one such solution.

SMC's largest North American plant is located in America's heartland, Indianapolis, Indiana. Although it makes extensive use of manufacturing techniques popularized in Japan, this facility operates in an environment different from SMC's home market. Therefore, to improve customer responsiveness and delivery the efficiency of manufacturing operations, the Indianapolis plant turned to a Made in America solution, advanced finite capacity planning and scheduling software from Waterloo Manufacturing Software.

Company Background

In 1977, SMC established their North American headquarters in Indianapolis, Indiana. Today, this facility serves as a base for manufacturing, design, sales and technical support. Business has grown so that SMC has expanded its North American operation to include plants in Los Angeles, Toronto, and Mexico City, as well as over a dozen regional sales and warehouse facilities.

SMC Indianapolis' pneumatic components are used primarily in industrial applications. Its customers include machine builders and providers of industrial automation equipment, as well as companies involved in the automotive, electric and electronics industries.

Large customers early in the company's history included Japanese companies such as Honda, Toyota, Sony and Panasonic who had transplanted manufacturing operations to the United States. In addition to these firms, today, SMC's customers include many major domestic manufacturers such as TRW, Anheuser-Busch and Eli Lilly.

From Distribution to Manufacturing

Initially, the Indianapolis facility started out as a distribution center. As the amount of business done by Japanese transplant firms increased throughout the 1980's, and as the company penetrated the domestic market, the volume of SMC's North American business increased dramatically.

In order to handle this volume, and to maintain customer closeness, the Indianapolis facility evolved from executing primarily a distribution function, to doing light assembly, to performing a number of high volume, high value added operations which take product from raw material through to finished assemblies.

The Business Problem

Managing change is never easy, and continually increasing production requirements have presented the Indianapolis facility with many challenges. However, the situation is greatly compounded by SMC's basic philosophies. Superior customer service requires a balance. It requires that customers be able to order the type of product that best meet their needs.

Superior customer service also requires that customers receive their product in a timely manner. This commitment to service results in SMC offering a large product line (over 6,000 different pneumatic components and assemblies), which includes a huge number of variations (over 50,000). SMC's customers tend to take advantage of their diversity. This, in turn, leads to increases in overall production volume that tend to get spread out over a wide range of part numbers.

Since it would be prohibitively expensive for SMC to stock sufficient quantities of all product variants, the Indianapolis facility tends to operate in a make-to-order environment. An extremely large volume of low quantity orders for many different part numbers, which are of varying sizes and configurations, and which have differing production routings, characterizes this environment. All of these orders are characterized by very short lead times.

The Key to Success

The Indianapolis plant's challenge in this environment is to maintain and continuously improve customer delivery, while controlling costs. One way these goals can be reached is through good production scheduling. SMC accomplishes this task admirably in Japan. However, given the company's large share of the Japanese market, part number production volumes are much higher and customer demand is much easier to predict. Therefore, techniques used in Japan are not directly transferable to the situation in North America. The Indianapolis plant had to develop scheduling techniques that suited its own unique situation.

Unfortunately, as production volumes grew at a rate exceeding 30%, by the early 1990's the plant began to have increasing difficult scheduling. The problem was particularly acute in the machining area. Machining is the highest value added process in the plant. It is also an area of the plant where changeover and set up times can consume valuable capacity.

At this time the Production Control Group of the Indianapolis plant was following a scheduling procedure that made use of programs it had developed in house using the DBASE database software. The procedure required high degrees of manual data input. Given the large number of orders completed daily, data maintenance alone consumed a significant portion of the scheduling staff's time. The system also didn't explicitly consider production loads or available capacity.

The best a scheduler could do with the software and data available at the time was to develop a highly arbitrary daily machine schedule. Sometimes the schedule was achieved, but more often then not it was missed. Also, the procedure provided schedulers little help resolving the never-ending battle between "customer service and efficiency". While SMC's philosophy mandated that customers receive product in a timely manner, wherever possible, the production department wanted to schedule similar work together to maximize machine uptime.

A Scheduling Solution

It was clear to the staff at the Indianapolis plant that better scheduling was the key to improved customer delivery in an environment of high production growth where order quantities and volumes varied widely. Based on experience with their existing systems, Production Control staff felt that any solution had to explicitly consider available capacity and, therefore, had to be able to schedule in a finite manner. Given the large amount of functionality desired, it was obvious that SMC would have to purchase commercially available software rather than seek to develop a package in house. The Production Control Group also had a preference for a PC based solution so that staff could be as self sufficient as possible during the implementation.

Based on input from staff in the Production Control Group and the Production Department, Production Control began a search for commercially available software, lead by the Supervisor of Production Control. Over a two-month period, staff contacted a number of vendors and received multiple on site demonstrations. Follow up presentations involved senior managers in Management Information Systems and Production Management.

The Indianapolis facility purchased TACTIC, a personal computer based advanced finite capacity planning and scheduling software package developed, marketed, and supported by Waterloo Manufacturing Software (WMS) of Wellesley, MA. TACTIC helps easily and effectively schedule manufacturing operations in a finite manner. The software allows "what-if" schedules to be interactively generated and allows schedulers to see the impact of potential improvements, as well as unforeseen shop floor occurrences, on customer delivery.

Production Control staff members were especially impressed with the software's generic data interface. They felt they could easily link the software with data in the facility's IBM mainframe as well as with its existing PC based shop floor control system.

Training and Implementation

The Production Control group assumed responsibility for the implementation of the software and put together an implementation team. The team consisted of the Production Control Supervisor, the Production Control Group Leader and other Production Control staff members as needed. Team members remained responsible for their regular duties. The team was able to quickly implement TACTIC in the plant's machining area, the highest value added and greatest bottleneck area of the plant, and within five weeks began receiving benefits.

The team began the implementation with one week of training and implementation assistance from WMS. This session helped the Production Control Group understand the function and features of the software, helped identify interface issues with other systems and helped establish some of the necessary file transfer links. The team also used the training session to expose everyone even remotely involved with scheduling to the software. Team members hoped this exposure would help gain organizational acceptance for the scheduling approach.

As part of the initial week of implementation assistance, WMS helped model all of the production resources to be scheduled. WMS also wrote software to extract production completion data from the plant's PC based shop floor control system and started on a program to extract routing data from a PC based routings and standards data base. Finally, WMS helped specify the necessary program to be written by the MIS Department to down load customer order information from the IBM mainframe.

Immediately after the session with WMS, the team plunged into the implementation. The first step was to complete the down load of routings. Once routings were transferred to the system, the staff was able to manually enter work orders and begin scheduling. A few weeks later, the MIS group completed their portion of the project and the transfer of order data was automated.

Once scheduling began, problems surfaced. These problems were not specifically software related, but are the types that occur whenever an organization attempts to rapidly change the way it operates. The implementation ran into problems in the areas of data accuracy, training and organizational acceptance.

For the first time, the plant was actively seeking to use its routings and standards database, and the standards information, in particular, was not up to the test. Problems were highlighted when the Production Department consistently finished work sooner or later than the software indicated. By underscoring standards problems, the software helped the plant rapidly improve its data.

Other implementation problems were training related. When the plant actually got up and running with the software, quite a few staff members were involved one way or another with the scheduling system. While they may not have been actively scheduling, the reporting, clerical, and support functions that they provided were critical to the system's overall success. The large volume of orders that the Production Department rapidly produced required frequent scheduling, which in turn required that the support tasks be carried out in a timely, highly accurate manner. Once the team identified training as an area of concern, it immediately documented all tasks related to the software's operation and trained staff members in these procedures, quickly and effectively solving the problem.

Only time solved the last set of problems. Even though the team had actively involved personnel from the Production Department in the initial software selection and training process, some staff remained skeptical that finite scheduling would be of benefit. They feared that the software would spit out schedules that would force them to set up and run work in an inefficient manner. The entire Production Control Group alleviated their fears by continually involving others in the scheduling process and by showing them how the software could be used in a manner that incorporated their input to ensure that the best scheduling decisions were made. As better and better schedules were generated, the benefits of the software became obvious.

Ongoing Use

The Indianapolis plant has successfully been using TACTIC in the machining area for over a year. The Production Control Group starts a typical day's use of TACTIC by downloading orders from the mainframe. Hot orders that cannot wait until the next morning to be downloaded are entered into the system manually. Schedules are generated and dispatch lists of the day's suggested production are electronically transmitted to terminals on the shop floor. Production personnel are responsible for reporting actual work completions twice a shift by a set time through these same terminals. The completion information, as well as additional new orders, is considered in schedules generated shortly after the production-reporting cut off points.

Shop floor supervision gets a list of any orders that are scheduled for finish after their due dates so that they can take corrective action. Supervision likewise gets a list of projected machine utilization. On an as needed basis, production supervision meets with Production Control to address anticipated problems highlighted by the software. These meetings make use of the software to review proposed actions such as working overtime or rerouting work from heavily loaded resources to those that are more lightly scheduled.

Benefits

SMC's Indianapolis facility has received numerous benefits from use of TACTIC, some of which are easily quantifiable, others that are harder to measure. One of the most obvious benefits of the software is that it has replaced an in house scheduling system that was very cumbersome and time consuming to operate. Shortly after implementation, the Production Control Group was able to reduce the man-hours required to perform scheduling related tasks by 50%. These meant that the software paid for itself in less than its first year of operation.

TACTIC has also helped smooth operations on the shop floor. The software has given the plant the visibility to look ahead in time and spot potential problems and make the necessary adjustments before the situation becomes critical. For instance, the staff is now able to better plan overtime production and tends to get much better value for the overtime dollars spent. The Production Department has also been able to better organize the shop floor and to leverage investments in capital equipment and tooling. TACTIC has highlighted the machines on the shop floor that tend to be consistently overloaded.

This information has allowed staff to better group production over machines based on part geometry, reducing setups and creating more available capacity. The software has also helped identify instances where relatively small investments in tooling can enable lightly used machine tools to be converted so that they can assume some of the load run by capacity constrained resources.

While the plant has been able to attribute substantial cost savings to TACTIC, the tool has also helped increase profitability. SMC's growth has been based on superior customer service and quality.

However, past success is not always an indication of future performance. Rapid growth and increasing order volumes often imperil the very levels of customer service that have led to that success. The software has helped SMC to avoid this trap and to maintain high levels of customer service. SMC's production, scheduling, and customer service personnel use TACTIC to monitor the status of orders as they make their way through machining. When an order is in danger of finishing late, corrective action can be taken.

Summary

SMC Pneumatics has benefited greatly from the installation of TACTIC advanced finite capacity planning and scheduling software at its Indianapolis plant. The software was successfully implemented in five weeks and paid for itself in less than a year with easily documented cost savings.

However, TACTIC's benefits have gone beyond simple cost savings. Through helping the company execute its fundamental strategy of superior customer service, TACTIC has helped SMC Pneumatic maintain its enviable growth rate.

About the Authors

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More Information

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