Scheduling Engineer-to-Order Manufacturing

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The Situation:

This manufacturer of industrial process equipment had a long history of growth and success based on its ability to develop and market proprietary technology. Part of the company's success stemmed from its ability to respond to customer requests for new product features that could be offered initially as a customization and later as a standard option. Although each product installation was built largely from standard components, over 80% of customer orders required custom engineering in order to satisfy requirements for physical layout, control systems and other customer-specific features. As the backlog of equipment orders in process topped 100 there was a growing awareness by senior management that the firm's ability to meet customer delivery requirements was breaking down. In order to keep up with growing product demand and also preserve a strong capability to capitalize on customer-driven innovation the company decided to overhaul its order fulfillment process.

Key Issues:

Individually, people were doing excellent work but overall process execution was becoming disjointed. Specific symptoms varied from order to order. They included:

- Missed delivery dates (with financial penalties) because custom components were ordered late
- Excess overtime costs due to late start of assembly and testing of equipment
- Excess finished goods inventory when assembly and testing were completed long before the customer would accept delivery
- Costs for rework because of engineering changes introduced after assembly had begun
- Order errors resulting from manual re-entry of data from one system to another
- Delays on product development projects due to overburdened engineering resources

Analysis:

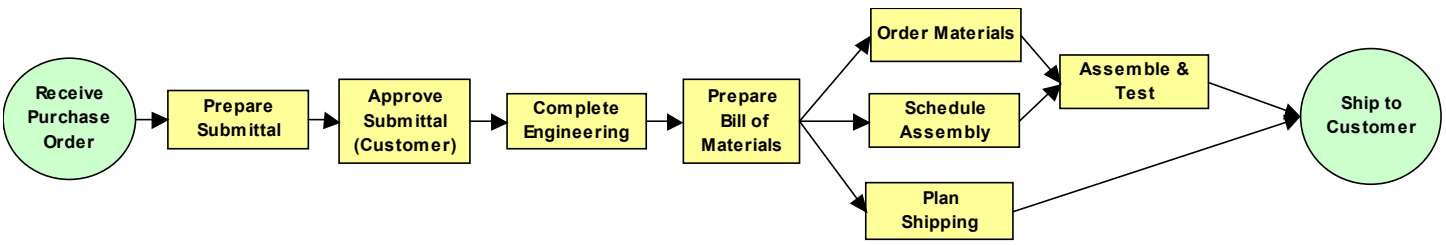
One focus of attention was software tools. Through interviews, observation and analysis the objective was to document:

- Key data, who used it and how they used it to plan engineering, documentation and production activity
- Process triggers and other key decision points that would affect on-time shipment of customer orders
- Gaps in software tools to support tracking of critical dates for each customer order

A few key observations were evident early in this stage:

- All orders, regardless of product line, followed the sequence of processing activities shown below from receipt of purchase order through to shipment. The amount of time and effort to complete each activity depended on characteristics of each individual order.
- Communicating milestone dates between departments was critical to timely completion of key tasks that preceded the start of production activity.
- The existing ERP system did not provide the ability to track key dates for completing submittals, engineering and other activities that were required to complete each order.

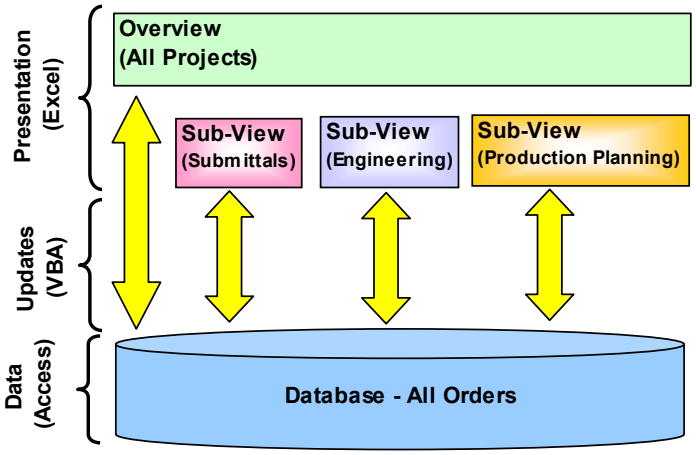
To keep track of critical dates, each group involved in the process had developed their own spreadsheets of in-process order information. A major portion of each weekly production meeting was taken up with an exchange of spreadsheet printouts as the participants tried to develop a common picture of dates and delivery requirements. Little time remained for the group to identify priorities, potential conflicts and remedies. Communication errors were common and delivery performance was suffering.



Master Schedule Prototype:

The main goal was to make it easy for people involved in the process to exchange date information. Time constraints called for an iterative approach to improving the scheduling tools so that improvements could be deployed rapidly and refined over time. Since all participants in the process were experienced Microsoft Excel users it was logical to continue using Excel to present data. That would shorten the learning time required to adopt a new tool. As well, Excel offered advanced analysis and data manipulation features.

A series of Excel workbooks, which were coupled to a database, standardized the presentation of milestone dates for all orders in progress and automated communication of dates between groups. Multiple spreadsheet views of the data satisfied the needs of specific groups to see and manipulate the data that was relevant to their work. During development, the Documentation Coordinator (responsible for preparing engineering submittals for customer approval) represented the business users by providing insight, testing and feedback.



When representatives from the Engineering and Production Planning groups were invited to review the new format the response was enthusiastic. Once everyone was satisfied that the new format contained the correct information, they were quick to introduce it to the production planning meetings as a replacement for the spreadsheets they had been using. This in turn, simplified information exchange and greatly improved the effectiveness of the meetings.

Refinement and Ongoing Development:

Adoption of the **Master Schedule** proceeded rapidly over the next few months, Within 6 months of initial release adoption had grown well beyond the original function of supporting the production planning meetings with added functionality that expanded use to a wider group. Engineering and other groups found that having key dates readily available aided their ability to plan work schedules and forecast resource demand. Over time, shipping and other groups adopted the tool in order to assist their planning. Addition of automated data updates from other business systems broadened the scope of use to support sales forecasting and other analysis activities.

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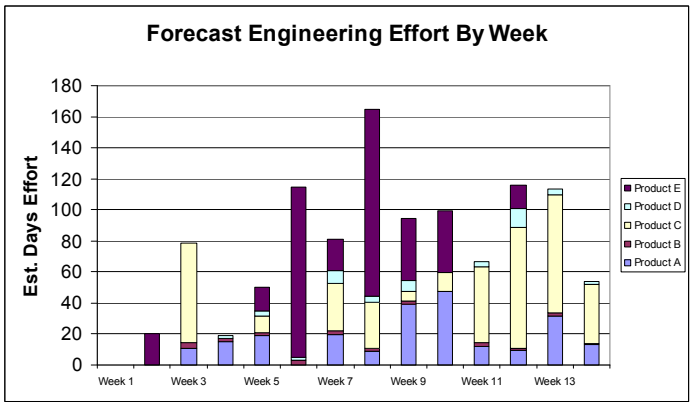

Benefits:

Business users had a working tool that aided the productivity of their planning meetings within 4-6 weeks of initiating the work. In subsequent development an iterative approach with intense end-user involvement enabled rapid deployment of a simple, effective communication tool. Specific, tangible benefits included:

- ***Better Planning Decisions*** at weekly production meetings because everyone arrived with up-to-date information they could trust
- ***Extension across the company,*** to aid operations in shipping and other areas
- ***Improved Order Fulfillment Performance*** *across all process performance indicators*

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The Master Schedule was a team effort that included representatives from across the company. ***Bill Neaves****, now principal consultant at DMA Systems, served as architect and lead designer throughout analysis, development and solution deployment. For more information please contact us.*

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