ERP Requirements for ETO Manufacturers

Vanilla ERP systems rarely fit an ETO (Engineer to Order) manufacturer. Yet almost every system claims to meet ETO needs. This chapter will review some of the unique ETO requirements not found in every system and expose the differences.

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The typical ETO organization reflects a unique style of manufacturing:

- New business based on engineered quotations.
- Products designed specifically to the customer's engineered specifications.
- Customer involvement throughout the manufacturing process; from original quote to final assembly and on-site installation.
- Complex products that often require many custom subassemblies.
- Raw materials purchased with long lead times, often times specifically for that one Job or Project

As a means of business survival, a recent shift within the North American manufacturing market has ETO organizations leading a call for change.

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ETO Manufacturing Challenges

Unlike more common manufacturing processes, within ETO manufacturing environments the Customer is heavily involved throughout the design and manufacturing process. This constant involvement results in frequent Customer and engineering changes.

Another constraint in the ETO manufacturing process is the historically long lead times from purchasing vendors spanning months—even years. These raw materials are usually purchased directly to the job or for a specific phase of the overall manufacturing project.

Because ETO manufacturers treat each job as a project, all costs and materials are reported to the actual work order and variances are further compared to the original estimate. In many cases, once the production phase is complete, the product is shipped to and assembled at the client's site.

Furthermore, aftermarket services and replacement part sales continue throughout the product life.

Requirements Differ vastly between ETO Manufacturers and Discrete Manufacturers

Unlike its repetitive/discrete production counterparts, the ETO manufacturer is faced with maintaining a business model that requires skilled, and knowledgeable Engineers, who continually design innovative solutions to complex problems.

Discrete manufacturers have placed greater emphasis on manufacturing products offshore.

ETO manufacturers have continued to focus their design, engineering, and production of products domestically.

ETO Manufacturers demand more from ERP vendors

In determining the ERP requirements, it is necessary to take a deeper look at the day-to-day operation challenges that ETO manufacturers face:

- Synonymous with Project-Based manufacturing, actual costs are recorded against the specific project task/ operations and variance trends are analyzed (compared to the original estimate/quotation).
- Customers are involved with the project from "cradle to grave", resulting in frequent engineering changes.
- Most materials are purchased direct to the job or project task and often require long purchasing lead times.
- Often the final step of a project will be the actual equipment installation at the customer's site.
- ETO manufacturers rely on skilled and costly engineers, who are charged with project designs that meet the Customers' complex, demanding and ever changing expectations.
- ETO manufacturers want to know the true labor and raw material costs through the entire multi-level Project or Job.
- ETO manufacturers want to schedule all associated sub-assemblies as part of one Job/Project, and drive to Promise Dates given to customers (pull-based).
- These are some of the reasons why ETO manufacturers have difficulties finding capable software solutions.

ETO Manufacturers demand more from ERP vendors

ETO Manufacturers' have been pleading for improvements, but only a select few ERP developers have returned with a complete solution.

Today's ETO manufacturer should expect their ERP to include:

- Strict Engineering Change Management, including workflow. This should also include revision controlled transaction security, so that obsolete items resulting from engineering changes will not be purchased, transacted, or consumed.
- Functionality such as % complete, revenue recognition, work breakdown structures (WBS) and scheduled due dates/milestones displayed in a Microsoft Project format.
- Linking Engineering with the ERP. Integration at a BOM level with popular CAD and PLM systems (single data entry minimizing human error).
- Project inventory management. Assigning a segregated "project warehouse" where inventory transactions will be isolated within the project.
- Project and work order shop floor feedback that details the actual project costs, including labor and raw material through all levels of the Job/Project.
- True Time & Attendance with integration to popular Payroll systems.
- A visual representation of the entire multi-level Job/ Project schedule on one screen.
- The ability to identify critical path constraints of a multi-level Job/Project.
- Tighter controls regarding long lead time materials, providing for accurate material planning early in the project, and the subsequent alignment of materials to later phases just in time.
- Preventative maintenance (internal equipment) and warranty contracts (external aftermarket).
- A Pull-based scheduling system, which drives for on time delivery performance while minimizing Work in Process.