Force Multiplication—Supporting Complex Customer Requirements at a Regional Level

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ABSTRACT

The days of original equipment manufacturers (OEMs) accepting lower levels of support from their regional suppliers than they receive from larger suppliers are long gone. Today's OEMs want all suppliers to have people and systems in place that support the product lifecycle, manage the program and provide visibility into project status. However, there are real differences in staff size between larger and smaller contract manufacturers. This presentation looks at ways that one contract manufacturer was able to force multiply through a combination of internally-developed program management software and an off-the-shelf cloud-based ERP solution.

Key Words: Electronics manufacturing services, EMS, contract manufacturing, ERP system, cloud-based computing, program management.

INTRODUCTION

As the electronics manufacturing services (EMS) industry has matured, EMS providers of all sizes have become trusted manufacturing partners with their customers. No longer are smaller EMS providers considered board stuffers who need to be closely managed by their customers. Instead, they represent a segment of the market known for agile response time and highly customized support.

However, that agile service culture is often driven by a flat management structure and limited administrative personnel. Neither sales volume nor culture will support a larger overhead infrastructure. At the same time, project complexity and demand variability are increasing. So, the challenge at the regional EMS level is developing systems and processes that are repeatable enough to provide some level of force multiplication for program management, yet customizable enough to provide the level of agility expected by customers. Additionally, the increase in complexity and demand variability drives a change in requirements from systems which measure what has happened to proactive systems which flag potential issues as they arise and provide visibility into developing trends.

This contractor opted for a mix of internally-developed systems combined with an off-the-shelf ERP system. This paper will look at the issues considered central in system design and the end solution.

From a systems perspective, four key issues were considered critical to address:

- Automate the program management function to eliminate repetitive tactical tasks
- Create a repeatable project launch process
- Efficiently keep customers "in the loop" on critical project issues
- Provide support for operational efficiency.

AUTOMATING PROGRAM MANAGEMENT

Program management approaches are evolving in EMS as better tools become available. The commercial airline industry provides a good analogy. Pilots evolved from flying planes through total manual control to a system where the plane is predominately flown by computer and the pilot simply manages the process. Similarly program management has evolved from a very reactive approach where the program manager gathers data and course corrects to a more active role of monitoring real-time processes. This contractor chose to take that process a step further to a proactive system that literately "flies the plane" through self-correcting systems that automatically track activities and deadlines, and notify responsible parties if schedule is slipping. Table 1 outlines the differences between these varying program management styles.

Table 1. Varying Program Management Approaches.

Reactive	Focuses on managing problems in a rigid process
	Time consuming and costly
	Self-perpetuating
Active	Focuses on monitoring real-time processes
	Similar to inspecting quality in
Proactive	Uses self-correcting systems which automatically track activities and deadlines
	Requires more frontend setup, but minimizes actual hands-on program management monitoring time
	Both a pull (team members can check status 24/7) and push system (warns of slippage)

The contractor's team started by customizing a Windows-based relational database. The system is called ProManage. The system was designed to interface with the MRP system and provide project team members with the ability to log on 24/7 to find out exactly what open action items they need to address.

The program manager inserts critical dates, basic account information and the team responsibility list. The system tracks activity status, assigns standard tasks and updates appropriate team members. If the schedule is slipping, the system automatically flags the issue and informs the team. Figure 1 shows the areas covered by the system.

The system also serves as a centralized database for all project activities, supporting both traceability and product history recordkeeping.
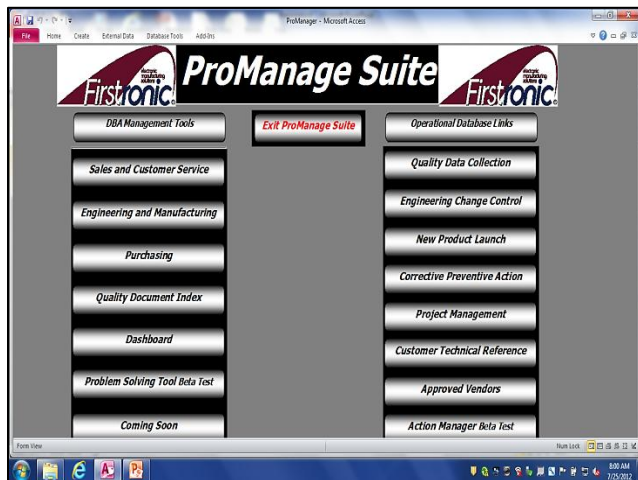

Figure 1. ProManage Main Screen.

CREATING A REPEATABLE PROJECT LAUNCH PROCESS

Project launch is a two-fold challenge for program management. First, it can be time-consuming, particularly when it is the first project launch with a new customer. Secondly, it often involves a complex set of tasks that are only done in the launch phase. Program managers who are frequently doing project launches can easily switch between project launch mode and volume production mode, but program managers who infrequently launch new projects may not be efficient in switching back and forth.

In analyzing project launch patterns, the team designing ProManage defined four basic types of project launch:
- Engineering/product development
- Prototyping
- New product launch
- Older assembly review.

New product launch included both launches involving newly released products and those that involved established products being transferred into the facility. Older assembly

review was a launch process for existing products that were built infrequently.

The templates automate approximately 90% of the project launch plan and any remaining items are added by the program manager. Figure 2 shows the main screen of a prototype template.The plan is then launched to the project team and the system begins assigning tasks to team members. If a deadline is missed, the system automatically escalates that series of activities to the program manager for resolution. The system also creates full documentation and a post-mortem history to allow for process improvement. [1]
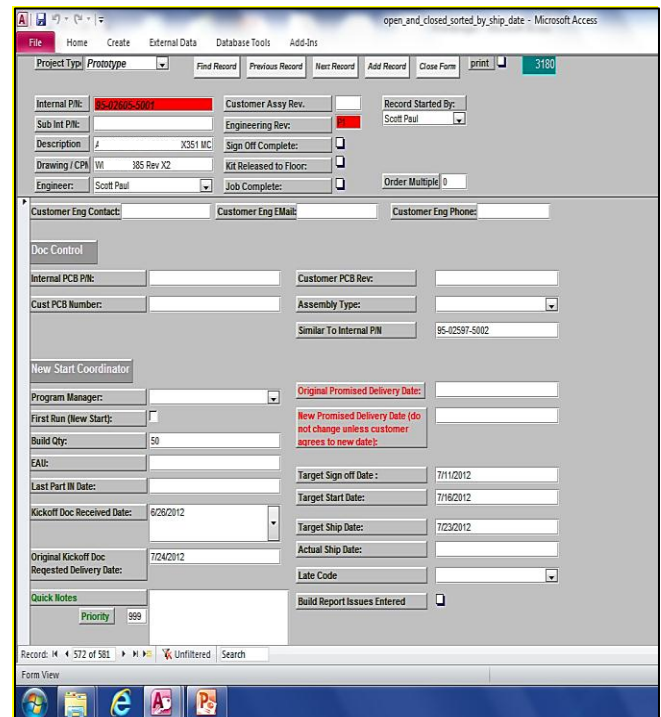

Figure 2. A Prototype Project Screen.

The most powerful aspect of this system is the fact that the project can be defined and standardized almost immediately, but the team then quickly adjusts the "standardized requirements" to match the individual nuances of each launch thus creating a tailored launch plan for each new assembly. The program manager has the time to better evaluate project trends and look at longer term project issues, instead of getting bogged down in day-to-day tactical tasks.

KEEPING CUSTOMERS "IN THE LOOP"

J. Edwards Deming pointed out that 94.6% of all failures are a direct result of poor communication. If anything that is optimistic in the EMS world. The challenge isn't that EMS project members don't communicate. It is instead, that in the midst of communication overload it can be easy to miss critical details. ProManage was designed with that issue in mind. It is both a pull and a push system. Project team members can pull critical real-time data at their convenience.

At the same time, it also pushes needed data to team members with unclosed action items.

The information loaded in the engineering database aligns with purchasing and demand planning to ensure materials are purchased and product is built to current revisions. Figure 3 shows a typical project status screen. The program manager is able to easily discuss critical issues with customers including:

- Demand vs. forecast trends
- Revenue
- Inventory levels/turns: by customer and by program
- Warranty returns
- Labor to plan
- Purchase price variances (PPVs) of significance
- On-time delivery: by customer and by program
- Backlog
- Schedule impact of engineering changes or shortages
- Minimum buy liability and excess inventory generated by engineering changes or end of project
- Part change notices (PCNs) indicating potential obsolescence issues
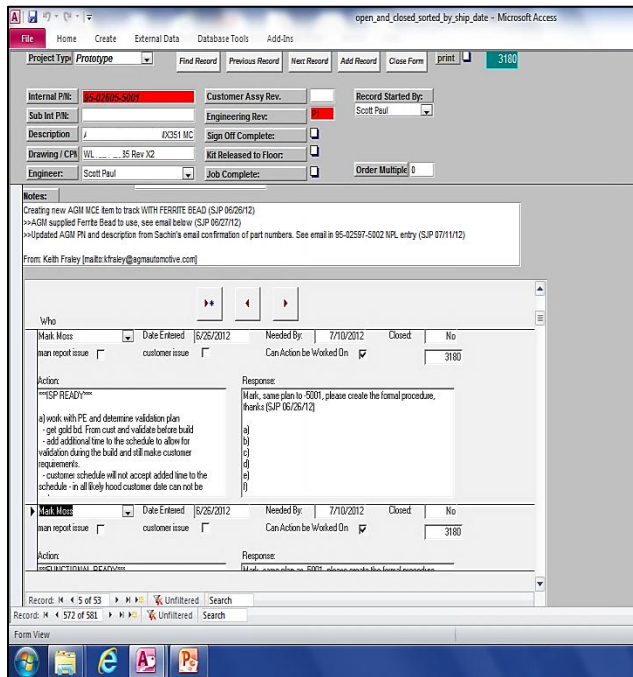- Market-driven cost variation trends.

Figure 3. Typical Project Status Screen.

Customer information can be output to Microsoft Project or Excel depending on the report. The customer sees project activity in its entirety making it easy to discuss trends, what-if scenarios and a range of course correction options. Figure 4 provides an example of quality reporting data.
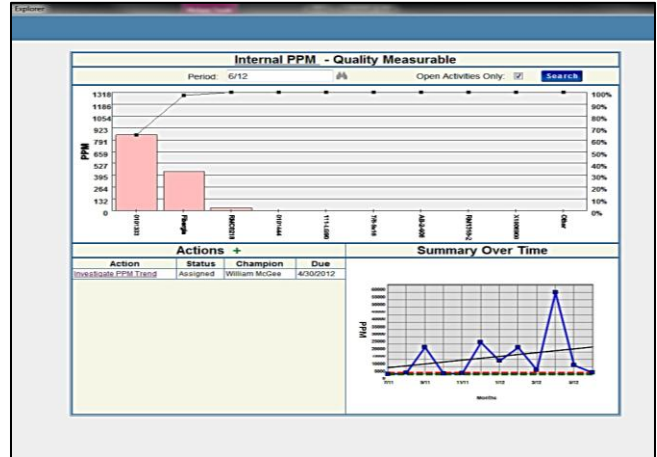

Figure 4. Quality Data Reporting.

The ability to quickly and easily present data to customers saves time in two ways. First, early discussion of potential issues opens the door to more options in terms of course correction. Second, it enables the program manager to make a business case for the proposed action. The ensuing negotiation is typically simpler because the issue is clearly understand and the customer has a range of options to choose from.

Technological advances are contributing to improved real-time data visibility. At the time ProManage was originally developed, there simply wasn't anything available off-the-shelf with similar capabilities. However, information systems technology continues to evolve in this direction. The contractor found redundant capabilities when upgrading its MRP system to Plex Online, a software as a service (SAAS), cloud-based Enterprise Resource Planning (ERP) system. Figure 5 shows the Plex interface screen that customers can access.
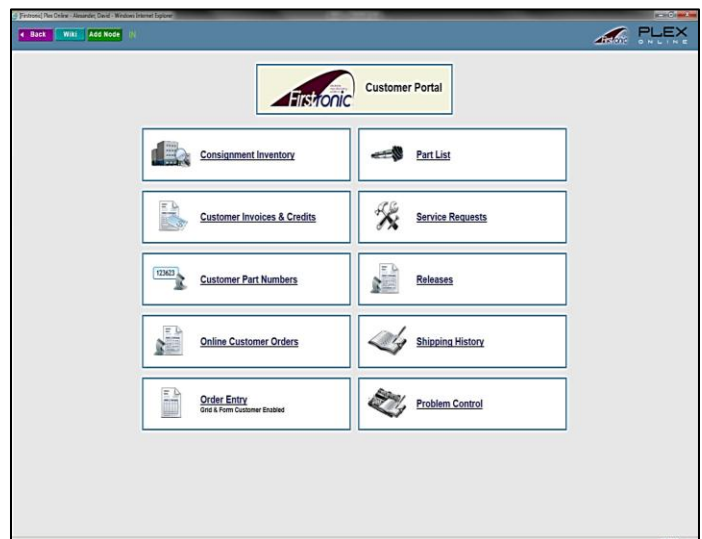

Figure 5. Plex SAAS ERP Screen.

The Plex implementation included the ERP system, manufacturing execution system (MES) module, EDI customer and supplier interfaces, and online quality data collection/reporting tools. Plex also fully integrates with ProManage. However, since the Plex system supported some activities also embedded in ProManage, modifications were made to eliminate the redundancies. Since Plex is cloud-based, both customer and contractor personnel are able to access Plex information remotely.

SUPPORTING OPERATIONAL EFFICIENCY
Regional EMS providers often have as many customers per facility as do their much larger competitors. The Plex implementation has added the ability to easily view cumulative data on project starts, machine utilization, scrap and work center availability. While that visibility is obviously valuable at the Operations level, that visibility is also helpful for program managers trying to assess likely constraints for new projects or gain a quick understanding of potential issues if a customer is experiencing upside demand variation. Figure 6 shows a list of project launches.

Figure 6. Project Launches Report.

CONCLUSION
Regional EMS providers have limited staff resources. However, today's information technology offers a way to stretch those resources significantly. Implementation of ProManage was a force multiplier that typically enabled one program manager to do the work of four-to-five people. The addition of Plex Online has simplified the customer interface and added additional operational visibility. Additionally, since the system is cloud-based, the project team has access while travelling which further enhances responsiveness.

While ProManage took significant internal staff time to develop, the full Plex implementation was done in less than two quarters and features which previously had to be custom programmed were part of the base package. The ability of off-the-shelf systems to support a "work smarter" focus

helps regional EMS providers meet the expectations of customers who continually raise the bar.

REFERENCE
[1] Firstronic, "A Systems Approach to Reducing Time and Cost in Project Launch," Global SMT & Packaging, February 2012. pp. 34.