

# Information flow as a tool for cost reduction

In the complex world of outsourced manufacturing, it isn't simply enough to capture critical data. It is equally important to organize shared information flows around critical processes. This article looks at one EMS provider's system for reducing the cost of wasted transactions and excess inventory through improved information flow.

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## Introduction

Poor information flow is the root cause of many hard-to-capture costs in outsourced production. The disruption and the time lag inherent in the lines of communication that have evolved among the OEM, electronics manufacturing services (EMS) provider and the supply base can increase inventory, slow product development cycles and impact customer service. While each player must do its part to create good data, it is critical that EMS providers take a stronger role as 'information flow managers.'

Genesis Electronics Manufacturing (GEM) has seen these challenges in its EMS business. This article looks at ways the company has structured information flow in:

- Product development
- Material procurement
- Production scheduling
- Repair depot services.



Figure 1. Work-in-process is tracked via bar codes throughout the production process.

## Identifying critical processes

To achieve cost reduction with enhanced information flow, it is important to understand which processes potentially drive the greatest inefficiencies. Typical process inefficiencies exacerbated by lack of information visibility include lack of component commonality, excess inventory, inability to meet market demand, quality issues and added logistics cost in repair depot support.

In deciding which areas to address first, the company surveyed suppliers and customers to

determine the areas in which they would like enhanced information flow. Both groups had some specific requests, and the final output was structured based on these preferences.

Suppliers can access the following information:

- Open orders
- Delinquent orders
- Cancellations
- Receipts
- NCNR orders
- Bonded orders
- Material rejection reports
- Performance reports
- Overall report card
- Packaging specifications and other agreement information.

Selected suppliers who have demonstrated superior performance can view MRP requirements via Planned Orders. This helps address the uncaptured cost of procurement events in which multiple phone calls are required to purchase and follow-up on delivery of a single part. Ultimately this streamlined information access minimizes personnel time utilized at both the supplier and the EMS provider.

Customers are provided the following information in two formats:

- The Pull System - In this format, the customer goes to a secure web portal and 'pulls' the information they want from a variety of categories, which include open orders, shipments, package tracking, serial number database, purchased inventory, consigned inventory, finished goods inventory, bills of materials, component 'where-used' database, ECNs, DFT analysis and design guidelines. Product quality data is also available.
- The Push System - In this format, the customer receives a custom report in their desired format that 'pushes' the data, via email, to their desktop. There is also a 'Pull' version available for customized reports. This feature was added primarily to support customers' regularly-scheduled internal status meetings.

Within the company, the same information is provided to key production team members in a more granular detail as it relates to the manufacturing schedule.

## Key areas where improved information flow drives cost reduction

So how does improved information flow address some of the identified areas of hidden cost?

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**Lack of component commonality**

Lack of component commonality in product families can drive some of the other issues, such as excess inventory or inability to meet product demand. Improved information flow among the product development team, supply base and EMS provider can help sanity check component selection decisions against cost effectiveness, supplier quality, historical availability and current product family commonality.

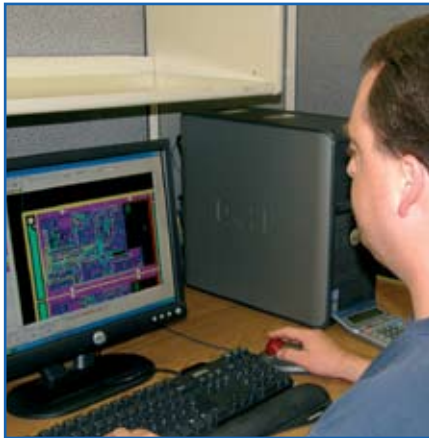


Figure 2. Ready availability of component inventory information makes it easy for engineers to sanity-check component commonality at the earliest stages of their design process.

In GEM's system, a customer's engineering team has visibility into existing inventory levels and part commonality. Innovative companies are often pumping out several new designs a quarter from different engineering groups within that same company. Utilizing a shared database, teams can speed development while avoiding creating additional inventories of 'new part numbers,' even when team members are assigned to different projects or different facilities. If cost impact on a re-design is being analyzed, a customer can use this tool to evaluate how the existing inventory of components will be impacted by the change and even time the change against depletion of current inventory.

In addition, the customer's engineer may actually change the planned design to incorporate existing inventory. The engineer can search the existing inventory database for component selection alternatives and ask for a sample to test. The ready availability of this information makes it easy for engineers to do this sanity-check at the earliest stages of their design process. Besides the cost savings associated with efficient consumption of existing inventory, this prevents the

'transaction waste' of creating new part numbers, entering new part numbers, ordering new part numbers and the other transactional costs associated with lack of component commonality.

To support RoHS conversion status visibility, a list of RoHS-compliant parts is maintained for each customer in a secure web-based information database. Customers can log on and view their RoHS-compliant product list and update as products are converted. This way both the customer team and EMS production team are always up-to-date on the status of which assemblies are RoHS-compliant and which are not.

**Excess inventory**

Excess inventory can be driven by many factors, including variations in end market demand, an engineering change notice (ECN) that eliminates parts already in the pipeline, minimum buy liability generated by low volume product, or simply a product reaching end of life. It becomes a liability when the parts are either non-returnable or can't be used or liquidated. Often there isn't an intention to create excess inventory. A project ends and the customer asks the EMS provider to hold the inventory to see if other products will consume it. A high mix, low volume project with low part commonality has several low runner board types cancelled and there is surprise at the minimum buy inventory which can't be consumed by other projects. The common factor in all of these cases is often lack of visibility between the teams making demand forecasting decisions and those managing the inventory.

The GEM system allows customers or GEM program managers to create custom reports that track issues such as minimum buy liability or unique parts associated near end-of-life projects. That, combined with the visibility afforded customer engineering teams, ensures that excess inventory issues are identified in time to address contingency planning.

The system also makes it easy for the supply base to support excess inventory consumption. The company feels its relationship with suppliers is a two-way street. The network of independent distributors which may be used for procuring hard-to-find components also serves as a network for liquidating excess inventory.

Within the system, inventories are segregated by customer. A prefix on the front of the standard part number identifies the component as associated

with that particular customer within the ERP system. This provides clear visibility into component inventories by customer. If the prefix is removed, it also allows GEM to analyze available quantities of a specific component in relationship to total demand across all projects. Should a customer need to liquidate a component that is in demand by another customer, the inventory may be transferred. Should a customer need to liquidate a component that is not in demand by other customers, it is also easy to query the supply base to determine if there is external demand.

From a cost-reduction perspective, the end result is early identification of excess inventory issues and visibility into multiple options for liquidating the excess while it still has market value. Transaction costs are also reduced, as much of the data is visible through standard system queries.

**Inability to meet market demand**

Supporting variable market demand is another area where good information flow among customer, supply base and EMS provider is critical. Raw material availability is the gating factor in most schedule change feasibility analyses. A kanban system offers a way to 'buffer' against demand variations, but developing the right sized kanban can be a challenge. Kanban is actually supposed to be keyed off of 'observed demand' (a pull) rather than a forecasted demand. However, no one wants to hold the level of component inventory needed to make quick and economical response to a pure kanban signal a reality in a high-mix, mid-to-low volume manufacturing environment. At the same time, customers don't want to hear that there is not enough material in the



Figure 3. Good information flow is critical in accurately tracking order status and work flow in repair depot operations. In addition, data on key failure issues should be transmitted back to design and production teams for analysis.

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pipeline to support an increase in demand.

In GEM's system, the program manager works very closely with the customer to jointly determine kanban levels. The kanbans are usually sized based on a hybrid of historical demand, average demand and material and manufacturing lead-times, buffered by some bonded inventory of long lead-time components and safety-stock.

The system also provides suppliers with visibility into demand trends, allowing them to suggest options early as pattern change becomes noticeable. Customers seeing changing trends in their consumption demand have visibility into their inventory levels and can request program management assess availability of additional inventory within either the company's total inventory or the supply base if an increase is anticipated.

The end result is optimum kanban sizing and minimized 'reactive' transaction costs.



Figure 4. Custom reports that track issues such as minimum buy liability or unique parts associated near end-of-life projects, combined with the visibility afforded customer engineering teams, ensures that excess inventory issues are identified in time to address contingency planning.

### Quality issues

While most EMS providers have robust systems designed to ensure product quality, information regarding supplier performance and rejected material often isn't shared as fully as it should be.

The GEM system measures a number of key metrics including supplier performance and rejected material. It provides reports on these issues and other key metrics to suppliers and the company's program management team. If a particular supplier or component is performing poorly, the system provides fast visibility for program management to recommend corrective action. Should it become necessary to recommend a substitution, the system also provides the ability to look at component

substitution options not only in terms of specifications, but also in terms of supplier performance and availability.

Ultimately cost is reduced through early identification of potential quality or supplier performance issues, combined with the ability to rapidly analyze options and select the best choice for corrective action.

### Added logistics costs in repair depot support

Many mid-volume projects have needs for repair depot support. Logistics challenges often represent the greatest avoidable cost. Visibility into likely logistics cost drivers is critical to minimizing them. Points of information flow focus include:

- IT strategy relative to communications among the OEM, end market and third-party repair depot
- System for ensuring critical material availability and integrity
- Returns packaging and shipping strategy.

It is important to establish systems that eliminate the costs driven by inefficient communication relative to warranty eligibility or WIP status, damage caused in either inbound or outbound shipping, quality issues related to component inventory integrity, and unnecessary handling, customs or transportation cost. It is also important that third-party repair mechanisms are transparent to end customers and meet expected service cycle time requirements.

Minimization of handling cost is not limited to maintaining process efficiency. Poorly packaged returns or inappropriate handling can increase product damage and actual repair cost. Handling and storage processes are clearly defined based on product requirements. In most cases, field returns are shipped directly to and from the repair depot to minimize shipping and handling costs.

Implementation of mutually agreeable order tracking systems is also key in efficient repair depot operations. In the GEM system, OEMs determine whether they want to maintain internal customer service functions or outsource that function as well and simply monitor activity status reports. To reduce service delivery time, an inventory of refurbished product sufficient to meet historical demand trends may be maintained. In that case, refurbished product is shipped back to the market as damaged product comes in. The repaired product is then restocked in the refurbished inventory.

### Conclusion

Today's computer technology simplifies the data collection process. However, in the

complex world of outsourced manufacturing, collecting information is only part of the equation. It is important to design systems that collect needed data and output it in ways that enable monitoring of key metrics and processes by the EMS provider, supply base and customer. When information flow is optimized in this fashion, uncaptured transaction costs can be reduced by 10-20%. Measured costs related to inventory levels see even greater reduction.

### References

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