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# Ensuring Efficient Transfer of Work: Five Areas Your Contractor Should Focus On

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## Ensuring Efficient Transfer of Work: Five Areas Your Contractor Should Focus On

*By Curtis Campbell and Keith Wheaton*

Why do original electronics manufacturer (OEM) sourcing teams stay at a contract manufacturer whose performance isn't on par with their expectations? Typically, it is because transferring that project carries significant cost, both in terms of non-recurring transfer cost at the contractor and in terms of personnel time, travel cost and stress at the OEM. Projects that are not a fit for internal production often stay in place for similar reasons. Perhaps the biggest reason for keeping an inefficient project internally is because it is often difficult to fully document for transfer.

Must transfer of work always be controlled chaos? The short answer is no. However, the reality is that whether or not the transfer is smooth is often more a result of the contract manufacturer than the OEM. This is because efficient transfer of work is inherently a "pull" system. A contractor with a well-defined process for pulling the needed information and proactively identifying potential manufacturability or supply chain issues is going to be less costly in terms of time and cost surprises than a contractor that doesn't have a well-organized process in place.

What are the signs that you are selecting a contractor with the disciplines in place to support a smooth transfer of work? Here are five areas to analyze:

- Willingness to help you structure the most cost-effective solution
- Efficient pre-launch process
- Ability to fill the gaps
- Robust new product introduction (NPI) process
- Strong systems for supply chain management and production status monitoring.

### **Willingness to Help You Structure the Most Cost Effective Solution**

Labor regions evolve and cost structures change over time. Factors such as production volumes, labor content, product maturity and demand variations all influence total cost. One of the first "tests" of the likelihood of a smooth project launch is the willingness of contractor's team to listen to your team's concerns and requirements. This discussion should be followed by the team quoting the options that would make the best sense for the project. Considerations that should be discussed include:

- Where is the end ship point in relation to the build site?
- Is proximity to your product development team important?
- Is demand stable or highly variable?

- How frequently are engineering changes orders (ECOs) issued?
- What percentage of unit cost does labor content represent?
- What are the annual volumes likely to be in the first two years of the project?
- If there are precision engineered parts, does the proposed build site have regional suppliers capable of supporting preferred lots sizes, material specifications, existing tooling sizes and lead-times?
- Do key members of the build site team speak your team's preferred language?
- Is a program manager available to work in your time zone?
- Are there trade agreements or duties in the build site region that would reduce or add to product cost?
- Do any of your end markets have local content requirements that might make building in that country advantageous?
- Are there quality or regulatory considerations that would influence the choice of one build site over another?

A contractor that can quote multiple build site options can be an asset in helping your team make a choice that considers a wide range of issues that would otherwise represent cost surprises during transition. In one recent example, SigmaTron International worked with a decision team that was divided over whether the best build site was China or Mexico. After careful analysis and quoting of both sites it was determined that the most cost effective choice was to build product destined for sale to the domestic China market in China and to build product exported to the rest of the world in Tijuana.

When the team at a contractor understands benefits and tradeoffs of each build site choice well enough to have robust discussion about options it is a good indicator that they also understand the key issues that need to be addressed to ensure smooth project launch from those locations.

### **Efficient Pre-Launch Process**

The first step in ensuring a smooth product launch is defining the gaps between the information needed and the information provided. Questions to be addressed include:

- Is there any variance from quoted volumes and forecasted volumes?
- Have there been any changes in component lead-times?
- If contract prices or substitutions were added to the quote during price negotiations have the necessary approvals been completed to put them on order?
- Is the documentation revision correct?
- Have all quote assumptions been validated (consigned equipment, non-recurring engineering (NRE), special processes), etc.?

- If production is outside the U.S., are there any specialized requirements related to Customs processing, consigned equipment transport, etc. that need to be addressed?
- Who is responsible for insurance and maintenance on consigned equipment?
- Are there any parts of the production process that are not well documented?
- Are there any manufacturability or testability issues to be addressed?
- Is material going to be transferred with the project and, if so, have inspection and acceptance procedures been agreed upon?
- Are there any specialized product or process verification procedures that need to be followed during NPI?

The goal is to identify surprises before they become issues. SigmaTron International's team uses a gantt chart with timelines and personnel responsibilities to track the status of all action items. The benefit of a time-sensitive tracked process is that it gives both the contractor and OEM teams ample ability to review the list of activities and determine if anything is missing at the beginning of the process.

A program manager serves as the central point of contact for all project activities, and a dedicated program team is structured based on the project's requirements. Typically, program managers are resident in the manufacturing site where the project is built. In the case of multi-facility builds a single program manager may be designated to interface with teams at all facilities. The team's language, proximity and/or time zone preferences may also factor into program team structure.

In addition to helping to ensure an efficient project launch, the program manager works with the customer team to develop a mutually-agreeable forecasting methodology, schedules project status meetings and/or conference calls based on customer preferences, proactively resolves project issues and works to ensure that necessary resources are in place to achieve each customer's sourcing goals.

### **Ability to Fill the Gaps**

Transfer of work is a complex process that often has surprises, particularly if the project has never been outsourced or has been outsourced for such a long period that the existing contractor has become the manager of the documentation. To minimize these issues the contractor needs to be able to quickly identify gaps in the process and have the support resources available to address them.

For example, projects that have never been outsourced typically have documentation issues. It isn't unusual for internal production personnel to have institutional knowledge resident in one or two lead people or supervisors rather than captured in the product or process documentation. It may be small changes that weren't documented in an ECO or process steps that have small modifications based on production workers making undocumented improvements. The best time to analyze in-house production is before the project moves. Having a team from the contractor observe in-house production

helps ensure that all steps of the process are documented and that any small changes not reflected in product documentation are identified.

While that type of observation system won't work when projects are being transferred from a competing contract manufacturer, it is important to ensure that transferred documentation is compared to quote documents to determine whether or not there are any variances in revision levels.

### **Robust NPI Process**

The NPI process shouldn't simply be focused on rapidly launching projects. Instead, it should be designed to build a roadmap that helps eliminate inefficiency and enhance quality over the long term.

At SigmaTron, the process starts with the receipt of CAD files from the customer, along with a bill of materials (BOM) and approved vendor list (AVL). Design for manufacturability (DFM) reviews include a report with specific recommendations on any issues that should be addressed prior to production start. The report is color-coded to indicate the seriousness of the issue: red indicates a critical process assembly issue, yellow indicates a tooling issue, green indicates minor changes that would be nice to have and blue indicates that no change is required.

Customer BOMs for longer life products also undergo a lifecycle analysis at the quote stage. SigmaTron also uses an outside service to provide more detailed custom reviews, when agreed upon as an additional service. The analysis normally looks at the lifecycle stage of each component, how many years it has been production, the anticipated number of years to end-of-life, available alternate components and links to datasheets.

Design for testability is also evaluated. The analysis includes a look at test coverage and whether or not the correct soldermask openings are in place. The goal is to create a robust verification process with as much coverage as possible. At the same time, customer preferences for cost of test are also considered. SigmaTron provides a range of test options which include in-circuit test (ICT), flying probe, automated optical inspection (AOI) and automated x-ray inspection (AXI).

Other issues that can potentially impact production cost are also evaluated as the process flow is designed. For example, a product with mixed technology may be analyzed to determine if wave solder or selective solder is the most cost effective way to solder the through-hole parts. This focus on developing the most efficient process flow is particularly beneficial for highly regulated products where there may be limitations on process changes once the product is in production.

Once the process flow is approved, SigmaTron's use of leading edge software enables machine programming to be done using the CAD data. This cuts time and ensures accuracy.

Product and process validation is done based on customer requirements. Any issues discovered during NPI and pre-production runs are documented and provided to the customer. The goal is to eliminate defects by eliminating defect opportunities wherever possible.

### **Strong Systems for Production Status Monitoring and Supply Chain Management**

A strong systems approach also contributes to a smooth project transfer. The ability to review material and product status real-time minimizes the potential of a surprise issue to significantly impact production. The ability to automate basic supply chain transactions helps reduce hidden costs and the potential for a requirement going unaddressed.

SigmaTron combines Exact Macola ES ERP software with its internally-developed iScore suite of supply chain management tools, to track demand, material on order, inventory, work-in-process, finished goods and shipments. An MRP Share program provides suppliers with complete customer forecast visibility, plus current inventory and material on order. The iScore system supports vendor-managed inventory (VMI) and Production Driven Replenishment (PDR™) pull signals. Customers are given visibility into inventory status via the Score™ customer portal. SCORE's advantages include:

- The ability to track product through the manufacturing process with order, manufacturing and shipping status available 24/7
- Real-time data that lets customers see changes as they happen
- An order notes feature that lets project team members at both contractor and customer share project data
- Direct email links to the Program Manager
- All the details of shipped orders with a single click.

VMI is used, as needed, with component suppliers. It can also be used with customers wishing to consume transferred inventories before new material is phased in. PDR™ is triggered automatically when the iScore system checks inventory for shortages as shop orders are released. If a shortage is detected, a PDR™ pull signal is sent to the supplier and parts are received in 2-7 days.

An Automatic Replenishment System (ARS) is used for higher volume "C" items. The ARS brings these items in at regular intervals.

SigmaTron also has resources to address a growing challenge: regulatory reporting requirements. SigmaTron's Green Initiative Compliance Service Center is one example of ways that its materials organization is going the extra mile to ensure materials integrity and regulatory compliance. The center is located in Taipei, Taiwan and interfaces closely with component engineers and procurement professionals to gather necessary materials documentation from suppliers related to regulatory, social and environmental initiatives such as RoHS, RoHS II, REACH, Conflict Minerals and California's

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Proposition 65, as well as customer specific initiatives, and communicates with the rest of the Company's supply chain management organization.

Specialized software supports the operation by providing updates as monitored jurisdictions create new rules or modify existing rules. The tool can also be programmed to support customers who have specific lists of substances and materials that they want to track.

Smooth transfer of work is achievable when a contract manufacturer and OEM carefully explore options, potential issues and best corrective actions. Taking the time to understand the contractor's standard approach to project transfer, the competencies of the support team managing the transfer and the contractor's systems strength during the selection can help ensure that a contractor with the needed capabilities is chosen.

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