Choosing a Legacy Product Supplier:
Five Areas to Evaluate

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By Chris Eldred

A new or mature "production" volume project can be easy to outsource to a large number of electronics manufacturing services (EMS) providers with the systems to support mission critical products. Legacy products represent a far more unique class of sourcing. These are products near end-of-life that require infrequent production builds typically to support spares or replacement product demand. In some cases, production of these products is continued by the supplier that originally built the production volumes and there may even be synergy with newer product versions. However, in other situations these products become orphans on the production floor because they are out of alignment with the EMS provider's preferred volumes or manufacturing processes. In these cases, the EMS provider may incentivize customers to find another source for their legacy product production via price increases or long production lead-times.

TeligentEMS, an EMS provider headquartered in Havana, FL, routinely supports mission critical legacy products. This whitepaper looks at five areas it considers critical to supporting the needs of these projects and suggests specific questions to ask with auditing potential suppliers for this capability.

Overview

A key challenge in identifying suppliers that are a good fit for legacy products is that the legacy product demand model often best aligns with the EMS "job shop" model. The problem is most job shops lack the breadth of production capabilities and data collection infrastructure to support the needs of mission critical military and aerospace products. Conversely, while larger EMS providers may have the required support capabilities, the prospect of a product with small volumes built one or two times a year is simply not attractive to them. Ideally, the right supplier will be an EMS company that has some level of legacy business already in place, who is committed to growing that segment of its business.

Key elements to look for in evaluating those suppliers' ability to fully support legacy product include:

- Robust supply chain management and component engineering capabilities
- Counterfeit mitigation measures
- Well-defined production processes and documentation control
- Extensive and varied test expertise
- The ability to provide post-manufacturing support services.

Robust Supply Chain Management and Component Engineering Capabilities

Supply chain management is another area requiring careful audit in determining whether or an EMS provider has the expertise to support legacy products. Questions to ask include:

- What systems are in place to monitor for obsolescence issues?

- What options can the EMS provider suggest when a component goes EOL?
- Does the EMS provider have the capability to identify sources or make redesign recommendations when subassembly parts with critical footprint or brightness characteristics such as a display or alphanumeric keypad go EOL?
- Does the sourcing team have global procurement expertise capable of identifying new alternate suppliers or it is dependent on customer and distributor recommendations alone?
- How strong are the EMS provider's systems relative to traceability, device history recordkeeping and compliance?

TeligentEMS' supply chain management team utilizes a commodity management approach that ensures competitive costs, appropriate lot sizes and minimal lead-time on fabricated parts such as PCBs, custom cables, molded plastics, cast aluminum, custom extruded aluminum, fabricated sheet metal parts, custom magnetics, custom fasteners and enclosures. An International Procurement Office (IPO) is located in Asia to enhance its global procurement capabilities and expertise, for both custom fabricated parts and subassemblies such as keypads or displays.

The Company has developed proprietary software tools around its Epicor ERP system to provide better visibility in material availability, material on order and material in inventory. Initially a system known as Possible-X was created that acted as a simple "what if" tool designed to integrate with the ERP system and quickly assess material availability of specific parts in existing inventory. Over time, this simple tool has grown to a suite of tools accessing a central repository for information. The Possible-X suite of tools is now predominately focused on supporting real-time shop floor control and documentation control. A related proprietary system, known as TeligentEMS Purchase Order Tracking System or TPOTS, provides a dashboard designed to help buyers more easily track cost and order status with a direct interface with suppliers. TeligentEMS' sourcing and component engineering teams focus on identifying alternate parts early in each project and approved alternates are loaded in Possible-X. Should a supplier issue an EOL notice on part, the list of approved alternates is few keystrokes away. Possible-X also supports fast searches of where that part is used and available inventory on hand and on order.

The team also has strong relationships with franchised distribution and has a formalized, multi-tiered system of trusted non-franchised brokers capable of supporting requirements for EOL parts with limited availability. When a customer is willing to agree to the liability and cost of a lifetime buy, TeligentEMS will store that inventory on premises. The supply chain management team has also worked with component packaging companies capable of procuring EOL silicon from the original manufacturer and packaging it to the required standard. Additionally, if a situation warrants it, TeligentEMS can perform BGA de-balling and re-balling, XRF for Pb-detection, and non-destructive or destructive component test and analysis.

The team's suite of software tools provides the ability to automatically collect mandated compliance data related to RoHS, lot, certificates of compliance and Conflict Minerals, etc., as required by customers. Possible-X and TPOTS support tracking of material by work order, lot code and date code to ensure a full device history is kept on each product.

Counterfeit Mitigation Measures

Counterfeit mitigation is an important part of supporting legacy product. The DOD's Defense Acquisition Regulations System (DFARS) puts responsibility for counterfeit part mitigation with the prime contractor and some of that responsibility flows down to subcontractors. While procuring parts that can be traced from a franchised distributor to the original manufacturer is the simplest way to ensure compliance with DFARS, that isn't always possible when a long lifecycle part goes obsolete. From an audit standpoint it is important to understand whether or not the EMS provider has procedures that are compliant with AS5553 Counterfeit Electronic Parts: Avoidance, Detection, Mitigation and Disposition. Questions to ask include:

- Do you perform visual inspection of all incoming parts and what does that inspection include?
- What validation processes/tests do parts go through if they must be procured in the secondary market?
- Do you work with a specific network of trusted, thoroughly vetted non-franchised brokers or develop new relationships with each sourcing effort?
- Do you belong to industry counterfeit mitigation groups?

TeligentEMS recognizes the importance of ensuring material integrity. Possible-X integrates closely with the ERP system in receiving. The receiving inspection process has been designed to capture the bulk of the information required for both internal and customer requirements. Upon delivery each component is validated to the AVL. Any variance in labeling triggers additional inspection steps. Custom components and non-franchised brokers are automatically routed to go through additional inspection including Critical-to-Quality (CTQ) measurements. Following inspection, a bar code label with purchase order receipt information is generated for each package and an ERP transaction is executed. The label data includes key information such as moisture sensitivity level (MSL), RoHS status, etc. Certificates of compliance are also validated at that point and scanned into Possible-X. The system automatically flags parts needed to fill shortages to ensure they are expedited. Possible-X supports TeligentEMS' robust process for counterfeit prevention utilizing a design that conforms to AS5553. The Company also maintains membership in the Government-Industry Data Exchange Program (GIDEP), to ensure that process includes checks for identified trends and reporting in counterfeiting.

The Company's standard practice is to procure components directly from the AVL source, which is normally the component manufacturer or a franchised distributor. When an obsolescence issue drives a need to procure parts in the secondary market, the customer is notified for pre-approval and to establish the inspection/test parameters for that specific case. When the parts are located, a quote is prepared that covers costs for both the components and the required validation processes. Pricing is subject to market conditions and availability. TeligentEMS has a tiered network of trusted non-franchised brokers that fit into two categories:

- Tier 1 brokers have trusted sources, are AS5553 compliant and have internal capabilities to perform AS6171 compliant tests such as: external visual inspection, radiological inspection, X-ray fluorescence, remarking and resurfacing, de-lid/de-capsulation destructive physical analysis, electrical tests, acoustic microscopy and optical scanning electron microscope (SEM) inspection to test components.

- Tier 2 brokers also have trusted sources and are capable of rudimentary counterfeit mitigation testing such as detailed visual inspection, marking verification, laser etch verification and verifying bar codes.

TeligentEMS requires suppliers in both tiers to warranty the parts, so in the event production testing determined there was an undetected issue the supplier would bear the cost of replacement.

Well-Defined Production Processes and Documentation Control

As mentioned earlier, a key challenge with legacy products can be order frequency over time. From a production standpoint, these products often represent a batch process that may get built only one or two times a year. In many ways, these infrequent batch orders are like a new product introduction. The production team is heavily dependent on the quality of the production documentation and process definition each time a batch order is built. Consequently, it is important to understand how well potential suppliers manage configuration management and ensure process consistency on batch projects. Questions to ask include:

- How is configuration management ensured in products that are built infrequently?
- Is documentation digitized and centralized or stored as paper files?
- What checks and balances are in place to ensure process consistency?
- Are production capabilities in place to support the needs of legacy product?

As the central digital repository for information, Possible-X is the access point for all production documentation and links all related information. It tracks ECOs and deviations and links them to work orders so that as documentation is pulled to build a product, production associates access the correct revision.

Possible-X also contains a new production introduction (NPI) checklist and work instructions for each product. The checklist aligns with the Company's focus on Lean manufacturing since a standardized setup process helps minimize variability. This is particularly important with low volume and/or legacy builds as production on these products is typically infrequent and there may be little production floor "memory" of production setup.

Production associates utilize Possible-X's Production Dashboard, known as p-Dash. This tool is designed to help empower production associates by ensuring they have fast access to the information needed to do their jobs. Associates must log in using their id number. They utilize the system to clock in and out, plus access all documentation related to their jobs, which is typically displayed at workstation monitors.

p-Dash also facilitates movement of cross-trained associates among different work areas as demand varies, since documentation access is linked to work order, ensuring efficient use of labor resources in areas supporting batch production. This login access supports both intellectual property protection and ITAR compliance.

p-Dash also lets associates open support tickets which text a message to an engineer whenever a production issue arises that the associate needs help with. This helps ensure that issues that could impact product quality are corrected immediately.

In addition to its automated SMT capability, TeligentEMS has assisted placement machines for plated through-hole (PTH) parts. This helps ensure that legacy PTH product is assembled correctly and efficiently. The Company also has conformal coating, encapsulation, potting and bonding capabilities for product used in harsh environments.

Extensive and Varied Test Expertise

Legacy products generally require functional or in-circuit (parametric) testing. In some cases, this can be performed on consigned equipment or with equipment resident at the supplier. However, in other cases, a knowledgeable test engineering team may be required to develop programming or test fixtures to support products as obsolescence issues drive redesign. Questions to ask include:

- Does the EMS provider's existing test equipment support the product requirements?
- Is the test engineering team capable of developing any needed test equipment for the product?
- Does the EMS provider have any recommendations on optimizing the test strategy?

TeligentEMS offers a full complement of test services to meet the specific needs of each customer's program and can support test strategy development, programming and fixturing. Internal test capabilities include flying probe, in-circuit test, functional test and environmental stress screening capabilities. A wide range of specialized communication testing is also supported. Inspection capabilities include 3D paste inspection, automated optical inspection (AOI) and x-ray inspection.

Additionally, Possible-X includes a metrics menu that takes the visible factory into the 21st century. Monitors showing a real-time, color coded graphical interface indicating both defects per million opportunities (DPMO) and production status relative to production targets are placed throughout the production floor and also accessible to management. DPMO in the SMT area is measured in real time and the charts displayed on monitors show averages of the last hour, previous 24 hours and previous 7 days. The top ten identified defects are shown in a pareto diagram. A test data collection chart displays results from in-circuit test, functional, flying probe, RF, burn-in and hi-pot, making it easy to identify if any issues are developing in any test stage. Issues are addressed as they arise by the people closest to the issue. This can be particularly important if the issue is being driven by a component-related defect. That risk is higher in legacy products which may be using older lifetime buy inventory. As with all

Possible-X tools, it is possible to drill down to data related to specific work orders and serial numbers to determine the root cause of any identified issues.

Post-Manufacturing Support Services

Legacy product may also have needs for out-of-warranty repair depot, refurbishment or upgrades. Questions to ask include:

- What systems are in place to ensure configuration management?
- Is there sufficient technical expertise to troubleshoot products being returned from the field?
- Does the EMS provider have the necessary systems in place to maintain post-manufacturing device history records?

TeligentEMS provides a variety of post-manufacturing services including:

- Programming of internal ESN (electronic serial numbers)
- Capturing factory test data measurements to the ESN
- Internet access to both program status and quality reports
- Configure to Order (CTO)
- Laser etching capability to support serialization
- Provisioning of SIM cards
- Build to Order (BTO)
- Bar code label creation and tracking systems
- Low Cost Region Order fulfillment
- Product labeling, unit packaging, and over packaging
- Outbound logistics
- Depot repair
- Failure analysis
- Ship to end user locations worldwide.

Materials and all products manufactured at TeligentEMS are tracked material via bar codes, and Possible-X collects data on the processes each product undergoes along with inspection and test results. This ability to look up a detailed history on each product is helpful in repair depot activities, since the product's original revision level and revisions since it was assembled are contained in the database.

Assuming parts are available, TeligentEMS will commit to specific cycle times in repair depot activities.

The benefits of finding an EMS provider capable and interested in supporting standalone legacy product include superior quality, obsolescence mitigation, cost reduction over time and a broader range of options for re-purposing that legacy product in inventory or the field. Analysis of potential supplier

capabilities should look closely at engineering, supply chain management and systems expertise, in addition to manufacturing capabilities.

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About TeligentEMS

For more than 30 years, TeligentEMS has provided a full range of electronic manufacturing services to companies in the industrial, medical, military/aerospace, telecommunications and instrumentation industries. We specialize in technically complex printed circuit board assemblies, subassemblies and box build. Our superior RF expertise enables us to support a wide range of communication technologies. We are ITAR registered and ISO 9001 and ISO 13485 certified.

Our global procurement and supply chain capabilities, combined with our real-time systems for project status, quality data collection and device history recordkeeping ensure we offer customers a cost effective and highly responsive solution.