TeligentEMS

Mitigating Counterfeit Component Risk: Five Areas Your Contract Manufacturer Should Be Watching

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By Chris Eldred

Counterfeit electronic components pose significant risks. In the best case scenario, undetected counterfeit components may result in failures during production test. In the worst case scenario, undetected counterfeit parts could result in a failure in a mission critical system in the field. When production is outsourced, the contract manufacturer becomes the first line of defense in mitigating the risk of counterfeit components. Understanding a contract manufacturer's commitment to counterfeit component mitigation should be an important part of any supplier selection audit.

TeligentEMS, an EMS provider headquartered in Havana, FL, routinely builds mission critical products and has a robust counterfeit component risk mitigation system in place. This whitepaper looks at five areas it considers critical in its approach to mitigating this risk.

Overview

Counterfeit electronic components have been proliferating through the supply chain for over two decades. A paper by the Semiconductor Industry Association Anti-Counterfeiting Task Force titled, *Winning the Battle Against Counterfeit Semiconductor Products*, published in August 2013, highlighted four areas responsible for driving an increase in counterfeit components:

- Periods of high market demand for semiconductors that attracted counterfeiters to parts on allocation
- E-waste recycling rules that create an inventory of used parts
- Growth in e-commerce trading of excess electronic parts and the ability for counterfeiters to create websites that look legitimate and then disappear easily
- An increasing buyer focus on price and availability linked with purchasing through internet-based brokers or on-line exchanges offering the best price or immediate delivery.

On May 6, 2014, the Department of Defense (DoD) issued a final rule, Detection and Avoidance of Counterfeit Electronics Parts (DFARS Case 2012-D055) amending the DoD Defense Acquisition Regulations System (DFARS) that addressed contractor responsibilities relative to detecting and avoiding counterfeit or suspect counterfeit electronic parts in the defense supply chain. This final rule puts responsibility for counterfeit part mitigation with the prime contractor and some of that responsibility flows down to subcontractors. It also includes requirements for use of an approved counterfeit part detection and avoidance system and defines the entities that are authorized to produce a genuine item as the original manufacturer, current design activity or an authorized aftermarket manufacturer. The term trusted supplier was dropped in favor of the phrase, suppliers that meet applicable counterfeit avoidance and detection system criteria. That said, for simplicity in this paper, TeligentEMS' reference to "trusted suppliers" is defined as suppliers who are meeting the applicable counterfeit avoidance and detection criteria outlined in the final rule.

In a perfect world, parts would only be procured from one of the defined entities authorized to produce a genuine part. Unfortunately, with the long lifecycles common to many defense and aerospace products, parts critical to the product may become obsolete or have very limited availability. Given the regulatory issues described above, when outsourcing it is important to find a contract manufacturer who is capable of minimizing the need to use anything but genuine parts and has a robust process for mitigating counterfeit component risk should the product eventually require parts only available from the secondary market. TeligentEMS' processes focus on five key areas:

- Product lifecycle management (PLM) at project start to reduce the need for anything but genuine parts
- Supply chain management to develop trusted suppliers compatible with the DoD's definition
- Rigorous incoming inspection procedures to validate that parts are genuine
- A robust traceability system to ensure that parts usage is carefully tracked relative to product serial numbers
- Interaction with industry groups focused on counterfeit mitigation to gain better understanding of trends and best practices in counterfeit detection and avoidance.

PLM at Project Start

The more sole-sourced parts on a bill of materials (BOM), the higher the risk of availability issues associated with unanticipated supply chain interruptions or obsolescence risk. Taking a proactive approach to broadening the approved vendor list (AVL) from the start of the program helps ensure the widest availability of alternate options.

TeligentEMS performs initial BOM PLM analysis using industry-standard software. This analysis identifies eight lifecycle stages plus custom components. Best availability is normally found in parts classified as active that have entered full production. Parts classified as preliminary because they are not yet in production or parts nearing end-of-life (EOL) are flagged because of potential availability or obsolescence risks. Last time buy, obsolete and aftermarket parts are also identified, as are parts whose status is unconfirmed.

Additionally 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 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.

Supply Chain Management Focused on Developing Trusted Suppliers

TeligentEMS' supply chain management team has strong relationships with franchised distribution and a multi-tiered system of trusted non-franchised brokers capable of supporting requirements for EOL parts with limited availability.

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.

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.

Rigorous Incoming Inspection

The DFAR's final rule called for acceptable counterfeit avoidance and detection systems to include risk-based policies and procedures which address the following minimum criteria:

- Training of personnel;
- Inspection and testing of electronic parts, including the rapid determination of suspect counterfeit electronic parts;
- Processes to abolish counterfeit parts proliferation;

- Traceability of electronic parts to suppliers;
- Use of the original manufacturer or sources with the express written authority of the original manufacturer or current design activity;
- Reporting and quarantining of counterfeit and suspect electronic parts;
- Detection and avoidance systems;
- Flow down of counterfeit detection and avoidance requirements;
- Process for keeping continually informed of current counterfeiting information and trends;
- Processes for screening GIDEP reports and other credible sources of counterfeiting information; and
- Control of obsolete electronic parts.

TeligentEMS recognizes the importance of ensuring material integrity, both in terms of standard quality assurance policies and counterfeit risk mitigation. As mentioned earlier, its supply chain processes have included development of trusted suppliers in the secondary market capable of rigorously testing components. TeligentEMS' robust process for counterfeit prevention utilizes a design that conforms to AS5553 Counterfeit Electronic Parts: Avoidance, Detection, Mitigation and Disposition. Possible-X aligns with the requirements of AS5553 and 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.

Robust Traceability System

A contract manufacturer's traceability system helps perform two functions, beyond simple compliance to regulatory device history recordkeeping requirements. First, it makes it easy to identify and quarantine suspect counterfeit or defective parts should fallout in production test indicate a problem. Second, in the event a part-related defect is discovered in the field, it makes it possible to quickly identify the products that may be using parts that are either in the same production lot or were part of a lot of components procured in the secondary market.

In TeligentEMS' system, products and materials are bar coded. Possible-X and TPOTs support tracking of material by lot code and date code to ensure a full device history is kept on each product. Possible-X collects data on the processes each product undergoes along with inspection and test results.

Additionally, Possible-X includes a metrics menu that takes the visible factory into the 21st century. Defects per million opportunities (DPMO) is monitored in the SMT area in real time. Monitors showing a

real-time, color coded graphical interface indicating both DPMO and production status relative to production targets are placed throughout the production floor and also accessible to management. DPMO 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. 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.

The end result of this level of systems visibility is a second line of defense in detecting counterfeit components. Test failures of parts procured in the secondary market trigger additional testing on the component lot. The warranty provided by secondary market suppliers ensures that should these failures occur the supplier bears the cost of replacement.

Interaction with Industry Groups

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.

One benefit of combined industry, law enforcement and regulatory efforts to increase vigilance relative to counterfeit components has been a reduction in counterfeit component incidences. However, the market has been fairly stable from a demand standpoint during that time, which also decreases the incentives to counterfeit.

Selecting a contract manufacturer with strong systems for detection and mitigation of counterfeit component risk not only makes sense from a regulatory standpoint; it also helps ensure that superior quality continues to be built into mission critical products. The five-part approach utilized by TeligentEMS helps minimize the need for procurement through secondary sources, which is always the best option. And, if secondary sources must be used, includes several sets of checks and balances from the supplier through production to minimize the possibility of counterfeit part use.

Chris Eldred is TeligentEMS' President and CEO. He can be reached via sales@teligentems.com.

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.