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Counterfeit Electronic Components: Understanding the Risk

You may have heard talk in the news lately regarding counterfeit electronic components making it into the US military supply chain. The U.S. Senate Armed Services Committee (SASC) recently reported in the Counterfeit Electronic Parts in the Defense Department Supply Chain hearing held on November 17, 2011, 1,800 cases of suspected counterfeit components that went into more than 1 million individual products. If you consider this number for the military, we can only imagine the number of counterfeits in our commercial yet high reliability products, such as life support or other critical systems. If you are the person within your electronics-based company who must perform risk analyses, counterfeiting is not a new concern, yet many do not realize just how good counterfeiters have become at their "trade".

When it comes to assessing the risk related to counterfeit electronic components, you must first assess the percentage of non-OCM (Original Component Manufactured) parts you purchase; this is where the danger lies. Secondly, if you are purchasing these "brokered parts", you must decide if field failure returns will endanger lives, tarnish your company's reputation and cost you significantly in warranty repairs. The third step is to calculate the cost versus the risk. To screen a typical lot of parts (<200 components) will cost between $800 to $2,000 depending if the failure is found visually or requires destructive analysis. If you determine you must take action, Trace personnel are available to you to help you establish the plan that is right for you, and the initial consultation is free.

Yes	No	Risk Assessment
☐	☐	**Does your company buy any electronic components from brokers (i.e. non-OCMs (Original Component Manufacturers))?** If yes, you are at risk for passing subpar product to your customers.
☐	☐	**Will field failure returns put lives in danger, tarnish your reputation and cost you a significant amount of money in warranty repairs?** If yes, you should screen brokered components to confirm authenticity.
☐	☐	**Can you afford to complete this screening procedure?** Full screening may be completed after parts are mailed from the broker and before they arrive at your production facility for a cost of $1500-$2000 for an average lot size. Approximately seventy-five percent of failures are visual failures with a significantly lower cost of $800 per lot. With an appropriately trained staff, the visual screening procedure may be brought in-house.

Please read attached article for specific details on the lucrative business of component counterfeiting and how you can avoid being a victim.

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Counterfeit Electronic Component Risk Mitigation

By John M. Radman, Renee J. Michalkiewicz and Daniel D. Phillips, Trace Laboratories, Inc.

Overview

A worldwide epidemic of counterfeit electronic components is flooding the market and affects the supply chains of all industries. It is estimated that the financial loss due to counterfeit components is well over $10 billion per year. According to Thomas Hallin, an intellectual property attorney at Greensfelder, Hemker & Gale, P.C., in Chicago and former chief litigation counsel in the IP (Intellectual Property) Practice Group at Ford Motor Company, "The multi-billion-dollar counterfeit industry, particularly in China, is costing the U.S. auto industry billions of dollars in annual sales and precluding the employment of hundreds of thousands of workers because of lost business." Hallin also added that the counterfeit parts problem also raises important safety issues.[1] With regard to high end electronics specifically, "the Alliance for Gray Market and Counterfeit Abatement (AGMA) estimates one out of every 10 IT (Information Technology) products are counterfeit or contain partial counterfeit parts."[2] Counterfeiting itself becomes profitable when scrapped components, components from recycled products, or inexpensive components can be "remarked" and sold as a new, more expensive, higher reliability version. Much of the effort today has not been placed on preventing counterfeiting but rather screening components to identify and remove counterfeits before they are used in a finished product.

As with any counterfeiting, be it money, designer clothing, or electronic components, there is a battle between the counterfeiter and the industry affected. Each tries to better their ability to either fool or recognize the other. Counterfeit components entered the marketplace and the electronics industry countered by adapting a variety of existing test methods to help screen components for authenticity. These methods have proven effective in detecting fakes before they enter the product stream and have become the conventional techniques used in the war on counterfeiting. They are becoming more and more familiar to engineers and purchasing agents and are often added to purchasing documents to insure the authenticity of incoming supplies. Unfortunately, these techniques and their limitations are also becoming more familiar to the counterfeiters themselves. With this knowledge, counterfeiters are able to improve their craft and utilize materials and processes that can allow a fake component to evade detection.

Because counterfeiting is so lucrative, counterfeiters are motivated to keep improving the techniques that will allow them to stay in business. The onus has now fallen back on the electronics industry to improve its techniques to detect this "next generation" of counterfeit components. In addition to the use of conventional screening techniques, a variety of unconventional techniques is being explored to stay ahead of the counterfeiters.

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Photo 1: Double marking evident on part on left

Reasons for Proliferation of Counterfeiting

The motivation behind counterfeiting electronic components is the same as any other counterfeiting operation – profitability. There are millions of dollars to be made with, currently, little risk to the criminal.

The origins of these counterfeit parts are now well known and they truly represent a situation in which we are reaping what we have sown. The U.S. was aware that electronic waste contained a multitude of hazardous substances but remained unwilling to restrict the use of these substances, deciding instead that it would be advantageous to sell and export our waste for disposal in poorer countries, who were more concerned with money than pollution. However, before this waste made it to the landfill, it passed through the hands of entrepreneurs who removed anything they could potentially use. The used and potentially inoperable electronic components that these individuals removed were refurbished and/or relabeled and resold back to the U.S. as new parts. Today's counterfeiting operations have grown from a simple cottage industry to complex operations run by organized crime that produce highly realistic-looking parts.

Findings Based Upon US Department of Commerce Report

In a report issued in January of 2010, the Office of Technology Evaluation (OTE) summarizes the state of US counterfeit electronics concerns.

- "all elements of the supply chain have been directly impacted by counterfeit electronics;
- there is a lack of dialogue between all organizations in the U.S. supply chain;
- companies and organizations assume that others in the supply chain are testing parts;
- lack of traceability in the supply chain is commonplace;
- there is an insufficient chain of accountability within organizations;
- recordkeeping on counterfeit incidents by organizations is very limited;

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- most organizations do not know who to contact in the U.S. Government regarding
- counterfeit parts;
- stricter testing protocols and quality control practices for inventories are required; and
- most DOD (Department of Defense) organizations do not have policies in place to prevent counterfeit parts from infiltrating their supply chain."[3]

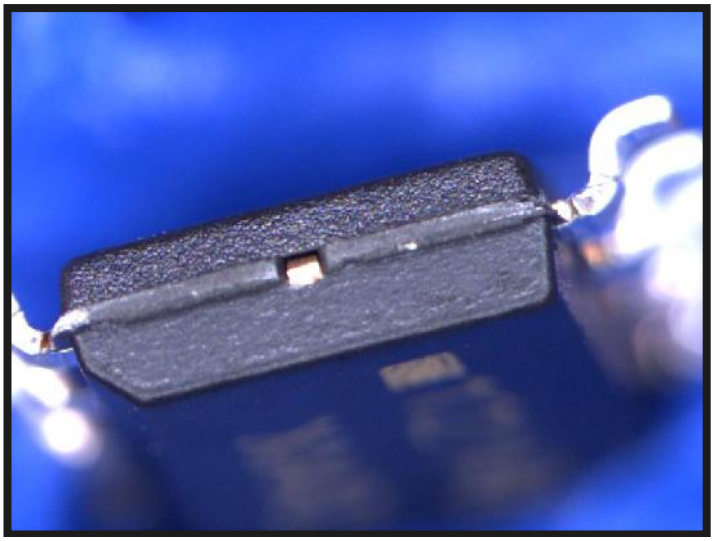

Photo 2: Texture differences evident between top and bottom due to "blacktopping"

So why does it seems that so little is done to deter counterfeiting?
Well, a variety of reasons act together in preventing an organized attack against counterfeiting. First, many counterfeits, particularly those that operate like the original, though typically not of the same quality, often go undetected and are installed into the finished product. When a counterfeit is suspected, it is frequently difficult to confirm as the inspectors typically do not know all the subtleties of the authentic part. Compounding the problem, Original Component Manufacturers (OCMs) are often unwilling to aid in the identification of suspect parts purchased outside of their approved distributors. They, rightfully, want to sell current products or products through approved sources and do not want to encourage the use of unauthorized vendors.

Second, even if a counterfeit is detected, there is not one central clearinghouse for this information. Thus, when a counterfeit is detected, companies typically just refuse to pay for them and discard them. There are several organizations, such as ERAI, that compile counterfeit information but the sources are only their member companies. Thus, there are likely far more counterfeits being detected than being reported throughout the industry.

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Third, there is a stigma associated with possessing counterfeits. Companies which originally reported that they had discovered counterfeit parts on incoming inspection were quickly criticized by media outlets, and associated with counterfeit components. A tarnished reputation was immediately felt by the mere association with counterfeit parts even though these companies may have been more diligent than their competitors in preventing counterfeit parts from entering their finished product. A fear of reporting counterfeit detection developed, and if the crime is not reported, there is little that can be done to prevent it.

Fourth, the law enforcement and government agencies involved in counterfeit prevention have limited resources. There are numerous organizations that have agents and individuals investigating and developing plans to deal with counterfeit electronic components; the FBI, ICE, IRS, Defense Criminal Investigative Service (DCIS), Naval Criminal Investigative Service (NCIS), DOD, NASA, Government Accountability Office (GAO), and many others are all aware of the problem. However, in regard to the main investigative agencies, the FBI and ICE, the electronic community does not lobby for action as the apparel, jewelry, pharmaceutical, music, and film industries do. Virtually all of the investigative resources go towards industries other than electronics.[4] This may soon change. "The Senate on Tuesday approved an amendment by the bipartisan leadership of the Senate Armed Services Committee to strengthen protections against a flood of counterfeit electronic parts coming into the defense supply system. Sens. Carl Levin, D-Mich., and John McCain, R-Ariz., the chairman and ranking member of the committee, offered the legislation as an amendment to the National Defense Authorization Act for Fiscal Year 2012. The legislation is a response to a committee investigation that found more than 1,800 instances of counterfeit electronic parts in the defense supply chain. It now becomes part of the authorization act, which is being debated on the Senate floor."[5]

All these reasons conspire against a concerted effort to prevent counterfeiting and keep the exact monetary losses unknown. So, instead of focusing on prevention, the companies within the electronics industry currently, individually, focus on finding and eliminating counterfeits on a case-by-case basis. This is costly and inefficient. Thus, the need for screening techniques developed.

Mitigating the Risk
So can you afford to keep the blinders on? What are the costs?

- Costs to replace failed parts
- Lost sales
- Lost brand value or damage to business image[6]
- Safety concerns

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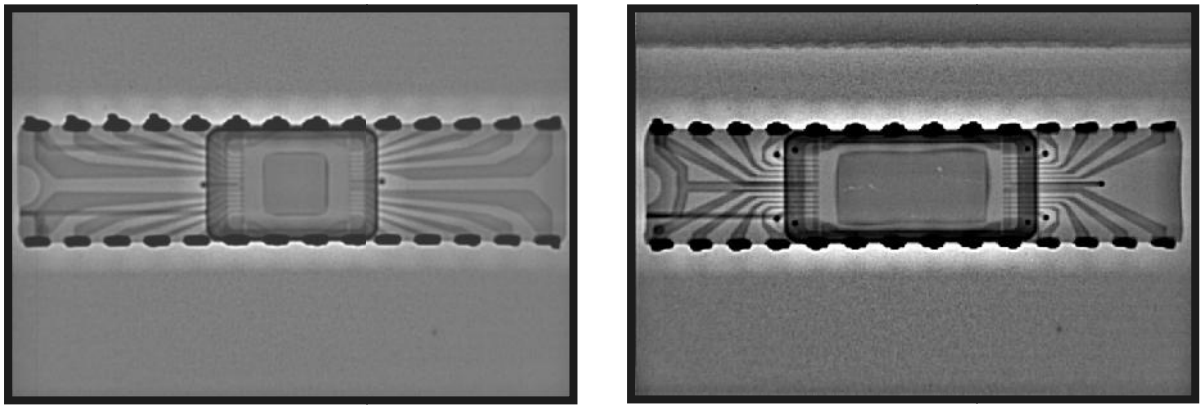

Photo 3: Lead Frame and die shape differences on components submitted as single lot

As reported by the US Department of Commerce, the following steps should be taken to minimize the risk of counterfeit component infiltration into the electronics market:

- "provide clear, written guidance to personnel on part procurement, testing, and inventory management;
- implement procedures for detecting and reporting suspect electronic components;
- purchase parts directly from OCMs and/or their authorized suppliers when possible, or require part traceability when purchasing from independent distributors and brokers;
- establish a list of trusted suppliers – which can include OCMs, authorized suppliers, independent distributors, and brokers – to enable informed procurement and develop an
- untrusted supplier list to document questionable sources;
- utilize third-party escrow services to hold payment during part testing;
- adopt realistic schedules for procuring electronic components;
- modify contract requirements with suppliers to require improved notices of termination of the manufacture of electronic components and of final life-time part purchase opportunities;
- ensure physical destruction of all defective, damaged, and substandard parts;
- expand use of authentication technologies by part manufacturers and/or their distributors;
- screen and test parts to assure authenticity prior to placing components in inventory, including returns and buy backs;
- strengthen part testing protocols to conform to the latest industry standards;
- verify the integrity of test results provided by contract testing houses;
- perform site audits of supplier parts inventory and quality processes where practical;
- maintain an internal database of suspected and confirmed counterfeit parts; and report all suspect and confirmed counterfeit components to federal authorities and industry associations."[7]

Trace Laboratories is available to help you begin a counterfeit detection program. The program can be as simple or as complex as you require; you determine the acceptable risk.

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