

CONVERGE®

A Converge White Paper

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Protecting the Supply Chain

- Why Quality Matters
- Spectrum of Challenges
- Quality Management Programs
- Protecting the Supply Chain

Unexpected Changes.
Reliable Results.

Quality Management Matters in the World of Electronic Component Distribution

There is a growing trend in the global electronic component trade that no one likes to talk about. Several years ago, you might have even heard the words spoken in a whisper: *counterfeit and substandard parts*. Yet, as the prevalence of electronic counterfeiting continues to grow, it has become impossible to ignore the problem.

Counterfeiting is big business. In 2007, the U.S. Department of Homeland Security reported seizing nearly \$200 million in counterfeit goods of all types, with consumer electronics, computers, hardware and “all other commodities” accounting for 20 percent of that total. And according to a U.S. Commerce Department report released in January 2010, the number of known counterfeit electronic products more than doubled from 2005 to 2008 in the defense industry alone. The most shocking cases typically make national headlines.

In November 2010, a Florida woman pleaded guilty to charges that she helped her employer sell counterfeit computer chips for use by the U.S. military. According to a report in *Computerworld*¹, prosecutors say that the woman’s employer did nearly \$16 million in business over a three-year period, doctoring and then selling counterfeit integrated circuits imported from Hong Kong and China. The fake chips were sold to many companies, often destined for use in sensitive areas such as missile programs, radiation detectors and nonmilitary systems such as high-speed trains, the Department of Justice said in court filings. Many of the chips were used in situations where a system failure would be disastrous.

This case, and others like it, illustrates the need for a world-class Quality Management Program in any company dealing with the buying and selling of electronic components, especially in the open market.

Broad Spectrum of Quality Challenges

Quality issues in electronic components fall into two main categories: counterfeit parts and substandard parts. Any electronic component that is fraudulently represented when sold is considered to be counterfeit. It may be a working part, but not the right working part. Or it may be older than



Table 1

Different Types of Counterfeit Parts

- Components with original component manufacturer (OCM) markings that were stolen and are being sold without testing.
- Dummy components with no die or wires inside, but marked as authentic.
- Scrap stolen from the manufacturer, but marked as good product and sold at the normal price.
- Rebranded parts from a low-quality manufacturer marked with the logo of a high-quality manufacturer and sold at a premium price.
- Recycled component sold as new.
- Blacktopped and remarked integrated circuit (IC) with a:
 - Newer date code;
 - Bogus part number;
 - Commercial part remarked as updated or upscreened without any assessment or testing
 - Recycled, reclaimed, pulled or salvaged part marked as new.
- Obsolete product pulled from stock of old boards and sold as new.

Zulueta, Philip. “Counteracting the Threat of Counterfeit Components.” Assurance Technology Program Office (ATPO) Newsletter. NASA/Caltech Jet Propulsion Laboratory (JPL), Issue 4, Oct. 2007.

it is represented to be. It may be the right type of part, but originally manufactured by a lesser-quality brand than the logo it bears. Or the part may be completely fake.

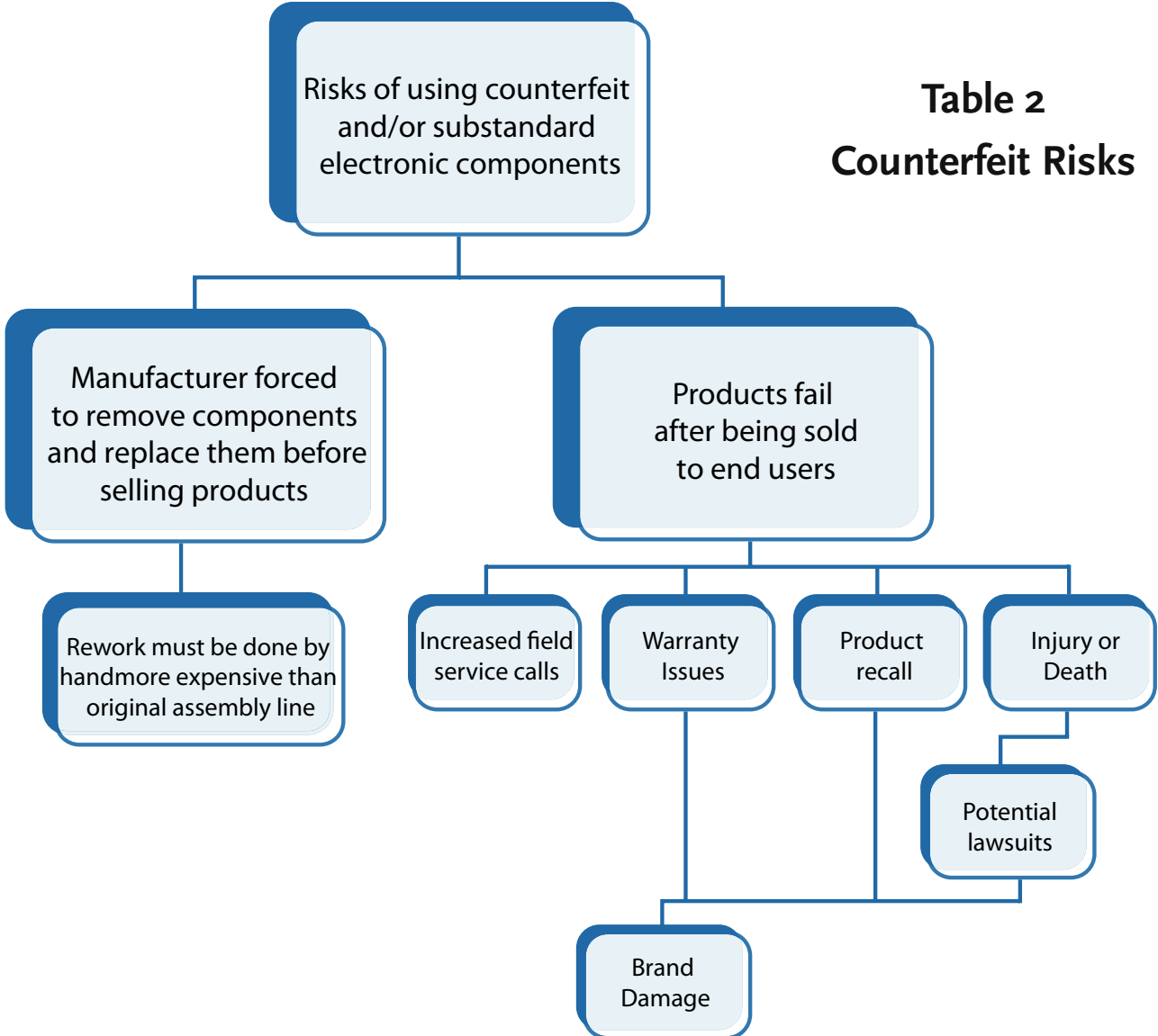
(See Table 1 for a more complete list of counterfeit possibilities.) According to *militaryaerospace.com*², all potential counterfeiters have to do is determine which parts are in the highest demand, get their hands on one of these particular parts, and copy the packaging, pin outs and manufacturer's markings. Unless the distributor makes serious efforts to screen and rescreen parts, these counterfeits can easily make their way into the marketplace.

Substandard electronic components are parts that fail to pass a distributor's quality inspections, but not necessarily because there was fraudulent intent. These parts were



- Risks**
- Product failures
 - Expensive rework
 - Service calls
 - Warranty issues

**Table 2
Counterfeit Risks**



likely either mishandled or damaged during the shipping process. Types of damage can include physical damage (lead bend, scratches, chipped edges, etc.), electrostatic damage and moisture damage. There is a chance that substandard parts may work in certain situations. They may work just long enough to make it out of the distributor's warehouse and into the consumer product. This is another reason why it is extremely important to have a trusted open-market distributor with a thorough inspection process to ensure that such parts are weeded out.

If counterfeit or substandard parts do find their way to an ODM (original design manufacturer), the results can be both expensive for the manufacturer and dangerous for the end user. (See Table 2.)

Even if the counterfeit or substandard parts are discovered at the ODM level and never make it into the consumer market, there can still be significant costs for the manufacturer. There are no automated component removal systems. Rework has to be done by hand, which is much more expensive than putting quality parts through the automated assembly line process to begin with. Therefore, it is in the best interest of the original design manufacturer to be sure that it is buying quality electronic components in the first place, even if it means spending a little more money to procure them.

What Does a World-Class Quality Management Program Include?

A world-class Quality Management Program begins with a high level of quality control and inspection programs designed to ensure that the right products and services are delivered accurately for each and every customer engagement.

Key components of a Quality Management Program include:

Strict vendor management - A trustworthy ECD (electronic component distributor) will research and prequalify its vendors to ensure that product is procured from only safe and reputable sources. This is not always easy to do in the open market. If a vendor passes initial background checks, it should be given only "cautionary" approval status until it has been proven to be a trusted supplier.



Quality

- Vendor Management
- Inspection Process
- Training

Once a supplier is added to an "approved vendor list," it should be continually monitored. Smart ECDs will periodically requalify each supplier based upon set criteria, including product quality history, performance and service fulfillment. Known counterfeiters and other vendors with a poor service history should be placed on a "do not call" list, preventing the ECD's buyers from doing any future business with them.

Rigorous quality inspection process - Quality inspection is an essential function in the quality management process to ensure that all counterfeit and substandard components are stopped before going on to design manufacturers. Best practice among distributors is a zero-tolerance policy for discrepancies of any kind. Each component should go through a series of rigorous quality inspections so that discrepancies can be detected, as follows:

Visual Inspection - Visual inspection and authenticity verification should be conducted on all incoming materials. A thorough visual inspection review will include:

- Manufacturer part number, quantity and date code verification
- Body marking inspection (faded marking, broken text, double print, ink stamps, etc.)
- Physical condition inspection (lead bend, scratches, chipped edges, etc.)
- Taping condition inspection (dented packet, missing parts, etc.)



- Moisture barrier protection verification (vacuum sealed, humidity indicator within specifications)
- Original factory-sealed components vs. non-factory-sealed
- Any visual irregularities

Engineering Review - Materials identified as questionable during the visual inspection process should be reevaluated by engineers. A thorough engineering review will include:

- Visual inspection finding review
- Reference and update of counterfeit databases
- Label verification (bar code and label review)
- Manufacturer logo and date log verification
- Reference of ERAI (Electronic Resellers Association International) counterfeit alert program

Additional Verification and Testing* -There are times when a final level of review or product testing may be required to ensure that any questionable materials meet manufacturers' specifications. Depending on the questionable issues, thorough additional testing may include:

Solderability test –done to ensure that parts will not have solderability issues in the manufacturing process

X-ray test – determines simple structural elements of the component, such as die presence and bond wire presence/location

Decapsulation test – removes a small cutout or top portion of the device through a chemical process, in order to analyze the actual die structure of the component under a special microscope

Surface contamination analysis – checks for the presence of contaminants that can cause untimely corrosion

**It should be noted that very few independent distributors actually have the ability to perform the in-depth tests listed above or are willing to make the investment to outsource these services. When you find a distributor that does take that extra step, consider it to be indicative of the company's commitment to providing 100% quality components.*

Continual training programs

Electronic component distributors should be committed to the continuous improvement of their quality processes. Continual training should be provided to all inspectors, keeping them up to date with the latest manufacturing trends, industry best practices and counterfeiting techniques. The best independent distributors also employ full-time component quality engineers who are certified to IDEA (Independent Distributors of Electronics Association) standards. These highly trained inspectors are experts at identifying potential quality issues and suspect parts.

Spot quality control testing - Every electronic component distributor should be improving its quality control processes through periodic internal audits and continual product testing. Distributors have to be "on top of their game." The counterfeiters continue to develop more sophisticated ways of covering up their counterfeiting techniques, so distributors need to keep finding new ways of detecting them.

Certifications and affiliations - Industry affiliations and certifications can give electronic component buyers some level of confidence that a distributor is adhering to strict quality standards and is working with organizations dedicated to improving supply chain quality and security. Meaningful certifications and affiliations include ISO 9001, ISO 14001, OHSAS 18001, ESD S20.20 and C-TPAT.

The IDEA is considered to be the electronic component industry watchdog. The association's charter is to improve the quality of products and services through a quality certification program, educational seminars and conferences, as well as to promote the study, development and implementation of techniques and methods designed to improve the business of independent distributors. IDEA member businesses typically follow internal quality processes that exceed industry best practices.

The Supply Chain Must Be Protected

Independent electronic component distributors offer critical solutions in a complex, fast-moving supply chain – purchasing excess inventory, responding to shortages, balancing demand and bringing flexibility to the marketplace. Neither OEMs nor ODMs could function without them. Yet, by serving in the role of “middleman,” the distributor takes on the additional job of protecting manufacturers by stopping counterfeit and substandard parts before they make it into the supply chain and, eventually, into the hands of consumers. If you are dealing with a distributor that does not have a rigorous Quality Management Program, you are putting your company's reputation on the line with every transaction.

When choosing an independent electronic component distributor, be sure to choose one with a world-class Quality Management Program. And ask to see the details. Anyone can procure a part. Only quality-driven distributors can guarantee parts that protect their customers and the manufacturers that they represent.



About Converge

Converge, a wholly owned subsidiary of Arrow Electronics, is the premier global supply chain partner for technology-driven companies. We provide solutions that increase your bottom line and reduce your risk in electronic components distribution.



¹McMillan, Robert. "Woman Admits Aiding Firm in Selling Fake Chips to U.S. Military." Computerworld. 23 Nov. 2010. Web, 30 Nov. 2010. <http://www.computerworld.com/s/article/print/9197758/Woman_admits_aiding_firm_in_selling_fake_chips_to_U.S._military>.

²Keller, John. "The Scourge of High Tech – Military & Aerospace Electronics." Military & Aerospace Electronics – Military Electronic Technology, Aerospace, Avionics News. 1 July 2007. Web, 8 Dec. 2010. <<http://www.militaryaerospace.com/index/display/article-display/298418/articles/military-aerospace-electronics/volume-18/issue-7/news/trends/the-scourge-of-high-tech.html>>.