Counterfeit Parts Control Plan Implementation

Supply Chain 2010
4th Annual NASA Supply Chain Quality Assurance Conference
October 21st, 2010
Introduction

• Standards for Counterfeit Part Control Plan Development, which one is right for you?
  - Overview of AS5553
  - Overview of AS6081

• Creating a Counterfeit Parts Working Group

• Creating a Test Plan

• Considerations for Implementation/Execution

• Backup
  - Resources
  - Building a Business Case
Counterfeit Definition

SAE Aerospace, AS5553 Definition (First Revision)

3.2 Counterfeit Part
A suspect part that is a copy or substitute whose material, performance, or characteristics are knowingly misrepresented by the supplier. Examples limited to:

- a. Parts which do not contain the parts of the manufacturer, wire bonding, or other similar process.
- b. Parts which have been represented as new products.
- c. Parts which have different materials or characteristics from the ordered parts.
- d. Parts which have not successfully completed the production and test flow, but are represented as complete product.
- e. Parts sold as up-screened parts, which have not successfully completed up-screening.
- f. Parts sold with modified labeling or markings intended to misrepresent the part’s form, fit, function, or grade.

Parts which are not generally considered counterfeit are those whose characteristics or specifications have been modified, but not knowingly misrepresented, such as reconditioned, up-screened, or uprated parts.
1. Buyers
   AS5553

2. Distributors
   AS6081

3. Test Laboratories
   ASxxxx

G-19 Supplier Certification Standards
SAE G-19 Document Roadmap, September 2010

G-19 Committee Oversight

Accreditation Body (ASxxxx Based in ISO 17021)

Accreditation Body (ASxxxx Based in ISO 17025)

Auditor Competency (ASxxxx)

Certification Bodies

<table>
<thead>
<tr>
<th>DISTRIBUTOR</th>
<th>USER</th>
<th>TEST PROVIDER</th>
</tr>
</thead>
<tbody>
<tr>
<td>ARPXXX1, Distributor Counterfeit Avoidance Process Rating (Draft in progress) (Dan DiMase &amp; Fred Schipp, Subcommittee Co-Chairmen)</td>
<td>AS5553, Counterfeit Electronic Parts; Avoidance, Detection, Mitigation, and Disposition (Revision A in progress) (Sarah Skinner, Convener, International Subcommittee)</td>
<td>ASXXX3, Counterfeit Electronic Parts Avoidance - Test Providers (Proposal in review) (Dan DiMase &amp; Sultan Lilani, Subcommittee Co-Chairmen)</td>
</tr>
<tr>
<td>AS6081, Counterfeit Electronic Parts Avoidance – Distributors (Draft in review) (Phil Zulueta, SAE G-19 Chairman)</td>
<td>ASXXX2 or ARPXXX2, AS5553 Compliance Standard or Guide (includes Audit Checklist) (Bill Scofield, Subcommittee Chairman)</td>
<td>ASXXX3 Compliance Standard or Guide (includes Audit Checklist)</td>
</tr>
<tr>
<td>AS6081 Compliance Standard or Guide (includes Audit Checklist) (Bill Scofield, Subcommittee Chairman)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

SAE G-19 Document Roadmap includes:
- Accreditation Body (ASxxxx Based in ISO 17021)
- Accreditation Body (ASxxxx Based in ISO 17025)
- Auditor Competency (ASxxxx)
- Certification Bodies
- Distributor Counterfeit Avoidance Process Rating (ARPXXX1, in progress)
- Counterfeit Electronic Parts Avoidance, Detection, Mitigation, and Disposition (AS5553, Revision A)
- Distributor Counterfeit Avoidance Process Rating Workbook (AS6081, in progress)
- Distributor Counterfeit Avoidance Process Rating Compliance Standard or Guide (AS6081, includes Audit Checklist)
- Counterfeit Electronic Parts Avoidance – Test Providers (ASXXX3, Proposal in review)
- Counterfeit Electronic Parts Avoidance – Test Providers Compliance Standard or Guide (ASXXX3, includes Audit Checklist)
SAE AS5553 Requirements

Counterfeit Parts Control Plan

Parts Availability

Verification of Purchased Product

Purchasing

Reporting

Purchasing Information

Material Control

Appendixes for Guidance

In Process Investigation
Counterfeit Parts Control Plan:

The organization **shall develop and implement a counterfeit electronic parts control plan** that documents its processes used for risk mitigation, disposition, and reporting of counterfeit parts...

4.1 Counterfeit Electronic Parts Control Plan

The organization shall develop and implement a counterfeit electronic parts control plan that documents its processes used for risk mitigation, disposition, and reporting of counterfeit parts. The control plan shall include the processes specified in 4.1.1 through 4.1.7 below.

4.1.1 Parts Availability

The processes shall maximize availability of authentic, originally designed and/or qualified parts throughout the product's life cycle, including management of parts obsolescence. Information and guidance for ensuring parts availability is provided in Appendix A, Parts Availability.
Counterfeit Parts Control Plan: Parts Availability

The process shall maximize availability of authentic, originally designed ... parts throughout the product's life cycle, including management of part obsolescence...

Requirements
Counterfeit Parts Control Plan: Purchasing Process

Source of Supply
- Determine risk of receiving counterfeit part...
- Actions may include surveys, audits, review...
- Specify a preference to procure directly from OCMs...

Approved Suppliers
- Maintain a register of approved suppliers
- Guidance on source selection and approval process
- Assure sources of supply are maintaining processes for counterfeit risk mitigation

Risk Mitigation
- Mitigate the risks of procuring counterfeit parts from sources other than OCMs...
- Specify supply chain traceability to the OCM...
- Specify flow down of applicable requirements to contractors and sub-contractors...

Requirements
Counterfeit Parts Control Plan: Purchasing Information & Verification

4.1.3 Purchasing Information

The documented process shall specify contract/purchase order quality requirements and clauses are provided in Appendix B Requirements.

4.1.4 Verification of Purchased Product

The documented process shall assure detection of counterfeit parts prior to formal product acceptance. The selection of methods shall be commensurate with product risk. Examples of methods include: visual inspection, measurement, X-ray, destructive physical testing, and other tests, as determined by the准时 sceptica of the vendor during product assurance.

“…This documented process shall specify contract/purchase order quality requirements…”

“…The documented process shall assure detection of counterfeit parts prior to formal product acceptance…”

Requirements
Counterfeit Parts Control Plan:

**In Process Investigation**

Shall address the detection, verification, and control of ... counterfeit parts.

**Material Control**

| Shall control ... nonconforming parts from entering supply chain | Shall control counterfeit parts to preclude their use ... |

**Reporting**

Shall assure that all occurrences of counterfeit parts are reported...
Example Procurement Clause

D.3.1 Test and Inspection Requirements

“The seller shall establish and implement test and inspection activities necessary to assure the authenticity of purchased products.

-Traceability and documentation verification,
-Visual examination
-[see Appendix E of this Aerospace Standard test and inspection activities]

Tests and inspections shall be performed in accordance with clearly delineated accept/reject criteria provided or approved by <BUYER>. The seller shall prepare and provide to the <BUYER> records evidencing tests and inspections performed and conformance of the product to specified acceptance criteria.

Tests and inspections shall be performed by persons that have been trained and qualified concerning types and means of electronic parts counterfeiting and how to conduct effective product authentication.”
QMS & Counterfeit Parts Control Plan:

…The organization shall **develop and implement a quality management system** (e.g., ISO 9001, SAE AS9120 …)

… The organization **shall develop and implement a counterfeit electronic parts control plan** that documents its processes used for risk mitigation, disposition, and reporting of counterfeit parts…
Counterfeit Parts Control Plan:
Purchasing Information & Supply Chain Traceability

4.2.1.2 Purchasing Information

The documented process shall specify contract/purchase order quality requirements to minimize the risk of counterfeit parts entering the supply chain. The flow down of applicable requirements of this document shall include:

... The process shall specify contract/purchase order quality requirements ... including the flow down of applicable requirements of this document ...

4.2.1.2 Supply Chain Traceability

The documented processes shall require supply chain traceability wherever such requirements are applicable. The processes shall provide traceability to the OCM or manufacturer to the direct source of the parts, identifies the name and location of all procurement lots, and the date of all inspections, test, and acceptance records. Records shall be available for customer review. If traceability is unavailable, the customer shall be notified ...

...The documented processes shall require ... traceability to the OCM... If...unavailable, the customer shall be notified...
Counterfeit Parts Control Plan:
*Verification of Purchased Product*

4.2.1.3 Verification of Purchased Product

The documented processes shall specify test and inspection methods for the verification of purchased product to prevent the acceptance of counterfeit parts. The process shall be designed to detect counterfeit parts present in the shipment. Each lot of parts shall be processed in the same manner.

Results of each inspection and test performed shall be documented, retained, and traceable to product information. The results shall be available to customers upon request.

All personnel performing inspection and test activities shall be formally qualified for the specific inspections and test that they perform based on demonstrated competency.

Product test and inspection requirements are provided in Appendix C, Product Assurance.
Forming a Counterfeit Parts Working Group
Next Steps – Recommendations

1. Get Leadership/Management Involvement and Buy-In
2. Create a line item in the resource plan to fund activity
3. Provide Training and Awareness of Counterfeit Issue
4. Formation of a counterfeit parts working group
5. Create cross function team of impacted departments
6. Creation of a Counterfeit Parts Control Plan
Formation of Your Counterfeit Parts Working Group

Departments impacted include:

- Parts Engineering
- Quality Assurance
- Supply Chain Management
- Receiving Inspection
- In-Process Inspection
- Procurement
- Materials Management
- Production & IT
- Legal & Contracting Organization

*Include Finance in the Group to Evaluate Costs of your Recommendations*
Counterfeit Parts Working Group Kick-Off
Define your Customers’ Business Requirements

Typical Business Requirements:

• Requirement of a Counterfeit Parts Control Plan. Reference to AS5553 or AS6081.

• OCM pedigree/traceability of EEE piece parts/components.

• Advanced notification and sign-off on any broker purchases.

• Customer pre-approval and sign-off on test & inspection plans and results prior to use of brokered parts.

• Segmented stock of brokered vs. OCM/Franchised stock.

• Option to include mechanical parts in the counterfeit parts control plan.
Perform a Gap Analysis

• What are the gaps compared to your current system vs. the business needs?

• Need to understand the organization’s and your contractors’ system and process limitations.

• Questions that need to be answered include:
  - Is inventory procured from other than the OCM and their Authorized Franchised Distributors segregated? If it is, how?
  - Are Common Parts used in multiple applications? Do the applications have varying risk levels?
  - How will material be cleared for use?
  - Will you allow Independent Distributors/Brokers to conduct their own testing to clear parts?
  - Will you allow material that has been cleared by third party laboratories to go back into Independent Distributors/Brokers inventory?
Additional Considerations

• Engineering test equipment
  - Will it being used on or in flight hardware? Is it a customer deliverable?

• Parts used on engineering builds for proof of concept designs
  - Are they or will they be customer deliverables?
  - Is there a possibility untested engineering material will get co-mingled with production material?

• Do you use 3PL’s or Channel Partners that would be impacted by contractual requirements?

• Are there any other customer contractual requirements?
  - Connect the front-end of the business (customer facing/contracts) with the back-end (operations) and include counterfeit subject matter experts to ensure that you do not over-commit what your process can deliver.
Supplier Choice and Material Controls

- Do you have a rigorous supplier qualification process? Do you visit/audit Independent Distributors/Brokers on your ASL?
- How does your system categorize suppliers?
- Will you categorize your suppliers by the transaction or for all transactions?
  - Do you have system limitations? Will your ERP system be able to address your requirement? Will new procedures need to be developed to address your requirement?
- Almost all Authorized Franchised Distributors have departments that procure material from Independent Distributors/Brokers. Most majors have controls to segregate the material and usually only perform the service if asked.
  - Recommendation – Include contract clauses for all your suppliers to restrict the use of brokered material. For large organizations, determine if it is being controlled by corporate or at the site level. Will you allow exceptions? How?
- Many Independent Distributors/Brokers now carry limited Authorized Franchised lines.
- Recommend creating a Governance Checklist to exhaust all options prior to use of Non-Franchised/Brokered parts.
Clearing Material for Use

• Does the material have traceability/pedigree directly to the OCM? How is it verified?

• Will you rely on CoCs?
  - Recommended for material procured from OCMs and their Authorized Franchised Distributors. Need to determine how data will be verified & archived.
  - Not recommended for material procured from Independent Distributors/Brokers. Paperwork is easier to fake than parts. Material could be co-mingled with non-pedigree stock.

• Will the testing be risk based?
  - Limitation – if parts are used from a common pool of inventory on multiple applications, then solution may be limited. Do not over-commit what you can deliver to your customers.

• Will you allow your suppliers to self-release based on your requirements?
  - Recommendation – additional audit will be necessary to verify. Ensure that contract clauses ensure archiving of relevant information and allow access to necessary information to conduct audit.

• What testing and screening will be conducted?
Inventory Segregation Solutions & Limitations

- **Bag & Tag?**
  - Advantages – Low cost solution for segregating material.
  - Limitations – ERP system will use inventory according to accounting settings such as FIFO. Subject to human error when technicians pull material for kit. Still need full traceability to determine which LRUs have used brokered material.

- **Separate storage areas?**
  - Advantages – Limits human error when technicians pull material for kit.
  - Limitations – ERP system does not select material based on storage location. Still need full traceability to determine which LRUs have used brokered material. Additional storage space is needed.

- **Batch Management?**
  - Advantages – Provides information if brokered parts were used on assemblies. You can track back to a specific supplier if a problem is discovered.
  - Limitations - Still need full traceability to determine which LRUs have used brokered material. ERP system must have feature. Turing on the feature will require more data entry and data storage.

- **Separate internal part numbers?**
  - Advantages – Most comprehensive control.
  - Limitations – Costly. Appears like customization for specific customers. Changes to BOM management need to occur at all levels of the assembly, from piece part, to the CCA and the LRU, straight through the end-BOM. Engineering drawings may be necessary to control contractors. Additional storage space is needed. More parts to manage.
Creating the Test Plan

- If the test plan is risk based, need to quantify the risk.
  - Recommendation: Create score based on Risk of Application, Risk of Product, and Risk of Supplier.
  - One example of the Risk of Application and Risk of Product could utilize a modified version of MIL-STD-1629 “Procedures for Performing a Failure Mode Effects and Criticality Analysis” to quantify risk.
  - Need to determine what data is available at your organization to categorize the Risk of Supplier. For example, PPM, Number of Nonconformance's, Past Performance, Industry Databases, Third-Party Quality Certifications (e.g. ISO 9000, AS9120, ANSI ESD S.20/20), Industry Memberships and data (e.g. ERAI, IDEA), etc.
  - Note – Component and Application risk can only be evaluated by the End-User and Original Equipment Manufacturer that produces the LRU and/or Final System.
Minimal Recommended Test Plan

• Delineate between quality and reliability vs. suspect counterfeit detection.

• If you have limitations on creating a risk based test plan, recommend the following test methods are performed on all Independent Distributor/Broker procurements:
  - External Visual Inspection per latest version of IDEA-STD-1010
  - X-Ray. Preferably against a known good sample.
  - XRF and Lead Finish Evaluation.
  - Inspection for Remarking or Resurfacing.
  - Decapsulation and Internal Die Verification.
  - Basic Functionality Test (i.e. value measurement/DC Test)

• Specify your sampling plan based on individual shipments and specific lot/date codes per shipment.

• Create an Archive Plan for the results of the test.
# BASIC FUNCTIONALITY TEST

<table>
<thead>
<tr>
<th>COMPONENT</th>
<th>MINIMUM FUNCTIONALITY TEST</th>
</tr>
</thead>
<tbody>
<tr>
<td>Microcircuits and Semiconductor Devices</td>
<td>Curve trace each pin and verify against a known good part/DC Test at ambient temp.</td>
</tr>
<tr>
<td>Resistors (includes heaters, thermistors, and fuses)</td>
<td>DC resistance</td>
</tr>
<tr>
<td>Capacitors (includes filters)</td>
<td>Capacitance, dissipation, and insulation resistance</td>
</tr>
<tr>
<td>Inductors</td>
<td>Inductance</td>
</tr>
<tr>
<td>Transformers</td>
<td>Winding-to-winding isolation, winding continuity, winding inductance, turns or voltage ratio</td>
</tr>
<tr>
<td>Connectors</td>
<td>Pin-to-pin and pin-to-case isolation, contact resistance</td>
</tr>
<tr>
<td>Relays</td>
<td>Input inductance, contact resistance</td>
</tr>
<tr>
<td>Crystal</td>
<td>Frequency and equivalent resistance</td>
</tr>
</tbody>
</table>
Risk Based Test Plan

• If your organization does not have system/process limitations and you are creating a risk based test plan:

  - Recommend that component engineer and/or reliability engineer evaluates the use of the item in the application and determines the risk on the CCA, LRU and Final System.
  - The type, level, and extent of electrical testing is so complex to try to weed-out counterfeit parts that it should be the responsibility of the EEE components parts engineer to make that determination, with the assistance of design engineering in certain critical applications, and generate the specific test requirements. This test documentation should be included in a Statement of Work (SOW) in the event the testing is done by an outside test facility or to document the test requirements if done in-house.
  - Include other required test methods in test SOW.
  - Flow-down test SOW on relevant purchase orders.
Electrical Test Plan Recommendations

- Select the pertinent key electrical parameters from the corresponding DSCC Standard Microcircuit Drawing (SMD) for microcircuits, MIL-PRF-19500 for semiconductor devices, and the appropriate MIL-PRF-XXXXX for passive devices.

- Commercial Off the shelf parts should be tested per the DSCC Vendor Item Drawing (VID) for the key electrical parameters.

- The DSCC website can be accessed at www.dscc.dla.mil/programs/milspec/, then click on Standard Microcircuit Drawings (SMDs) or Vendor Item Drawings (VIDs). For a cross-reference of SMDs, at bottom of page, click on MIL-HDBK-103.

- More complex devices such as Microprocessors, Microcontrollers and Memory etc. will require the original test-tapes and these may only be available from the original component manufacturer. In these cases, if the available testing is not sufficient to authenticate the parts, a sample of parts may have to be submitted to the manufacturer for testing.
Additional Test Method Considerations

- Thermal Shock for Passive Devices
- Thermal Cycle Testing
- Burn-In
- Final Electricals including limits and delta limits
- Fine & Gross Leak (Hermetic Devices)
- Flexibility to Include Additional Test Requirements as New Methods of Counterfeiting are Discovered.
- Recommend creating a standardized test statement of work with input from components engineering and failure analysis engineers.
## Example Sampling Plan for your Test Plan

### EXTERNAL VISUAL INSPECTION SAMPLE SIZE
- **STD LOT**
  - 116 devices plus 3 devices = 119 total devices, c=0
- **SMALL LOT**
  - lot size ≤116, test all devices, c=0

### REMARKING & RESURFACING INSPECTION SAMPLE SIZE
- **TOTAL LOT**
  - 3 devices, c=0

### X-RAY, XRF, LEAD FINISH EXAMINATION SAMPLE SIZE
- **STD LOT**
  - 45 devices, c=0
- **SMALL LOT**
  - lot size ≤ 45, test all devices, c=0

### DELID PHYSICAL ANALYSIS SAMPLE SIZE
- **TOTAL LOT**
  - 3 devices, c=0

### FUNCTIONAL TEST AT AMBIENT TEMP. SAMPLE SIZE
- **STD LOT**
  - 116 devices, c=0
- **SMALL LOT**
  - lot size ≤116, test all devices, c=0
<table>
<thead>
<tr>
<th></th>
<th>ELECTRICAL TESTS SAMPLE SIZE</th>
<th>BURN-IN SAMPLE SIZE</th>
<th>THERMAL SHOCK SAMPLE SIZE</th>
<th>ABBREVIATED LIFE / BURN-IN SAMPLE SIZE</th>
</tr>
</thead>
<tbody>
<tr>
<td>STD LOT</td>
<td>116 devices, ( c = 0 )</td>
<td>STD LOT 45 devices, ( c = 0 )</td>
<td>STD LOT 22 devices, ( c = 0 )</td>
<td>STD LOT 45 devices, ( c = 0 )</td>
</tr>
<tr>
<td>SMALL LOT</td>
<td>lot size ( \leq 116 ), test all devices, ( c = 0 )</td>
<td>lot size ( \leq 45 ), test all devices, ( c = 0 )</td>
<td>lot size ( \leq 22 ), test all devices, ( c = 0 )</td>
<td>lot size ( \leq 45 ), test all devices, ( c = 0 )</td>
</tr>
</tbody>
</table>

**Note:** Always test all devices for quality control purposes.
DMSMS and Obsolescence

• Create a DMSMS plan using the guidance from:
  - DOD SD-22 “Diminishing Manufacturing Sources and Material Shortages Guidebook”
  - GEIA GEB1 “Diminishing Manufacturing Sources and Material Shortages Management Practices”
  - EIA-4899 “Standard for Preparing an Electronic Components Management Plan”

Reduce the necessity to procure from suspect sources
Flow-Down your Requirements

• Ensure that you flow-down your requirements to your subcontractors and sub-tier suppliers.

• Coordinate with your legal and contracting organization on the supply side to flow-down appropriate clauses.

• AS5553 Appendix D has recommend contract clauses for flow-down.

• Socialize your requirements with your critical subcontractors
Considerations for Execution/Implementation

- Determine if organizational structure needs modification. Who owns the process? Will they have authority over the functional groups required to perform the activity?

- Ensure that impacted parties, internally and externally have been trained.

- Determine a date of implementation. Allow enough time for contractors and sub-tiers to be compliant.

- Ensure that there are appropriate resources and manpower to implement the requirements.

- Create fully-loaded charge accounts for the various required activities such as testing and engineering time.

- Scale-up the audit activity to determine compliance, internally & externally.

- Evaluate if incentives and goals are in alignment with new procedures or if they need modification.

- Debrief on lessons learned for future activities.
Summary

• Understand various standards to help create a counterfeit parts control plan

• Know the departments that will be impacted and include them in the development of your plan

• Have an understanding of some of the trade-offs and limitations

• Have an understanding of how to create your test requirements for your plan
Thank you for your time!

Questions?

Dan DiMase  
Counterfeit Parts Control Specialist  
Daniel.DiMase@Honeywell.com

Philip Montag  
Director, Business Quality Services  
Philip.Montag@Honeywell.com
Backup Slides
Resources
Work Groups/Committees/Associations

- US Chamber of Commerce Coalition Against Counterfeiting and Piracy (CACP)
- Semiconductor Industry Association (SIA) Anticounterfeiting Task Force (ACTF)
- SAE G-19 Counterfeit Electronic Parts Technical Committee
- Center for Advanced Lifecycle Engineering (CALCE)
- Surface Mount Technology Association (SMTA)
- TechAmerica G-12 Counterfeit Task Group
- Aerospace Industries Association (AIA) Counterfeit Parts Integrated Process Team
- International Microelectronics and Packaging Society (IMAPS)
- Components Technology Institute (CTI)
- NASA Quality Leadership Forum (QLF)
- Independent Distributors of Electronics Association (IDEA)
- ERAI
- SEMI
- DoD trusted Defense Systems Workshop
- DoD Trusted Foundry Program
- Defense Logistics Agency (DLA) Counterfeit Parts Integrated Process Team (IPT)
Welcome to the world’s premier AUTHORIZED source directory. Our authorized distributors provide guaranteed assurance that products are fully traceable and certified by the manufacturer. In today’s electronics marketplace, selecting an authorized distributor is more important than ever before. With accelerating inventories of questionable quality, including counterfeit and sub-standard product sold through surplus dealers, customers need a directory of reputable and authorized distributors.

This directory has been created through the endorsement and efforts of the SIA Anti-Counterfeit Task Force. Through a network of corporate CEOs and working committees, SIA shapes public policy on issues critical to the industry and provides a spectrum of services to aid members in growing their businesses.
Welcome to the DMSMS & Standardization Conference 2009

The theme for this year’s conference is: New Directions and Challenges. The focus areas are: Strategic Partnerships, Visibility into Total Ownership Costs, Opportunities for Partnering, and Standardization Enablers.

A Message from the Chairman
As this year’s Chairman, I would like to invite you to participate in the DMSMS and Standardization 2009 Conference. With a new administration taking the helm of the federal government, there will be change. The theme of this year’s conference - “New Directions and Challenges” - will focus on what changes to expect and how those changes will affect the DMSMS and standardization communities.

The target audiences for this conference are DMSMS and standardization professionals who wish to hone their skills and be a part of shaping the future of DoD acquisition and sustainment policies. In addition to a full day of tutorials taught by some of the top experts in government and industry and hands-on experience with some of the latest automated information tools, this conference gives attendees access to the now incoming DoD acquisition and sustainment leadership and a chance to hear first-hand about their goals, objectives, and direction.

After the incoming DoD leadership has set the stage for our new directions and challenges, there will be workshops and discussion panels to allow audience participation and input into future DMSMS and standardization policies, procedures, guidance, and automated tools. We have also invited an outstanding array of experts to share their experiences through technical presentations on how they have successfully addressed the challenges of obsolescence, counterfeiting, standardization, parts management, lead-free, and many other related technical issues.

Diminishing Manufacturing Sources and Material Shortages (DMSMS) Guidebook

Office of the Under Secretary of Defense Acquisition, Technology, & Logistics

November 1, 2006

SDMP
Pre-qualified distributors

Semiconductors and Microcircuits

Distributors with demonstrated quality assurance practices

Qualification based on JESD31 QMS requirements, e.g.:
- Traceability
- Certificate of Compliance
- Handling and storage

FSCS 5961 (Semiconductors)/5962 (Microcircuits)
### Complaint Type: Counterfeit Parts

<table>
<thead>
<tr>
<th>Company</th>
<th>Additional Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>For Lik Shun Electronics Technology Limited</td>
<td>Bank Name: Standard Chartered Bank, Shenzhen Futian Central Sub-Branch</td>
</tr>
<tr>
<td>Phone: 86-755-8395-8937</td>
<td>Account: 9841380411</td>
</tr>
<tr>
<td>Fax: 86-755-8395-8657</td>
<td>Beneficiary Name: FOR LIK SHUN ELECTRONICS TECHNOLOGY COMPANY LIMITED</td>
</tr>
<tr>
<td>Email: <a href="mailto:kelvin888@hotmail.com">kelvin888@hotmail.com</a></td>
<td></td>
</tr>
<tr>
<td>Address: R2008 North #2 Unit Jing Gang Mingyuan</td>
<td></td>
</tr>
<tr>
<td>Shenzhen China</td>
<td></td>
</tr>
</tbody>
</table>

**Status:** UNRESOLVED  
**Last Updated:** 08/28/2007  
**Date Modified:** 08/26/2007  
**Scheduled Release:** 08/22/2012

**Details**

In June 2007, a Member placed an order with For Lik Shun Electronics for 1,100 pieces of part number PEF20534H10V2 totaling $16,500.00. The invoice is dated June 26, 2007 and the order was facilitated through an escrow service with a 5-day inspection period.

The parts were sent to an independent test facility for testing prior to being sent to the Customer. The test results dated July 10, 2007 state:

"...showed evidence of remarking and resurfacing. The die shows LSI Logic as the manufacturer with HS0683F as a mask code in an Infineon marked part. The product is remarked and therefore counterfeit."

According to the Reporting Member, they contacted For Lik Shun the same day the test results were received, July 10th, for an RMA and refund and this and all other subsequent attempts to contact For Lik Shun Electronics have been ignored. ERAI has not received a response from For Lik Shun Electronics regarding this matter, leaving it unresolved as of this date.
Resources (cont)

The Independent Distributors of Electronics Association's
IDEA

IDEA-STD-1010-A
Acceptability of Electronic Components
Distributed in the Open Market

Quality
Qualität Calidad
質量Qualité
Training Opportunities

IDEA-ICE-3000
Professional Inspector’s Certification Exam

Available to Employees of:
- IDEA Member Companies
- OEMs
- CM/EMS

The IDEA Professional Inspector’s Certification Exam is designed to demonstrate inspection competency for the benefit of all stakeholders. Successful examination provides the employee and the employer with a heightened degree of confidence in the basic working knowledge and resource-ability of the inspector.

When personnel who conduct visual inspection of product from the excess market have been certified, the company’s stakeholders are provided objective evidence of inspection competency and therefore reason for increased confidence that customer satisfaction will be achieved and further offer increased marketability of products and services.

Upon successfully passing the IDEA Professional Inspector’s Exam (IDEA-ICE-3000) the candidate will be awarded a certificate stating that the individual has passed the exam and their name will be maintained on record at IDEA as having met this achievement.
Training Programs

Semiconductor Technology Seminar - STS - An intensive course that addresses the needs of scientist, engineers, and technicians newly involved in design, development, testing, production, management, procurement or evaluation of semiconductors. The course will add to the knowledge and understanding of experienced technologists in modern semiconductor processes in sub-micron CMOS and BiCMOS. The impact of processing on yield and performance and reliability issues are emphasized by the course.

IC Failure Analysis for Yield Enhancement Seminar - ICFA - A comprehensive seminar which presents the latest techniques for analyzing wafer defects and IC failure mechanisms. The course discusses the means for correction of process defects to improve yields. Students will take away an understanding of how results of physical failure analysis can supplement statistical defect reduction efforts.

Passive Components Seminar - PCS - A seminar that covers design, construction, selection for the applications, failure mechanisms, testing, reliability, and lessons learned on ceramic; electrolytic film capacitors; carbon, film and wire wound resistors; and a select group of inductive devices. The seminar is based upon the CLR Passive Components Handbook by Fagerholt plus considerable additional material. Students will receive a copy of the CLR Handbook and slides presented.

Counterfeit Components Avoidance Program - This Training and Certification Program addresses the problem being experienced with the many Counterfeit Components that are entering the electronics supply system. It will address practices for detection and prevention of using counterfeits. The Training Program will develop specific engineering quality and purchasing practices for avoiding counterfeit components. Users and suppliers of components are encouraged to submit abstracts for presentations on this issue.

The Certification Program certifies independent distributors as active participants in testing for counterfeit components to insure they only distribute genuine components.
Counterfeit Parts Avoidance Training

Counterfeit Parts in the News
- In 2009, Acting Administrator Christopher Scolese disclosed to Congress that counterfeit parts are a significant cause of budget over-runs for NASA
  - Estimated cost to NASA - unknown
- In late 2007, the US Patent and Trademark Office estimated that counterfeiting and piracy drain about $250 billion out of the US economy each year along with 750,000 jobs
- Counterfeit EEE parts comprise about 10% of the parts in the supply chain
- In December 2006, four executives at Western Titanium, Inc. were indicted for fraud
- US Dept of Commerce Bureau of Industry and Security survey reveals China as biggest geographical source of counterfeit electronic parts

Class Date and Time
- The QLF class is scheduled for September 29, 2009, 1:00 – 5:00 p.m.
- Enrollment requests should be submitted to Diana Shellman

Class Details
Class Objectives
- To learn about counterfeit parts and why they are a significant risk.
- To learn inspection methods to be used for the detection and avoidance of counterfeit parts.
- To mitigate the risks of acquiring counterfeit parts and to eliminate the risk of introducing counterfeit parts into flight hardware.
- To apply inspection techniques during an individual hands-on examination of counterfeit EEE parts, with microscopes.

4-hour class is for anyone who works with EEE parts and includes the following:
- Terms and Definitions Overview
- Counterfeit Parts in the Industry
- JPL's Counterfeit Parts Mitigation Strategy
- Best Industry Practices
- Case Studies of Counterfeit Investigations
- Hands-On Training and Written Exam

Please contact Katherine Whittington
Katherine.V.Whittington@jpl.nasa.gov
or 818.354.8749
for information about the class content or related questions.
Building a Business Case
Supporting Documentation for Business Case

- Provide empirical data such as the US Department of Commerce information.

- Show actual examples of counterfeit parts and pictures of counterfeit parts processing.

- Summarize the business requirements from other companies invoking requirements.

- Benchmark number of non-franchised purchases against industry best practices.

- Show the industry & government trend and direction.

- Research the historical cost and number of counterfeit escapes.

- Quantify business at risk from customers invoking requirements that current processes cannot support and add historical cost of escapes to calculate cost avoidance. Perform financial analysis (NPV, IRR, Payback Period, etc.) of recommendations offset by the calculated cost avoidance.
Magnitude / Scope of Counterfeiting

Total EEE Counterfeit Incidents:
(398 Companies Surveyed)

142% Increase Since 2005!

Year          Number of Incidents

2005          3,868
2006          8,139
2007          8,600
2008 (est.)   9,356

U.S. Customs Notifications

Year | Number of Incidents
-----|---------------------
2005 | 1
2006 | 29
2007 | 169
2008 | 604

U.S. Department of Commerce – Preliminary Data (as of March 4, 2009)
What We are Up Against

- New Blacktopping Techniques-

Exemplar Top Surface

Suspect Top Surface

New Blacktop Material Can Only Be Removed With an Xacto Knife

Pure Acetone 7 Day Soak No Effect
What We are Up Against
- Bogus Test Reports -

19% of companies employing testing contractors had problems with U.S.-based firms concerning faulty or forged testing.

- The parts were cleared by the testing house, but were later found to be counterfeit by the customer.

U.S. Department of Commerce February, 2009
Sources of Counterfeiting

Workers extract plastics from discarded electronics in Guiyu, a few hours' drive northeast of Hong Kong. The city has 5,500 family workshops handling e-waste.

© 2006 The Seattle Times Company

Laborer de-soldering circuit boards over a coal-fired grill. Rock in the box is where boards are hit to remove solder. Pliers are used to pluck off chips which go into various buckets. The boards are then tossed into a pile for open burning. © BAN
Sources of Counterfeiting

MORE than a backyard industry!!!

Millions of Scrap Boards

Component Removal

Reprocessed

Sort by Size Similarity and Lead Count
Components on river bank drying

Slide courtesy of

0402 Case Size Capacitors ($0.005 ea from Fran. Disty)
How certain are you of your suppliers’ capabilities?

This ERAI member independent distributor advertises over 800 companies on its line card, with search capability for thousands of components. Google indicates the advertised address is a commercial building.

The distributor was not available for a visit. The “suite” located for the company address was determined to be a mailbox (this company was not an MDA-approved supplier).
Example – Tampa Area
Counterfeiting Consequences

Exploding counterfeit cell phone battery

Genuine
Pre-2003 breakers do not have white paint

Counterfeit

Recalled circuit breakers

“Trojan Horse” or Backdoor Entry

Delays and Cost Overruns
… At a House subcommittee hearing on NASA's cost overruns, the agency's acting administrator, Christopher Scolese, was asked why it is that so many space projects fail to stick to their budget. … some spacecraft are built with parts that turn out to be "counterfeit".

Agency Chief Says Suppliers Sometimes Skimp on Quality

NASA satellites get "counterfeit" parts, Scolese says

By NED POTTER

March 7, 2009 —

Maybe it was something he didn't mean to say. Or maybe it was something he should have said weeks ago. But at a House subcommittee hearing on NASA's cost overruns, the agency's acting administrator, Christopher Scolese, was asked why it is that so many space projects fail to stick to their budget. "Some spacecraft are built with parts that turn out to be "counterfeit.""

Counterfeit? Ears in the room perked up.

"In dealing with that, you find out late, typically, when you get counterfeit parts," said Scolese.

Sometimes, he said, "you find out about it when you're in tests, or you find out about it when you're sitting on top of the rocket, or worse, you find out about it when you're in space. And all of those have cost implications."

So NASA was faced with a sudden brush fire. Were satellites being launched with parts that might doom them to failure? Were astronauts in danger?

NASA insists the answer is no. But there have been cases in which it says companies have supplied it with parts or materials that were not what had been originally promised.

The most recent case involves NASA's Kepler probe, which was a day from scheduled liftoff when the hearing was taking place Thursday morning. Engineers built Kepler to spend at least three years in solar orbit, with a powerful camera to look for evidence of Earth-like planets circling other stars.

Last fall, a supplier was indicted for selling falsely approved titanium to NASA and the U.S. Air Force - including the metal for Kepler's camera mount. That did not necessarily mean the titanium was in danger of failing, but the company had allegedly falsified its records to say it had done all the necessary tests.

"We analyzed the mount for about three weeks," said J.D. Harrington, a spokesman for NASA. "and we..."
Counterfeit Parts Control Plan

Organizations Adopting Policies:

- NASA Policy Directive 8730.2C
- MDA Policy Memo and PMAP
- DOD adopts AS5553 August 2009
  - SMC and NRO do not accept AS5553 in its current form and have more stringent requirements
- Other companies with plans:
  - BAE Systems
  - Orbital Sciences Corp.
  - Lockheed Martin
  - Honeywell
  - Ball Aerospace

Flow Down will Invoke Requirements
This traceability requirement applies to new purchases of material, material in inventory and material transferred from other businesses within the organization. **If this traceability is incomplete or unavailable, customer approval in advance is required.**

Standards are scheduled for release in FY2011
U.S. Government Reports on Counterfeits


The Defense Department's supply chain is vulnerable to the infiltration of counterfeit parts, potentially jeopardizing the lives of American soldiers, according to two Democratic Senators. In an Aug. 6 letter to Ashton B. Carter, undersecretary of Defense for acquisition, technology and logistics, Sens. Sherrod Brown of Ohio and Tom Carper of Delaware argued the Pentagon was not doing enough to protect the system from imitation supplies, many of which originate overseas. ...
SEC. 1206. COUNTERFEIT PARTS.

(a) IN GENERAL.—The Administrator shall plan, develop, and implement a program, in coordination with other Federal agencies, to detect, track, catalog, and reduce the number of counterfeit electronic parts in the NASA supply chain.

(b) REQUIREMENTS.—The Administrator shall ensure that procurements of parts from vendors that will—

(A) teach employees how to identify whether a part is counterfeit;

(B) educate employees on procedures to follow if suspect a part is counterfeit;

(C) regularly update employees on new threats, identification techniques, and reporting requirements;
Additional Legislation in the Senate

SEC. 1063. EXECUTIVE AGENT FOR PREVENTING THE INTRODUCTION OF COUNTERFEIT MICROELECTRONICS INTO THE DEFENSE SUPPLY CHAIN

(a) EXECUTIVE AGENT FOR PREVENTING THE INTRODUCTION OF COUNTERFEIT MICROELECTRONICS INTO THE DEFENSE SUPPLY CHAIN

... the Secretary of Defense shall designate a senior official of the Department of Defense to serve as the executive agent for preventing the introduction of counterfeit microelectronics into the defense supply chain.

(A) Development and maintenance of an implementation plan that ensures that the Department of Defense has the ability to identify, mitigate, prevent, and eliminate counterfeit microelectronics from the defense supply chain.

Legislation passed H.R., Proposed for FY2011
Proposed Legislation on Counterfeit Parts

- NAVSEA/NASA Legislative proposals– intended to address these areas:
  - Need for a common counterfeit electronic part definition
  - Need to flow down requirements to suppliers/vendors at all tiers
  - Need for criminal penalties in the event of loss of life and property damage. There does not need to be loss of life or property damage for the government to pursue the case.
  - Need to dispose of and return counterfeit electronics
  - Need to control export/disposal of populated scrap circuit boards
  - Need to address payment for counterfeit material when the Government or contractor has accepted counterfeit material
  - What to do with identified counterfeit electronics: Need to retain and preserve counterfeit items as evidence of fraud
  - Need to submit information regarding counterfeit material to the appropriate investigative service

Legislation targeted to become law in FY2012
Examples - Counterfeit Part Escape Incidents

**Actual Example 1**
- Reliability Testing: $57K
- Labor to replace suspect chips: $30,000
- Change parts in field: $70K
- Cost of Parts + Test - $90K

**Actual Example 2**
- Test NRE: $90K
- Redesign Costs: $335K
- Replace Parts: $1.8M
- Program Mgt. Time: $2,275
- Upscreen Comm Parts: $173K

**Total cost:**
- Actual Example 1: >$500,000
- Actual Example 2: >$2,400,275

**Additional Revenue impact due to delayed shipments**

*Cost of these escape incidents still growing*
Counterfeit Product Impact

What “failed parts” mean to the Organization

- Schedule slippage
- Cost Increase
- Reduced performance
- Poor reliability
- Product failure
  - Personnel Safety
  - Mission Success
  - National Security Interests
- Decline in mission readiness
- Loss of Brand Reputation
- Legal – Criminal & Civil Actions
<table>
<thead>
<tr>
<th>Costs</th>
<th>Savings</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Additional Test &amp; Inspection when purchasing from non-franchised sources</td>
<td>• Reduce Cost of Poor Quality</td>
</tr>
<tr>
<td>• Cost for Audit and Verification</td>
<td>• Reduce Cost of Goods by reducing high cost of obsolete parts</td>
</tr>
<tr>
<td>• Training Costs: Internal &amp; External Supplier</td>
<td>• Improve Reliability with known sources of supply, pedigree, &amp; part handling</td>
</tr>
<tr>
<td>• Administrative &amp; Recordkeeping</td>
<td>• Reduce Quality Escapes</td>
</tr>
<tr>
<td>• Engineering Time</td>
<td>• Reduce Scheduling Delays and Rework fees due to counterfeit and poorly handled parts</td>
</tr>
<tr>
<td>• Supplier Contract Renegotiations</td>
<td>• Reduce accrual on warranty expense</td>
</tr>
<tr>
<td></td>
<td>• Ability to service contracts with counterfeit clauses</td>
</tr>
</tbody>
</table>