

The Quest for “Reasonable Assurance” in Detecting Counterfeit Electronic Components

NRC Workshop on Vendor Oversight for New Reactor Construction

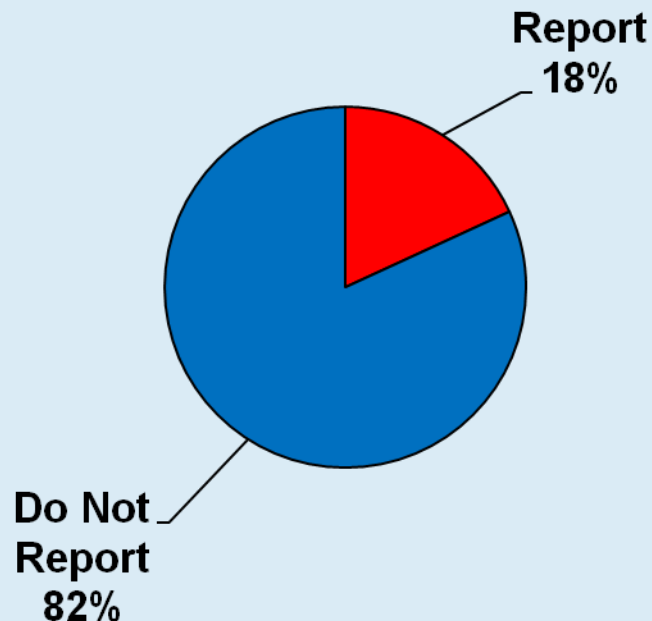
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June 17, 2010



**Percent of Companies
With Counterfeits
Reporting to GIDEP**



140%
**INCREASE IN COUNTERFEIT
INCIDENTS**
2006 - 2009

THE MOTIVATING INFLUENCES BEHIND COUNTERFEITING ARE CHANGING – U.S. DOC

- Obsolescence/DMSMS (Diminishing Manufacturing & Material Shortages)
- Rare or exotic designs
- Supply shortfalls
- Purchasing policies that force procurement from noncertified distributors
- The unwillingness to validate the integrity of goods from non-certified distributors
- Lack of Lot/Batch traceability (lost when counterfeits are suspected)

U.S. GAO REPORT ON THE DEFENSE SUPPLIER BASE



- DoD currently does not have a policy or specific processes for detecting and preventing counterfeit parts.
- DoD does not have a department-wide definition of the term “counterfeit”. (While some DoD entities have developed their own definitions, these can vary in scope.)
- DoD does not have a consistent means to identify instances of suspected counterfeit parts.
- DoD databases are not designed to track counterfeit parts.

U.S. GAO REPORT ON THE DEFENSE SUPPLIER BASE



- Reporting (Counterfeiting instances) is low due to the perceived legal implications of reporting prior to a full investigation.
- (DoD) staff responsible for assembling and repairing equipment are not trained to identify counterfeit parts.
- Individual commercial sector companies have developed a number of anti-counterfeiting measures, including increased supplier visibility, detection, reporting, and disposal.
- Recent collaborative industry initiatives have focused on identifying and sharing methods to reduce the likelihood of counterfeit parts entering the supply chain.

BRICK and MORTAR



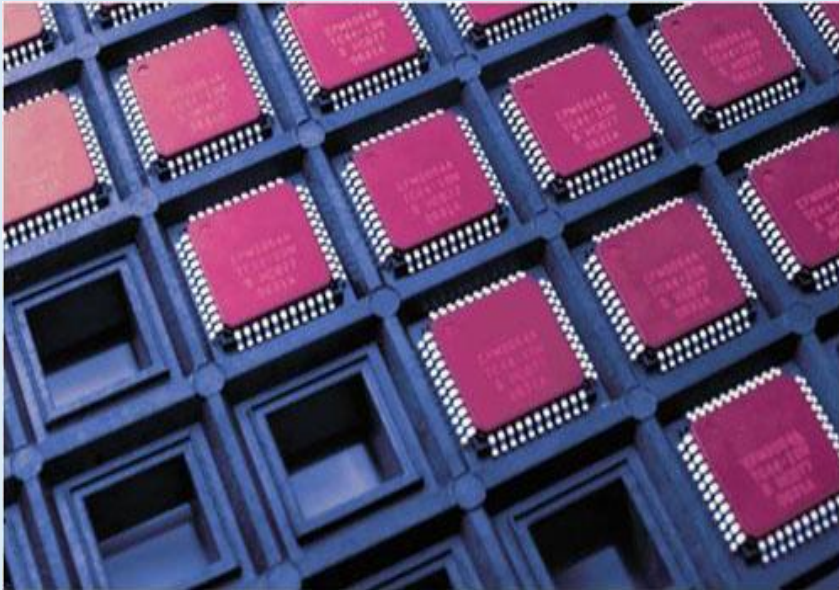
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SUPPLY CHAIN



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vs.



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TRAINING



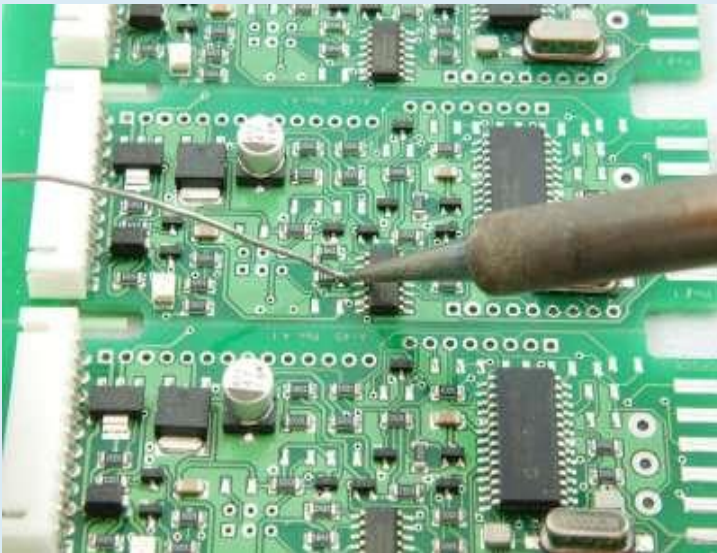
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QUALIFIED PERSONNEL



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vs.



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QUALITY CONTROL



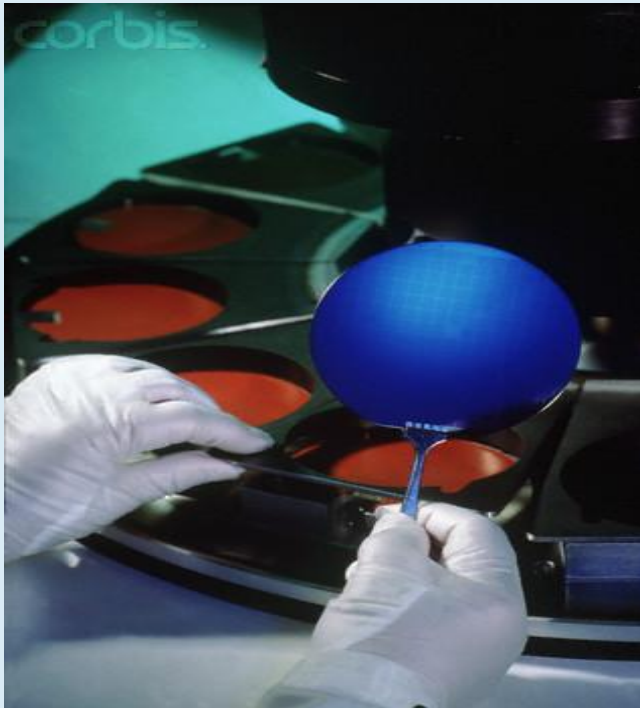
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PROCESS CONTROLS



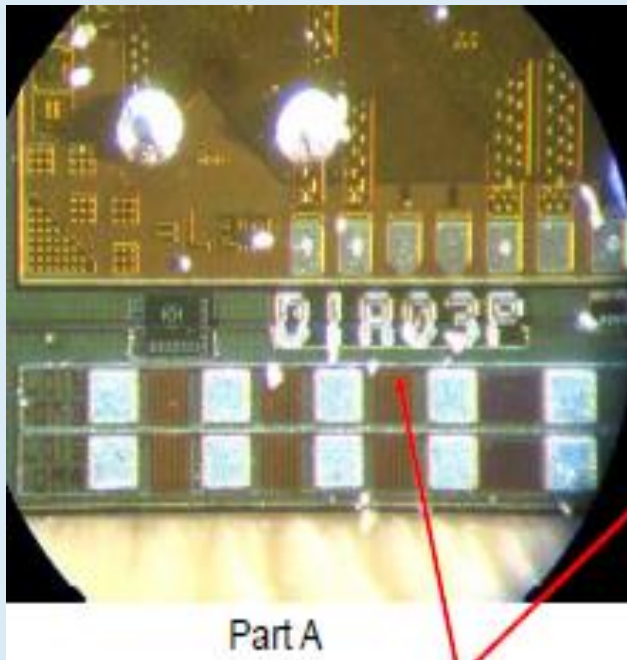
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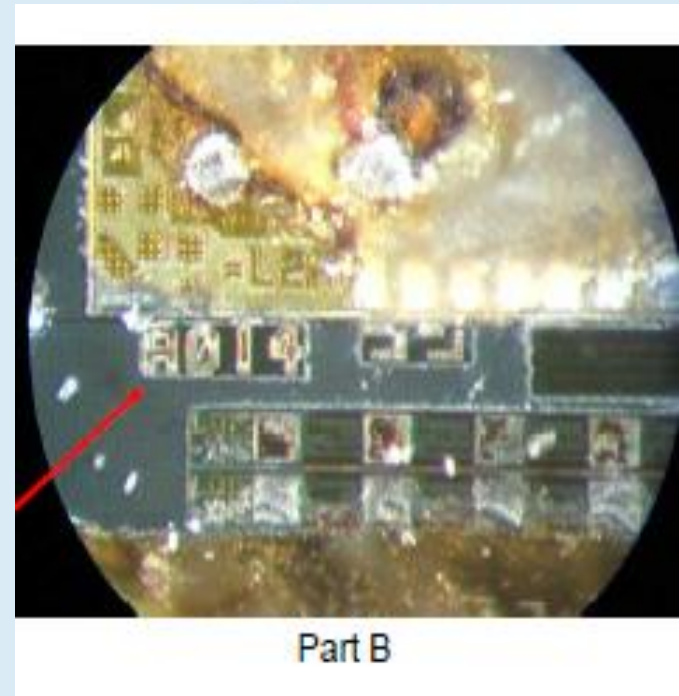
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CORROSIVE EFFECTS of ACID



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vs.



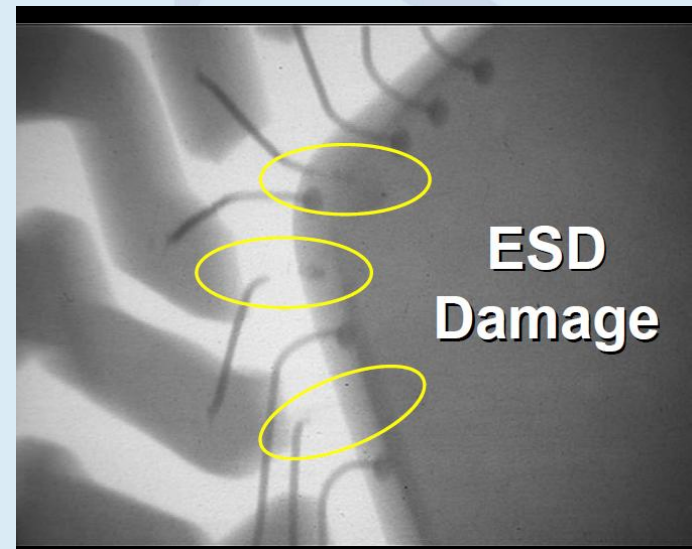
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ELECTRO-STATIC DISCHARGE



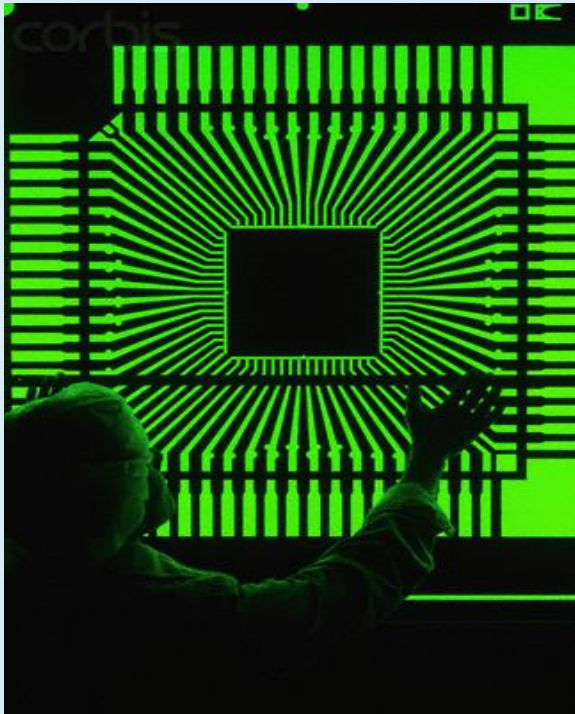
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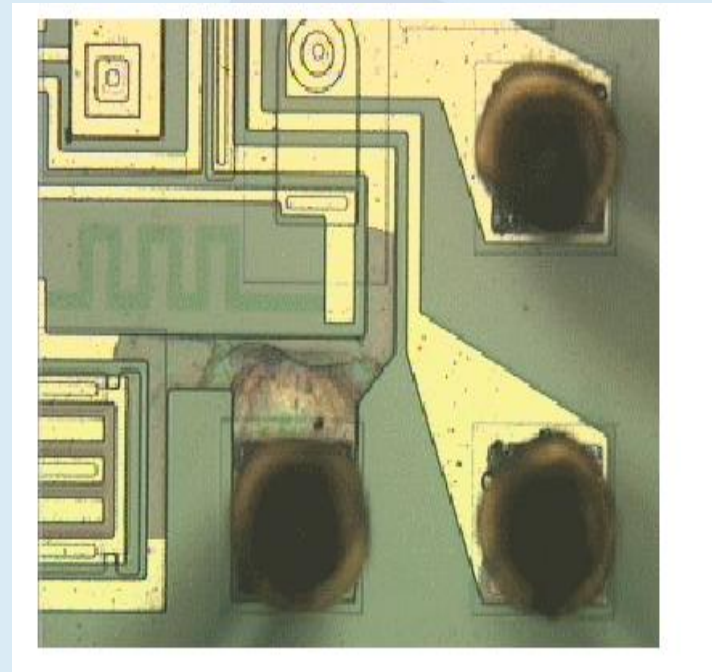
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SAMPLING



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vs.



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EFFECTS OF POOR HANDLING

- Acid erosion of internal integrated circuitry (die)
- Bond fractures
- Electrostatic buildup
- Moisture intrusion
- Substrate damage
- **Delayed service failure**

NRC OUTREACH

TO UNDERSTAND:

- THE CREDIBILITY OF THE THREAT,
- THE ENORMITY OF THE ISSUE,
- WHAT CONSTITUTES A REASONABLE ATTEMPT TO DETECT POTENTIALLY SUBSTANDARD ELECTRONICS.



Counterfeit Detection and Inspection...

CAN YOU AFFORD NOT TO KNOW?

Come join us for a counterfeit detection analysis workshop. Woody Hewett, Quality Manager, will be demonstrating processes on how to detect sub standard components that propose significant risks to the global supply chain.

When: December 11th, 2009
11:30am to 1:30pm

Where: Saint Petersburg Marriot
12600 Roosevelt Blvd. North
St. Petersburg, FL 33716 USA.
Tel: 1-800-230-4134

Cost: FREE

A luncheon buffet will be provided.
Please reserve your seat now as space is limited!
This event is reserved for OEMs and EMS companies exclusively
RSVP to: info@equalityprocess.com

EQuality
PROCESS

12420 73rd Court
Largo, FL 33773
(727) 474-9722

www.counterfeitdetection.com

Outreach Organizations

Department of Defense

- **Government Information Data Exchange Program (GIDEP)**
- **Diminishing Sources and Material Shortages (DMSMS)**
- **NASA**
- **Aerospace Standard AS5553, “Counterfeit Electronic Parts; Avoidance, Detection, Mitigation, and Disposition**

Department of Energy

- **Suspect/Counterfeit or Defective Items Program (S/CDI)**
- **Occurrence Reporting and Processing of Operations Information (ORPS)**

Department of Commerce

- **International Trade Administration, Office of Energy and Environment**
- **Manufacturing & Services**
- **Bureau of Industry & Security, Office of Technology Evaluation**

Nuclear Procurement Issues Committee (NUPIC)

- **Commercial Nuclear Power Licensees & Suppliers**

Nuclear Energy Institute (NEI)

Electric Power Research Institute (EPRI)

GL-89-02, SECTION C

“DEDICATION PROGRAMS”

“It is each licensee's responsibility to provide reasonable assurance that nonconforming products are not introduced into their plants.

Dedication programs that ensure the adequacy of critical parameters of products used in safety-related applications can also contribute to the identification of counterfeit or fraudulently marketed vendor products.”



YOU CAN'T CATCH WHAT YOU'RE NOT LOOKING FOR

**THE GOAL: Provide a quality part
or component that will perform
its' intended safety function.**



10 CFR Part 21

Critical characteristics ...are those important design, material, and performance characteristics of a commercial grade item that, once verified, will provide reasonable assurance that the item will perform its intended safety function.

CATEGORIES OF EEE FUNCTIONALITY

- **Passive components**
 - Capacitors
 - Resistors
- **Active components**
 - Microchips
 - Integrated Circuitry
 - Transistors
 - Firmware
 - PROMS
 - EPROMS
 - EEPROMS



WHAT INSPECTIONS AND/OR TESTING CAN BE DONE?

LEVELS of ASSURANCE:

- Logical assessment - confirming manufacturer, date code, and QPL
- Visual inspection - evidence of remarking, re-use and other tricks
- Functionality testing - performance to mil-spec and manufacturer's specifications
- Destructive testing - marking permanency, delidding, etc.

ELECTRONICS TESTING

1) Logical Assessment

- Documentation Inspection
- Packaging Inspection

2) Visual Inspection

- Basic Visual Examination (Kick & Count)
- Comparison Tests
- Solderability testing
- Scanning Electron Microscope (S.E.M.) Inspection
- Scanning Acoustic Microscopy (S.A.M.) Inspection
- Scanning Acoustic Tomography (SCAT)
- Inspection-In-Line X-Ray Imaging
- Analytical X-Ray Imaging
- X-Ray Florescence (XRF) <RoHS

ELECTRONICS TESTING

3) Destructive Testing

- Decapsulation & Die Verification
- Destructive Physical Analysis (DPA)

4) Functionality Testing

- Hermeticity Verification <moisture intrusion
- Electrical Testing
 - Additional Resistance Testing
- Mil-Standard Functional Specification
 - Thermal Cycle Test
- Burn-In Testing
 - Pre Burn-In
 - Burn-In
 - Post Burn-In
- Customer Specified Functional Specification Testing (including accident parameters)

INDEPENDENT TESTING LABS

- **Authenticity Testing** - an emerging industry
 - Struggling to keep up with the counterfeiting industry.
- **Testing prices** - based on the requested probability of authentication,
 - May require expensive, sophisticated equipment.
- **Independent Testing Labs** currently not certified to a national standard.
 - several certifying programs available,
 - no one certification program is considered the industry “official” standard
 - each supplier/broker selects a lab with an accreditation program of his choice,

As Always ...

CAVEAT EMPTOR



Let the buyer beware!

INDUSTRY RESOURCES:

- EPRI TR-1019163, Counterfeit, Fraudulent and Substandard Items, Mitigating the Increasing Risk
- EPRI NP-5652, Guideline for the Utilization of Commercial Grade Items in Nuclear Safety Related Applications
- EPRI NP-6629, Guidelines for the Procurement and receipt of Items for Nuclear Power Plants
- IAEA TECDOC-1169, Managing Suspect and Counterfeit Items in the Nuclear Industry
- DOE G 414.I-3, Suspect/Counterfeit Items Guide...
- IDEA Std-1010-A, Acceptability of Electronic Components Distributed on the Open Market
- SAE AS5553, Counterfeit Electronic Parts; Avoidance, Detection, Mitigation, and Disposition
- SEMI
 - SEMI T20-Specification for Authentication of Semiconductors and Related Products
 - SEMI T20.1-Specification for Object Labeling to Authenticate Semiconductors and Related Products in an Open Market
 - SEMI T20.2 -Guide for Qualifications of Authentication Service Bodies for Detecting and Preventing Counterfeiting of Semiconductors and Related Products

??? QUESTIONS ???



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