American Competitiveness Institute

Mechanical Shock, Humidity, Salt Fog And Lead Residue Testing

September 21, 2004

- Agenda

- Salt Atmosphere Testing Status
- Humidity Testing Status
- Mechanical Shock / Vibration Testing Status
- Lead Residue Testing Status

- Salt Atmosphere Test Status

- **Salt Atmosphere Testing Performed September, 2004**
  - *Based on ASTM B117 Test Method for 48 hours*
  - *SnPb Boards: Serial Numbers 35, 36, 37*
  - *SnAgCu Boards: Serial Numbers 104, 105, 106*
  - *SnAgCuBi Boards: Serial Numbers 143, 144, 145*

- **All Passed Salt Atmosphere Testing**
  - *Checked continuity on specific packages*
  - *Found some failures prior to the test*
  - *Found no failures after test*
  - *Report to be generated*

- Temperature Humidity Test Status

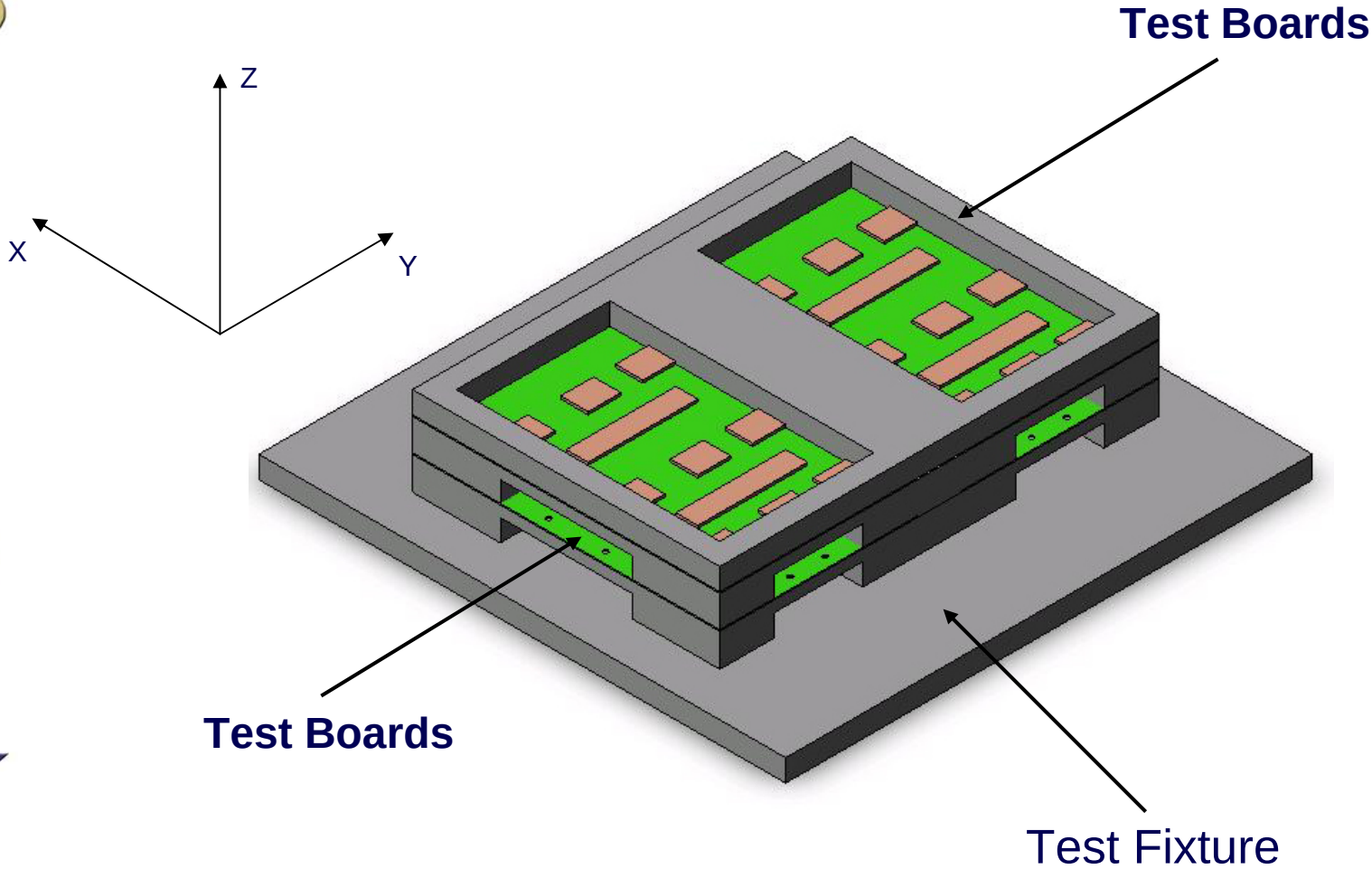
- Temperature Humidity Testing Being Scheduled
  - *Based on MIL-STD 810F; Test Method 507.4*
  - *SnPb Boards: Serial Numbers 38, 39, 40*
  - *SnAgCu Boards: Serial Numbers 107, 108, 109*
  - *SnAgCuBi Boards: Serial Numbers 146, 147, 148*

- Will Check Continuity Prior To Testing

- Mechanical Shock / Vibration Test Status

- **Test Procedure Approved**
  - Tooling being designed and manufactured
  - Anatech System being ordered
- **All Boards Received**
- **Pathfinder Boards Identified**
  - *SnPb Boards: Serial Numbers 25, 61*
  - *Used to set-up test fixtures at BAE Systems*
- **Testing being scheduled with BAE Systems**
  - Will notify team when tests will be performed

Mechanical Shock, Humidity, Salt Fog And Lead Residue Testing



- Mechanical Shock / Vibration Test Status

- **Mechanical Shock Test Set 1**
  - *MIL-STD 810F; Method 516.5; Procedure 1*

- **Boards Identified**
  - *SnPb Boards: Serial Numbers 26, 27, 62, 63*
  - *SnAgCu Boards: Serial Numbers 95, 96, 151, 168*
  - *SnAgCuBi Boards: Serial Numbers 134, 135, 196, 197*

- Mechanical Shock / Vibration Test Status

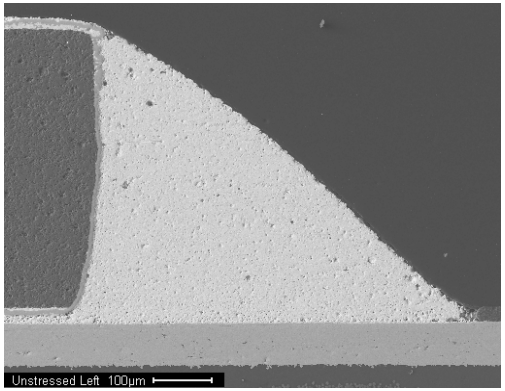
- **Mechanical Shock Test Set 2**
  - *Modified version of MIL-STD 810F; Method 516.5; Procedure 1*
  - *Hardware will be tested to failure*

- **Boards Identified**
  - *SnPb Boards: Serial Numbers 28, 29, 64, 65*
  - *SnAgCu Boards: Serial Numbers 97, 98, 170, 171*
  - *SnAgCuBi Boards: Serial Numbers 136, 137, 198, 199*

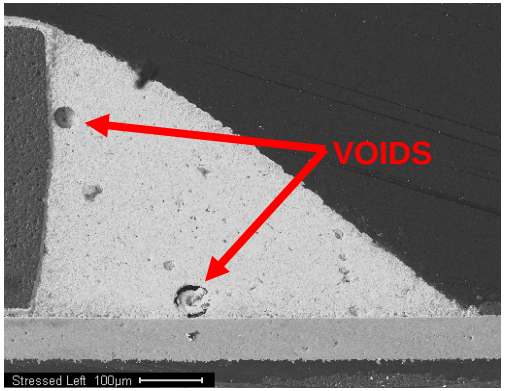
- Lead Residue Test Status

- **Metallurgy Analysis**
  - *Microsectioning*
  - *Determine what intermetallics are in Lead Free solder joints*

- **Examples of Lead Free Intermetallics**
  - *ACI Lockheed Martin Lead Free Solder Rapid Response Project*
  - *Hardware experienced 126 thermal cycles; -55°C to 125°C*

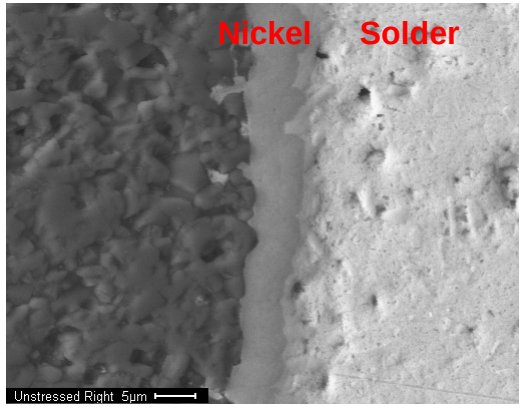


Unstressed Solder Joint

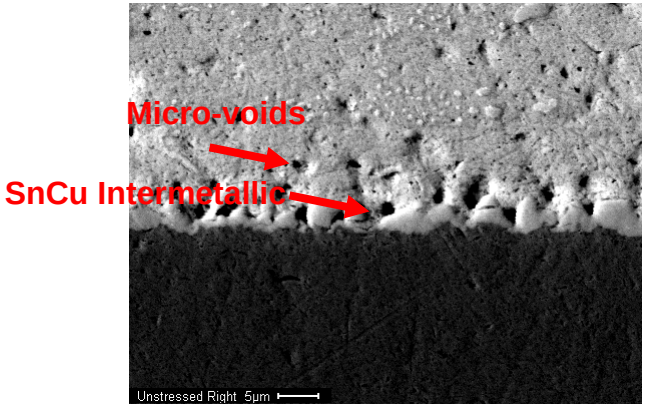


Stressed Solder Joint

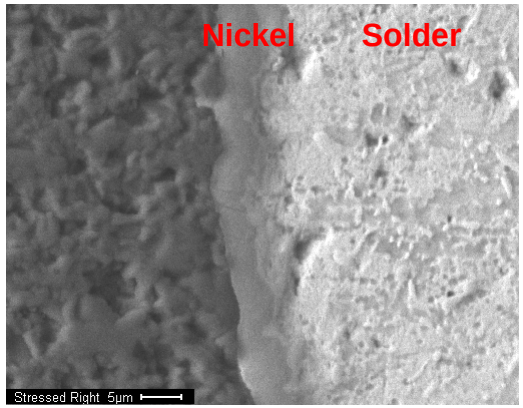
- Lead Residue Test Status



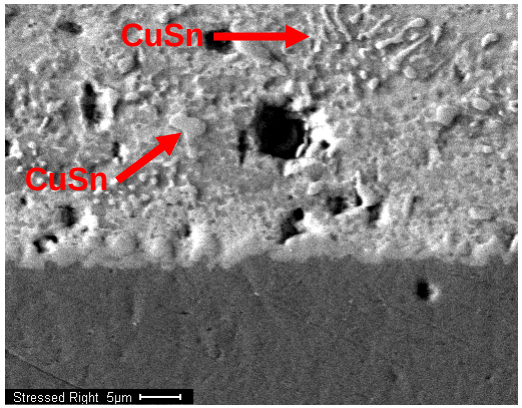
Unstressed Component Interface



Unstressed Pad Interface



Stressed Component Interface



Stressed Pad Interface