iNEMI

International Electronics Manufacturing Initiative

Keeping industry reliability test protocols current with rapidly changing markets

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APEX
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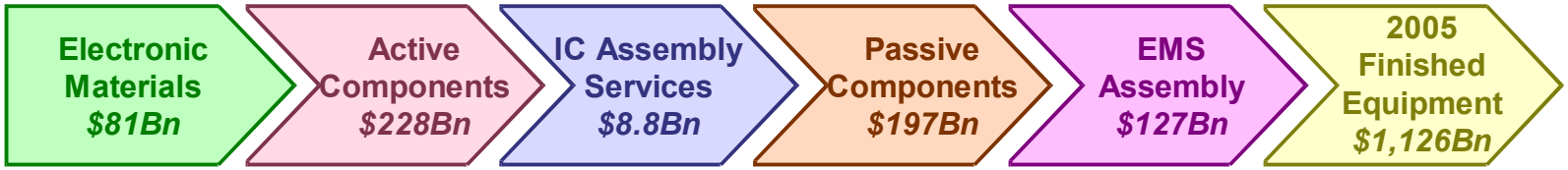
Advancing manufacturing technology

Situation Analysis: 2007 iNEMI Roadmap

- Growth of Automotive Electronics
- Market Convergence
  - Medical-Consumer
  - Automotive-Entertainment
  - Communication-Entertainment
  - Computing-Entertainment
  - Military-Consumer
- Divergence in Hand Held Devices
  - Low cost low function devices
  - High fashion, high end, high function devices
- Miniaturization and Thinner
- Improve Quality
- NPI limited by environmental regulatory requirements
- R&D moving to lower cost regions/emerging markets
- Shortage of qualified staff

VALUE CREATION IN THE SUPPLY CHAIN

ls17.034bes-chain



	Electronic Materials $81Bn	Active Components $228Bn	IC Assembly Services $8.8Bn	Passive Components $197Bn	EMS Assembly $127Bn	2005 Finished Equipment $1,126Bn
Typical Companies	Sumitomo Bakelite, DuPont, Ablestik	Intel, STMicro, LSI Logic	Amkor, ASE, SPIL	Tyco, Molex, AVX, Sharp	Solectron, Sanmina-SCI, Flextronics	Dell, HP, Cisco, Nokia, Teradyne, Visteon, Siemens
Gross Margin	30%	45%	17%	25%	6%	30%
Operating Margin	10%	15%	8%	8%	2%	8%
R&D	7%	15%	2%	5%	< 1%	8%
Margin Value	$8Bn	$34Bn	$0.7Bn	$16Bn	$3Bn	$90Bn
R&D Value	$6Bn	$34Bn	$0.2Bn	$10Bn	$1Bn	$90Bn
%Total R&D	4%	24%				64%

Customer Expectations are in conflict as products merge and markets change

- Consumer-Large Market- Example DVD Player
  - Quality
  - Reliability
  - Product Life
- Commercial- Medium Market-Broadband Communications
  - Quality
  - Reliability
  - Product Life
- Military- Small Market-Electronics for the Soldier
  - Quality
  - Reliability
  - Product Life

Changing Landscape

- **Use Conditions**
  - **Thermal Environment- How many products see 6000 cycles 0-100C?**
  - **Humidity-Moisture**
  - **Mechanical Stress (Drop Test, Bend Test)**
  - **Vibration (Automotive)**
- **Technology**
  - **Material changes for environment**
    - **Pb-free**
    - **Halogen free**
  - **Miniaturization driving**
    - **Tighter pitch**
    - **New packaging structures**
    - **New Materials**

The Objective: Risk Minimization

- Reliability Risks are identified throughout the 2007 iNEMI Roadmap by both the PEGs (Product Sectors) and TWGS (Technology Roadmaps)
- Significant increase in reliability issues from previous roadmaps

New Technology Changes Reliability Concerns

- Example Change from Eutectic Sn-Pb to SAC
  - Drop Test
  - Flexure
  - Thermal Cycling

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iNEMI Reliability Activities

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Pb-Free Reliability Activities
Bifurcation of the industry

- All Products
  - Tin whisker projects
  - Rework projects
- Consumer Products
  - Optimize Processes and Materials
  - Reduce Cost
  - Increase Yield and Throughput
- High-Reliability Products
  - Taking the Pb exemption has changed the risk profile for High Reliability producers.
  - The components supply chain has rapidly converted to RoHS compliant offerings (Pb-free) with little motivation to continue to produce SnPb product.
  - Activities are underway to provide the industry with better understanding of Pb-free risks in high-reliability applications
  - Initiatives are being developed to understand and resolve risks

Other Reliability Activities/Concerns

- **Medical Electronics**
  - **Component Reliability Specifications Project**
  - **SCOPE: Test and extrapolation methodologies for electronics components leading to non-prescriptive specifications for medical reliability assessment**
- **System in Packaging**
  - **The reliability of SiP based technologies which are critical for the miniaturization of electronics and the continued growth of the consumer electronics market is not well understood by industry**
    - **There are no well defined reliability test standards**
    - **There is limited industry wide data on the reliability of these new technologies under various use conditions**
    - **There is limited characterization data available on the types of failure mechanism and related test methods for acceleration of failure mechanisms**

Summary

- The Markets are changing
- The Products are changing
- Failure Modes are changing
- Risks are changing
- Reliability Standards must:
  - Address the expectations of the Customer
  - Reduce the risk of the OEM
  - Reduce the risks throughout the supply chain
- Reliability Test Methodologies must:
  - Be correlated with known failure modes
  - Minimize real risks throughout the supply chain.
  - Be Risk-Benefit effective
  - Provide quick response
- We Need a Major Change in our Methodologies
- To succeed we must prioritize and focus our efforts

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