Programs and Their Value

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Evolution of iNEMI

- Our industry is going through fundamental change.
- iNEMI is changing to deal with this in a way that:
  - Continues to add value/be relevant to members
  - Continues to add value/be relevant to industry
- Our early focus had been on North American region.
- Our strategy favors volume manufacturing as the activity where change can be effected:
  - Technology development/deployment
  - Supply Chain integration
- As volume manufacturing continues to migrate we have:
  - broadened our geographic reach
  - modified our thrust areas for collaboration.
Methodology

Available to Market Place

Competitive Solutions

Research

GAP Analysis

Projects

Technology Evolution

Product Needs

Disruptive Technology

Government

Academia

iNEMI Members Collaborate

Global Industry Participation

No Work Required

Industry Solution Needed

Advancing manufacturing technology
2009 Technology Working Groups (TWGs)

- Organic Substrates
- RF Components & Subsystems
- Optoelectronics
- Optoelectronics
- Packaging
- Ceramic Substrates
- Board Assembly
- Final Assembly
- Customer
- Test, Inspection & Measurement
- Thermal Management
- Environmentally Conscious Electronics

- Modeling, Simulation, and Design
- Solid State Illumination
- Organic & Printed Electronics
- Semiconductor Technology
- Connectors
- Sensors
- Passive Components
- Mass Storage (Magnetic & Optical)
- Energy Storage Systems

Red=Business Green=Engineering Blue=Manufacturing Blue=Component & Subsystem
9 Contributing Organizations

Interconnect Substrates—Ceramic

iNEMI / ITRS Packaging TWG

Interconnect Substrates—Organic

iNEMI / IPC/JIEP Interconnect TWG

Supply Chain Management

iNEMI Roadmap

iNEMI Board Assy TWG

Magnetic and Optical Storage

iNEMI Optoelectronics TWG

Optoelectronics and Optical Storage

iNEMI Mass Data Storage TWG

Advancing manufacturing technology
2009 Roadmap

• 20 Technology Working Groups (TWGs)
  (New Roadmap on Solid State Illumination)
• 5 Product Emulator Groups (PEGs)
• Roadmaps the needs for 2009-2019
2009 Roadmap Schedule

- November 13, 2007 – Roadmap kick-off Europe, Productronica
- February 20-21, 2008 PEG Workshop/TWG Kick-off, Santa Clara, CA:
  - May 14, 2008 – North American Roadmap Workshop, Herndon, VA
  - June 2008 – European Roadmap Workshop
  - June 2008 – Asian Roadmap Workshop - China
- August 6-7, 2008 – TC Review with TWG Chairs, Liberty Lake, WA
- September 22, 2008 – Final Chapters of Roadmap Due
- December, 2008 – Roadmap Released to iNEMI Members
- April, 2009 – Industry presentation at APEX
Roadmapping

• iNEMI roadmaps technology in 20 different areas.
• Each roadmap chapter is created by a Technology Working Group (TWG).

Deployment

• iNEMI has technology deployment activities in 7 different areas.
• Each project area is organized by a Technology Integration Group (TIG).
• Projects address technology and business gaps.

Roadmap and project groups are made up of industry people (including leadership).
**Miniaturation Thrust Area**

**Goal:** Provide the customer maximum product value in the smallest possible form factor

### Strategy:
- Minimize product size by converting substrate from a space transformer to a circuit element
- Minimize substrate & assembly conversion costs to shrink product costs
- Expand product capabilities by adding intelligence to component type products yielding new applications
- Enhance global testing and manufacturing processes

### Tactics
- Develop advanced PWB and assembly technologies that increase substrate and component packing density
- Develop new materials systems & assembly processes
- Introduce smart technology & software into component type products
- Create methodology that enables reliable comparison of test coverage between test environments, revisions, & assessors
- Create & disseminate industry roadmaps
- Manage increased heat densities to enhance reliability

### Impact
- Increased product throughput while minimizing capital investment
- Increase manufacturing margins
- Enable new value added product applications with increased margins
- Enables more informed decision making on issues pertaining to test.
- Establish efficient supply chains to meet industry growth rates
## Energy and the Environment Thrust Area

**Goal:** Provide low cost electronic assembly processes that encompass environmental attributes, meet current and future regulations, are sustainable & energy efficient

### Strategy:

- Create a proactive stance in the electronics industry to evaluate environmental impact with stakeholders
- Increase global communication and cooperation within industry regarding recycling challenges
- Promote basic principles for effective energy efficiency requirements
- Increase technology input to government policy making on material & energy restrictions

### Tactics

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<tr>
<th>Tactics</th>
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<tr>
<td>• Conduct R&amp;D to create a sustainable infrastructure and viable recycled materials market for use in new products and other applications</td>
<td>• New revenue streams to support recycling efforts</td>
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<td>• Develop Product Lifecycle Integration Management (PLIM) standards to expected energy reporting requirements</td>
<td>• Provides assessment methodology to support decision making</td>
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<td>• Develop solutions to compliance requirements that are transparent, implementable, and not unnecessarily burdensome</td>
<td>• Reduce energy usage</td>
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<td>• Create &amp; disseminate industry roadmaps to drive technology development</td>
<td>• Minimize risk of both negative environmental performance and business disruption</td>
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<td>• Establish efficient supply chains to meet industry growth rates</td>
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Medical Electronics Thrust Area

**Goal:** Provide the patient and medical community with seamless end-to-end solutions for improved health management

**Strategy:**
- Wirelessly connect implantable devices, portable devices and diagnostic imaging tools for clinical and home-health monitoring.
- Increase substrate and component packing density for producing small, easy to use, cost effective medical devices.
- Increase device reliability for long term product life cycles.

**Tactics**
- Develop modeling tools to understand RF traffic issues in the wireless clinical and home-health environment.
- Develop advanced PWB technologies that address the performance & I/O density requirements of medical devices.
- Develop component reliability standards & test methods that address the unique performance requirements and use environments that characterize the medical products sector.
- Create & disseminate industry roadmaps to drive technology development.

**Impact**
- Reduce paperwork and recording errors between patient and care-giver.
- Enable new cost effective device designs, products and treatments.
- Reduce time investment for medical approvals by governmental agencies.
- Establish efficient supply chains to meet industry growth rates.
The “i” in iNEMI: a Phased Approach

Advancing manufacturing technology
Phase 1 – Global Roadmapping

Key goals:
- Expand roadmap process to create global view of future
- Explore regional deployment collaboration using China as vehicle

Operational strategy:
- Targeted approach to global best-in-class roadmap input
- Regional collaboration within existing membership

Success criteria:
- Acceptance of Roadmap as global document
- Regional collaboration within membership
Phase 2 – Regional Collaboration

Key goals:
• Strengthen global roadmapping and gap analysis
• Establish regional centers of collaboration

Operational strategy:
• Attract suppliers through regional centers
• Formal alliances with regional organizations

Success criteria:
• Acceptance of Roadmap as the global leader for manufacturing
• Successful integration of regional firms as members
2007

- Opened an office in Shanghai and added a team member in Europe.

- Dr. Haley Fu is leading operations in Asia.

- Grace O’Malley is representing us in Europe from her base in Ireland.
iNEMI
International Electronics Manufacturing Initiative

iNEMI Value

Advancing manufacturing technology
“Connect with and Strengthen Your Supply Chain”

- iNEMI offers the opportunity to collaborate with the entire supply chain in an efficient manner
  - To understand and accelerate strategic directions
  - To define future needs and opportunities
  - To jointly create industry standard solutions.
  - Today’s increasingly distributed supply chain makes collaboration more important than ever.
- iNEMI is a “virtual organization” that adapts to industry changes and provides timely leadership.
- iNEMI provides Important deliverables:
  1. Technology roadmaps
  2. Forums on Key industry issues: Today’s Forum is an example
  3. Deployment projects
iNEMI’s Highest Value Product

- Roadmapping
  - Global acceptance as the source that provides systems view of electronics manufacturing – published biennially.
  - Coordinated with other major organizations: ITRS, IPC, JIEP, IMAPS, OIDA, NSIC, SMTA, IEEE/CPMT.
  - Has accurately predicted importance of a number of manufacturing technologies (e.g. Microvia PWB, open systems architectures in mfg. software, Pb-free assy).
  - Broad industry view (2007 version created by 500+ people from 265 companies/organizations):
    - Participating from 17 countries
    - Across 4 continents
  - Evolving to address changing priorities: Supply Chain Management, Environmentally Conscious Electronics, Challenges of distributed manufacturing model.
Examples of iNEMI Project Results: Value to Members and Industry

• Meet Product sector Needs for Miniaturization:
  – High Density Interconnect 1996-1999
  – Infrastructure for Embedded Passives 2000-2003

• Improve Manufacturing Efficiency:
  – Manufacturing standards for Optical Interconnect 2000-Present

• Help Industry Address Challenges of Materials Restrictions:
  – Supply Chain Readiness for RoHS/WEEE 2003-Present
  – Transition to Pb-free assembly 1999-Present
Transition to Pb-free Assembly
Will be Discussed in Detail at Forum

• 1998 Roadmap Identified the Gap
• Phase I Project developed the alloy, process, components and reliability from 1999-2002
• Phase II Project expanded the technology base to include rework, wave-soldering, and reliability of lead finishes
• Phase III Project teams addressed these supply chain transition issues identified in the 2002 Roadmap
• Phase IV Projects worked to optimize and standardize manufacturing processes
• Phase V Projects are currently addressing the needs for High Reliability Products

Results:
• The iNEMI efforts have accelerated the establishment of SAC alloys as the standard and reduced the effort in each member company.
iNEMI Strengths

- Strong support of member companies at senior levels.
- Technology roadmaps known and used on world wide basis.
  - Evolution of existing technologies
  - Predictions of disruptive/break-through technologies
- Proven track record/methodology to conduct collaboration across the supply chain.
  - Focus on challenges identified in Roadmap that are best addressed by working together
  - Address issues/gaps related to technology development & deployment
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