iNEMI
International Electronics Manufacturing Initiative

iNEMI Halogen-Free PCB Follow-On Project Proposal

Stephen Tisdale
Intel Corporation
April 2, 2008

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Project Management

Project Formation

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Project Formation

- The development of a new project and its Statement of Work (SOW) is open to all members of industry (iNEMI members and non-members)
- Non-members can participate in developing the SOW as long as they support the goals of iNEMI and actively contribute to the development of the SOW
- Non-members will have 45 days to join iNEMI members and be a founding member of the project after the SOW is completed and the project statement circulated to members for signature
- OEM and EMS firms must be iNEMI Members to participate in the project

Project Formation

- **The following issues should be evaluated during the formation phase before committing to go forward with a project**
  - **Is there enough interest in the project to ensure a critical mass?**
  - **Is there enough diversity of interest? (It is preferable to have suppliers, users, and customers all represented)**
  - **Is there redundancy in sources of project needs so that if one or more participants drop out, the project will still have enough support?**
  - **Does the project team have a willing and capable mentor who is either a member of the TC or an iNEMI staff member?**
  - **Will the project include non-member suppliers? If so, what critical capability will they provide? What information will they receive?**

iNEMI Halogen-Free PCB Follow-On Project Proposal

Overall Project Objectives:

- Build on industry knowledge and capability
  - iNEMI HF PCB Project
  - Other Projects
- Consider unique market segment requirements
- Identify technology readiness and gaps
- Stimulate supply capability
- Determine HF board level reliability for various components

3 - Phase Approach:

1. Design
2. Test
3. Results

iNEMI Halogen-Free Follow-On Project Proposal

IS / IS NOT

This Project IS:	This Project IS NOT:
Technical evaluation of key electrical and mechanical properties	An EHS assessment
Focused on those attributes which are of most value to supply chain	Biased towards specific laminate suppliers, geographies, or market segments
Build on learning from prior investigations	Repeat of prior work
Focused on completely HF SMT and Wave Solder Assembly & Rework Capability	Focused on standard processing
Focused on circuit board materials and solder joint reliability – Board / Component Interaction	Focused only on materials characterization

Phase 1: Design

Goal: *Review prior work and make recommendations for testing needed. Investigation should take into account the needs of electronic product sectors represented by iNEMI membership*

- **Identify market segment requirements**
- **Identify candidate materials**
- **Identify key performance characteristics and test criteria**
- **Design test vehicle(s) and test methodologies, leverage standards where possible**

Phase 2: Test

Goal: *Develop, manage, and execute performance testing*

- **Develop evaluation schedule**
- **Procure parts and test vehicles**
- **Assign teams to carry out completion of the testing in a standardized fashion**

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- **Perform mechanical and reliability testing on test vehicles**

Phase 3: Results

Goal: *Compile results, assess significance, make recommendations, and publish report*

- **Assess performance relative to market segment requirements**
- **Assess technology readiness / identify gaps**
- **Assess manufacturing capability and supply capacity**
- **Publish results**

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Anticipated Outcomes

- **Validate electrical and mechanical properties**
  - **Loss tangent and Dk modeling over required range of signal speed**
  - **Mechanical performance validation for lead free assembly and rework (delamination)**
  - **Critical Test Parameter Evaluation (CAF, IST, flex, etc.)**
- **Validate board level reliability capability**
  - **PCB modulus / thickness impact on mechanical capability**
  - **HF board level assy / rework process characterization**
  - **Mechanical characteristics (pad crater / ball pull etc)**
  - **CTE characteristics**
  - **SJR (shock / TC etc)**
  - **HF component / HF PCB**
  - **nHF component / HF PCB**

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Proposed Project Schedule

Project Formation

- **Begin SOW Development** **IPC / APEX FTF (April 2, 2008)**
- **Formalize Project** **TBD**

iNEMI Technical Committee Review and Approval

Project Execution

- **Phase 1 (Design)** **TBD**
- **Phase 2 (Test)** **TBD**
- **Phase 3 (Results)** **TBD**
- **Release Results** **TBD**

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Program Management

Statement of Work (SOW)

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iNEMI Statement of Work – Basic Information

- **Scope of Work – definition of what is to be done**
- **Purpose of Project – explanation of how the project addresses an industry need and how the project is aligned to the roadmap and technical plan**
- **Previous Related Work – review any related research or development done within the industry**
- **Participants – list all interested participants and their companies**
- **Intellectual Property (IP) – list any know background (IP) for each participant**
- **Project Planning – detailed description of what will be done (see next page for more detail)**

NOTE: All changes to SOW must be approved by the TC (version control)

iNEMI Statement of Work – Project Planning

- **Project Plan – a detailed description of what will be done including:**
  - **Resources**
  - **Materials and Processes**
  - **Testing Procedures (if applicable)**
  - **Schedules with milestones**
  - **Project monitoring plans**
  - **Outcome of the project**
- **Final Project Plan can be submitted after preliminary approval of the project, since it takes time to generate and revise the plan based on input from the TC and final team members**

NOTE: All changes to SOW must be approved by the TC (version control)

Reference Information

iNEMI Statement of Work – Basic Information

- **Scope of Work – definition of what is to be done**
  - **Expected deliverables**
  - **Major project goals; does the project seed a global solution or is the purpose of the project to contribute one part of a solution to a complex problem?**
  - **If the project is complex, it should be divided into phases and a description of what comprises each phase should be provided**
- **Purpose of Project**
  - **Explanation of how the project addresses an industry need and how the project is aligned to the roadmap and technical plan**
  - **Discuss the approach to design of experiments that the project will use to ensure reliability, accuracy, and statistical significance of results (Research Projects)**
  - **List all standards bodies considered for the project, explain how each was evaluated and justify the final choice of organization(s) (Specification Projects)**

NOTE: All changes to SOW must be approved by the TC (version control)

iNEMI Statement of Work (SOW)

- **Previous Related Work**
  - **Review any related research or development done within the industry**
  - **Summarize, briefly, directly related academic research, if any**
- **Participants**
  - **List all interested participants and their companies**
  - **State role and expected contributions of each project team member**
  - **Advantages expected for participants, iNEMI members in general, and the industry**

NOTE: All changes to SOW must be approved by the TC (version control)

iNEMI Statement of Work (SOW)

- **List any know background Intellectual Property (IP) for each participant**
  - **Research Projects should address both background and foreground IP due to exploratory nature of projects**
- **Anticipated time to completion, required to be 6 – 12 months, not including Accelerated Life Testing (ALT)**

NOTE: All changes to SOW must be approved by the TC (version control)

iNEMI Statement of Work – Project Planning

- **The final Project Plan can be submitted after preliminary approval of the project, since it takes time to generate and revise the plan based on input from the TC and final team members**
- **Project Plan – a detailed description of what will be done including:**
  - **Resources**
  - **Materials and Processes**
  - **Testing Procedures (if applicable)**
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  - **Outcome of the project**

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Statement of Work – Project Planning

Resources

- Detailed list of resource needs and expenditures expected for the project, including:
  - Human resources
  - Equipment
  - Money
- List of committed resources from participating companies
- State source of funding for any components, assembly, design, and testing needs
  - Funding alternatives include
    - Participant donation
    - Supplier donation
    - iNEMI direct funding

Statement of Work – Project Planning

Materials and Processes

- Identify materials to be used
- Describe any processes to be used, including applicable standards and specifications
- Identify specific suppliers or technologies required and reasons for the requirement
- When custom components are necessary, state which project participant is responsible for assuming this cost
- Standard processes and materials should be used whenever possible to reduce costs, improve yields, and assure widest applicability of results within the industry
- Justification is needed if non-standard materials or processes are to be used
- Specify and describe any non-standard materials or processes

Statement of Work – Project Planning

Testing Procedures

- State anticipated number of parts to be tested
- Use IPC 9701 0-100C as baseline ATC unless justification can be given for alternate test parameters
- For test vehicle design and fabrication, recommend using reference components that have been ATC tested on previous projects be used to provide a baseline and facilitate comparison of results
- Use standard design practices and commonly used software to reduce costs and widen applicability of results
- At what stages will testing be done along with time needed

Statement of Work – Project Planning

Schedules With Milestones

- **Project plan with**
  - **Identified tasks**
  - **Intermediate check points**
  - **End dates**
- **A detailed timeline, including each project activity**
- **Content and dates for:**
  - **Technical reviews (2 per year)**
  - **Progress reports**

Statement of Work – Project Planning

Project Monitoring Plans

- Plan to ensure open lines of communication among participants?
  - Provide planned teleconference schedule
  - Request progress reports as tasks are completed
- Review project requirements with prospective team members and suppliers before the project begins
- Use opportunity analysis to identify new areas or topics that might be addressed in additional projects
  - To prevent scope of the current project from expanding keep project focused on original goals
- Practice risk analysis by anticipating problems and having alternate solutions ready
- Provide regular updates to Technical Committee

www.inemi.org

Email contacts:

Jim McElroy

jmcelroy@inemi.org

Bob Pfahl

bob.pfahl@inemi.org