IPC Standardization

Case Study of the Consensus Process
David W. Bergman, VP International Relations
IPC Overview

• Founded in 1957 as the Institute of Printed Circuits with 6 Member Companies

• Strong Foundation as Technical Organization Dedicated to Meeting Industry Needs

• Focus on Design, PCB Manufacturing and Electronics Assembly
## IPC Membership

### Type

2,771 Member Companies

- **PCB Manufacturers**: 282 (10%)
- **EMS Companies**: 645 (23%)
- **Suppliers**: 707 (26%)
- **OEMs**: 888 (32%)
- **Government/Others**: 249 (9%)

As of: December 31, 2010
Members located in 56 Countries

- 73% North America
- 12% Asia
- 13% Europe
- 2% Other
IPC Technical Committees

- 26 General Committees
- 200 Subcommittees and Task Groups
  - Consist of industry peers
  - Started writing standards in 1959
  - ANSI recognized since 1981
  - Managed by Technical Activities Executive Committee (TAEC)
IPC and ANSI

- IPC’s procedures were reviewed by ANSI and approved in 1981
- IPC procedures are audited by ANSI every 5 years
- IPC’s focus is NOT to write American standards but rather Global standards with best standards development practices
ANSI’s key philosophy points

- Open, fair, equal, transparency
- Any individual can challenge the group
- Ensures a documented process, and that all comments receive response
- Documents successfully passed through this process represent an industry consensus
ANSI Requirements

• Documents must be supported
  – Reviewed or revised every 5 years
  – Official interpretation/clarification of intent

• IPC supports this with staff, chairmen, email forums and committee experts

• In China TgAsia@ipc.org is actively used for manufacturing support and standards questions
IPC Standards and Environmental Legislation
Maximum Concentration Values

- Maximum Concentration Values (MCVs) established by Technical Advisory Committee

<table>
<thead>
<tr>
<th>Substance</th>
<th>MCV</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lead</td>
<td>0.1 %</td>
</tr>
<tr>
<td>Mercury</td>
<td>0.1 %</td>
</tr>
<tr>
<td>Cadmium</td>
<td>0.01%</td>
</tr>
<tr>
<td>Hexavalent Chromium</td>
<td>0.1 %</td>
</tr>
<tr>
<td>Penta-, Octa- and DecaBDE</td>
<td>0.1 %</td>
</tr>
<tr>
<td>PBBs</td>
<td>0.1 %</td>
</tr>
</tbody>
</table>

- De-minimis concentrations or maximum concentration value (MCV) defined at the homogeneous materials level
RoHS Additional Substances for Restriction

Commission

• Oko Institute hired to study need for additional substance restrictions
• Draft Oko report called for broad restriction of organo-halogens and many other compounds
• IPC workshop and lobbying
IPC Advocacy

- TBBPA has undergone a comprehensive EU risk assessment that determined it to be safe for the environment and human health
- Is not expected to be restricted under REACH
- Precedent of restricting a substance for political instead of scientific reasons
- Additional substance restriction under RoHS should be based on scientific methodology instead of continuing arbitrary substance restrictions
- Should Align RoHS and REACH methodologies
RoHS Additional Substances for Restriction

EU Commission

- No Substances proposed for immediate restriction
- Four REACH Substances of Very High Concern (SVHCs) recommended for “Priority Assessment”
  - HBCDD (Hexabromocyclododecane)
  - DEHP (Bis (2-ethylhexyl) phthalate)
  - BBP (Butyl benzyl phthalate)
  - DBP (Dibutyl phthalate)
- TBBPA not included as a result of IPC lobbying
Drivers for Removal of Halogens

- Concern by some stakeholders over environmental and human health impacts
- Certain BFRs are toxic (PBBs, PBDEs)
  - Structural similarities between many BFRs and Polychlorinated Biphenyls (PCBs),
  - Precautionary principle applied to all BFRs
- EOL combustion byproducts
  - Incomplete combustion of halogens creates dioxin
  - Prevalent in uncontrolled burning
Drivers for Removal of Halogens

- Strong Opposition to BFRs by Environmental Groups
- Marketing campaign targeting computer manufacturers
  - Computer Takeback
  - Silicon Valley Toxics
  - Greenpeace
Drivers for Removal of Halogens

- OEMs now seeking “halogen-free” solutions/pushing down their supply chains
- Major OEMs announce elimination of bromine
  - Apple (PVC and BFR by the end of 2008)
  - Dell (BFR 2009)
  - HP (BFR and PVC 2009)
JEP-709 – A Guideline for Defining Low-Halogen Solid State Devices

Curtis Grosskopf
IBM Corp.
Chairman, JEDEC JC14.4
Impetus for a document

- Existing IPC 4101 and IEC 61249-2 documents, but their scope only covered PCB Laminates
- Possibility of legislation restricting use of brominated and chlorinated flame retardants (BFRs & CFRs) as well as polyvinyl chloride (PVC).
- Availability and growing use of ‘halogen free’ flame retardants and other materials in certain electronic products & components
- Diverging definitions of ‘halogen-free’ & ‘green’
Background on effort for joint document

- Joint IPC/JEDEC document: J-STD-709
  - IPC Task Group 4-33a
  - JEDEC JC14.4 committee
- Joint working group formed 2007,
  - Co-chairs:
    - Stephen Tisdale – Intel
    - Scott O’Connell – (formerly) Dell
  - Very large participation from all areas of the electronics industry
Background on effort for joint document

- Original scope of document
  - Covered all uses of chlorine (Cl) and bromine (Br)
  - Applied at a homogeneous material level
  - ‘All materials and parts’ used in electronic equipment
    - Mechanical plastics
    - Cables
    - Printed circuit boards
    - Electronic components
    - Connectors
    - Films, adhesives, tapes
    - Vibration dampening parts
    - Solder fluxes
  - Same threshold definitions (900ppm) as used by IPC 4101, IEC 61249-2, and JPCA-ES-01-1999.
Main points of debate within working group

- What is the threshold limit applied to?
  - Homogenous material
    - Alignment with EU RoHS
  - Article
    - Alignment with EU REACH
  - Component
    - Alignment with IPC terms and definitions
- Final decision was to apply threshold to all plastic materials in the product.
Main points of debate within working group

• Proposed multiple tier approach
  – Elemental
    • Ease of verification
  – BFRs, CFRs, and PVC
    • Alignment with environmental and health concerns
    • Alignment with possible legislation

• Final decision was single tier approach and only cover BFRs, CFRs, and PVC.
End of joint working group

- IPC membership divided on document
  - No IPC ballot ever had enough ‘Yes’ votes to pass
  - A group of IPC voting members did not believe in the need of this document, and stated they would always vote ‘No’ on every ballot
  - Co-chairs agreed to step down, but no volunteers

- JEDEC membership had approved all ballots
- IPC agreed to allow JEDEC to release the document as a ‘JEDEC only’ publication.
- Sept. 2009, JC14.4 agreed to solely own JEP-709
IPC 175x Standard
V1.1 and V2.0 comparisons

Date: 20 Jul 2010

Co-Chairs:
Eric Simmon - NIST
Mark Frimann – Texas Instruments
IPC 175x Advantages
Over Current Data Request Formats

- 100's - 1000's of Different Types of forms coming from customers

Data can reside in ANY format

Supplier (Sender)  IPC 175x XML FORMAT  Customer (Requestor)

1. Current methods for data requests
   - There are almost as many different types of forms as there are customers needing data

2. Using the IPC 175x format allows 2 ways to exchange data
   - Customer sending the form and Supplier fills in data (return form or XML data)
   - Automation possible by using it as a data translator from Supplier database to Customer database
     - Supplier uploads data being requested - Customer downloads information into their database

Data can reside in ANY format

Time Consuming Efforts to understand and fill in forms
<table>
<thead>
<tr>
<th>Requester Information</th>
<th>Supplier Information</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Company Name</strong></td>
<td><strong>Company Name</strong></td>
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<tr>
<td>ABC Industries</td>
<td>Texas Instruments</td>
</tr>
<tr>
<td><strong>Contact Name</strong></td>
<td><strong>Contact Name</strong></td>
</tr>
<tr>
<td>Alan B. Company</td>
<td>Mark Frimann</td>
</tr>
<tr>
<td><strong>Contact Title</strong></td>
<td><strong>Title - Contact</strong></td>
</tr>
<tr>
<td>ESH Coordinator</td>
<td>SLL CQE Manager</td>
</tr>
<tr>
<td><strong>Contact Phone</strong></td>
<td><strong>Phone - Contact</strong></td>
</tr>
<tr>
<td>999-888-7777</td>
<td>903-868-7291</td>
</tr>
<tr>
<td><strong>Contact Email</strong></td>
<td><strong>Email - Contact</strong></td>
</tr>
<tr>
<td><a href="mailto:alan.b.company@abci.org">alan.b.company@abci.org</a></td>
<td><a href="mailto:m-frimann@ti.com">m-frimann@ti.com</a></td>
</tr>
<tr>
<td><strong>My supplier ID</strong></td>
<td><strong>Title - Representative</strong></td>
</tr>
<tr>
<td></td>
<td>SLL CQE Manager</td>
</tr>
<tr>
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<td><strong>Phone - Representative</strong></td>
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<td></td>
<td>903-868-7291</td>
</tr>
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<td><strong>Request Date</strong></td>
<td><strong>Email - Representative</strong></td>
</tr>
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<td><strong>Request Document ID</strong></td>
<td><strong>Supplier Comments or URL for Additional Information</strong></td>
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<td><strong>Duplicate</strong></td>
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<tr>
<td>2006-08-07</td>
<td>Contact -&gt; Authorized Representative</td>
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<table>
<thead>
<tr>
<th>Item Number</th>
<th>Item Name</th>
<th>Mfr Item Number</th>
<th>Mfr Item Name</th>
<th>Mfr Item Version</th>
<th>Manufacturing Site</th>
</tr>
</thead>
<tbody>
<tr>
<td>1111-1111</td>
<td>SN74HC04DR</td>
<td>Logic IC</td>
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<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Manufacturing Process Information</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Terminal Plating / Grid Array Material</td>
</tr>
<tr>
<td>Nickel/Palladium/Gold (Ni/Pd/Au)</td>
</tr>
</tbody>
</table>

Per J-STD-020C

This document is a declaration of the substances within the manufacturer listed item. Note: if the item is an assembly with lower level parts, the declaration encompasses all lower level materials for which the manufacturer has engineering responsibility.
175x V2.0 Updates – major change

- Move from Adobe solution to 3rd party solutions
  - XML schema supported by 3rd party suppliers
- Full System Approach
  - Move from one form/representation (1752) to sectional solutions
    - 1751: Business information and Basic Declaration Requirements
      - Supplier / Requestor info
      - Legal statements and “signature”
      - Component name(s) & weight(s)
        » Support multiple parts
      - Modules available (1752 – A, B, C and/or D, 1756, etc.)
    - 1752: Material Declaration
      - Level A = Yes/No ==> was Class 1 & 2
        » Type of declaration (EU, China, REACH and/or others)
      - Level B = Material Group Level (NEW)
      - Level C = Product Level (JIG-101) ==> was Class 3 & 4
      - Level D = Material Level (Substances) ==> was Class 5 & 6
    - 1756: Manufacturing information (in approval cycle)
      - Was a part of Class 2, Class 4 & Class 6
- Additional modules can easily be added
Conclusion

• IPC1752 v1 provided industry with the much needed ability to report material composition data at a critical time

• IPC1752 v2 is the next generation declaration and provides more flexible approach including
  – Multiple parts
  – Tool independent data exchange
  – Electronic signature
  – More regulations (not EU RoHS centric)

• V2.0 released 24 Mar 2010
Thank you

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