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Business Impact of the RoHS Directive

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RoHS compliancy: The nature of the change

RoHS conversion characteristics:

- The electronics industry would not convert on its own initiative. An external force drives the conversion.
- The change that has to be established is massive.
- The period of change is very short.
- >50 years of tradition and experience is abolished.
- There are many unknowns and risks to be dealt with.
- Will we benefit from it?
This is debatable.
- There may be casualties...

The definition of a revolution!



Introduction of lead-free soldering

- Lead-free soldering forms the basis of a massive, mandatory change in the electronics industry.
- A change that is NOT limited to the electronic assembly plant!
- A change that affects the complete electronic supply chain.

Why?

- SnPb solder has been used for well over 50 years as the general purpose soldering material.
- There is NO drop-in lead-free solder replacement.
- Major adaptation required of: (temperature/metallurgy)
 - Soldering processes and equipment
 - Components
 - Printed Circuit Boards





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Towards RoHS compliancy

- Besides making a product Bill-of-Material RoHS compliant.
- The product must be made compatible with lead-free soldering.
- For exempted products, also a product review is necessary because:
 - The components are changing.
 - Is the BOM still compatible with the SnPb soldering process?
 - Will the SnPb component version be available in the future?

BE AWARE that:

- RoHS compatible components/products
 - Lead-free components/products
 - Lead-free soldering compatible components/products
- ... are three DIFFERENT things!**





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Affected electronic company activities

1. Product Management
2. Manufacturing
3. Design
4. Procurement
5. Quality
6. Logistics
7. Marketing
8. Installation, after sales, repair
9. HRM
10. Corporate management

Implementing RoHS implies a company wide multi-disciplinary conversion project that should be high on each Electronic OEM's CEO priority list. It requires substantial and dedicated resources!



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1. Product management

- New product design:
 - What products to be made RoHS compliant?
 - What products to be lead-free soldered?
 - When will this be implemented?
 - What will be the qualification program for these products?
 - ...
- Existing products:
 - Do they have to become RoHS compliant?
 - Do they have to be lead-free soldered?
 - Do they need a design modification?
 - Go for a re-design or out-phase the products?
 - Use as spare parts?
 - Use as capacity extension?
 - ...
- All products
 - Future availability of components (lead-free/SnPb compatible)
 - **PRODUCT (NON)-CONVERSION PLANNING!**



2. Manufacturing

- Replacement of some equipment: wave soldering machine(s), soldering irons, selective soldering,...
- Selection and qualification of solder materials: solder paste, wire, bars, flux, cleaning agents,...
- Adaptation of process set-up rules, procedures, control and maintenance.
- Adaptation of quality control standards.
- Set-up of RoHS, lead-free soldering and mixed SnPb/lead-free compatible manufacturing logistics.
- Training of operators, supervisors, quality auditors, process engineers, factory management,...
- Prepare for increased need for product trouble-shoot and repair.



3. Design



- Full screening of all (50K-150K components) actually used and to be used components with regards to their:
 - RoHS compliancy
 - All substances!
 - Also non-electronic parts!
 - Lead-free soldering compatibility
 - SnPb soldering compatibility
- Adapt CAD systems and part data management systems to handle increased number of design parameters and part codes.
- Identify quality and reliability areas of risk.
- Set-up component selection criteria/algorithms/filters for design of RoHS/non-RoHS/SnPb solder/lead-free solder/... products.





3. Design



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- Set-up design guidelines and train the designers.
- Adapt CAD output to provide RoHS and soldering process information to manufacturing and procurement. Provide adequate Printed Circuit Board, component and Printed Board Assembly specifications.
- Review existing designs, define required modifications, redesign, prototype and qualify.
- Make new design according to new design rules and methodology, prototype and qualify.
- Monitor manufacturing yield, quality and field performance.





4. Procurement

- Collect supplier information
 - RoHS compatibility of components taking into account the exemptions.
 - Technical information regarding the soldering compatibility of components: lead-finish metallurgy, temperature tolerance.
 - Component qualification test results: solderability, solder joint reliability, Sn-whiskering, electrical performance,...
 - Suppliers conversion planning.
 - (Future) component availability
- Define component acceptability criteria.
- Define component part coding and labeling criteria towards suppliers and internal ERP systems and logistics procedures.
- Provide supplier instructions.
- Set-up procurement plan for RoHS/lead-free soldering conversion.
- Set-up excess and obsolete mitigation plan.



5. Quality



- Prepare for more and new quality and reliability issues. Identify areas of quality and reliability risks.
- Adapt qualification criteria and quality control procedures.
- Train auditors and quality engineers.
- Closely monitor quality aspects throughout the complete product development and manufacturing chain.
- Set up a PCB/component/product quality issue traceability system.
- Make sure you have access to field performance.
- Be vigilant!



6. Logistics

Align Design – Procurement – Manufacturing:

- Procurement must buy what the product design specifies.
- Manufacturing must select the correct component to assemble the products as designed.
- Establish a logistics procedure/system that can accomplish this

This is not obvious! Because:

- There are many more parameters that make a difference. More part codes needed!
- ERP systems and Part Data Management systems are usually not ready to handle more data elements and part codes/part code extensions.
- ERP soft is hard!
- Alignment of design CAD, procurement ERP, manufacturing ERP, manufacturing CAM...
...across different companies!



6. Logistics

Set-up a complete operational supply chain that can make a difference between:

- RoHS/lead-free soldering products and components
 - RoHS/SnPb soldering products and components
 - Non-RoHS/SnPb soldering products and components
 - Non-RoHS/Lead-free soldering products and components
- In the ERP systems: coding!
 - Identifiable on components and products in warehouses and the factory floor. Labeling.

Why?

- To prove RoHS compliant development and production capability.
- To guarantee product quality and reliability.

The logistics part may well be the hardest part of the RoHS conversion project!



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7. Marketing

How will the customer be approached?

- Will the RoHS conversion project be made visible to the customer?
- Will RoHS conversion and/or lead-free soldering conversion be exploited? E.g., if not mandatory, does it provide added value to the customer?
- How will a non-conversion be presented to the customer?
- Green image or not?
- How will customers requests to go RoHS compliant or lead-free when not mandatory be handled?
- How to handle conversion capacity limitations, delays, etc. towards the customer?
- ...



8. Installation, after sales and repair

- Set-up installation, after sales and repair of field return procedures depending on:
 - RoHS/lead-free soldering products and components
 - RoHS/SnPb soldering products and components
 - Non-RoHS/SnPb soldering products and components
 - Non-RoHS/Lead-free soldering products and components
- How will the products be repaired?
 - All lead-free solder?
 - Solder depending on product's soldering process?
 - Replacement of non-RoHS and/or SnPb soldered products?
- How will replacement be done?
 - RoHS with RoHS, non-RoHS with non-RoHS?
 - All RoHS?
- How do service technicians and engineers know what they are working with and what they have to do?



9. Human Resources Management



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HRM?

- Company wide training of people required.
- Additional, temporary resources needed during the conversion project.
- Managers, engineers, employees,... working overtime

- And if the conversion project is not successful...
... HRM may have to do some overtime.





10. Corporate management

- For an electronics OEM the RoHS directive implementation is not the sole responsibility of the component and/or manufacturing service provider.
- The OEM is fully responsible for the successful RoHS implementation including the outsourced activities!
- It affects all business activities of the OEM company including the outsourced activities!
- A conversion project lead at corporate level with sufficient priority and means is mandatory for a successful RoHS compliancy implementation.
- Even if the OEM's product are not in the scope of RoHS (are you sure?) they will be affected by the RoHS conversion now and for sure in the future. Act accordingly.
- Be aware and acknowledge the complexity!



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**Merci
Dank u wel
Thank You**

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