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## Workshop Report

"How to Transition your Products and Supply Chain  
for RoHS Compliance"

By

Connie MacKenzie

## Technical Memorandum

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## “How to Transition your Products and Supply Chain for RoHS Compliance”

This report will serve as an overview of the pertinent information from the conference titled “How to Transition your Products and Supply Chain for RoHS Compliance”. The workshop began with a short session on the legislation itself and the remainder of the conference dealt with Original Electronics Manufacturer’s (OEM) and supplier relationships. Another segment of the workshop dealt with the relationship between the OEM and the contract manufacturer (CM).

The portion of the day dealing with the legislation looked at the products covered by the Restriction of Hazardous Substances Directive (RoHS). Also we explored how to realize if a product is in fact RoHS compliant.

There are six different materials that will be virtually eliminated from all electronic products through the RoHS Directive:

- Hexavalent Chromium
- Polybrominated Diphenyl Ethers
- Polybrominated Biphenyls
- Lead
- Cadmium
- Mercury

None of the above materials can make up more than 0.1% of any “Homogeneous Material” within any component that makes up the product. A homogeneous material is defined as a material that cannot be mechanically disjoined into other materials through unscrewing, cutting, crushing, grinding and abrasive processes.

The main point that was stressed frequently in this section of the workshop is not to take any risks with your revenue. In the UK, the enforcement of the regulations can take many forms. It shall be the duty of the National Weights and Measures Laboratory, acting on behalf of the Secretary of State for Trade and Industry, to enforce these regulations. Various powers of enforcement will be available, including: - • Making test purchases. • Requesting compliance documentation, inspecting processes and performing analytical tests. Issuing of a compliance notice requiring certain action to be taken.

The RoHS Regulations introduce the following offenses: Contravening or failing to comply with the prohibition on hazardous substances in the RoHS Regulations could result in those held responsible facing a fine up to the statutory maximum (currently £5,000 approximately \$10,000 USD) on summary conviction or an unlimited fine on conviction on indictment. Those failing to submit compliance documentation at the request of the enforcement authority may be liable to a fine up to level five on the standard scale (currently £5,000). The defense of ‘due diligence’ is available where a company took all reasonable steps and exercised all due diligence to avoid committing an offense. This may include reference to an act or default or information given by a third party, in which case it must be accompanied by information identifying the third party, or that information in possession of the person making the claim. The Regulations also provide for

the ‘liability of persons other than the principle offender’ and allow a third party to be prosecuted as though they had committed the offense. Where an offense by a corporate body is shown to have been committed with the consent, connivance or through the neglect of any director, manager or similar officer of the corporate body, they could be regarded as having committed the offence as well as the corporate body.

The seminar raised many points that led me to think about certain situations at Axonn. I wanted to highlight some of these situations in order to be sure they are dealt with and do not fall through the cracks.

Axonn is operating under the assumption of an exemption to RoHS because of the application for the device. Axonn was given an opinion by an outside consultant that the STXII does not need to be compliant because it is being sold in an MMT as part of a vehicle tracking operation and therefore will fall under the “End of Vehicle Directive” instead of RoHS. This is a dangerous assumption in my opinion and I would recommend Axonn contract a qualified firm to supply a definitive answer to this important question.

The issue of an exemption leads into the next topic, our customer in the European Union. Axonn should have a clear understanding of the European Union (EU) customer and the revenue this customer represents. If it turns out the MMT is not exempt from the RoHS directive, Axonn will not be allowed to sell any of this product in the EU until we can become compliant with the directive. Even if we are granted an exemption there could be questions on the validity of this exemption from the customer or government agencies, we need to be sure we have done all we can to prepare.

I think we should explore some questions to insure our own preparedness with our European customer. What are the customer’s expectations in regards to RoHS? What is our customer going to be doing in regards to RoHS? What are Axonn’s responsibilities in regards to this issue in the eyes of the customer? This is not something we should leave undefined, we do not want to get surprised at a later date and find out our customer or Axonn is not prepared.

The second portion of the workshop dealt with the supply chain of electronic components. Component Manufacturers are transitioning to the RoHS directive. There is no standard method for this transition and problems are arising because each manufacturer of components is dealing with this situation in their own manner. Some are obsolescing old non-compliant parts, others will sell both types. Some component makers are changing the part #'s to reflect the compliance, others are not changing.

Another issue will be availability. Lead times are being increased across the board for all components. The big customers will get allocation of the devices they choose and smaller companies may be forced to wait until there is sufficient stock. Another issue each OEM must face is the “Certificate of Compliance” (CoC) for each component that is a part of the final product. The component suppliers are not following standards for this document or not supplying this document at all.

Ideally every manufacturer would supply a CoC and it would contain the following information:

- ✓ Company Part number
- ✓ List of Material Declaration
- ✓ Manufacturing Date for RoHS
- ✓ Company Officer Signature
- ✓ List of compliance requirements

These documents should be put on file and used to compromise part of the “due diligence” defense if needed. These certificates have been haphazard in the past and Axonn must insure that we have these certificates and they contain sufficient information. This area is of most importance for small suppliers. The larger suppliers with substantial reputations will endure less scrutiny than the small unknown supplier so it is imperative we gather these certificates from these type suppliers. I would like to begin the process of gathering these CoC’s and keeping them together in a file for any future issues. Presently we are not claiming RoHS compliance but eventually we will and having all the paperwork in order could make a big difference if questioned later.

Another issue that needs to be addressed is long term reliability of RoHS product. The phenomenon of “Tin-whiskers” can take place when using RoHS solder paste. These whiskers can lead to shorts and other reliability problems in the future. Axonn must be diligent and realize these problems can lead to future failures and be vigilant to insure prompt recognition and resolution if this problem arises..

Another reliability issue for RoHS is the coating of the PCB. There are various coatings that can be applied to a PCB. They all have advantages and disadvantages, these issues must be addressed in order to decide on a path to follow. It is a cost vs reliability issue with these coatings. Axonn needs to be pro-active in their choice in order to put our best foot forward.

The third section of the workshop dealt with the CM. Specifically, this portion looked at doing an audit of a CM for RoHS processes. This section was of interest considering the upcoming trip of Axonn personnel to Shanghai to visit Sinbon’s facilities.

In an audit you must evaluate various levels and various processes of the CM. Everything must be evaluated from management and their practices to the material management and inventory control practices of the CM.

The following are suggested areas to evaluate and some pertinent questions.

### MANAGEMENT

1. Does the Management have a presence on Industry committees, especially dealing with RoHS?
2. What is their investment in equipment?
3. Do they have focused resources assigned to Axonn?
4. How is Sinbon managing the RoHS compliance? Is it a one time effort? Is there an ongoing program to insure compliance?
5. What kind of investment has Sinbon made to train their personnel in RoHS?
6. Is there a cross-functional understanding of the RoHS directive and objective?
7. What is the capacity to produce product on the RoHS assembly line?
8. Does the RoHS assembly line affect capacity for non-RoHS product?
9. How will RoHS affect the pricing from the Manufacturer?

### QUALITY SYSTEM

1. Does Sinbon have a strong quality program with documentation? A quality manual?
2. Do they conduct internal audits to ensure ongoing compliance?
3. Is there a channel of communication to management to report non-compliance events?
4. What is the process to monitor in-bound quality: certification, auditing and inspection?
5. What type of system does Sinbon use to track inventory, product etc...?
6. Is there traceability of components from receiving through production?
7. What type of solder/solder paste will Sinbon utilize in the RoHS process? How will they insure these products are infact RoHS compliant?
8. Does Sinbon have an RMA process?

### SUPPLIER MANAGEMENT

1. Has a risk assessment been done on current suppliers for RoHS compliance?
2. Is there a supplier “watch list” based on performance or non-compliance?
3. Do they keep an updated look at how each supplier can impact sourcing?
4. Has Sinbon compiled supplier compliance certifications?
5. Does Sinbon have any rating system for suppliers? To grade them on delivery? Price?
6. Do they deal with any distributors that are non-franchised?
7. Do they have a list of all distributors that have supplied parts?
8. Has Sinbon audited any of their own suppliers for RoHS compliance documentation and processes?

## INVENTORY CONTROL

1. Does Sinbon segregate compliant and non-compliant parts? How do they insure they will not be mixed together? What is their inventory control policy?
2. Do they label parts reels for RoHS compliance?
3. Can parts on the production floor be identified as RoHS or non-compliant?

This is not meant to be an exhaustive audit but a starting point. The answers to the questions above could go a long way in identifying potential problems transitioning ourselves to RoHS compliance.

A final component to the workshop dealt with terms and conditions for a Manufacturing Services Agreement (MSA) for a CM. This agreement outlines the relationship between Axonn and its CM. It is a document signed by both parties that describes the duties and responsibilities of each party. Currently Axonn and Sinbon have a signed MSA but we are not operating under the terms of this MSA. I think we should negotiate with Sinbon to formulate a new agreement and use it moving forward.

The remainder of this paper covers some additional terms and conditions that could be negotiated as part of an amended MSA.

### Component Procurement

Manufacturer shall not purchase any components from a non-franchise distributor or component broker for use in our products without the express written consent of Axonn. Manufacturer must be able to provide a list of the companies where they purchased all goods used in Axonn products. This will insure the authenticity of the components, non-franchised brokers are known for counterfeit replacements and with RoHS there is an extra issue.

### Late Delivery Provisions

After an agreed delivery date is set, if a delivery is not on time, or if Manufacturer expects to make a delivery that is not on time, Manufacturer shall promptly notify Axonn, and unless the delay is caused by Axonn, shall at no additional cost to Axonn employ accelerated measures such as material expediting fees, premium transportation costs, or labor diversion or overtime to meet specified delivery date or minimize the lateness of deliveries.

### Information Access

Manufacturer shall make available any data regarding quality, yield, rework or scrap rates, lot tracking/status information, shipment summaries and supplier agreements to Axonn.

## Warranty & Epidemic Failure

### Performance Warranty

Manufacturer warrants to Axonn that products furnished by Manufacturer shall conform to the manufacturing specifications, shall be built with parts from Axonn supplied documentation. Also all products shall be free from defects in material and workmanship under normal use for a period of XX months from the date of delivery to Axonn or its customers.

### Epidemic Failure

If at any time within XX months after delivery, more than X percent of any given product sold and delivered to Axonn fails to operate properly due to a similar defect then an Epidemic Failure shall be deemed to have occurred. The defect may result from problems with materials, workmanship and/or manufacturing processes. Upon notice by Axonn of any epidemic failure, Manufacturer shall promptly develop a plan to eliminate the problem in all continuing production and to correct the problem in all affected units of product previously sold and delivered to Axonn. Manufacturer shall submit such plan to Axonn for approval. Upon approval Manufacturer shall implement the corrective action at its expense. If manufacturer's corrective action plan is not acceptable to Axonn, then Axonn can require Manufacturer to repair or replace the affected product at Manufacturer's cost. The parties agree to use reasonable efforts to complete the repair or replacement of affected product within twenty days after written notice of such epidemic failure is provided to manufacturer.

For epidemic failures that are affecting current production, Manufacturer shall identify the problem and develop a plan to solve it within twenty four hours of Axonn's notice. In the event of an epidemic failure due to a common cause which is neither (A) otherwise covered by the previous paragraph; nor (B) due to Axonn product design, Axonn supplied test design or Axonn proprietary component; both parties will use reasonable efforts to determine, address and resolve such failure and its consequences.

The goal of this report was to give an overview of the workshop I attended and to share the knowledge and insight with others in the company from this workshop so that Axonn can be more prepared to move forward. A second goal was to highlight potential issues, bring them to the forefront and deal with them before they become road blocks.

Connie Mackenzie  
Component Engineer  
Axonn LLC