

RoHS panel discussion

For several years, industry has been working towards eliminating lead in electronics. By 1 July 2006, the European Union's Restriction of Hazardous Substances (RoHS) Directive came into force. Complying with RoHS is actually much more complicated, as companies have found out. The following substances are part of the ban: lead, cadmium, mercury, hexavalent chromium and both polybrominated biphenyl (PBB) and polybrominated diphenyl ether (PBDE) flame retardants. In addition to the EU RoHS Directive, there are now related laws and regulations in China, Korea and in the State of California. RoHS is a major issue in the South African electronics industry and in particular for companies who are exporting products to countries that have already ruled that only lead-free and other hazardous substances free electronic equipment may be imported and sold on their local markets. RoHS is far more complex than just finding a soldering solution. How have South African companies responded to the issues? EngineerIT invited several players in the industry to give their views on the subject.



Gregg Patterson,
EBV Electrolink

EBV Electrolink, an Avnet company was founded in 1969 and is a leading specialist in European semiconductor distribution. EBV maintains its successful strategy of personal commitment to customers and excellent services. 240 technical sales specialists provide a strong focus on a selected group of long-term manufacturing partners. 110 continuously trained application specialists offer extensive know-how and design expertise. Visit www.ebv.com for more information.

supplying to lead-free manufacturers, with many companies here changing to lead-free. Components can be an issue as some older types may not be available lead-free, however many have a pure tin-plated finish. This means we have all been assembling some lead-free components for years

Gregg Patterson, EBV Electrolink: Initially the response was a little slow. As a pan-European distributor we were working to the European timescales. Once the local industry realised the full implications of the ROHS legislation, including the reality that we would only be able to get RoHS-compliant parts, most of our customers adopted a strategy to switch over with fairly aggressive timescales. The only real issue was with RoHS-compliant BGA parts as they are not compatible with a standard 235°C solder profile whereas most other RoHS-compliant parts are.

How have component suppliers responded to the new requirements and what measures have suppliers and manufactures adopted to keep inventory separate during the change-over?

Keith Bryant, SMART Group: Again, my view is that this varies tremendously; some suppliers have done a very good job managing this transition. However, some components have a suffix to denote lead-free, some a different number, but some just changed termination finish (lead content) without any other change, marking or code.

Gregg Patterson, EBV Electrolink: Our manufacturers have responded to RoHS requirements by manufacturing RoHS-compliant components. Some automotive-specific parts are still to be changed as this industry is exempt from the RoHS directive. In most cases a short-term plan is in place to convert the parts to be RoHS-compliant. These exceptions aside, the automotive industry has chosen to follow RoHS directives where possible.



Lutz Otto,
RS Components

RS Components is a market leader in the high service level distribution of electrical, electronic, mechanical and industrial products. Offering over 200 000 products across 2000 leading brands RS serves every sector of industry in the procurement of their products relating to maintenance, repair, operations, low volume production, research and development.



Keith Bryant,
SMART Group, UK

The SMART Group had its origin in the United Kingdom where the various sectors of the electronics manufacturing industry saw, in 1983, the need to form an industry association for the advancement of surface-mount and related technologies. Its main objectives are to promote the industry to talk to each other and provide a platform for the advancement of technologies in the industry, be it in design, manufacture or testing.

How has the South African industry responded? Are we able to meet RoHS requirements on all goods exported to countries where the ban applies?

Keith Bryant, SMART Group: I think, like many counties outside the EU, the industry here has been slow to respond and momentum is coming from customers who require approval. All the materials and equipment are readily available and many companies now have a history of

Unfortunately no authority laid down a directive for part-numbering to be able to distinguish between compliant and non-compliant parts. The Joint Electron Device Engineering Council (Jedec) has a list of "e" designations as a suggestion but this was not taken as part of the RoHS legislation, which was a major oversight. This has resulted in a plethora of approaches from the manufacturers. Some did indeed use the "e" suffix but there were so many different approaches it became a minefield. The subtle difference between Pb-free and ROHS-compliant added to the issues as well.

To be able to distinguish between the classes of components, manufacturers either changed the part number or stated that from a specific date forward all parts were RoHS- or Pb-free. As a further measure EBV Electrolink labelled all parts received with a simple label on the outside of the packaging. We created an additional field on invoices and quotes to designate RoHS compliance. We also created new entries in our database for all RoHS-compliant parts to be able to determine the category of the inventory.

Some manufacturers were forced to improve their material declaration sheet availability for our end-customers so they could be assured of compliance.

Lutz Otto, RS Components: Component availability for conversion to RoHS-compliant assemblies was initially an issue, but most components are now available in RoHS-compliant versions with a few exceptions. Of our customers, some require RoHS-compliant parts, others not, as they are in industries that are currently exempt from the requirements such as medical, control and monitoring or maintenance, repair and operations. The approach amongst manufacturers' varied, some making an early decision to issue new part numbers for RoHS-compliant versions of components with others moving to compliance without change of part number. Our approach at RS was to adopt the processes followed by the manufacturer.

Is there any legislation in this regard in South Africa? Are local customers insisting on hazardous substance-free manufacture?

Gregg Patterson, EBV Electrolink: No legislation to my knowledge. Local customers are not insisting on hazardous substances manufacture unless they are exporting or wish to not mix inventory/process with export products.

The ban was first announced in 2003 and came into force in 2006. How did the RoHS ban impact on your company? Was your company able to respond in time and how did it impact on your costs?

Gregg Patterson, EBV Electrolink: The RoHS legislation had a huge impact on us. We had to virtually double our number of active parts. When you are dealing with 100 000s of part codes this is significant.

We took time to educate our customers on the issues both in person and with an educational DVD. This increased the workload dramatically during the switch-over period in addition to many requests to check or prove compliance.

EBV responded decisively and in good time with the result that we were not left with significant Pb-containing inventory.

Lutz Otto, RS Components: At RS we stock and sell far more components than we do finished goods and for us the challenge was to make "compliant" components available to our customers to facilitate the development of compliant designs and finished items.

In our experience there is still some confusion as to what is and what is not covered by RoHS

and we receive many questions with respect to this on a daily basis. It's useful to remember that RoHS takes its scope from the Waste Electrical and Electronic Equipment (WEEE) directive with eight of the 10 categories within scope and that components are not specifically covered by the requirements but they are required to build compliant assemblies.

Our company in the UK is a licensee of the BSI RoHS Trusted Kitemark Scheme and our processes are audited not just by ourselves but by a third party.

As a business we made significant investments in terms of our RoHS-compliance project and continue to do so to maintain our position in the marketplace.

Are you subject to compliance testing? If you are, by whom? If you are not, how do you ensure that your products meet the requirements?

Gregg Patterson, EBV Electrolink: This is the responsibility of our suppliers.

Lutz Otto, RS Components: In order to meet the requirements of the scheme we are audited at six-monthly periods and components are taken away for analysis by an independent test laboratory.

Any areas of suspected non-compliance are investigated by us and reported back to our auditors.

We took the decision in 2005 to invest in our own equipment for compliance screening, a bench-top ED-XRF machine that allows us to evaluate potential new products for areas of concern and respond rapidly to customer enquiries.

On the question of non-compliance, has your company ever encountered problems or been fined?

Lutz Otto, RS Components: There have been very few incidents of suspected non-compliance with products we sell and where these have been identified they have mostly either been subject to exemptions or due to misunderstanding the requirements.

There has been no cause for the authorities to investigate any aspect of the business in connection with RoHS.

Is rework and repair an economic option for high-density lead-free electronic products?

Keith Bryant, SMART Group: Yes, but it has to be done with good quality equipment with excellent temperature control to avoid damage.

Gregg Patterson, EBV Electrolink: Not applicable to a distribution company. However I'd like to ask how rework in a lead-free process is more complicated or more costly than for a Pb-containing process? Slightly higher temperatures and different solder are the only requirements. There is a slightly higher risk of lifting tracks.

Lutz Otto, RS Components: In our view it will depend upon the value of the product as much as the practicality. Some items will very quickly become beyond economical repair and should be responsibly recycled.

With respect to long-term reliability, are the fears of tin whiskering-related failures a threat to modern product reliability within their design life?

Gregg Patterson, EBV Electrolink: Until this characteristic of Sn is fully understood I don't believe we will know the answer. Whiskers appear to be a totally random characteristic of Sn. Whiskers will grow on some parts and not on others when all are subjected to the same mechanical, thermal, electrical and moisture stresses over the same time period. Some whiskers will grow more quickly and have different dimensions in the same control group of components.

Manufacturers have taken different approaches. Some have gone for a simple matte Sn lead plating while others have added metals like bismuth, silver, gold, palladium or used NiPdAu plating in an attempt to stabilise the Sn or remove the Sn finish.

Many people have forgotten or overlooked this bogey characteristic of Sn. The best White Paper I have seen on this topic is from Texas Instruments <http://focus.ti.com/general/docs/techdocsabstract.tsp?abstractName=szza051b>

Keith Bryant, SMART Group: Not in my opinion, but there are several studies which point to possible issues in the high reliability area, but some solder alloys seem more susceptible to this than others.

Lutz Otto, RS Components: There are concerns related to tin whiskering but they have to be balanced against the prospective life of a product and criticality around premature failure. For example, equipment in categories exempted from RoHS such as medical equipment is likely to be of greater concern than something such as a DVD player.

Any other related issue for comment?

Bryant, SMART: In a world which is fast becoming lead-free, I would suggest that it is better to be part of it than to fight against the tide. Regardless of customer needs, the standard process will very soon be lead-free and it is always easier to be with the majority. Added to this, running two processes unless there is a huge commercial advantage is something to avoid, as it can lead to huge problems both with manufacture and traceability

Gregg Patterson, EBV Electrolink: I have alluded to this above, but to be clear, Pb-free means that the component or assembly does not contain Pb. RoHS-compliant means that in addition to not containing Pb the concentration of many other banned substances is below the legislated ppm.

It has been my experience that few manufacturing companies pay adequate attention to the moisture sensitivity level of devices. This is now especially critical with increased reflow temperatures from 235°C to 260°C. I find that quite often a company pays no attention to the shelf life of components until they have a bad experience. For example many TSOP and QFP packages now have an MSL 3 which cannot be ignored. MSL 3 means the component must be reflowed within 192 hours of opening the sealed package in which it was delivered, provided the ambient is less than or equal to 30°C and 60% relative humidity. This comment expands to general goods inwards and material storage conditions. Many stores are not temperature- or humidity-controlled and are not well sealed against dust and corrosive airborne contaminants found in many industrial estates.

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