

Environmental Compliance for Design & Supply Chain Services

Executive Summary

Increasingly, electronics and appliance manufacturers are subject to governmental regulations which restrict the use of materials, such as lead and mercury in the manufacture of consumer and electronics products. In 2002, there were 256 laws in 100 countries that restricted hazardous materials and today there are more than 320 regulations. Two of the most comprehensive regulations were adopted by the European Union (EU) in 2003. The directive for the Restrictions on the use of Certain Hazardous Substances (RoHS) limits the use of six substances in electrical and electronic products and the Waste from Electrical and Electronic Equipment (WEEE) directive requires producers to provide recovery and recycling programs for the processing of electronic waste.

Similar environmental regulations are being introduced in China and Japan, as well as the United States and other parts of the world. It is estimated that by 2010, more than 75 percent of all electronic products will be sold in countries with legislation similar to RoHS. With virtually every region of the world embracing regulations, companies must develop environmentally friendly products in order to remain competitive in today's global marketplace.

The WEEE directive went into effect in August of 2005 and the RoHS directive will go into effect on July 1, 2006. Companies that do not have compliance management programs today will struggle to meet the deadline for RoHS due to the complexity of the regulation and the level of effort required to determine product compliance. Failure to conform to the directive will introduce potential financial risk including banned or delayed shipments, penalties and exclusion from important markets. Companies that manage compliance strategically through enhancements to internal design and supply chain processes and systems will create significant cost advantages over competitors with tactical approaches based on simple reporting systems which consolidate certificates of compliance collected from suppliers. This paper begins with an analysis of the many challenges to deploying a cost-effective compliance program and explores the limitations of tactical approaches. The final section presents recommendations for organizing a compliance task force, optimizing design and supply chain processes and deploying information systems for maximum return on investment.

Environmental Compliance Challenges

The multitude of product compliance issues that companies will encounter can be categorized into three areas: regulatory complexity; impact on the cost of products and production; and operational cost and information systems.

Regulatory Complexity

The RoHS and WEEE directives require EU member states to enact local laws for implementation, monitoring and enforcement of the directives. This has the potential to create significant complexity because the interpretation of the requirements as well as enforcement will vary by country. A recent example of this occurred when a manufacturer of power supplies was notified by one EU country that its products were subject to the RoHS regulations and another country declared the same products exempt. Also, the directive allows countries to enforce greater restrictions than those defined by the EU. Producers will be forced to design and build products for the most restrictive markets or abandon those markets.

The WEEE directive, which applies to more products than RoHS, is equally complex with requirements for waste collection and recycling. Producers must register for recycling programs in each country; however the procedures for registration have not yet been defined in most cases. The cost of recycling for consumer product waste will likely be allocated among the producers based on market share while business-to-business waste recycling cost will be addressed between the trading partners. Producers will have the added burden of reporting market share and business waste disposition for each country.

Similar legislation in China, known as Management Methods for Controlling Pollution by Electronic Information Products (China RoHS) and Regulations on the Recycling and Disposal of Waste and Used Household Electrical and Electronic Appliances (China WEEE) is pending. China RoHS includes notable differences to RoHS, such as the absence of exemptions and provisions for additional substances. Also, China RoHS requires pre-certification of product compliance prior to sale, whereas RoHS does not.

The timeframe by which companies must comply with RoHS is rapidly approaching and China is expected to require compliance and recycling by producers in 2006, further adding to the urgency of the challenge. The required changes to business processes

and information systems needed to manage compliance are significant. Organizations that have not started to implement compliance programs need to act quickly in order to mitigate the financial risk.

Impact on the Cost of Products and Production

The compliance regulations will impact the cost of products and factories will require re-tooling to incorporate lead-free manufacturing processes. Producers will need to source new components and replace other materials such as flame retardants. Current product designs will require costly modifications to accommodate multiple compliance regulations and to improve the recycle-ability of those products. Companies can also expect increases in excess and obsolete inventory as non-compliant inventory is transitioned. New product design and supply chain sourcing processes will need to assess compliance before products are released and components procured.

The cost of compliant parts will decline as component manufacturers transition to new parts and supplies catch up with demand. Conversely, the cost of non-compliant parts will likely increase as component manufacturers begin to phase out or reduce production of non-compliant parts and supplies decline. Consequently, products that are exempt from the regulations will cost more to manufacture, potentially leading to the redesign of those products in order to incorporate compliant components. RoHS has the potential to affect the cost of many more products than those covered under the regulations.

Operational Cost and Information Systems

Organizations can expect to incur significant incremental costs for labor and information systems related to the RoHS and WEEE directives. Although most companies have been reporting environmental data and producing material data safety sheets, the new directives require the collection and analysis of information that has never been collected and is often unavailable. Analysis has shown that more than 30 minutes of labor is required to gather and consolidate material content information for a single component to determine if the part is RoHS compliant. That extends to 580 days of labor for an organization that purchases 10,000 components. Some organizations have taken approaches to reduce the labor requirements by foregoing analysis of material content data and relying solely upon a compliance declaration from the supplier.

While this can reduce the level of effort, there is an inherent risk that cannot be ignored. Our research has determined that more than 50 percent of compliance declarations are incorrect. This is due to many factors, including a common misconception that material concentration levels calculated for a component's total weight are sufficient to determine compliance. In fact, the directives define allowable concentration levels at what is known as the homogeneous material. A homogeneous material is defined as a material that cannot be separated mechanically. For example, a wire is comprised of two materials, a conductor and insulation. Allowable concentrations of substances are calculated at the homogeneous material level only and are not based on total part weight concentration.

In addition to the compliance status of purchased parts, companies need to know how the restricted substances are used in the manufacture of products. This is important because the application of the product in which the part is used can provide cost advantages to the producer. For example, in the case of lead, the RoHS directive is much more restrictive for consumer electronics than industrial applications. Companies that can capitalize on these application-based exemptions will be able to significantly reduce levels of excess and obsolete inventory and eliminate the need to redesign certain products.

Typically, critical information about suppliers, parts purchased and how those part substances are used in the products is maintained and managed in separate systems. Additionally, most information systems were never designed to collect and verify compliance data. Companies will need to make investments in IT systems which can integrate with current systems and provide a compliance framework to manage and analyze the vast amounts of information that will be required to implement cost-effective compliance programs.

Recommendations

The recommendations presented here are based on Synapsis Technology's work with both large and midsize global manufacturing companies. Although each company encountered different issues, all of these organizations leveraged their product compliance programs to improve organizational collaboration and operational effectiveness.

Executive sponsorship is critical to the success of any project that creates changes in operations. With commitment from senior management, the responsibility, authority and accountability for program success can be assigned to organization members with the most expertise and capability to design a program and drive it through deployment.

Since compliance management affects many functions within an organization, companies should establish a program office that has representation from all of the departments, including engineering, manufacturing, procurement, logistics, quality, environmental health and safety, information systems and finance. Too often, organizations manage programs within a single department or separately at each location, thereby introducing variability in quality and costly duplication of effort. The program office should be chartered with developing best practices and a global compliance process that is deployable throughout the organization. This creates consistency and high quality results which mitigates financial risk and produces economies of scale that lower the cost of compliance. Following project rollout, the program office should be responsible for monitoring the effectiveness of the program and initiating enhancements to the process as required. The committee also tracks changes to the regulations and plans for new regulations.

The impact on product cost can be reduced by integrating the best practices developed by the program office into the engineering and supply chain business processes. Beginning with product design, engineering can incorporate compliance verification into the part specification procedures and design approval process to ensure that the products are designed for compliance from inception. This will reduce the number of design iterations and development cost.

Similarly, procurement and vendor management should include compliance verification into the sourcing, qualification and quality control processes that the company currently uses to manage the supply chain. The procedures used to select and source components can be expanded to include part material data collection and verification. Analysis of the material data will yield the compliance status of the part, which will be available to engineering. This closed-loop compliance status will ensure that engineering designs with compliant parts when required by RoHS or other regulations.

Information systems are important enablers to implementing these changes and reducing the cost of compliance. Whether purchasing commercial software or developing a custom program, the most effective architecture is one which provides a closed-loop framework that can integrate compliance management across existing engineering and supply chain systems. Architectural approaches that separate compliance reporting from operational systems are less effective and result in costly duplication of data and infrastructure.

Flexibility and adaptability to accommodate changing regulations and new regulations is crucial for any compliance system. Without it, manufacturers will be forced to invest more, which increases the cost of compliance. The system should provide functionality that reduces the labor necessary for exchanging information with trading partners by supporting newly emerging compliance data standards, such as RosettaNet and IPC 1752. Finally, the system should have a robust analytical capability to calculate and verify compliance; otherwise the producer will bear the financial risk when incorrect compliance declarations from suppliers cause the manufacturer's products to fail inspection.

Product compliance is a cost of doing business that will continue to increase in scope. Manufacturers that make the strategic investments now will reduce their risk and benefit competitively by reducing the overall cost of compliance.

About Synapsis Technology, Inc.

Synapsis Technology, Inc. is a global software and consulting company specializing in providing environmental compliance, product lifecycle management (PLM), and supply chain solutions.

The company's expertise spans the spectrum of environmental compliance issues to information systems and technologies used in product development with particular emphasis on PDM/PLM and the integration with CAD (computer aided design) and ERP (enterprise resource planning) systems, as well as with the inbound supply chain management. With its deep industry and business process expertise, Synapsis can mobilize the right people, skills and technologies to help clients improve their performance.



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