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Information Management for Environmental Concerns and Regulatory Requirements

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Introduction

Global awareness of manufacturing's impact on the environment has grown considerably in recent years. Concerns about toxic materials affecting Earth's ecosystem and humans' health have prompted governments to take action. Frequently, that action comes in the form of legislation designed to restrict the impact that manufacturing, use and reclamation of products have on the environment. Due to the quick obsolescence of electronic products, and the current use of potentially harmful materials in both the manufacturing process and the products themselves, many of these new restrictions are aimed directly at the electronics industry.

Complying with these new laws and regulations requires the electronics industry to make numerous changes in the way they do business. The changes include modifications to product designs and manufacturing processes, as well as new information exchange requirements. For an example of some of the information requirements of present and future regulations, see Table 1.

Unfortunately, even determining what information is necessary can be difficult because of the sheer number of environmental regulations being enacted globally. To make matters worse, many of these new regulations cover a similar scope, but have subtle differences and unique data requirements. This has created a situation in which companies are left struggling to determine what changes need to be made in order to ensure compliance for their product in any given market or country. Failure to comply with regulations can expose a company to both legal and economic ramifications. Key to meeting these new challenges is a viable and robust information management system for environmental and regulatory data. A company's internal systems must be able to exchange data with other partners in the supply chain. To address this need, much effort has been spent to develop environmental data exchange standards for the electronics industry. Since the early regulations focused on substances within electronics products, the first generation of these standards focused on product material data.

Types of Standards

Material declaration standards typically fall into two groups: domain-specific and implementation-specific. The domain aspect focuses on the "what," i.e., the information that needs to be exchanged. This includes both the environmental data that needs to be

included and the way it is to be reported. Not as obvious, the domain can also include measurement methods for the data, and information as to why particular data must be included. Any material declaration standard will incorporate at least some elements of the domain.

The implementation focuses on the “how.” Implementation requires a more mechanical perspective, in which the data transportation mechanisms and structure are laid out. Possible elements included in an implementation include data types/structures to reference software tools. No true material declaration standard will ever focus only on the implementation – at that point it would simply become a generic data exchange mechanism. Instead, most material declaration standards will be a combination of both domain and implementation but might focus on one or the other.

Industry Efforts

When the electronics industry first became aware of the need for managing material data, the information management systems being used didn’t allow them to gather the necessary information. Since then, many leading industry organizations such as EICTA, EIA, iNEMI, RosettaNet and IPC have been working on the problem of material data exchange.

As the number of laws increased, so did the difficulty in understanding the requirements of each. The electronics industry organizations EICTA, EIA and JEITA worked together to provide a guide that condensed regulations into a single document, which then allowed companies to address a single set of requirements instead of dozens, and which therefore limited the burden placed on supply chain entities.

At about the same time, iNEMI had flagged RoHS and other environmental regulations as a major issue in the iNEMI roadmap, and created two working groups focused on environmental data issues. The iNEMI Materials Declarations Project and the Materials Composition Data Exchange Project provided recommendations for an industry-standard materials declaration format and process. These projects provided input to the IPC 2-18 Supplier Declaration Subcommittee and RosettaNet 2a13/15 project to turn the recommendations into working standards.

The IPC 2-18 Supplier Declaration Sub-committee was formed in early 2005 and began developing a standardized way of reporting material data. One concern of the IPC team was that smaller manufacturers would have difficulty in implementing environmental data management systems. The team worked hard to develop a solution that was both simple to use and flexible enough to integrate with large company data systems. RosettaNet is a global consortium developing electronic data exchange standards for the electronics supply chain. It collaborated with iNEMI and IPC to create a material data

framework that could be used with RosettaNet business-to-business gateways and would also be compatible with the IPC 1752 standard.

Finally, IEC TC111 (Environmental standardization for electrical and electronic products and systems) WG1 (Material declaration for electrical and electronic products and systems) has begun work on an IEC material declaration standard. The resulting standard will cover both the domain and implementation.

Current Standards

Presently, three major standards are used in the electronics industry to support material data exchange. They are the EIA Joint Industry Guide (JIG-101), the IPC 1752, and the RosettaNet 2a13/15.

JIG-101 is a domain-oriented standard that defines substance lists and thresholds, but provides only limited guidance on the format that the data should take. It groups the substances into two categories: level A, substances which are presently restricted for use in electronics; and level B, substances of concern, which have the potential to be restricted in the future. Substances are grouped into substance categories (e.g., lead and lead compounds) to ease the reporting burden. The JIG provides reporting thresholds for each substance category based on the lowest threshold specified in applicable regulations. Below this level, substances don't need to be reported, as the product meets the environmental regulations covered by the JIG. To help users understand the regulations and how they relate to the substance groups, the JIG also provides a detailed table of substance groups and the regulations pertaining to each group.

The IPC 1752 standard focuses on the mechanics of data transfer and uses the substance lists in the JIG as the basis for material declaration. IPC 1752 also provides individual substance reporting so that companies can prepare for future regulations. This full material declaration provides the ability to add additional substances of concern if those substances are not on the JIG lists. IPC 1752 includes two standards documents, an XML schema definition and two PDF files that act as data entry tools and containers for the XML data. IPC 1752 is the first part of a supplier declaration framework designed to cover all the declaration needs of an electronics supplier.

The RosettaNet PIPs (partner interface processes) define a data format for use within the RosettaNet B2B framework. The PIPs provide the necessary information to allow business transactions between trading partners using RosettaNet gateways. There are two sets of PIPs that provide material declaration support for companies using RosettaNet PIP gateways: 2a10, Design Engineering Information; and 2a13/15, Material Composition Information. The 2a10 PIP provides material data support within the RosettaNet technical dictionary, but the 2a13/15 PIPs are of more interest, as they are designed to support JIG data and have been aligned with the IPC 1752 standard to ease the conversion between the IPC and RosettaNet formats. The PIPs require a large investment in a data management solution, so the RosettaNet gateways are mainly

implemented by large companies. By supporting the simple conversion from 2a13/15 to IPC 1752, material composition data can be easily exchanged between all partners in the supply chain.

About the Authors

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