REACH, RoHS, LCA… – Managing several complex material compliance requirements and evaluation of the environmental effects of a product during the whole lifecycle in SAP

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Abstract: Companies in the automotive and high-tech sectors are required by EU legislation such as REACh, ELV, RoHS, and WEEE to provide product-related compliance information. This product data relates to regulated substances used in products. As the level of outsourced production and development of assemblies and individual parts rises, it becomes increasingly necessary to involve suppliers in providing compliance data. The challenge then is to find a declaration model which provides maximum information on substances with only a minimum of queries to the supplier. To secure comprehensive support for compliance management processes TechniData and SAP have developed the SAP REACh Compliance Solution based on the SAP NetWeaver technology. This underpins companies' internal processes and collaborative processes with customers and suppliers.

1 Introduction

The European directives REACh (Registration, Evaluation and Authorization of Chemicals), WEEE, EU- RoHS and the China-RoHS (Pollution Control of Electronic Information Products) build a basis for manufacturer`s requirements in the Electronic Industry. Together with other national and international regulations and laws as well as client-specific requirements, long lists of banned substances have to be managed, controlled and fulfilled by the Supplier Industry.

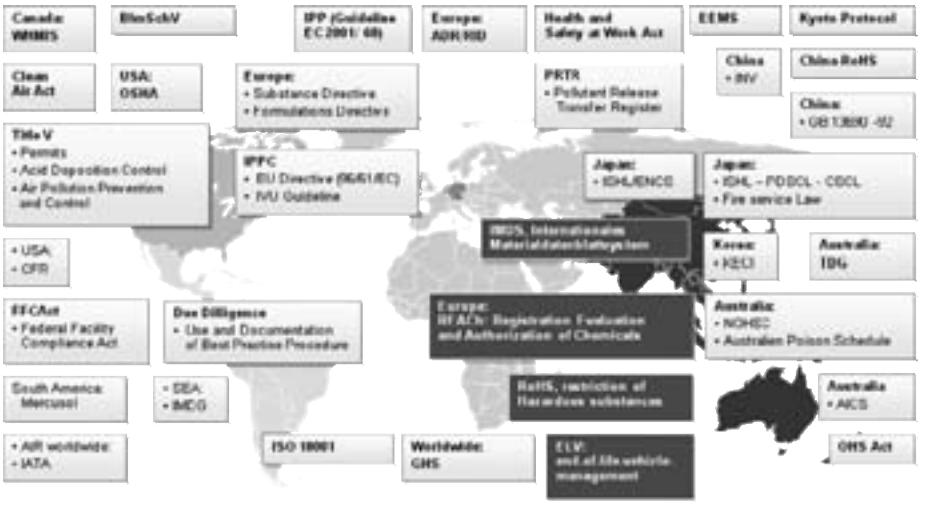

Abbildung 1: The environmental legislation challenges are various [Ba08]

Therefore, automated organisational security between business partners and between company departments becomes essential. In order to reduce process costs, the handling of compliance data has to be transferred from island solutions into companies' main business solution. Data about "not-to-use-substances" are required where product decisions are made daily, i.e. in Laboratory, Purchase and Engineering department but also in Production and Controlling/Finance. The centralised availability of data within companies combined with effective tools to link supplier data as well as customer requirements together is a main challenge for IT-tools today. Based on SAP's business suite, the following text provides a solution map to meet today's business requirements in the area of compliance, environment and safety.

2 Integrated Environmental Compliance Management

National and international regulations, laws, and recommendations are confronting all industries with more and more tasks and obligations. And economic competition is not getting less intense. In nearly all industries new regulations are coming up – especially the REACh directive has an impact on various sectors of the economy and obliges companies to take a cross-section look at their business. These European Directives build the basis for manufacturer`s requirements in the electronic industry. Long lists of banned substances have to be managed, controlled and fulfilled by the supplier industry. Therefore, under economical and time consuming aspects, not only the Engineering and Research departments are placing their focus more and more on these challenges.

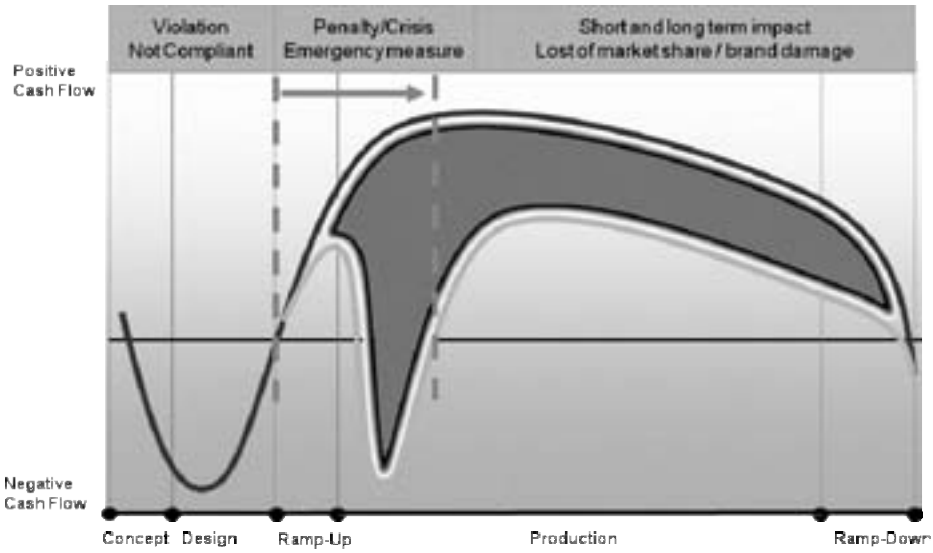

Abbildung 2: Economic aspects: costs of non-compliance [Fo06]

One example shows the resulting consequences for enterprises: In 2007 non-compliance of a product line forced a big toy manufacturer to carry out a number of product recalls. Media coverage did not mention where exactly the problem originated from but still the economical consequences where quite considerable: The incident destroyed 42 million Euro of sales volume. T his shows that product design in line with environmental requirements is no longer a mere subject of internal company policy. It is a substantial factor which is decisive not only for revenue losses, but also for market chances.

Among all named Directives, REACh, EU-RoHS, China-RoHS and Korea-RoHS are of great significance. Companies ignoring the impact on construction imposed by the directive run the risk of non-compliance. The resulting consequences are:

- loss of revenue
- denied markets
- penalties and enforced fees
- competitive regional disadvantage

Manufacturers have financial responsibility for all hazardous substances within products from cradle to grave. REACh compliance affects the entire value chain including the supplier qualification process, and in many cases, fundamental reengineering will be required. According to the business role that is assigned to the participants on the

environmental supply chain, the participants have a special compliance management profile.

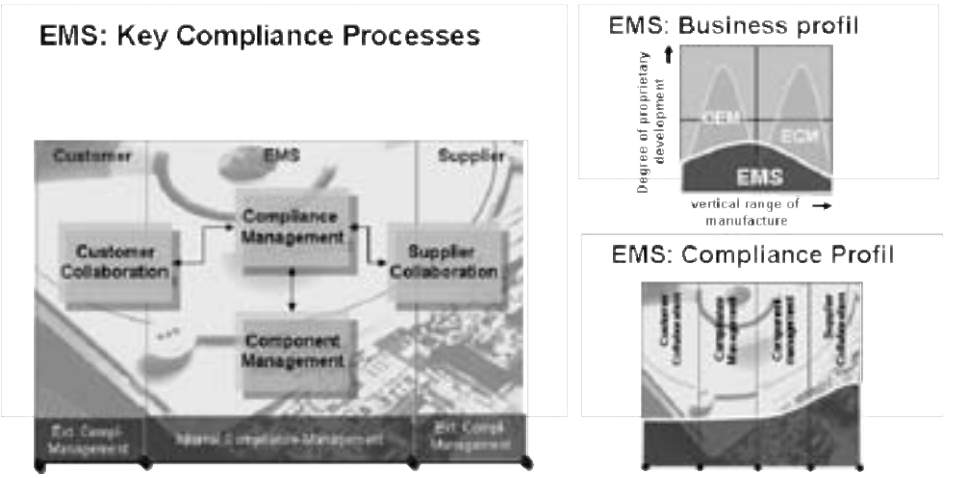

Abbildung 3: Compliance management profile of a Contract manufacturer [Kr06]

Automated organisational security across businesses between departments and between business partners becomes not only necessary but also essential. In or-der to reduce process costs, a transfer of compliance data has to be effected from island solutions into companies' main business solution. Data about "not-to-use-substances" is required where product decisions are made daily.

3 Company-wide declaration objectives are the key to success

When it comes to efficiently meeting all product-related complience requirements the assessment of a declaration objective is the silver bullet. It is vital to decide on a number of fixed criteria for compilation mode and transmission of a product declaration. The relevancy of declaration objectives becomes even more evident when we consider the possibility to choose suppliers from different parts of the world: Gobal choice of business partners implicates a global perspective of compliance standards. In other words: Global sourcing and regional compliance do not necessarily go together. In the process of defining declaration objectives various aspects have to be considered:

3.1 Declaration Objective

The assessment of a declaration objectives can be accomplished via three different approaches:

- Level 1 – qualitative propositions concerning the compliance of a product, e.g. yes/no.
- Level 2 – quantitative information on a defined list of substances, e.g. the possible contingent of a substance in a certain item.
- Level 3 – 100 percent complete declaration about composition and structure of a product.

Today, most companies tend to adhere to Level 2 in an effort to strike the balance between depth of data, frequency of queries and sustainable information value. Quite a number of enterprises have started out with Level 1 for EU-RoHs. However, when China-RoHs came up they were faced with the problem that existing data could not be reused. On the other hand companies which aspire towards implementing Level 3 have to deal with a dilemma: So far the supply chain does not support the need for detailed information to the full extend.

Abbildung 4: Example of a maximal list in DCT

3.2 Maximal List of Declarable Substances

To commit oneself to one of these Levels means to make a decision on how to gain compliance-relevant data. In this context the so-called “maximal list” is a key component. This list is utilized to address an important question: “Is our supplier able to provide us with all the information we need to answer the different legal and client-specific enquiries about our products?” The maximal list is the foundation of every query to the supplier which means that it sets the limits for possible propositions about the composition of a product. Therefore it is important to design the list in a way that matches the intersection of legal and client-specific demands. Additionally, the basis of valuation of each directive must be taken into account. The target must be to harmonise the aspired validation context of the diverse requirements. Thus it should be possible to send a request to the supplier and to get back the comprehensive information needed to decide whether a product matches legal or client-specific requirements. TechniData supports the compilation of intra-corporate maximal lists and the transmission of these lists to the supplier with its Data Collection Tool (DCT), an integral part of the SAP REACh Compliance Solution. The output of this process is a harmonised list of declarable substances which can be utilized company-wide whenever it is necessary to send a request for information to a supplier. The supplier on his part is in a position to answer queries about a product quickly and comprehensively. Importing these lists into an inhouse compliance management system such as the SAP / TechniData solution allows a multiple use of the generated data to answer different queries by legal institutions or by the customer. The effect: Fewer enquiries produce better data with less effort.

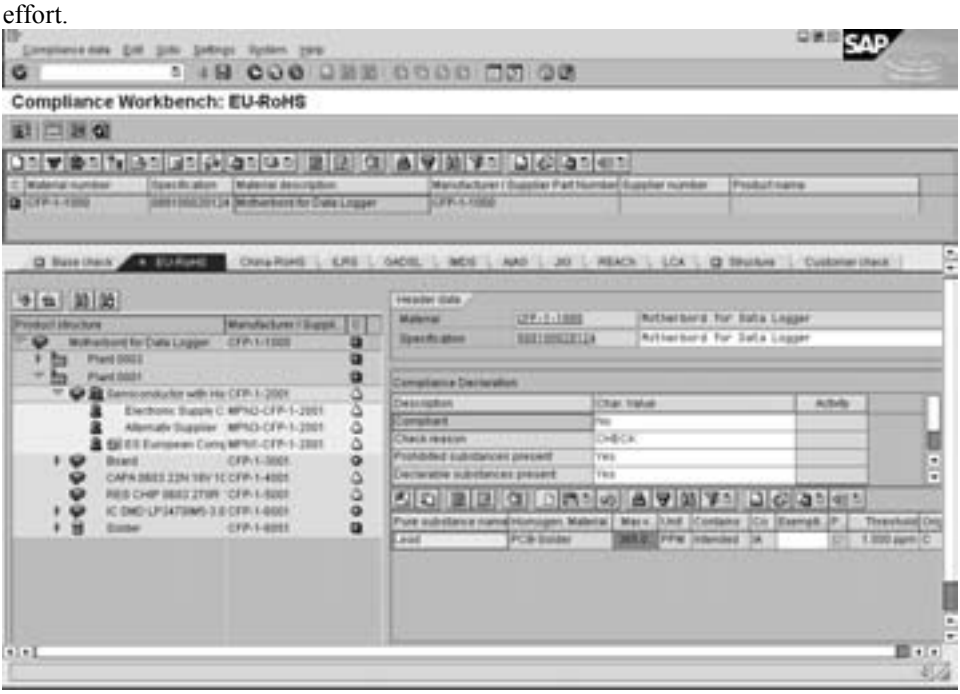

Abbildung 5: One maximal list to address multiple enquiries about the compliance of a product.

The release of the „List of Candidates“ in the context of the REACh directive considerably expands the list of substances which have an impact on product design in the high-tech industry. Additionally, this list must be perceived as an ever changing work in progress – another good reason to assemble company-specific lists of substances and to establish a well-defined communication process with suppliers.

3.3 Influencing factors

The declaration objective is influenced by a number of factors [Ab09]. Different surveys indicate that whenever the amount of notifiable substances increases the rate of return decreases and the quality of the data provided gets poorer. In the process of defining the declaration objective enterprises should weigh different factors against one another:

- Contract conditions – will existing contracts with suppliers correspond with the employment of a declaration objective?
- External data sources – are these both accessible and compatible with the declaration objective (e.g. IMDS)?
- Standards – are there declaration objectives which are commonly used and widely supported within the branch?
- Formats – do existing exchanges formats support the declaration objects (e.g. AIAG, IEEE, IPC1752)?
- Position – does our enterprise occupy a sufficiently strong position within the supply chain to support the requirements?

Mixed declarations – they do not lead to the desired results because the poorest quality decides about how the product is rated as a whole

According to experience companies often misconceive the impact of these influencing factors as being more positive than they really are. Eventually this can prompt companies to define their declaration objective in a much too comprehensive way. This in turn might put a drag on the accomplishment of the project, demanding increased internal and external time and effort. A number of examples show that the declaration objective could not be reached because the targets were set too high from the beginning which in fact stalled the support both from the supply chain and the inhouse staff. At the end of the day running the risk of loosing internal and external support has a much more serious impact than not being able to provide a 100 per cent perfect product declaration.

3.4 Best Practices

Backed by the experience of more than 30 implementation projects which TechniData has accomplished we recommend the following procedure to secure successful and effective compliance management:

- Identification of legal implications in all top target markets
- Identification of high priority customer requirements (primarily A-level customers)
- Identification of internal requirements
- Harmonisation of all these three aspects
- Checkup on the conditions stipulated in contracts with A-level suppliers
- Deduction of the company's declaration objective
- Verification of this objective with regard to the A-products
- Compilation of the company-specific maximal list
- Assessment and evaluation of standards and external data sources
- Selection of preferred exchange format
- Instruction/training of A-level suppliers
- Review of accomplished achievements
- Roll-out of the maximal list to the suppliers
- Evaluation of the rate of return and the quality of the provided information
- Definition of an update cycle (recommended: every 12 months)

4 Learning from Experiences – Automotive Industry and IMDS

The automotive industry has already been confronted by similar tasks. Here – some years ahead of EU-and China-RoHS – the initial issue was to impose a ban on a number of heavy metals. This resulted in the concept of an integrated constituent material management which meanwhile has passed a comprehensive test in practice. Compared to the automotive industry where, due to a manageable number of OEMs, exchange of information can be solved in a relatively simple way by an Internet application, the electrical and electronics industry is faced by an enormous challenge because of its heterogeneous structure – with a large number of OEMs very different in size. The collaboration with customers and suppliers is of great importance; and this must be mapped by the respective software. The key for this is a global harmonized and standardized compliance data exchange format. The benefit of this model is evident in the fact that the automotive industry covers the requirements of REACh for Articles by a simple extension of the GADSL list of substances: Substances listed as “candidates” can be transferred to the GADSL list of substances. The process to exchange material data sheets can be re-used entirely.

5 Challenge for IT-Tools

The collaboration between Laboratory, Purchase De-partment and Engineering Department gives a trans-parent example of a built-in-process to release a new material within the design process. As each depart-ment will have its own k.o. criteria on when not to use the material under substantial aspects, only integrated solutions can streamline the process with overall workflows and collaboration between departments. System support for compliance management recommends a strong commitment and adherence to ISO standards and proved and audited transparency of risk potential, combined with advanced task management.Companies have to be aware that only accurate, reli-able and timely information, modelled in sustainable processes will guarantee and improve image and legal compliance within each step of the daily business. The area of compliance, environment, health and safety, is subject to many national and international regulations, laws and last but not least, customer-specific requirements. The centralised availability of data within companies combined with effective tools to link supplier data as well as customer requirements together is a main challenge for IT-tools today.

6 The Software Has to Cover All Parts of the Process Chain

An example: The use of cadmium is prohibited for an important regional market, but allowed in all other markets on certain conditions. The company has to make sure that none of the products delivered to the regional market contains cadmium. This has an effect on all central departments:

- R&D: Is there a substitute? Can their properties be compared?
- Purchasing: Are there any suppliers which deliver the substitute? How does the procurement of the substitute affect costs?
- Material Laboratory: Does the substitute meet all requirements?
- Production: Which alternatives does the company have?
    - The entire production will be changed to cadmium-free products.
    - Only that part of the production will be changed which is required for the re-gional market (e.g. 10%).
    - Only part of manufacturing will be changed (e.g. one plant, all other pro-duction facilities will continue to work as before).
- Finance/Controlling: Which decision is the most appropriate one under business aspects?
- Logistics: How can it be guaranteed that only cadmium-free products reach the regional market. This includes
- Generation of import documents („Products are cadmium-free as provided by local requirements“)
    - Generation of packaging labels. Here, the company can retrieve constituent material data via software.
    - Supplier auditing and documenting.

Insular solutions are not able to manage this complexity. Here, a solution is required which is completely integrated into the main business processes of a company. The SAP REACH is the SAP solution for Environmental product compliance and covers all requirements imposed by REACh (Chemicals and Non-Chemical Industries) Global-RoHS and material declaration aspects for the high-tech industry. The solution comprises fully integrated business processes from Design for Environment, Supplier Collaboration and Status Tracking for Supplier Components to Restriction Checks and Compliance Analytics. The comprehensive software has been developed by TechniData, which is the exclusive SAP development partner for the Compliance Management solutions SAP Environment, Health and Safety (SAP EH&S) und SAP Environmental Compliance (SAP EC), and as such has developed environmental and safety solutions for almost 20 years now.

7 Optimum Integration

The integration into the SAP environment – for example in purchasing – provides great advantages for the company. The existing ERP system with master data record and vendor assessment is merely extended by environmental aspects; there is no redundancy in collecting and processing data. This also allows the systematic management of hundreds of suppliers. Relevant information includes:

- Which supplier is compliant, which is non-compliant and in which areas. Which substances have been released as of which date and for which period, etc.

- The system collects data not only on prohibited substances, but also quantities under the aspect of adhering to absolute limit values for substances that have to be monitored and are not to be used. This is of decisive importance due to the cumulative effect of a large number of suppliers and components, respectively, for the final product.

- In addition, detailed information on environmental impacts can be collected for the classification as hazardous substance, dangerous goods, etc. Not only data on the recycled content and on disassembling of a product can be stored, but also serial numbers of components, etc.

The system provides an electronic interface for supplier data. This data is structured and then made available e.g. for the production department via a status network (Status Tracking) both on component and constituent material level. And, for example, answers given in supplier surveys with regard to constituent materials used can be imported and further used via document management.

8 Effective Restriction Check

The system allows companies to check the bill of ma-terial of a product quickly and systematically for compliance issues – in both directions, top down and vice versa. Calculations can be made for the entire product. Information on substances to be monitored can be aggregated both on product and component level. Especially, for proofs of use the system shows which products or components contain a certain substance. Since SAP-based software uses automated checking procedures, also product revisions will be considered. This is an advantage which is mainly important in ex-tensive configure-to-order manufacturing. Changes in the operational strategies will automatically be checked for product-relevant environmental and ma-terial data with regard to REACh, Global-RoHS, and other customer specific provisions.

9 Transparency Regarding Regions and Customers

Based on this high transparency, companies can view all substance information of its products vertically and horizontally:

- From a regional point of view considering country-specific requirements
- From a customer point of view, each with different company-specific requirements, re-striction lists, etc.

This shows very quickly whether a company is able to meet the requirements of its key customers, which action is to be taken or if there are new market chances. Thus, the system gives a clear picture of the situation and provides the company with a higher legal security with regard to the organisation of its markets. At the same time, the system is able to consider time lines in the background – for example, certain limit values which are to be met as of a certain date. Based on the customer master file of the SAP system the company always keeps track of to which company or where which deliveries have been made. The integration into Finance/Controlling is not only important for profitability calculations, but also for making provisions.

10 Future prospects

The increase in legal requirements goes hand in hand with a growing demand for corporate responsibility such as the demand for climate-neutrality. The first step towards fulfilling these expectations must be to identify the possible environmental impact of one's own products and plants. Secondly companies have to make optimum use of these findings: The task is to put the focus on measures which are suited to efficiently reduce negative impacts on the environment. The definition of the Carbon Footprint for

products and locations is already an integral part of our roadmap and has already been successfully tested in different pilot projects.

Abbildung 6: Life Cycle Assessment with TechniData CfP [Ab06]

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