

# Boeing and Rolls-Royce on Restricted Substance and Environmental challenges

The Environmental Materials Information Technology (EMIT) Consortium is a collaborative project (members include Boeing, Airbus Defence and Space, Airbus Helicopters, Emerson Electric, GKN Aerospace, Honeywell, NASA, NPL, Pratt & Whitney, and Rolls-Royce) that develops and applies information technology solutions to enable product design and development in the context of environmental objectives and regulations. A particular focus is on restricted substance regulations, such as the European Union’s REACH.

Restricted substances pose serious challenges to manufacturing enterprises—legal liability, non-compliance costs, costly re-design, potential product recalls, or inability to make or service products as materials become obsolete. At an Open Seminar hosted by the UK’s National Physical Laboratory (NPL), who help to administer Consortium, two of the members, **Boeing** and **Rolls-Royce**, presented projects that are helping to meet this challenge.

## Boeing: Mitigating restricted substance risk for materials

*“For the first time we have the linkage all in one place”*

Boeing’s involvement in the EMIT Consortium arose from a growing awareness of the acceleration in regulatory restrictions. They were looking for a way to connect materials, specifications, regulations, and parts: “a laborious and costly process when you consider the mountains of data”. They also needed to keep track of, and report on, enormous amounts of historical data, in some cases exceeding 80 years.

“Near-term risk reduction actions,” **Boeing’s Peter Mezey** explained, “included managing chemical information.” So Boeing adopted the GRANTA MI™ software to provide a centralized hub of materials knowledge, allowing restricted substance information to be fully integrated with other materials information. “For the first time we have the linkage all in one place”.

Linkage is about more than just connecting individual specifications, materials, and regulations. It can also help overcome the common challenge of ‘missing information’ in vendor data. ‘Fallback links’ fill in the missing information using appropriate restricted substance information from Granta’s comprehensive reference database. This allows risk reports to be generated, even when suppliers have only disclosed the minimum of legally-required information. “Fallback links are a brilliant innovation,” Mezey concluded.

The first phase of the project has already enabled simple queries of this materials and substance knowledge-base (based on links between materials, specifications, and legislation) and the production of the reports (known as “REACH Article 33 reports”) which are required to provide information on whether an article is impacted by materials on the REACH Candidate List Substance of Very High Concern (SVHC). The return on investment from using GRANTA MI has been significant, particularly in areas such as data cleanup, risk mitigation, and the enormous efficiency benefits seen

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through data linkages. One example was the ability to respond much more efficiently when Boeing had to questions around Mercury usage in Canada.

Phase II is now focusing on automated bulk data importing, of, for example, TSCA Section 12.B Export Notifications, CAS registry numbers, material safety data sheet (MSDS), and various Specifications. With very large quantities of data and their inter-relationships to import, it was inevitable that this would be a challenging process. However, as EMIT members, Boeing “have been impressed by how consistently Granta have met these challenges, making vast improvements”. As the first organization

to attempt to bulk-import such large amounts of information, Boeing’s input has been invaluable in providing enhancements from which many others will soon benefit.

As someone directly involved in implementing the materials information management system at Boeing, Peter Mezey highlighted just how important it was to “get the internal IT team on board early”, in order to maximize the effectiveness and ease of adoption. He concluded the presentation by focusing on their involvement in the EMIT Consortium, especially working on a common specification schema. “Being able to directly influence the ongoing development of GRANTA MI has been an excellent opportunity.”



*The seminar at the UK National Physical Laboratory*

## **Rolls-Royce: Data-driven assessment of materials supply and environmental risks to design-out problems**

**Andy Clifton, Manager of Sustainable Development and Health and Safety in Design at Rolls-Royce**, opened his presentation by

looking at the risks and opportunities presented to a business when considering environmental impacts. He emphasized that Design for the Environment (DfE) “is an essential element of effective risk management: operations create impacts; undesirable impacts attract regulation; and regulation restricts the ability to carry out operations.”



**Rolls-Royce**

As many of Rolls-Royce’s products have extremely long lifecycles “a lack of proactive thought in design would create the potential to miss opportunities and increase risk.” Instead, they are committing significant resources early-on (pre-launch). This allows them to identify problems and develop solutions when costs are low, and to minimize the resource required post-launch. In this way, “environmental performance by design” leads to greater revenue than “reactive design”.

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“DfE at Rolls-Royce is about understanding the risks of a system’s lifecycle-impacts and integrating the consideration into our decision processes,” Clifton explained. This includes phases such as: design; extraction of raw materials; product manufacture; product use; maintenance, repair, and overhaul; and end-of-life. Having this “big picture” is how Rolls-Royce made the decision to invest US\$1 billion in R&D to reduce use phase emissions and improve efficiency in 2013: “since concerns about use-phase emissions are an integral part of the decision process within the company.”

In the aerospace industry, material choice is critical: safety is paramount; the product lifecycle is very long; cost is proportional to weight; and the materials must function in a severe operational environment. The result is a very limited range of material options for a given level of performance. This means that *material criticality* has become a key area of concern. Assessing the business impact of supply disruption is “relatively straightforward”, but the challenge is establishing the likelihood of disruption accounting for physical, market, and political factors—“there are many things associated with the supply of materials and the resulting environmental impact that can have a significant effect on the supply of materials.”

Through Rolls-Royce’s involvement in the EMIT Consortium, they have been able to work on this problem “with a group of like-minded people. EMIT provides a wide user base of companies all working towards practical ways of managing materials data issues. The structure of EMIT allows for a quick turnaround on ‘working demonstrators’ that turn your requirements into a practical solution.” In particular, Rolls-Royce’s requirements have resulted in the Critical Materials Data Module which links elemental supply risk information to materials by composition. This enables data-driven assessment of materials supply and environmental risks, so Rolls-Royce can design-out problems and meet legislative requirements. Together, Andy Clifton concluded, they have developed approaches that deliver a “triple win scenario” benefiting customers, the environment, and suppliers/manufacturers.

***With data-driven assessment of materials supply and environmental risks, Rolls-Royce can design-out problems and meet legislative requirements***

## Further information

More information is available on the Granta Design website:

The EMIT Consortium – [www.grantdesign.com/emit/](http://www.grantdesign.com/emit/)

GRANTA MI for Restricted Substances – [www.grantadesign.com/products/mi/restricted/](http://www.grantadesign.com/products/mi/restricted/)