

## Novo Nordisk: materials information technology in industry

Granta Design hosted a seminar on Materials Information Technology in Industry at the Danish Society of Engineers (IDA) Conference Center on the Copenhagen waterfront. Attendees came from a wide range of industrial sectors (including medical, wind energy, and aerospace), and over the course of the day, the seminar addressed issues such as the need for tools and data for composites, steels, medical device design, eco design, restricted substances, and lightweighting.



Image from: <http://ida.dk/sites/moedecenter/english>

Guest speaker, Dr Rya Eskimeren Nielsen from Novo Nordisk, gave a fascinating presentation providing an insight into how rational materials selection is supporting medical device research and development. Novo Nordisk develop medical devices including injectable products used in the treatment of conditions such as diabetes and haemophilia.

As part of a large organization, the device R&D team are involved in a large number and variety of projects, some of which have very long timelines. They must not only choose the right materials for individual products, but also interact well with the rest of the organization including the QA and QC teams, as well as with materials suppliers and subcontractors. This means they must both optimize material choices and be able to explain and justify these decisions, ensuring traceability in design audits.

Materials selection has traditionally been based on internal 'expert knowledge' combined with supplier recommendations. However, systematic material selection has enhanced this process while retaining the input from experience within the organization. A rational selection methodology is often employed using Granta's CES Selector™ to yield a narrow range of material types well suited to the project: this process involves listing the requirements of the material, screening out materials which fail to meet these criteria, and then using material property charts (Ashby Charts) to assess the trade-off between different properties.

Such property charts clearly show the relative benefits of different materials, and allow the R&D team to explain their selection of the most suitable materials for further testing. CES Selector makes use of Granta's MaterialUniverse, providing complete property data for virtually every class of purchasable engineering material. As property values are either populated with known, referenced data or with values estimated using Granta technology, Novo Nordisk know that they have considered the complete 'universe' of potential candidate materials without excluding those which would otherwise have had incomplete

datasets. The selected material types are then translated into specific grades, considering in-house knowledge and databases such as IDES and CAMPUS. In the medical device industry, it is particularly important that several materials are taken forward at this stage. It can take up to eight years to get a product to market, so it is preferable to have at least two candidate materials that fulfil all the requirements. Specific grades of these materials are then used in further testing, such as comparative leachables.

Having used this combination of rational selection and in-house expertise, Novo Nordisk can be confident that they have selected the optimal materials for each project. The ongoing challenge, as in many organizations, is ensuring that this information is deployed across the entire organization in an efficient and traceable manner.

### **Applications for Materials Information Technology**

Dr Nielsen's presentation was very well received and prompted a lively discussion, both in the Q&A and in the subsequent round-table session. This helped establish the needs of those present, guiding the presentations that followed. A key issue common across all industries was the need for efficient and effective material information management: this was addressed in a presentation on the management of materials data using GRANTA MI, including both in-house test data and external materials reference data.

Presentations in the afternoon included reviews of three subject-areas identified as of particular interest to participants:

*Composites:* Composites provide a particular challenge because of need to store and manage a variety of different types of data. Granta's Composite Schema is a valuable and flexible tool that helps companies build a successful corporate composite database. Within the MI:Composites Lab, this information can be integrated with analysis tools that help with the processing and use of test data results. The presentation demonstrated how this can support the systematic flow of composite data and analysis results, together with their inter-relationships, in a fully traceable manner.

*Materials Selection:* The second presentation covered a case study of rational materials selection for the medical device industry. Using CES Selector, it was shown how materials could be screened against essential requirements (such as biocompatibility and sterilization), and a rational trade-off between key material properties performed using Ashby charts.

The case study demonstrated how this process could be applied to the materials currently used in some medical forceps. It was interesting to see how newly certified biocompatible materials could offer improvements compared to the range of materials available when the medical forceps were initially designed.

*Eco Design:* Finally, the focus turned to the topic of eco design. Designers and engineers are facing increasingly complex regulatory pressures, as well as needing to respond to customer concern. The presentation looked at the best ways to respond to these pressures, including the importance of considering environmental issues at the early stages of design when changes cost least and have maximum impact.

The day concluded with a final questions and answer session, with the panel of Granta experts providing insights into the wide range of software tools and data available to support materials information technology in industry.

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Granta would like to thank Dr Rya Eskimergeren Nielsen from Novo Nordisk for her presentation, and are grateful to all the participants for making this an instructive and informative day.