

## Design For Manufacturing with Dassault Systèmes

Specialists from Operations and Logistics at Nokia are spearheading the drive for Design for Manufacture (DFM) by acting as facilitators between Design and Manufacturing in order to help to cut costs and improve product quality. Currently, Nokia is using CATIA for mechanical design as well as detailed design in the product development process. DELMIA is used to make the most of this CATIA data in the assembly design process, while ENOVIA SmarTeam is used to manage the resultant data. There are 60 Nokia global servers in 18 sites in the world allowing numerous clients to work in the same shared environment. (Figure 1)



A group called the Mechanics Engineering Service supports this global engineering environment. They are composed of highly-skilled engineers and support the mechanical team and related business groups by establishing and maintaining an environment for mechanical design and product lifecycle management.

### Before DELMIA could be implemented

Before implementing DELMIA, Nokia had two major challenges. The first was to reduce the data conversion work required to send a

CATIA part data to a process study tool. Nokia was finding that the assembly study necessitated for products containing many parts required a great deal of time for data conversion, leaving little room for "real" design activities. The second challenge was to improve the creation of work instructions, as well as the speed with which documents could be updated to reflect design change.

### DELMIA implementation and utilization

In order to solve these issues, Nokia implemented DELMIA DPM Assembly at the

beginning of 2006. Out of 50 licenses globally, 15 licenses are used in Asia Pacific. "Our CATIA - ENOVIA SmarTeam combined environment was already in place," explains Nokia Corporation Technology Platforms/Mechanical Engineering Services key account specialist, Ari-Pekka Pietila. "To improve the use of our CATIA data as well as our manufacturing process integration, we were able to reuse our CATIA native data, for customizability, automation, robotic and production line simulation in DELMIA." As a result, DELMIA products are currently used for DFM assembly study, concept design of final assembly work, creation of assembly work processes and creation of work instructions. This means that CATIA 3D data can be now directly linked to assembly process information, making assembly study or document creation more efficient. An additional advantage is that DELMIA performs concept design of assembly work by adding assembly instructions in the form of annotations. These annotations are in the form of a 3D geometry snapshot and are automatically imported into an Excel document. (Figure 2)

When an assembly study is performed in DELMIA and the design of a part is changed as a result of the study, the updates now automatically reflect the changes to the linked document. Additionally, Nokia used CATIA for 3D design mainly for concept designs of products and detailed designs of parts before the DELMIA implementation took place. Therefore, no mechanical design taking into account the manufacturability of each part was conducted in CATIA. Thanks to DELMIA, users can now perform assembly studies with CATIA 3D models, enabling mechanical design that takes into account the ease and speed of assembly, as well as minimizing the number of parts used.

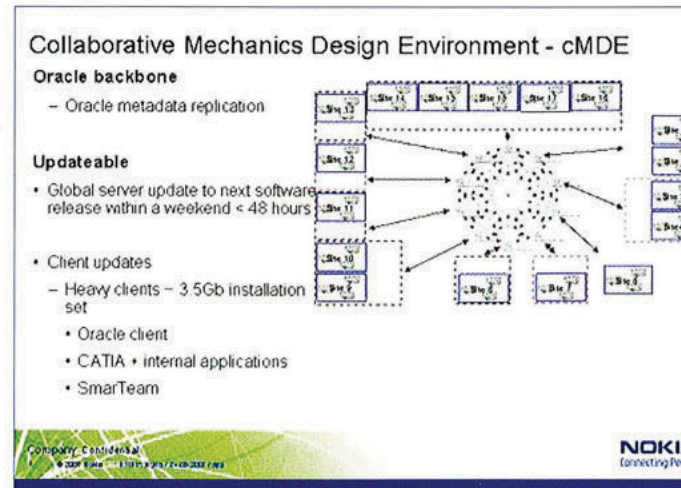


Figure 1: Collaborative Mechanics Design Environment established by Nokia

### Benefits from DELMIA use

#### No data conversion

As DELMIA can directly load CATIA data, data conversion has been totally eliminated.

#### Front loading of trouble shooting

One of big advantages of DELMIA is that assembly studies can be conducted with a 3D model, allowing problems to be communicated to the design team at an early stage.

Since the mechanical design in CATIA is linked to DELMIA, if any design change is deemed necessary as a result of a DELMIA assembly study, the manufacturing engineers can contact the designers to discuss the changes.

Prior to the implementation of DELMIA there was no close collaboration between designer and their manufacturing colleagues. After the implementation, the 3D models became communication channels, allowing defects to be fixed quickly. In addition, Nokia has found that DELMIA enables digital mockup review, reducing the number of physical prototypes, leading to time and cost reduction.

"By better utilizing DELMIA, I think we will be able to largely reduce the creation of prototypes," comments Ari-Pekka Pietila.

#### Document creation, efficient update

In the past, when the design of a part was changed, all documents that related to assembly needed to be updated manually, changing each corresponding part. After implementing DELMIA, there is direct link between assembly related documents and 3D models, so this change is automatically reflected in the work instructions.

"We have no quantitative measured gains to compare before and after DELMIA, as it has been only eighteen months since the implementation. However, I strongly feel that we are heading in the right direction with the

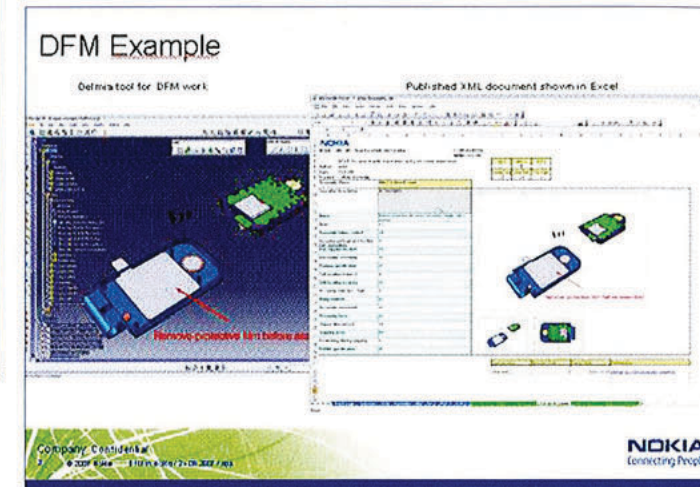


Figure 2: Document creation with DELMIA

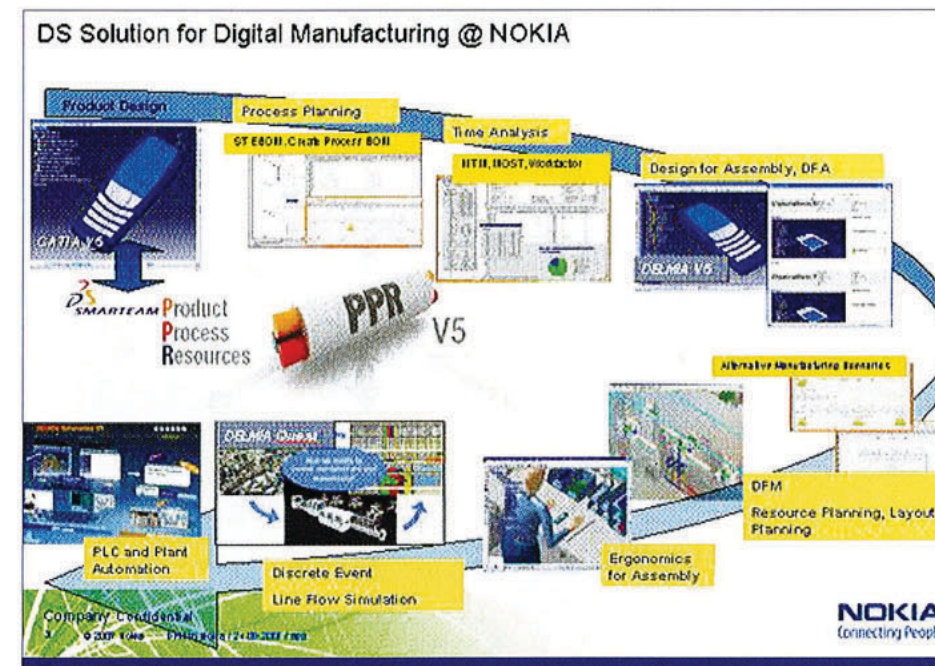


Figure 3: Nokia process flow goal and corresponding DS and DELMIA solutions

implementation of DELMIA products," comments Ari-Pekka Pietila.

### Next Steps

Figure 3 shows the ultimate business flow at Nokia. Nokia is currently using CATIA for product design and DELMIA DPM Assembly for assembly design. Though the company also uses DELMIA Quest for production line simulation, its integration with other processes such as product design, process design, and equipment design is something Nokia is working toward. The ultimate goal is to realize total digital manufacturing.

Photos courtesy of Nokia Corporation Technology Platforms/Mechanical Engineering Services Key Account Specialist Mr. Ari-Pekka PIETILA

### ABOUT NOKIA

Nokia Corporation is the world's largest mobile phone manufacturer. In 2005, Nokia mobile phones were sold in more than 130 countries, with net sales revenue at 34.2 billion euros and ranked as the 6<sup>th</sup> most valuable brand in the world. The company has R&D centers in 11 countries, deploys manufacturing sites in eight countries and manufactures more than 1.2 million mobile phones a day.

Information about Nokia at:  
[www.nokia.co.jp](http://www.nokia.co.jp)