Athlete FA

Using 3D Data In Semiconductor Manufacturing - Process Innovation Begins with XVL

Athlete FA Corporation, headquartered in the Nagano prefecture in Japan, develops, manufactures and sells semiconductor devices for the automotive industry. One product, the Microball Mounter, was recently awarded a top prize by the Japanese Society for the Promotion of the Machine Industry, and its industry-leading COF Underfill equipment maintains a 60% market share worldwide.

3D CAD software was introduced into Athlete FA in 2007 to meet demands for higher accuracy, faster and smaller products, shorter time-to-market, as well as lower product costs in the face of foreign competition. The 3D CAD process was implemented only in the design department, while production, assembly and technical documentation departments remained using 2D data. But with 3D CAD in place, however, it was found that new workflow issues were now being experienced which demanded designers' time and focus away from design. This needed to be resolved.

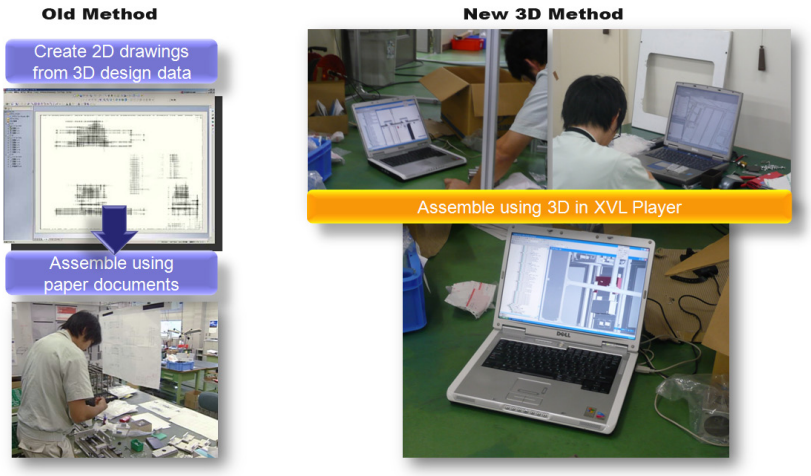

Figure 1: A comparison between 2D paper-based assembly processes and 3D visual assembly processes at Athlete FA's manufacturing site

Once the company realized that it needed to adopt new strategies to benefit from using 3D data, a 3-year plan called "the A3 Project" was started to directly address the workflow issues being encountered. To start, each department in the design-to-manufacture process identified workflow issues that would need to be solved, while management made sure each issue fitted within the mission of the Project. As part of this process, it was identified that while current assembly and design review processes used only 2D data, 3D would provide a better solution to the workflow issues being experienced. However, some in Manufacturing were of the opinion that 3D CAD data was too bulky to be easily shared and that the use of it in a process like this was premature. On the other hand, the shop floor staff felt strongly that to better understand the products, understand the motion of the product and the assembly processes, and so on, 3D data was a necessity:- In fact, they pushed for 3D data use company-wide.

Tackling the tasks of illustration, simulation and animation were a challenge with the large 3D CAD data and the CAD tools available, so it was determined that that the design department would originate designs using 3D CAD, and non-design departments would use the 3D downstream in a different format. In 2007, after a benchmark of the XVL format and applications developed by Lattice Technology, Athlete FA adopted XVL. The company cited XVL's industry leading 3D compression, high usability, and availability of features in the applications that allow equipment assemblies to be viewed, simulated, animated and documented for immediate use downstream, as the reasons for selecting XVL.

Benefits

XVL Studio Pro, Lattice3D Reporter and the XVL format enable Athlete FA to:

- Identify more than 80% of design issues prior to physical prototype (with Vmech for mechatronics)
- Manufacture products faster and more accurately by using digital data on the shop floor
- Directly use 3D data to create accurate work instructions for use across the company
- Automate design review of 3D data to improve design quality
- Concurrently check data and perform design changes prior to release of the design
- Easily and rapidly share visual instructions and parts lists to globally dispersed manufacturing operations

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Using XVL at Athlete FA

The company found that a 470 MB model from the 3D CAD system is just 2.79 MB in size when it is compressed into XVL, a size which was found to be lightweight enough for company-wide use. In addition, composite parts could be accurately viewed with attributes and part numbers to allow correct device configuration. Prior to the adoption of XVL, 2D drawings had been created directly from the 3D CAD system but the resulting drawings were hard to read. To resolve this, XVL was implemented to deliver assembly instructions and documents using digital 3D data, which is viewed on PCs on the shop floor. Since then, there has been notable growth in requests for additional PCs on the shop floor and new processes for data security have been proposed by the shop floor staff.

Once this was implemented, the teams in Japan began to focus their attention to sharing animated assembly and work instructions as an effective means of communication for its manufacturing site in China. To that end, the company is creating a process which delivers work instructions, parts lists, interrelated 3D information and animations on Excel spreadsheets using the Lattice3D Reporter application from Lattice Technology.

Simulation Using XVL and Vmech

In 2008, the Vmech application was introduced into the process. Vmech*, by Interdesign, works with XVL data and allows early simulation and testing of mechatronic systems, including the control software, and identifies issues that can then be resolved long before physical prototypes are created.
(*. Note. Vmech is currently only available in Japanese.)

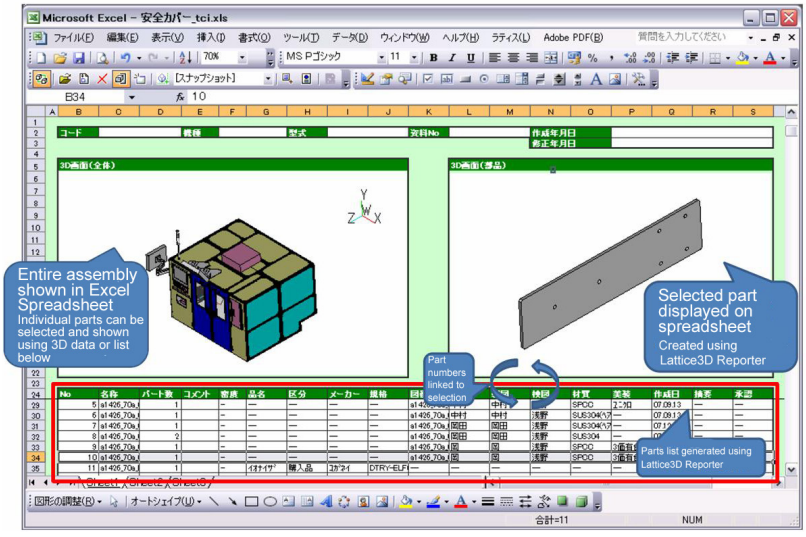

Figure 2: An example of a 3D parts list in Microsoft Excel format, created using Lattice3D Reporter, which shows the entire assembly and the ability to pick parts using the 3D view or parts list.

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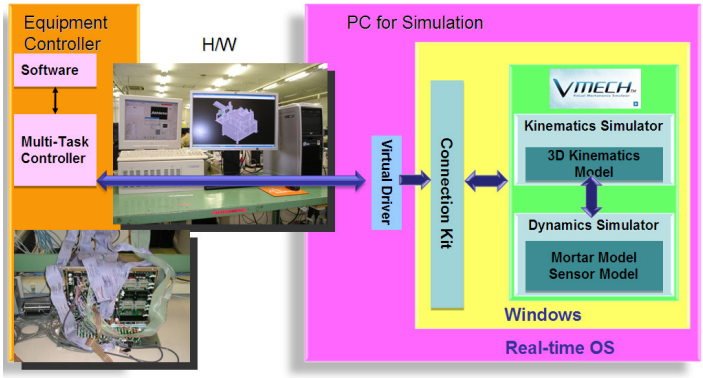

Figure 3: Workflow of virtual mechatronics simulation using Vmech and XVL.

Using this methodology, Athlete has at times found more than 80% of the design issues present prior to physical prototype testing, delivering much faster time-to-market and greater accuracy of the product designs. Today, Athlete is working on improving effectiveness further by involving Vmech and XVL yet more in virtual testing in its design-to-manufacture process.

Continuing Process Innovation

Design review is an important aspect of the product design and development process, and was previously conducted at Athlete using 2D data. In February 2009, the company started testing automated design review using XVL Studio Pro, which improves accuracy of the design, as well as allowing concurrent design changes to occur. The integration of the Vmech application also broadened that design review process, giving the company great advantages in identifying issues and resolving them far earlier. The company feels that to benefit fully from digital process engineering, changing the design review procedure is a key requirement.

Simply having 3D CAD data in design does not in itself improve design quality, efficiency, cost and faster time-to-market. 3D CAD data needs to be backed by a strategic plan and some innovative technologies to allow it to be used to its full potential. Lattice Technology delivers the tools needed to implement that strategic plan and allows Athlete FA to continue to build its strategy of using 3D data enterprise-wide.

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Lattice Technology Inc., sets the standard in Digital Mock Up and Technical Documentation software applications. These industry-leading applications are focused on making manufacturing productive, efficient and profitable through the use of 3D data. While creating 3D design data is the first step, it is not tuned to the needs of the shop floor, production, procurement or support staff, nor easily applied into these disciplines in its native formats. In addition, as 3D design data has become much more complex and heavyweight, so design errors are more easily missed and adequate simulation and testing of the data is not being performed.

The Lattice Technology Solutions deliver the tools to thoroughly and accurately check 3D design data before it is released, and to design, simulate manufacturability and document manufacturing processes in 3D long before manufacturing commences. These applications deliver the information that has traditionally been delivered on paper drawings and reports, but as print-ready and digital documents that allow immediate cross-referencing of listed parts, work instructions and other annotations with the specific, relevant 3D data.

Customers of Lattice Technology have measured significant improvements in design accuracy, process design, as well as eradication of delays, and considerably reduced errors on the shop floor. To find out more about the Lattice Technology Solutions, please visit www.lattice3d.com.