Efficient Use of 3D-Data in Business Process

*M*ost companies nowadays develop their products in 3D from start to finish. However, 3D data is not yet used to optimize other business processes on a consistent basis, except maybe in the manufacturing context. There is no shortage of tools available. The integration of PLM and 3D PDF technology allows 3D data from the development department to be prepared in automated fashion and supplied to other areas of the company in a standardized – and, above all, universally readable – format.

The use of 'intelligent' 3D PDF documents, which are filled automatically with the current 3D models and 2D information from the back-end systems, speeds up the provision of sales and service documentation. One of the ways in which the PDF Generator 3D is used is to augment spare parts lists with 3D information, which is then sent to the mobile devices of on-site service engineers. (Photos: PROSTEP)

Efficient Use of 3D Data in **Business Processes**

The use of 3D not only accelerates product development but also facilitates the communication of product information in the fields of technical procurement, marketing and sales, as well as in assembly, technical documentation and service. However, the efficient use of 3D data in other business processes was hampered in the past by the fact that the data had to be prepared slightly differently or in different formats for every application area, entailing a great deal of 'manual tinkering'. In practice, this often resulted in the 3D data having to be flattened down for reasons of simplicity and passed on as 2D drawings or views. The tiresome extra effort involved had the additional drawback of forcing users to forego the benefits of 3D in subsequent processes.

For some time now, the 3D PDF technology developed by Adobe has offered companies a standards-based solution with which 3D models from all established CAD applications can be converted into a neu-tral format and embedded in PDF documents that can be displayed using the normal Adobe Reader. This technology provides a broad group of users, both inside and outside the company, with access to 3D information – without having to install additional applications. One major advantage of PDF-based 3D communication as compared with conventional viewing solutions is that the 3D models can be combined with 2D information from any applications, which is an essential requirement for many business processes. Just think of the provision of sales and service documents, assembly instructions and product documentation, to name only several examples.

Preparing the 3D product data

The challenge posed by 3D communication lies in preparing the relevant 3D data in automated fashion and making it available to the respective application areas alongside supplementary 2D information such as PDM metadata or BOMs from the ERP system, as this is the only way of putting them to efficient use in company processes. The technical basis is provided by the former Adobe LiveCycle ES PDF Generator 3D, the further development, sales and support of which was handed over to Darmstadt-based PROSTEP AG by Adobe Systems Inc. in September 2010. At the same time, Adobe transferred the responsibility for further development and enhancement of the 3D interfaces to the established CAD/CAM/CAE systems to Tech Soft3D, with whom PROSTEP also collaborates closely. Strategic cooperation between the participating companies is aimed at establishing 3D PDF technology as a generally

accepted standard for the communication of 3D product data in manufacturing industry. The acquisition of the PDF Generator 3D has also paved the way for closer integration of the 3D PDF technology into all the business processes of the Darmstadt-based product data and process integration specialists. "We developed our PDF Generator 3D on the basis of the existing Adobe solution," reports Peter Pfalzgraf, head of the product center for the 3D PDF solution portfolio at PROSTEP AG. "However, it remains a component of the Adobe LiveCycle architecture and covers all the LiveCycle functionalities required to generate intelligent 3D PDF documents." One major focus in the further development of the PROSTEP PDF Generator 3D has been on PLM support – with a view to transferring metadata such as product structures, BOMs and other information automatically alongside the 3D models. "This is a prerequisite if the 3D data is to be provided to other users in the company in its currently valid versions and updated in reliable fashion whenever modifications are made."

The integration of 3D PDF technology in PLM processes offers companies in the manufacturing industry a wide range of application options, including the rapid visuali-
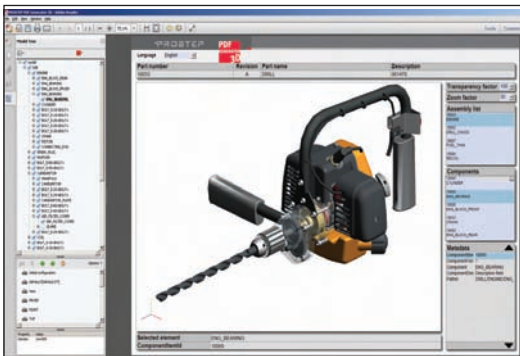
For some time now, 3D PDF technology has offered companies a standards-based solution with which 3D models from all established CAD applications can be converted into a neutral format and embedded in PDF documents. All that is needed to display them is the Adobe Reader.

zation of multi-CAD data in the development process. Thanks to the high-performance 3D interfaces, models from various CAD systems can be converted more quickly than with other visualization tools, making it easier for users to search for the specific files they need. At the same time, the Adobe Reader provides functions for visual version comparison, allowing differences between various versions of a file to be spotted at a glance – a function that suppliers like to use to check incoming data.

The current version of the PROSTEP PDF Generator 3D supports around twenty 3D formats that can be converted into either facet models or BREP models within the respective file. The tool is able to create compressed PDF portfolios with a multitiered structure, enabling individual PDF documents within the container to be encrypted with a digital signature or access rights to be monitored, restricted or withdrawn with the help of the DRM (Digital Rights Management) functions after being sent. Thanks to the container function, the original 3D data can also be integrated in the 3D PDF documents and provided with special protective mechanisms, allowing 3D PDF to be used as a vehicle for data exchange.

Form-based 3D communication

Companies that work with various CAD systems or have to process CAD data from various sources can use the PDF Generator 3D to prepare and supply the 3D models automatically for design review processes. The software analyzes the assembly structures, together with the transformation information contained in the CAD models and saved in the PDM system, using this information to position the components in the 3D PDF documents. Even large assemblies can be visualized and measured in real time in the PRC format using the Adobe Reader.

Used in conjunction with the PLM integration modules, 3D PDF technology allows technical procurement staff to automate the integration of 3D models of parts to be manufactured externally in their requests for quotation (RFQ), enabling bidders to calculate their offers more easily. With this in mind, PROSTEP has developed a form-based solution to accelerate the RFQ process as part of a customer project. This allows supplier data to be read automatically from the ERP system together with the purchase requisitions and inserted into a PDF form template that is then sent to all the eligible bidders. In the reverse direction, data from incoming offers can be extracted automatically and transferred back to the ERP system for the purposes of bid comparison.

The use of these 'intelligent' 3D PDF documents, which are filled automatically with the current 3D models and 2D information from the back-end systems, also speeds up

the creation of sales and service documentation and their updates when products are modified. The rapid provision of such documentation presents a huge challenge to companies with global operations in particular. One of the ways in which they can use the PDF Generator 3D is to augment spare parts lists with 3D information, thus facilitating the search for the requisite spare parts by service engineers working on the customer's premises.

The automatic generation of assembly instructions is another application area in which 3D PDF technology promises considerable benefits in the eyes of the Darmstadt-based company. The use of 3D models of the components and assemblies to be installed in conjunction with BOMs and other written information helps assembly staff to understand the operating steps to be taken – while also saving time and money otherwise spent on the creation and distribution of paper drawings. Users of the free Adobe Reader can navigate through and zoom into an assembly, as well as show and hide components and rotate 3D models in real time, so that they can be viewed from every angle.

The integration of 3D PDF technology into business applications such as PLM and ERP offers companies new ways of preparing their technical product documentation automatically on the basis of a product or documentation structure and making it available in electronic form. This represents an interesting alternative to conventional document creation for plant engineers in particular, who have to provide enormous quantities of technical documents in a number of different versions ('as planned', 'as built', 'as accepted'). PROSTEP has, for example, implemented a solution for a well-known power engineering company that enables 3D models, 2D drawings and Office documents to be merged in a PDM-supported process and published in the form of 3D PDF documents.

Thus the integration of 3D PDF technology in the PLM infrastructure offers a wide range of application options that can also render the use of 3D data in other areas of the company more efficient. With its many years of experience in the manufacturing industry, PROSTEP itself can offer additional support in identifying and optimizing business processes in which the provision of 3D data promises the most benefit.

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