WHITE PAPER

GENERATING
SERVICE CONTENT
MORE EFFICIENTLY

The service business is not only a high-margin source of revenue for companies in manufacturing industry but also enables them to differentiate themselves better from their competitors. If, however, they are to fully exploit this potential, they must integrate their service processes more tightly with other business processes. PROSTEP's service content solution, which enables end-to-end digitalization of information flows between development, sales, technical documentation, spare parts management, after sales and service, helps you do this.

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Management abstract

In view of the cost pressure in product-related business operations, many companies are faced with the question of how they can expand their higher-margin service business. The connectivity of products via the Internet of Things (IoT) is giving rise to new service offerings such as remote maintenance, predictive maintenance, functional (software) updates and the like and even innovative product-as-a-service offerings. Instead of selling air-conditioning systems, for example, manufacturers merely sell the air conditioning of a certain volume of space per year and also assume responsibility for maintenance and availability of the system. A prerequisite for fully exploiting this new service potential is, on the one hand, tighter integration of the processes in development, production and after sales and, on the other hand, end-to-end digitalization of the information flows, from the creation and provision of service documentation to spare parts provisioning through to the feeding back of changes from the field to the service organization. The systematic digitalization of service-relevant information allows both its visualization in the product context with the help of augmented reality (AR) methods and the use of digital product models for the on-site additive manufacturing of spare parts.

This white paper outlines the possibilities opened up by the end-to-end use of digital data in the service organization with PROSTEP's service content solution and illustrates the resulting increase in efficiency when it comes to processes in spare parts management, service and after sales.

PROSTEP's service content solution enables end-to-end digitalization of information flows between development, sales, technical documentation, spare parts management, after sales and service.

Service as a competitive advantage

Gone are the days when service was primarily regarded as a cost factor–- for a growing number of companies, it is turning into an important source of revenue. Studies show that nearly one in two companies now generates a quarter of its revenue in the service business, although this still primarily involves conventional services such as maintenance and spare parts provisioning. Offering products entirely in the form if a service, as engine manufacturer Rolls Royce does with its Power by the Hour model for example, remains the exception. However, the trend toward servitization is increasing with products being equipped with sensors and connected via the Internet.

There are several reasons for the growing appreciation of the service business. On the one hand, companies in manufacturing industry today expect maximum availability of their machines and systems, which often run around the clock. Downtimes, due to missing spare parts or delivery of the incorrect spare parts for example, generate high costs resulting from production losses. On the other hand, manufacturers realize that they can earn more money with innovative services than they can selling products. The margin for product sales is trending downward while margins in the service business continue to increase steadily. According to surveys, many companies achieve a service margin of 30 percent or more.

Ever-shorter development cycles and global competition make it difficult to maintain a product's innovative lead. Services, on the other hand, require technical know-how, experienced employees and familiarity with customer requirements. That is why it is difficult for competitors in countries with low labor costs to simply copy them. This means that intelligent, customer-oriented services are increasingly becoming a feature that distinguishes companies from their competitors These services not only extend the service life of the delivered products, e.g. by means of retrofit offers, but also increases customer loyalty.

It is true of the spare parts business in particular that the purchase of a product is only the first in a long line of purchases. Ironically, at many companies sales of spare and wear parts fall once the warranty period has expired even though demand actually increases as the service life of the products lengthens. Customers tend to buy these parts from third-party suppliers because purchasing OEM parts, which are usually more expensive, provides them with no additional benefit. If, on the other hand, they can locate the spare parts faster and place direct orders online, their maintenance engineers save time and downtimes are reduced. Ideally, a smart, connected machine or system reports the impending failure of a component to the manufacturer before servicing is actually required, thus allowing predictive maintenance to be performed.

Efficient spare parts provisioning is the key to the success of service-oriented business models. The use of additive manufacturing processes for the production of spare parts on demand is capable of bringing about significant cost reductions thanks to the fact that the parts and the production equipment required to manufacture them no longer need to be held in stock. In addition, additive manufacturing accelerates spare parts logistics because the parts are no longer shipped but instead can be printed in 3D or laser sintered on site as needed. This shortens the downtimes of the machines and systems for which the spare parts are required.

Weaknesses in the information flow

Today it is the quality of service rather than the quality of the product (which is taken for granted) that determines the sustainability of business relationships with customers. This quality is heavily influenced by the currency, reliability and comprehensibility of the service information provided. Customers not only expect a product that is tailored to meet their requirements, but also service documentation that is an exact match for their specific product variant. And they expect the service to be provided right the first time round (first time right).

Linking the data from the purchase order process with component data and assembly structures makes it possible to create tailor-made service documentation. If, however, the information is to be linked with an acceptable level of effort, the data sources and data management systems must be integrated in the processes in the technical documentation and service departments. This is not yet the case in practice. There are enormous communication gaps between engineering and service in particular.

The consistency of data and information flows has improved considerably over the past 20 years. Today, powerful PLM systems manage revision levels, organize the reuse of assemblies and control release processes. Integrations to ERP systems allow the integration of stock lists, purchased and standard parts and the transfer of product structures and BOMs to production planning. However, it is rare for this data to reach after sales without significant media discontinuities. This means that illustrations for service manuals are created using the finished product instead of, for example, rendered illustrations from the engineering department. The same is true of assembly instructions. The service BOM is often created manually and with a considerable time lag between its creation and that of the MBOM.

The demands placed on the efficiency of the service processes increase as the importance of the service business grows. When servicing is required, maintenance engineers need the appropriate spare parts, repair instructions, operational plans, etc., which are often distributed across a large number of specialized and poorly integrated applications. To give just one example, a global market leader for medical devices with approximately 5,000 employees uses more than 30 different IT systems in after sales alone. Non-redundant data synchronization is difficult to achieve given these conditions.

The introduction of new IT tools is time-consuming and involves relatively high outlay for training, which initially reduces their productivity and further complicates the already complex workflows during the introductory phase. When selecting a system, particular emphasis should therefore be placed on reducing the number of different applications and on ease of operation. In this context, simplification also means providing the right amount of data with the level of detail required for the respective purpose. The employees in the service department know best which information they need, which is why their requirements should be given greater consideration when selecting a system.

When preparing the service information, future requirements such as its visualization using AR technology should also be taken into account. Linking this technology to the configuration of the delivered product makes it possible to display information for maintenance and assembly operations directly on AR glasses. Maintenance engineers no longer need to study manuals to know which components of the aggregate to inspect and replace if necessary.

Strengths of PROSTEP's service content solution

The efficient reuse of existing information provides the basis for improving the flow of information between development, sales, technical documentation, spare parts management, after sales and service. This requires flexible communication tools and technologies that enable employees in the technical documentation department to prepare and publish their data with as little effort as possible and allow the recipients/users in the service department to display and if necessary edit the data on any end device without having to install additional software. The use of 3D CAD data is particularly important in this context as it conveys a considerable amount of information in a way that makes technical interrelationships easier to understand.

However, the transfer of design data to the technical documentation department in particular is difficult in practice. In the automotive industry, users often receive data pools comprising 150-percent car models, including all variants, that have a volume of data and level of detail that they neither need nor can process. The data has to be simplified manually for documentation purposes, which generally requires the CAD system used to generate the data. Therefore, one recommended alternative is to integrate the model data in the documentation with the help of 3D PDF technology or appropriate CAD connectors, which can be used to freely select the representation and level of detail.

Its versatility means that 3D PDF technology is the ideal tool for providing and using service information efficiently in different use cases. It is characterized by the following unique features:

Integrative: Not only 3D data from different CAD applications, including the assembly structures, but also accompanying documents of any kind and even video and audio recordings can be embedded in PDF documents.

Interactive: Bidirectional linking allows 3D content to be seamlessly combined with purchasing, manufacturing and maintenance information and displayed using standard viewers such as Adobe Reader or any HTML5-capable browser.

Automated: The integration of ERP, PDM and CAD systems allows the creation of service content to be automated, which reduces the amount of time and effort involved in creating documents by up to 95 percent.

offline/online: The service content can either be provided online in HTML5 format or offline as a PDF document. Support is also provided for the generation of print-ready service documentation.

device independent: The preparation of the service content in different formats makes it possible to display the information on any end device, including mobile devices and AR glasses.

CI-compliant: The templates for creating the service documentation can easily be adapted to reflect the corporate identity (CI) of the respective company, regardless of whether the documentation is made available in the web or as a PDF.

Protected: Data and documents can be merged in a structured PDF container and assigned property rights individually or jointly in order to protect the information (intellectual property protection or IPP).

Authenticated: In combination with the Secure Additive Manufacturing Platform (SAMPL), embedded 3D data can be authenticated with the help of blockchain technology and used to print samples, prototypes and spare parts.

Monitored: Multilevel security mechanisms allow access rights to be configured user-specifically in order to control the transfer and use of the contents even after the PDF documents have been sent.

Potential service benefits

PROSTEP's service content technology ensures a higher level of consistency with regard to information flows within the company and communication with the customer's maintenance engineers or external service partners. The beneficial effects depend on the use case in question. The automated processing of existing information always increases process reliability, avoids errors and inconsistencies by reusing the existing engineering data, reduces the amount of time and money involved in creating the service documentation and ensures that the information can be made available to the service staff at an early stage.

Faster delivery of service documentation: Companies in manufacturing industry today go to great lengths to prepare and update their technical documentation for their service departments. The ability to automatically merge all the information relevant to service in compact 3D PDF documents speeds up the preparation and publication of service documentation and makes it easier for users to update technical documentation when changes are made.
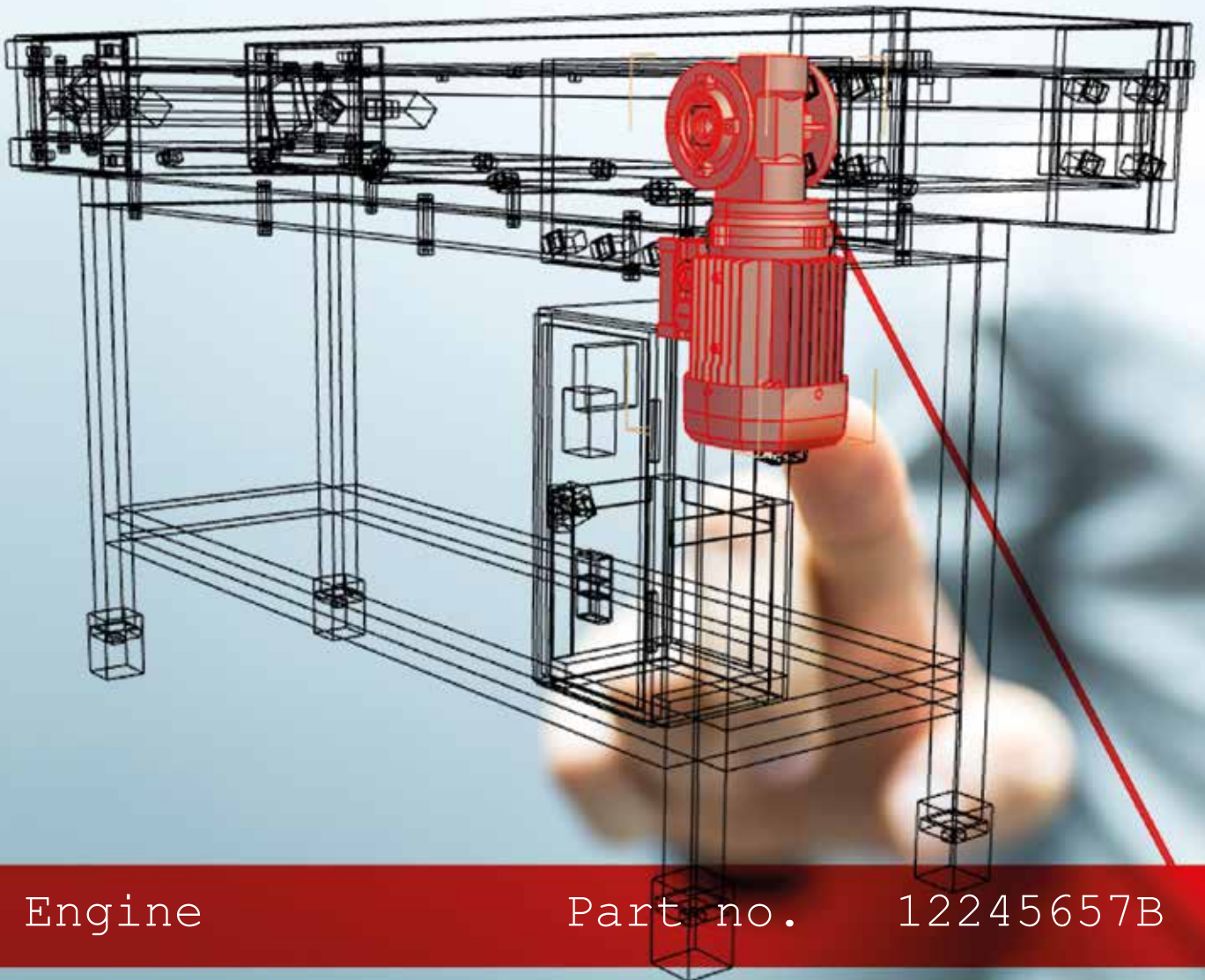
Easier access to all relevant service documents: The maintenance, repair and overhaul of durable capital goods regularly involve unnecessarily lengthy downtimes because maintenance and service engineers first have to locate the current documentation. Thanks to the graphical navigation function and document links in the 3D PDF-based documentation, they can quickly find all the relevant documents for the case in hand and view them with the standard Adobe Reader.

Reliable identification of the required spare parts: The growing number of product variants means that maintenance and service engineers often order or carry the wrong spare and wear parts. Individualized spare parts catalogs for the delivered product not only make it easier for them to identify the parts they need but also enable them to place direct orders using intelligent 3D PDF forms. This means that customers have less incentive to order parts from a third-party supplier.

Better feedback of information from field: When it comes to durable capital goods in particular, the status of the service documentation and the actual status of the product as maintained diverge as the service life increases because the service engineers make changes to the configuration on site. The bi-directional exchange of information between 3D PDF documents and source systems simplifies the process of updating service documentation and is thus also a prerequisite for the creation of a digital twin.

More readily understood service documentation: Service engineers who maintain numerous different product lines sometimes find it difficult to immediately understand which operations need to be performed on a particular product. Embedding 3D models, animations and video sequences in the 3D PDF documents makes the documentation easier to understand and at the same time facilitates the training of young colleagues who do not yet have much experience.

Better protection of intellectual property: Sharing service documentation with customers and external partners discloses a great deal of information about how a product works. 3D PDF technology improves intellectual property protection in these collaborative processes by allowing the amount of information provided to be configured in a flexible manner and controlling its use even after the 3D PDF documents have been sent.

Engine   Part no.   12245657B

Application examples / use cases

PROSTEP's service content solution is not only used by engineers and technicians in after-sales service, customer service and technical service. It is also used in different areas of application ranging from technical documentation to production planning, production management and assembly planning through to spare parts management. PROSTEP helps customers identify suitable use cases, roll out the service content technology and integrate the solution in their existing process and system environment.

Use case: 3D assembly planning

Many machine and plant engineers still plan and document the assembly of their systems using the object in question. New photos and illustrations are often created for the assembly instructions instead of using existing material from the engineering department – a time-consuming and labor-intensive way of working. Furthermore, the assembly instructions cannot be created until the systems are finished. If companies started planning the assembly sequences during the digital stage, they would be able to deliver their systems faster.

PROSTEP's service content solution allows them to plan the assembly steps based on the CAD models and using a large library of typical assembly operations and to calculate assembly costs reliably. The use of digital models makes it easier to validate the assembly sequences and speed up delivery of the systems. The embedded 3D models can also be animated to illustrate specific assembly steps, thus reducing assembly errors.

Use case: spare parts catalog

For financial reasons, an increasing number of components for which the customer can buy spare and wear parts on the open market are also being used in customer-specific products. If they are to keep the spare parts business alive, manufacturers have to offer their customers added value by identifying the required spare parts faster and more reliably and ensuring that direct orders for these parts can be placed. This reduces downtimes and avoids production losses.

PROSTEP's service content technology makes it possible to create product-specific spare parts catalogs and automatically embed 3D models including the assembly structure, which facilitates navigation in the parts inventory and accelerates the search for spare parts. Service engineers can order the parts they need directly from the 3D PDF application using intelligent forms whose contents are automatically evaluated and, for example, imported into the ERP system.

Use case: service documentation

The creation of operating and maintenance manuals and other documents is extremely time-consuming as it involves collating and processing information from different source systems. At the same time, customers today expect service documentation that reflects their specific product configuration. Automating the creation of service documentation based on the delivered product configuration not only saves time and money but also minimize the risk of errors.

PROSTEP's service content solution speeds up the document creation process and can be integrated in other enterprise applications, thus allowing service documentation to be compiled automatically based on the configuration of the delivered product. The service documentation can be made available both online and offline and if necessary can also be printed on paper.

Use case: field service

The as-built or as-maintained state of capital goods changes over the course of their lifecycle due to the fact that on-site field service staff are constantly makes changes. There is often a long time lag between the changes being made and these changes being incorporated in the service documentation. However, up-to-date documentation is a prerequisite for ensuring fast and reliable service delivery (first time right) and minimizing downtimes.

The service content solution from PROSTEP makes it possible to exchange information between 3D PDF containers and the data source bidirectionally using interactive documents and automatically transfer changes made to the product configuration to the service documentation. This ensures that service engineers always have the correct, up-to-date documents available to them, regardless of whether they access the documentation online or take it with them on their end devices as PDFs.

Technical foundation

PROSTEP's PDF Generator 3D provides the basis for using the service content technology. It includes the key tools and functions for automatically generating interactive 3D PDF documents, including the CAD converters and the PLM connectors required to integrate the solution in the PDM and ERP environment of the respective company. In addition to generating PDF documents, the service content solution supports HTML5 export so that the service information can be made available online in the web. The content can also be prepared in such a way that the service documentation can be printed out.

The 3D PDF architecture comprises the following components:

PROSTEP's PDF Generator 3D is a **server solution** that includes a number of functions for generating intelligent PDF documents. This allows XML data to be automatically imported into and extracted from PDF templates. PDF Generator 3D enables the creation of structured PDF containers, which may contain native data as attachments, in addition to embedded 3D models, 2D drawings and XMP metadata. The data and documents in these containers can be linked with each other and protected using individual passwords.

PROSTEP's PDF Generator 3D includes powerful **CAD direct converters** for importing 3D data from numerous CAD systems, including CATIA from Dassault Systèmes, PTC Creo Parametric, Autodesk Inventor, NX from Siemens PLM Software and SolidWorks (Dassault Systèmes). The solution also supports neutral formats such as STEP, JT and IGES. The converters can be used for the fast integration of native CAD data without the need for a license for the respective CAD system.
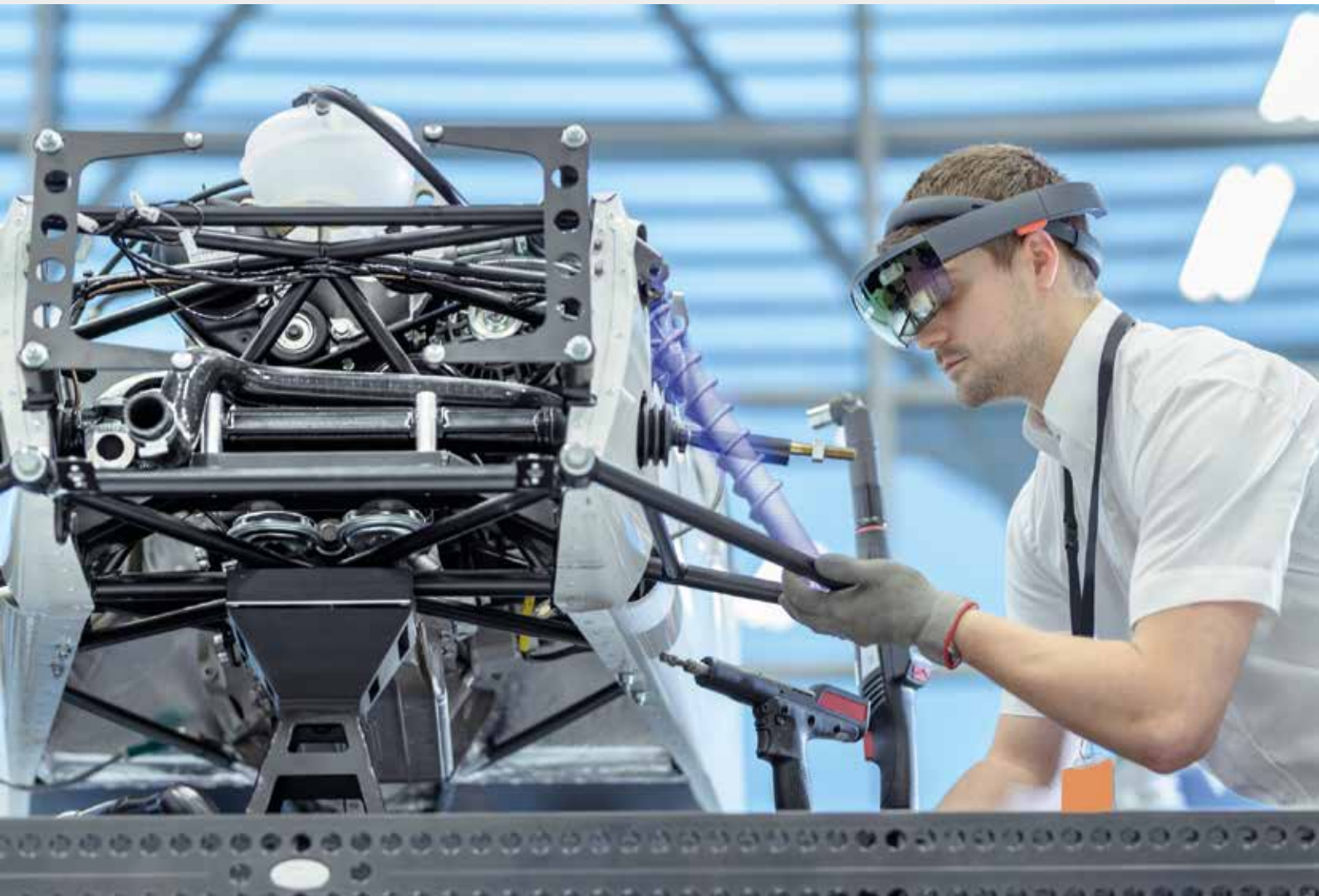
The **PLM connectors** provided by PROSTEP's PDF Generator 3D allow the server solution to be fully integrated in the PDM or ERP landscape of the company in question so that 3D PDF documents can be created automatically, for example in the case of a change of status. PROSTEP offers connectors to commercially available PDM and ERP systems such as 3D Experience, SAP, Teamcenter and Windchill, as well as integrations to customers' legacy systems.

PDF Generator 3D Rights Management is an add-on module that allows additional protective mechanisms to be set up on the basis of special user rights and clearly defined functions. The recipient has to log onto a security server using a separate key in order to view, copy or print the 3D PDF document. Once defined, user rights can be changed or revoked after the document has been sent, allowing owners to retain full ownership over their documents and control their use throughout the entire product lifecycle. Access can also be limited to a specific period of time, for example to prevent the circulation of obsolete document versions.

Concluding remarks

A powerful service organization and efficient service processes are the prerequisites for offering new services and exploiting the potential of innovative product-as-a-service offerings. The key to efficiency is the end-to-end use of digital information, which is often distributed across a large number of poorly integrated IT systems both inside and outside the service organization. PROSTEP's service content solution provides a common denominator that allows information to be collected automatically and made available in a form that can be read and used by all the parties involved without any need to install additional software.

The service content solution can be used for a variety of different use cases inside and outside the service department. The use cases listed in this white paper are merely a few selected examples that are already being used productively by customers. The main benefits they report are a higher level of process reliability thanks to the automated preparation of documents and the ability to avoid errors and inconsistencies by reusing existing information. In addition, considerable time and cost savings can be achieved when creating service documentation. The fact that service engineers can access the documents they need faster and with greater ease and that embedded 3D content makes the documentation easier to understand improve service quality. From a business perspective, the fact that the solutions provide maximum protection for intellectual property is also of major importance.

Your comments

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Do you have any comments or questions?

We look forward to your feedback at
infocenter@prostep.com