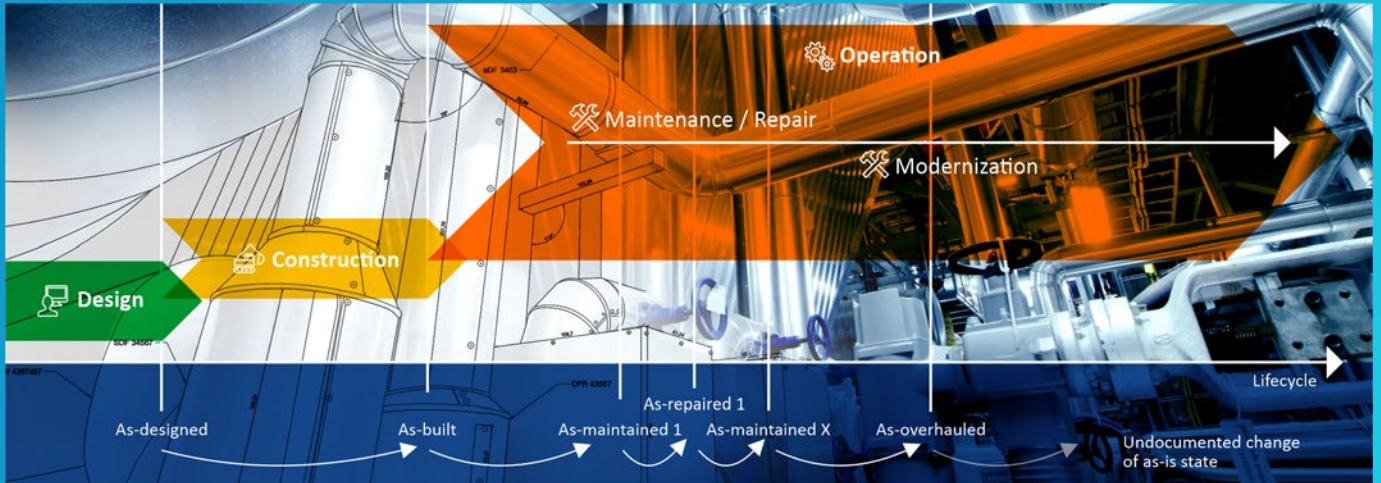


Using artificial intelligence to create
3D twins of existing plants

OPENDESC[®]
3DigitalTwin

YOUR REQUIREMENTS

AS-IS DOCUMENTATION



The first differences between the design of a plant (as-designed) and the plant that is actually built (as-built) can be seen as early as the construction phase. Even if these differences are not crucial to the operation of a plant, it means that the as-is documentation is not up to date. In addition, maintenance, repair and modernization activities lead to ongoing changes throughout its lifecycle. Documentation of the as-is state is often neglected.

MODERNIZATION



Prerequisites:

Plant Structure (incl. equipment)	Piping (diagram)	3D Plant Model

Comprehensive as-is-documentation of a plant is a prerequisite for the modernization of a plant. An up-to-date 3D model of the plant is crucial. Designs based on the latest 3D models ensure seamless integration of the newly designed and existing parts of the plant. Information about the plant structure, including all the equipment installed and the latest piping diagram, are also required. Although the as-is-documentation is often not maintained, it is essential when a plant is about to be modernized. Capturing the current as-is state is a time-consuming task that involves measurement and manual remodeling, which in turn incurs high costs.

VIRTUAL REALITY

P&I Diagram (P&ID)

3D Model

Plant Structure

Meta-Information

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Produktionsjahr	14
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Werkstatt	
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Pumpe	
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Virtual reality allows plant operators to use applications such as virtual operation or virtual training. This requires an up-to-date 3D model of the environment that is linked to the P&ID diagram and enriched with real-time sensor data from the plant. In the case of new plants, virtual applications can be taken into consideration during the planning phase. Making it possible to use virtual applications for existing plants is a major challenge. 3D models, if available, are often obsolete due to maintenance, repair, and modernization activities. Creating an up-to-date 3D model first of all requires manual measurement or 3D scanning, followed by manual modeling. This involves a great deal of time and effort and is therefore costly.

AUGMENTED REALITY

Identification of Equipment

3D Model

Plant Structure

Meta-Information

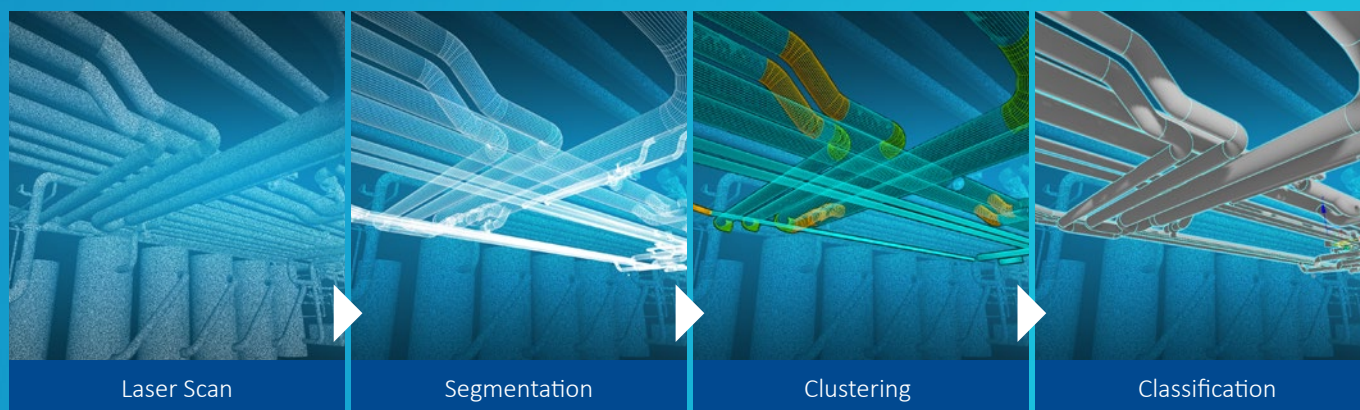
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Maintenance : Augmented Reality Mode

Augmented reality applications provide a number of benefits, for example with regard to maintenance activities. Portable devices provide maintenance engineers with the information they require in the field. This means that all the components need to be clearly identified and enriched with meta-information. Information on the plant structure is also provided and puts all the components in context with each other. In the case of new plants, these types of applications can be taken into consideration during the planning phase. Existing plants are subject to constant change as the result of maintenance, repair, and modernization. Documentation of these changes is often neglected, which means that the relevant information and up-to-date models are not available.

OUR APPROACH

Nowadays, the first step towards creating the digital twin of an existing plant is capturing the as-is state as a 3D model. Devices such as 3D scanners create point clouds, which represent the surface of a plant. A manual remodeling process is used to turn the point cloud into a 3D model. Due to the high manual effort, the creation of a 3D model of an existing plant is a cost-intensive process.



To overcome these challenges we developed 3DigitalTwin, to provide an elegant, faster, and economical solution. By applying artificial intelligence to the object recognition process, 3DigitalTwin is able to derive a digital twin from a point cloud using an autonomous three-stage process. First of all, object structures such as piping and equipment are automatically recognized and subsequently converted into 3D models. The model of the plant is then enriched with process knowledge from the P&ID diagram. The piping system “knows” what components it’s made of.

To achieve the aim of creating digital twins of existing plants automatically, PROSTEP and SCHULLER & Company bundled their expertise in a collaborative venture. PROSTEP developed the initial software as part of the German research project “DigiTwin”. This software was subsequently refined and developed further to create the 3DigitalTwin software. PROSTEP’s decades of experience with data conversion (OpenDESC.com) ensures that data quality remains excellent. SCHULLER & Company provides wide-ranging plant engineering know-how. Their expertise makes it possible to enrich the 3D models with data from P&ID diagrams for example.

HOW YOU BENEFIT

Regardless of the use case (as-built documentation, modernization, virtual or augmented reality) you are dealing within the context of an existing plant, 3DigitalTwin will provide you with support implementing it. To ensure that it meets your requirements regarding a digital twin, it can be scaled up from the logical structure to a comprehensive digital twin (including 3D model, plant structure, identification of all components, and their enrichment with meta-information). You can customize the digital twin of your plant to meet your specific requirements and operate it yourself.

PROSTEP's experience with model data conversion not only ensures a high level of data quality but also provides the data in the desired format. This makes sure that our solution remains vendor independent and allows you to use your digital twin in your existing IT environment (Autodesk, AVEVA, Bentley, CADMATIC, HEXAGON, etc.). We make sure the digital twin meets your requirements and can be processed in your systems without any problems.



- High-quality 3D model of plant
- Automatic part identification based on AI
- Parts enriched with meta-information
- Logical plant structure
- Provision in desired format

Comprehensive as-is digital twin for various applications

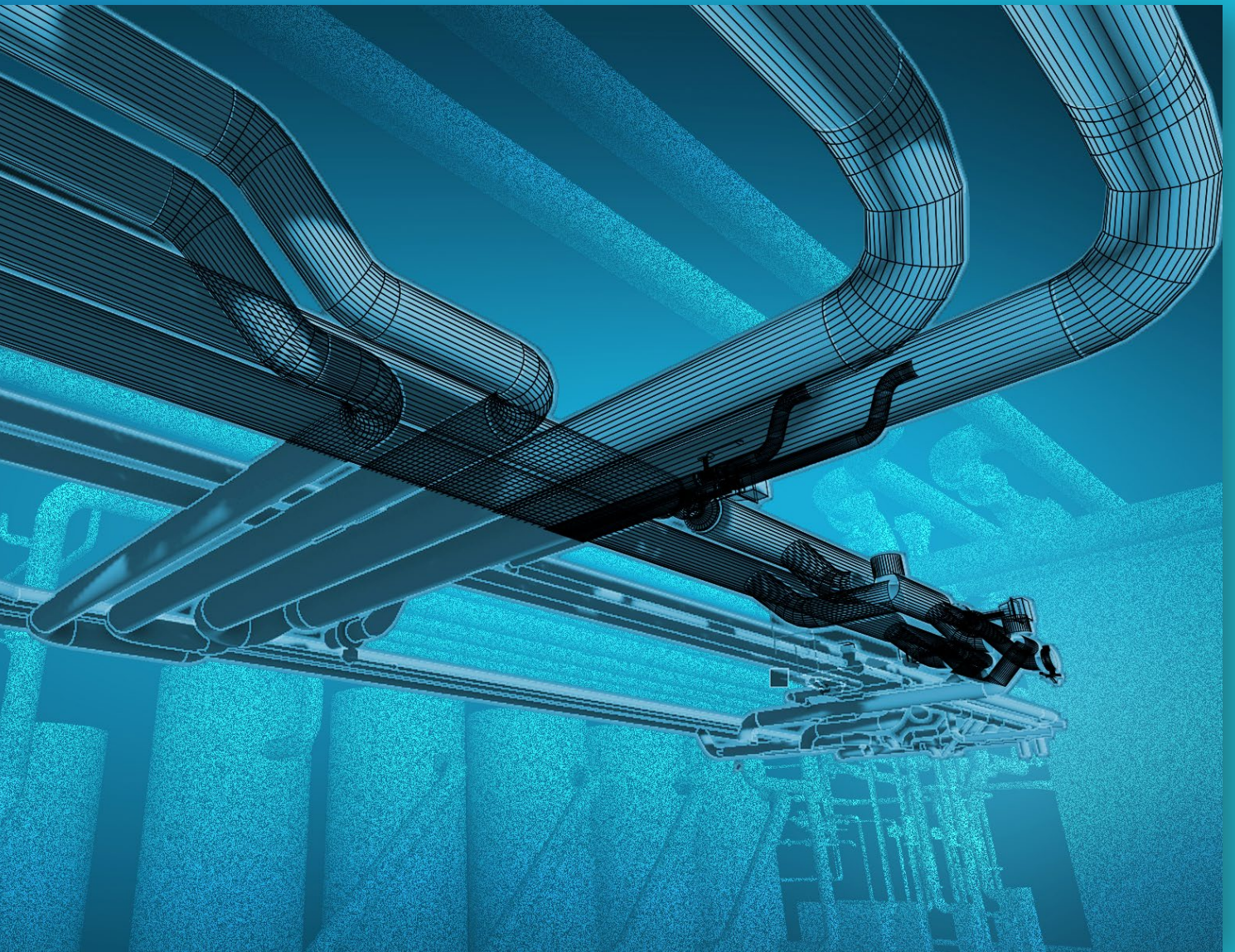
EXPERIENCED PARTNERS AT YOUR SIDE

A great deal of know-how is required to provide a digital twin that has been scaled to meet your specific needs. Processing the product data and mastering the AI are essential. In-depth knowledge and understanding of the processes in the plant engineering industry are also crucial. Combining this expertise allows us to provide a digital twin meeting the high requirements of plant engineering and plant operation.

SCHULLER & Company, in their role as "Digital Asset Experts", provides companies in various industries with support for asset management, the management of asset data and documents, and the generation of customized digital twins.

The experts from **PROSTEP's** data logistics service OpenDESC.com have more than 23 years of experience with CAD data conversion. They enable the AI-based processing of 3D scan data and offer 3DigitalTwin as a service.

Our combined expertise is the basis for developing 3DigitalTwin. Artificial intelligence makes it possible to supply a service that automatically generates the desired digital twin from a point cloud. As a customer, you benefit from outstanding plant engineering process know-how, over 23 years of experience in handling and converting model data, and independence from software vendors.



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