Operator of Green Diesel production breaks new ground with platform-as-a-service

The Hamburg-based owner/operator HOLBORN is implementing a future-proof greenfield project without constraints, with a firm commitment to on-time and on-budget delivery. An innovative business model from INNOVEVA provides the foundation.

Picture: HOLBORN

Biodiesel represents a future-proof infrastructure, and digitalization aims for the same. So why not combine these two investments? This is precisely what HOLBORN Europa Raffinerie GmbH, part of the OILINVEST Group, has done with a new refinery project called GDP (Green Diesel Production).

'Green' diesel and kerosene (also known as HVO and SAF) are low-CO_2 fuels made from waste and residual materials that have the same chemical properties as their fossil counterparts but reduce greenhouse gas emissions by up to 90 percent over their entire lifecycle (1). Therefore, the sustainability criteria of the EU Renewable Energy Directive (RED III) can be met efficiently. End-to-end digitalization (from plant design to operation) also serves to ensure a sustainable future.

Off to new shores

The construction of the new GDP facility on the company's own refinery site in the Port of Hamburg includes the development of a hydrogenation plant that will produce approximately 220 000 t of HVO and SAF, annually. The project volume is around 475 million euros. The complex is scheduled to go into operation in early 2027. It comprises a pretreatment and GDP production plant, as well as the connection infrastructure to the existing facilities. Construction already began in September 2024.

KT (Kinetics Technology), a subsidiary of Milan/Italy-based Maire Tecnimont SpA, won an international tender for an EPC (Engineering, Procurement and Construction) contract worth approximately 340 million euro. Additional scopes of supply, such as those for a tank farm and the interconnecting piping connecting the new and existing facilities, were awarded separately. Lars Bergmann, Managing Director of HOLBORN Europa Refinery, explained: "This project is an important step in HOLBORN's long-term transformation process" – not only from a technological perspective, but also from the perspective of digital transformation. More on that later.

Starting from scratch

Christian Marbach and Frank-Peter Ritsche are the main contacts for project execution and interface management for the individual scopes of supply on behalf of the investor and future operator ('O/O'). The external employee Christian Marbach is responsible for the engineering IT. Frank-Peter Ritsche, as project director, has overall responsibility for the project. For HOLBORN, it is a first-of-kind project in the truest sense of the word.

When 3D models or digital twins are discussed, long-term decisions are involved that must be carefully considered in advance. "HOLBORN operates a rather small, but very sophisticated refinery that was built many decades ago. Documentation according to modern standards therefore hardly existed," the project director points out. There were no business processes for managing large-scale projects like those typically found in a major refinery. The new GDP plant is consequently a completely greenfield project. Or, if you will: A dream for an ambitious project management team (Peter Ritsche: "A stroke of luck").

The challenge, therefore, was to modernize the processes, tools, and methods in a refinery complex that had remained (virtually) unchanged for decades. "It was perfectly clear for the new refinery that we needed to create new, future-proof structures," says Mr Ritsche.

The new GDP complex is built on the grounds of the Hamburg HOLBORN refinery in the area between the tank farms and the company's own jetty at 'Seehafen 4'

Source: Elsen/Euroluftbild.de / HOLBORN / www.dvz.de/technologie/antriebe/detail/news/dvz-vor-ort-40000-liter-biokraftstoff-pro-stunde.html

So what to do? Buy software? “The digital twin platform works based on viewer technologies. However, we quickly realized that the relevant providers wanted to sell software, but not the service. For the current project phase, that wasn’t an option. It would require us to invest significantly in our own IT expertise. Therefore, we opted for INNOVEVA and its platform-as-a-service approach.”

This also includes the goal of later reusing the data generated during the planning phase in a neutral format in other applications.

DMS implementation

As a first step, a new document management system (DMS) was implemented for the realization of the project. It is the PCTplus DMS from KPC-E Dev, a subsidiary of INNOVEVA. PCTplus offers all the necessary transmission functions for exchanging documents. It also serves as a repository for the documents and their metadata. “These capabilities allow the engineering data delivery by the EPC to be checked using a quality assurance process, ensuring that no data is lost,“ explains Mr Marbach.

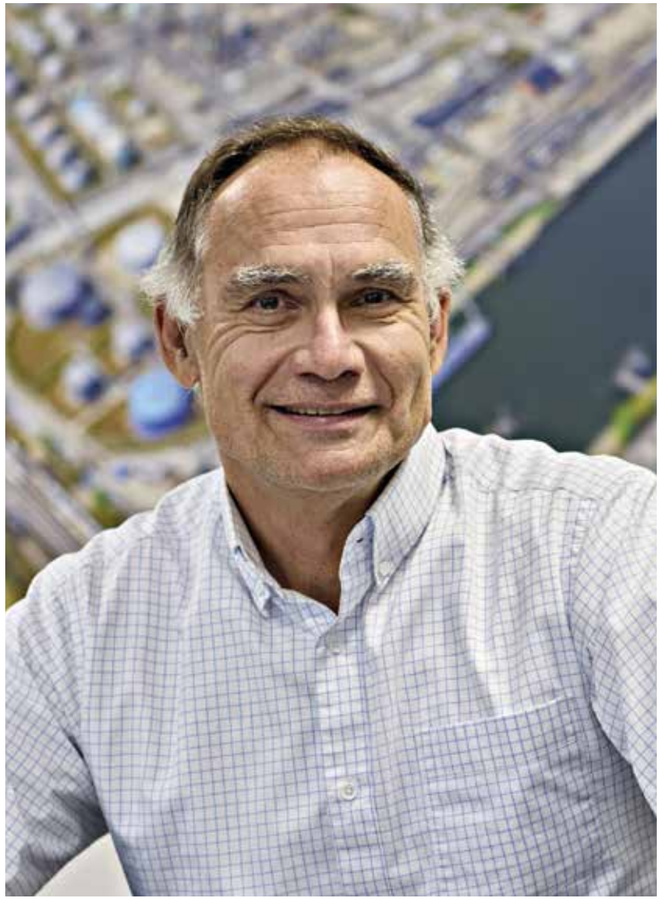
Project execution is based on principles previously formulated in a strategy paper:

- Project execution should be supported in the best possible way – throughout the entire project duration.
- The new green refinery will be prepared during project execution to ensure maximum efficiency.
- The future viability of the green refinery is guaranteed for the next 30 to 40 years.

“These strategic requirements led to the introduction of a digital twin of the refinery. The digital twin integrates engineering information as well as future asset information, including data from manufacturing, construction, commissioning, and operation, as well as inspections, maintenance, and much more,” Mr Ritsche says.

“Virtual reality is not science fiction in maintenance applications, but science fact – and this should be utilized. I don’t just want to talk about it, but implement it! INNOVEVA is helping us making this a reality.”

Christian Marbach, SILVERBACKup



”Introducing a digital twin is an enourmous effort not only from the information technology perspective. It is a transition project to new business processes, changing the way how people do the work. Creating a culture that is open to change and understanding the human behavioral aspects in this transition is a key to succeed.”

Frank-Peter Ritsche, HOLBORN

To this end, a cross-disciplinary 3D model is being developed during project execution in a neutral data format based on international data exchange standards, enabling all stakeholders to work with it. “The access is realized via an engineering portal. It is linked to the existing documents”, Mr Marbach said. And the progress is remarkable: The 3D model is already 90 percent complete.

The 3D model serves as the central data hub, unifying a variety of formats. While EPC KT also works with AVEVA E3D, its suppliers and other engineering firms commissioned by HOLBORN submit data in other formats such as DWG, STEP, NWD, IFC, and PDF.

These are consolidated in the 3D Universal Plant Viewer (UPV) from INNOVEVA partner company CAXperts. “The 3D viewer is linked to the documents in the PCTplus DMS. No matter which item is clicked in the 3D visualization or in Smart P&ID, the already linked documents are accessible,” the IT manager says with satisfaction.

Data from AVEVA E3D / Diagrams, and AVEVA Engineering (as a database) are integrated into the UPV visualization. Mr Marbach explains: “In practice, this is the first time KT has worked with this combination. Populating the AVEVA Engineering database, in particular, is a real challenge for KT.” INNOVEVA’s partner solution, UVP, ensures that the data is available in a neutral exchange format. This 3D model integration enables, for example, collision detection of data from different disciplines and verification of coordinate assignments. However, the 3D viewer does not allow for any changes, only annotations.

Digital twin of project execution

Excellence in project execution is often associated with a digital twin of the project (5) for an optimum of traceability. The difference from the usual definition of a digital twin lies, among others, in the consideration of the dynamics on the construction site – what was assembled at what time and under what specifications. “We

have set up a work breakdown structure (WBS). It refers to all correspondence, for example, with suppliers or the EPC, as well as to the Primavera schedule," explains Mr Ritsche. The WBS is a central coordination means, another one is the tag ID. The stored documents can also be retrieved via the tag ID. "This is very important because a data record stored in one database must be able to be linked to corresponding data records from other databases."

The tag ID is an important structuring element in the sense of a plant breakdown structure (PBS). Behind this lies a hierarchical system for organizing all components, elements, and data of an industrial plant. It divides the large plant ensemble into smaller, manageable parts such as units, systems, and subsystems, as well as individual components, the so-called tagged items.

Construction site management at its finest

KT is responsible for coordinating and monitoring all activities on the construction site. They utilize their own software solution, Milemate, which is used by KT, its subcontracted construction and assembly companies, and the operator's supervisors. The software manages inspections and generates the corresponding inspection reports, which the on-site inspectors approve with their electronic signatures on their tablets. The final documents and data are then transferred via data exchange to the digital twin of the HOLBORN project.

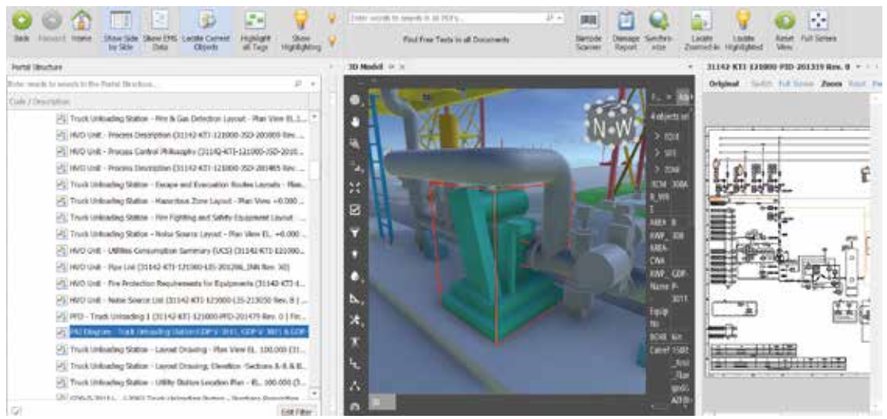
"The enormous efficiency of this approach is thanks to Luigi Anselmi. The internationally recognized construction site manager relies on the so-called Advanced Work Packaging method. Milemate offers interfaces to Primavera for exchanging Level 2/3 information, which can be broken down to the lower Levels 4 and 5. This enables linking across different levels, for example, for work permit and scheduling. The corresponding information is also used for documentation," explains Mr Ritsche, adding: "We also benefit from this because we can save our construction inspections in the Milemate database via mobile devices."

Successful Teamwork

Looking back on the challenges, Christian Marbach recalls: "Everything had to be reinvented. While it's a greenfield plant, it has to fit into HOLBORN's overall structure with its historically grown and evolving software architecture, established processes, and organizational structures. In addition, we have to align our working methods with those of KT. Thinking in digital terms isn't yet common knowledge. For example, virtual reality in maintenance isn't science fiction, it's already science fact – and we intend to utilize it. I don't just want to talk about it, I want to implement it!" The use of the relevant technologies starts now, not just when the complex is completed, the IT manager emphasizes.

"More and more clients are using our PaaS approach for project processing in the cloud to focus on their core competencies of project management, progress control, and change management. PaaS in the cloud enables them to make all project data centrally available to all stakeholders 24/7 with access control within two to three weeks."

Dirk Hanewacker, INNOVEVA



Section of the GDP complex as a digital twin. The IT infrastructure was provided by INNOVEVA
Source: HOLBORN

And how satisfied is the IT manager with the provision of the engineering software by INNOVEVA? "The solution fulfills its purpose perfectly. It was a good and correct decision. We simply couldn't have managed such a demanding project otherwise, because we lacked the resources and had a very short lead time to build the IT project infrastructure."

Another interesting point is added: "It needs to be clearly stated: We, as the customer, have a significant influence on how the platform-as-a-service approach develops. To some extent, we are essentially part of INNOVEVA's development team, because we define the requirements demanded by the market." This is hardly surprising, since a refinery belongs to the group of critical infrastructures, which are subject to special regulations. The documentation effort is enormous and requires particularly intensive coordination between HOLBORN and INNOVEVA. "Every newly requested function must be considered as a strategic integration task," adds the project director.

Conclusion

From HOLBORN's perspective, the PaaS approach has already proven its worth. All data, documents, models, and structures are available to all project participants in a 24/7 manner and are updated daily or weekly as the project progresses.

Frank-Peter Ritsche points out that ongoing discussions with HOLBORN's Managing Director Lars Bergmann have taken place to align project and company strategy. A consensus has emerged that the experience gained from comprehensive digitalization during the project execution of the new GDP facility, based on INNOVEVA's PaaS approach, should serve to further develop the organization: Technological changes, for example, should be accompanied by the same transformative intensity within the organization. More on this in (6). (bv)

References
(1) www.neste.com/de-de/produkte-und-innovation/neste-my-renewable-diesel
(2) www.holborn.de/presse/baustart-fuer-deutschlands-ersten-gdp-komplex-in-einer-raffinerie
(3) www.fortunebusinessinsights.com/de/industrie-berichte/markt-f-r-biodiesel-101631
(4) www.mordorintelligence.com/de/industry-reports/diesel-as-fuel-market
(5) Valnion, B. D., „Skillfully coordinated for the grand finale", d1t1tal AGENDA 2/2025, S. 52 bis 55, Baden-Baden
(6) Ritsche, F-P et al: "EPC 4.0 – Unleashing the hidden potential", 2019, www.project-team.org/epc-4-0-unleashing-the-hidden-potential
Note: There is a follow-up study: www.project-team.org/the-value-of-bim