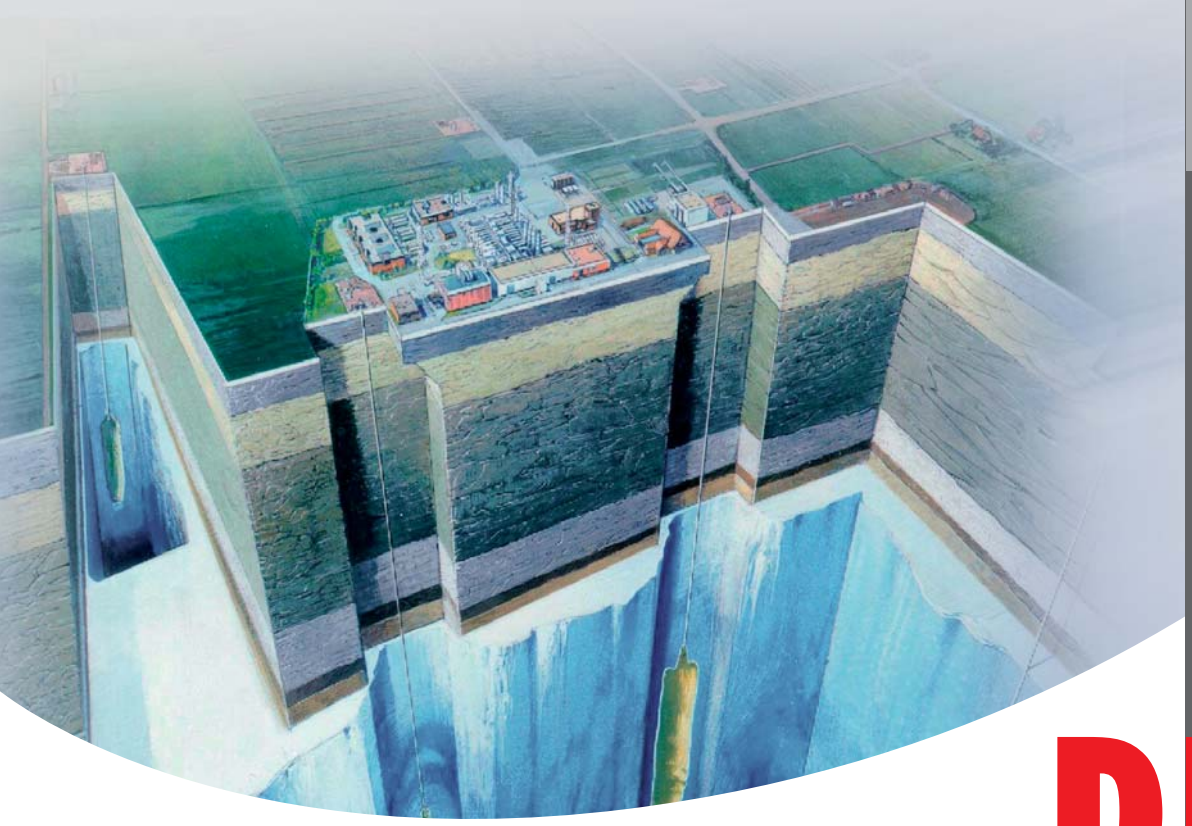

Underground Storage

ePLAN® ppe

DEEP.

Underground Engineering

Integrated engineering in cavern design

1,000 to 3,000 meters deep caves

Natural gas is a promising energy carrier since reserves are expected to last much longer than petroleum. Furthermore, because it can be sourced from regions closer to home, such as the Norwegian coast, this guarantees a high level of supply reliability. Before reaching the end consumer, rather than coming directly from the exploration regions, the natural gas is usually stored in interim regional storage facilities maintained by the gas utility companies. Caverns – artificially created caves at a depth of 1,000 to 3,000 meters – are used for these storage purposes. Planning and building these caverns is a highly challenging task and DEEP. Underground Engineering GmbH, based in Bad Zwischenahn, operates in this specialist field.

"As the name indicates, the company DEEP. Underground Engineering GmbH specialises in working underground. The engineering firm, with a staff of around 50, works in the underground storage sector, constructing giant caverns for the storage of natural gas in old salt mines among other things. The company uses EPLAN PPE to plan the electrical instrumentation and control of the installations, and benefits from an integrated approach. The advantages further extend to the inter-disciplinary level since the system also interfaces with the mechanical CAD software."

ePLAN your engineering

FRIEDHELM LOH GROUP

TIME
to automate
manual tasks

Hans-Günther Jongebloed explains: "With manual planning, inconsistencies in the drawing stage become apparent time and time again when the systems are being built. What is more, duplicate measuring points or duplicate designations can never be completely ruled out. This leads to time losses during system production, but they can be avoided by using an integrated CAE-based system for electrical instrumentation and control engineering."

A clever, resource-conserving solution

The company's premises were chosen not so much for their idyllic location on Lake Zwishenahner near the North Sea but the site selection was prompted instead by the fact that these caverns are often found in the vicinity of the coast – and for a very good reason: The caverns are created by selectively "rinsing out" salt mines with fresh water to create the desired space and pouring the salty waste water straight into the ocean. This clever, resource-conserving solution allows caverns with a volume of up to 1 million m^3 to be created at depths of well over 1,000 meters. The pipeline used to supply fresh water and take away the residue later serves as a gas pipeline to deliver and extract the natural gas via a gas compressor station, also supplied by DEEP.

A concrete project leads to the use of EPLAN PPE

DEEP.'s customers tend to be energy groups and gas suppliers, as was the case in a recent project: A major German energy group planning a new cavern in northern Germany commissioned DEEP. to plan the aboveground and underground installations. As the customer was already using EPLAN PPE internally for its electrical instrumentation and control planning, the obvious solution was to use the same system at DEEP.. Not only does this ensure easier data exchange in the planning phase, but the power company is also able to use the documentation later during system operation. With this in mind, the system engineering experts at DEEP. attended the Hanover Trade Fair in 2006 to find out about the benefits of the EPLAN software and witnessed the world premiere of the new EPLAN Platform.

High importance given to electrical instrumentation and control engineering

Instrumentation and control engineering plays a major role in system engineering at DEEP., partly because the fresh water is pumped into the emerging cavern by a series of pumps. Engineer Hans-Günther Johnebloed is responsible for electrical instrumentation and control within the system engineering division at DEEP.: "Typical brine pumps operate at a capacity of around 300 m^3/h and a pressure of 100 bars. We tend to use regulated, frequency converter-controlled pumps and record a wide range of parameters which are used to control the system, such as pressure, flow rate, temperature and vibration. All of the valves and fittings in the pipelines are equipped with status scans, so the piping & instrumentation diagrams of our systems are highly complex." The gas compressor station is also integrated into the electrical instrumentation and control software of the cavern system. This particular client's request therefore struck a chord at DEEP., where the planning of extensive instrumentation and control technology was still a labour-intensive manual process. Hans-Günther Jongebloed explains: "Particularly with the amendments which inevitably arise during planning, the manual conversion of measurement signals into tables can be very time-consuming. The time had come to automate this task."

PPE
Flexibility on a high level

EPLAN PPE: Electrical instrumentation and control planning with an integrated information flow

EPLAN PPE was developed precisely for this task, as it allows standardised planning of electrical instrumentation and control systems on the basis of NAMUR recommendations. As the design data is stored on the central EPLAN Platform, neighbouring disciplines such as electrical CAE are likewise able to access data from the electrical instrumentation and control engineering. This ensures an integrated information flow as well as helping to ensure that everyone involved in the planning has access to the very latest status at all times.

Convincing presentation

EPLAN PPE's initial demonstration at the Hanover Trade Fair was followed by a more in-depth presentation at DEEP.'s premises, during which EPLAN Software & Service addressed the specific requirements associated with the systems engineering of the cavern storage. These presentations were evidently convincing because the software was introduced at DEEP. in September of the same year, making it one of the first users of EPLAN PPE based on the new EPLAN Platform.

After several months of working with the system, the electrical instrumentation & control engineers were pleased with the outcome. Hans-Günther Jongebloed adds: "One of the major benefits is that network engineering allows several colleagues to work simultaneously on the same project. For example, the process and design engineers who produce the P&I diagrams and the electrical instrumentation and control engineers have joint access to a database of measuring points for any given project. Evaluation of the measuring points and measuring signals has also been automated. As an engineering company working for numerous customers all with their own specific standards, we also appreciate the high level of flexibility afforded by this system. For example, we are able to format the layout of the lists individually and give both location- and system-specific designations to the measuring points." The DEEP. staff are also impressed by how easy EPLAN PPE is to use.

Comparison between mechanical drawing and electrical instrumentation & control design

The benefits of the integrated information flow are also apparent in the connection between CAD drawings and electrical instrumentation & control. Here, the DEEP. engineers work with AutoCAD® and are able to integrate the measuring points directly since AutoCAD® likewise has access to the EPLAN database. In the near future, the company is planning to extend the use of EPLAN PPE beyond the engineering process.

"After two days of training, the system is very intuitive. We did purchase telephone support from EPLAN, but we have hardly ever needed to use it," says Hans-Günther Jongebloed.

Underground Storage

ePLAN® ppe

"There will then be three CAD/CAE systems – AutoCAD®, EPLAN PPE and Autodesk® Inventor™ – which are able to communicate with one another and ultimately use the same database."

Different CAD/CAE systems using the same database

SUMMARY

Current project: Integration of EPLAN and Autodesk® Inventor™

Another current project aimed at optimizing the use of CAD/CAE systems concerns three-dimensional planning with the incorporation of EPLAN PPE: In the future, DEEP. will use Autodesk® Inventor™ for three-dimensional representation of the cavern systems. Autodesk® Inventor™ will be used for individual components rather than complete systems. For example, where there are licensing procedures with public participation, it may be useful to represent the projects in 3D format. Traditionally, DEEP. has commissioned the preparation of such drawings externally. In the future, it intends to achieve this faster and more cost-effectively, benefiting from the fact that EPLAN Software & Service likewise sells and supports Autodesk® Inventor™ as a CAD system for mechanical design. This way, the company will receive all its support from a single partner and will be able to enjoy an integrated, perfectly coordinated system.

Find out more about DEEP. on www.deep.de

ePLAN your engineering

ePLAN

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