

Case Study

GDF SUEZ E&P in the Netherlands Optimizes Pipeline Processes using UniSim Design Suite



“UniSim® Design Suite is the preferred process simulation tool used by GDF SUEZ E&P in the Netherlands. The UniSim Design asset model is now being used to support production accounting and for compressor studies.”

- Ronald Romijn, Process Engineer, GDF SUEZ E&P Nederland B.V.

Background

The GDF SUEZ E&P pipeline network supplies a substantial portion of the natural gas that is extracted from the Dutch continental shelf and beyond. The 270km NOGAT pipeline system connects several offshore platforms to onshore, mainly transporting natural gas with some condensates. This subsea pipeline network converges at the Dutch coast at the NOGAT gas treatment facilities in Den Helder. After treatment, natural gas is

then directly delivered to the pipeline of Gas Transport Services B.V. which manages the national gas transportation network.

Challenge

To perform their gas trading activities, the gas dispatchers of GDF SUEZ E&P Netherlands use a hydrocarbon accounting system called Energy Components (EC), supporting them with the nomination of the production rates at the different assets. This hydrocarbon accounting system requires process data, including gas properties and qualities that are usually difficult to obtain from online measurements.

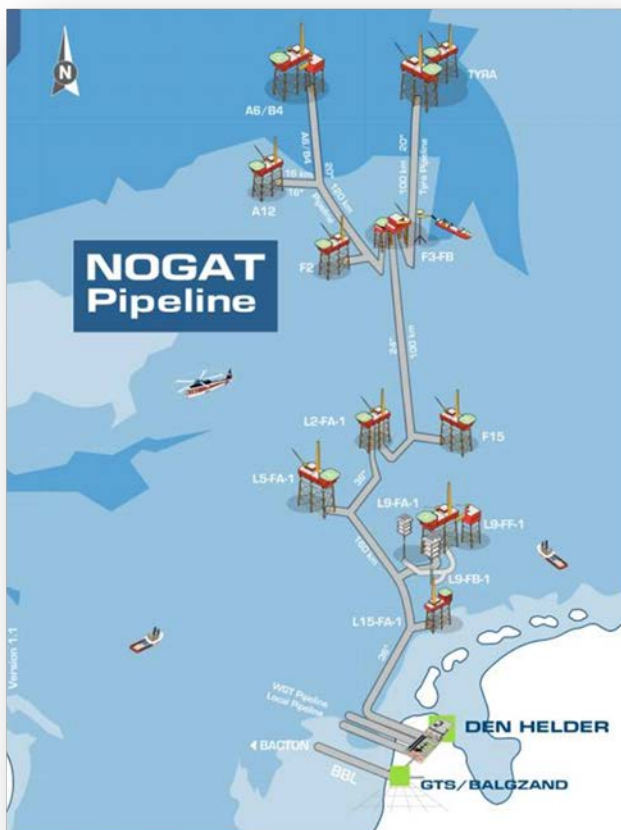
GDF SUEZ's challenge was to acquire such data reliably in order to improve their gas trading activities – based on insight into the current operating conditions and prediction of future operation scenarios.

Solution

In order to provide the required insight, different steady state models of the NOGAT subsea pipeline network were developed, including more than 10 offshore platforms and the onshore gas treatment plant in Den Helder.

The process simulation models were then connected to plant data, which allows automatic updating of the models to ensure they accurately represent current operation in the field. In addition, the models were integrated into the EC accounting system to allow a fully automated workflow.

Altogether six different UniSim Design models support the four scenarios that are handled by the Energy Components accounting system:



1. Required Buffers Scenario:

On day D-1, and in the event of a renomination, the scenario calculates the required pressures in [barg] on each of the platforms and the gas inventory in the NOGAT pipeline system expressed in [MJ] to allow a nomination of gas flow in [MJ/h].

The **Required Buffers** are calculated each day at 3:00 PM to predict the required buffer for the next day. The required buffer is the amount of energy that is required in the NOGAT system to allow the nomination point to meet its output nomination.

2. Input Nominations Scenario:

On day D-1, and in the event of a platform or in the event of a renomination, the scenario forecasts the sales gas deliveries for the remainder of day D-1 and day D. Based on a nomination of gas flows expressed in [Nm³/h], the model calculates the pressure at some platforms in [barg], the pressure at Den Helder treatment plant, also called the landing pressure, in [barg], the fuel gas rates in [Nm³/h], the Wobbe index in [MJ/m³] of the sales gas produced by Den Helder treatment plant, and the amount of sales gas in [MJ/h] produced by Den Helder treatment plant.

The **Input Nominations** are calculated each hour for each nomination point in order to enable the hourly output nomination.

3. Total Energy Scenario:

At the end of each day D, the scenario helps to reconcile the stock account balances to the physical pipeline stock. Based on a nomination of gas flows expressed in [Nm³/h] and the pressure at a platform in [barg], the model calculates the total energy pipeline network inventory in [MJ].

The **Total Energy** is calculated each day at 6:00 AM to calculate the total energy within the NOGAT system and is used in the daily reconciliation system to allocate the energy in the system to the nomination points.

4. Recovery Factor Scenario:

On receipt of the nomination point sample analyses for month M, the hydrocarbon accountant calculates recovery factors for month M+1. These are used in the Allocation Procedures during month M+2. The model calculates the gas & liquid recovery factors per component for each of the platform based on the input data.

The **Recovery Factor** is calculated before the 20th day of each month.

To run these four scenarios, the hydrocarbon accounting system will trigger the required inputs, and will automatically launch the

execution of the simulation case files at different frequencies, going from several times per day to once per month.

The gas dispatchers then retrieve the results of these simulations directly from the hydrocarbon accounting system, without any manual intervention.

Depending on the scenarios several properties will be estimated by the simulations, including:

- Pressure levels at the different platforms
- Wobbe index of the sales gas
- Total energy inventory in the pipeline network
- Gas & liquid recovery factors per component for each of the platforms.

Results and Benefits

This project is based on the deployment and optimization of process and pipeline simulation models of the NOGAT system, and their subsequent integration with plant data and GDF SUEZ's hydrocarbon accounting system (Energy Components) to support their nomination and allocation procedures.

The workflows of this application have been automated. Thus input is gathered and output is generated automatically and does not have to be generated manually. This has reduced the time required to generate the input and ensures consistency, improving and smoothing the overall nomination and dispatch cycles, and at the same time reducing the risk of human errors.

The implementation of the UniSim Design models was completed without any major issues. UniSim Design is now being used by process engineers at GDF SUEZ to perform any type of process calculations and compressor studies.

"The involvement of Honeywell's engineers was highly appreciated – they made sure that the models were implemented correctly and stable operation was achieved. In case of any problems, the Honeywell team was easily accessible to get solutions, and answers were generated on short notice," commented Ronald Romijn, Process Engineer, GDF SUEZ E&P Nederland.

About GDF SUEZ

The GDF SUEZ Group develops its business (power, natural gas, energy services) around a model based on responsible growth to take up today's major energy and environmental challenges: meeting energy needs, ensuring the security of supply, fighting against climate change and maximizing the use of resources.

The Group focuses on four key sectors: independent power production, liquefied natural gas, renewable energy and energy efficiency services.

GDF SUEZ currently employs 138,200 people worldwide and achieved revenues of €32 billion in 2012. GDF SUEZ is also a reference shareholder of SUEZ Environment, an expert in water and waste management.



GDF SUEZ E&P Nederland B.V. is one of the largest operators in the Dutch sector of the North Sea. With more than thirty production platforms and 300 employees, it is at the basis of the provision of energy to the Netherlands and several other countries.

About UniSim Design Suite

Honeywell's UniSim Design Suite is intuitive and interactive process modeling software that enables engineers to create steady state and dynamic models for plant design, performance monitoring, troubleshooting, operational improvement, business planning, and asset management.

It provides powerful tools to help engineers evolve process optimization designs with lower project risks, prior to committing to capital expenditures.

Major use cases in process modeling using UniSim Design Suite include:

- Process flowsheet development
- Utilizing case scenarios tool to optimize designs against business criteria
- Equipment rating across a broad range of operating conditions
- Evaluating the effect of feed changes, upsets and alternate operations on process safety, reliability and profitability
- Monitoring equipment performance against operating objectives.

UniSim® Design Suite is a registered trademark of Honeywell International, Inc.

For More Information

Learn more about Honeywell's UniSim Design Suite visit www.honeywellprocess.com/software or contact your Honeywell account manager.

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