OVERVIEW

Designing complex well string operations requires rigorous analysis to define the key aspects of each pipe-related operation in the wellbore. Determining which rig or equipment to use, the proper string components, and the appropriate fluid properties and parameters to drill safely and efficiently are just a few of the challenges the drilling engineer must address. To navigate these challenges, users require software solutions that can manage this complexity and bring to bear a wealth of scientific capabilities while at the same time being simple and intuitive to use.

DecisionSpace® Well Engineering software is the latest evolution in more than 20 years of innovations in well-construction information solutions. Building upon the industry-leading WELLPLAN™ suite, DecisionSpace Well Engineering software extends and simplifies the science through dramatic advancements in ease-of-use and data visualization. Integrated together with Engineer’s Desktop™ and Engineer’s Data Model™ (EDM™) applications, it provides the most complete and unparalleled well-engineering software tool kit in the industry.

BENEFITS

*Configure the right tools for any job*

Select the optimum rig and equipment, string components, and fluids to drill any type of well (onshore, offshore, deep water, high-pressure/high-temperature, 3D directional profiles, horizontal, and extended reach). Model pipe strings to define optimum windows of operation during the design and execution phases of your well. Anticipate risks and know how to drill faster without compromising the safety of the operation.
Dramatically simple to use
For both the novice and expert user alike, the completely redesigned user interface provides a simple approach to input data and powerful graphical visualization capabilities to interpret it better and faster. Output driving input methodology identifies the required data and provides hyperlinks to the appropriate input panel. The user simply clicks on the hyperlinks and inputs the required data and the application does the rest. The interactive wellbore schematic provides visual feedback throughout. By simplifying this process, users can conduct faster and more accurate analysis that helps make better decisions. The dramatically enhanced usability typically requires minimal training for existing WELLPLAN software users to master, while new users can be brought up to speed quickly.

Well engineering integration
All the results and analysis performed in the DecisionSpace Well Engineering interface are stored in the EDM database, the most widely used database for drilling and completions applications in the world. This data is available across the Landmark suite of drilling applications for other specific drilling, casing, or costing analysis. The applications can operate in a standalone or multi-user environment enabling you to scale from a single user to a corporate-wide system.

FEATURES
Torque and Drag analysis
Plan and analyze drilling, casing, and completion running operations, and assess the impact of predicted loads related to torque and drag. The main calculations are tension, torque, side force, fatigue, and tri-axial stress. A top-down analysis mode allows users to know accurate forces acting along the string all the way down to the bottom of the well based on surface parameters. It also accounts for the effect of hydraulic parameters like fluid properties, flow rate, diverse fluid columns, and pressures. Temperature effect on the string is also considered for the pipe stretch calculations. Riser-less and Inner-string configurations are also modeled as well as the effect of stand-off devices like centralizers and friction reduction devices.

Model any type of directional well profile and pipe strings including stand-off devices and multiple fluid columns.
**Hydraulic analysis**

This module can be used to model pressure losses across the circulating system of the rig and the well pipe string, estimate the equivalent circulating density (ECD) across the annular space, and analyze formation cuttings transport and its effect on pressure and ECD calculations. Temperature effect is also considered using four different rheological models, fluid compressibility, Fann® Viscometer readings at different temperature points, critical fluid velocity, and bit-nozzle size calculations for optimized rate of penetration.

It considers string eccentricity effect, pipe roughness, returns to sea floor for dual-gradient operations and backpressure for underbalanced operations.

**Underbalanced Hydraulics Analysis**

With the increased use of Underbalanced Drilling (UBD) and Managed Pressure Drilling (MPD) to improve circulation, ROP, and reduce formation damage and stuck pipe events it becomes critical to properly model multi-phase fluid flow to optimize liquid pump and gas injection rates and control bottom hole and surface pressures.

Using industry well known engineering calculations, this module provides a set of comprehensive analytical tools to determine the feasibility and optimal parameters for operations where more than one fluid is mixed including the injection of gases, and/or continuous formation influx to effectively control the pressures of the entire system. It takes in consideration the effect of wellbore geometries and deviation, string components dimensions, temperature effects, fluid properties and formation cutting transportation. With this module operators can quickly determine pressure, ECD, velocity and cutting transport ratio profiles and other relevant hydraulic calculations for multi-phase fluid circulation operations.

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*Gas injection rate, flow rate, and bottom hole pressure represented in the shaded operational window is automatically generated.*
**Transient Swab and Surge Analysis**

When drilling wells with narrow mud weight windows, high pressure, high temperature scenarios or low clearance in the annular space, it is critical to control the speed and other movement parameters of the string within the wellbore to avoid induced formation kicks or formation damage due to excessive swab or surge pressures.

DecisionSpace Well Engineering now offers the capability to calculate transient pressures within the wellbore caused by pipe movement during tripping and cementing operations.

Highlights:

- Optimized tripping speed schedule
- Detailed pressure transient response at any wellbore depth and at any string depth
- The model considers temperature and pressure effects on the compressibility and viscosity of water- and oil-based muds
- Pipe movement while circulating, displacing and pumping slurries, taking into account the axial elasticity of the moving string as well as the formation and previous casing and cement ones
- Work string input allows for drill strings, casings, liners, tubing, coiled tubing and packer assemblies
- Supports both conventional and auto-fill float equipment

*Pressure Transient versus time while reciprocating the pipe on bottom.*
**Well Control**

This application’s Well Control module offers the most intuitive workflow in the industry to determine kick tolerance of an operator’s well designs and kill sheet calculations, offering a large set of modeling capabilities and variable effects such as temperature, complex wellbore and string geometries, to reduce the uncertainty when planning a well and/or performing a well control operation.

Highlights:

- Extremely intuitive user interface with high standards on result visualization expediting the usage learning curve and interpretation of results
- Kick class determination and kick tolerance calculations
- Revised kill sheet application based on latest standard IADC forms
- Three types of influx (gas, oil and water)
- Safe drilling depth, maximum allowable kick volume, wellbore kick circulation animation with synchronized pressure profiles, pit volume gain, formation breakdown gradient charts

**Casing Centralization Placement**

Proper casing centralization placement is a key factor in completing an optimal and safe cementing job. With this module, users can calculate centralizer placement for any combination of hole size, pipe size, and centralizer and determine the optimal spacing between centralizers to achieve a desired casing stand-off, including the effect of torque and drag forces and survey tortuosity. The simple visual interface provides a fast and effective method to input the appropriate data and then visualize the results in an easy to understand way making it easy to compare different alternatives to optimize placement along the casing string.
Sensitivity analysis

DecisionSpace Well Engineering software provides a powerful method of performing generalized sensitivity analysis. Instead of performing manual iterations or running several analyses one at a time, users can define a range of values for the numeric variables wanted and perform the analysis simultaneously. Detailed graphical representations enable a quick review of the different alternatives.

Users can define ranges of any relevant parameter to easily perform sensitivity analysis.
Output driving inputs

Input only the data needed for the specific calculations that will be run. DecisionSpace Well Engineering software provides clear step-by-step guidance to the user on what data is required and leads them through the input panels in just a few clicks. Dynamic navigation and notifications highlight what is needed and how to enter it on the fly, enabling users to know what needs to be done next. Outputs are only calculated when all the right data is input. This enables engineers to use the system faster and easier while supporting more accurate results.

Interactive wellbore representations

Results are displayed graphically as part of interactive wellbore representations making interpretation of the results easier to visualize and understand.

Free upgrade for WELLPLAN users

Existing WELLPLAN customers that are current in their maintenance and support can license DecisionSpace Well Engineering for no additional license costs. Plus, they have the freedom to run or operate either or both applications at the same time with the same license, using the same data and even on the same computer.
“We perform Swab and Surge Transient Pressure Analysis using this software for deepwater wells, reducing tripping operation times by 30% on average.”

**DRILLING ENGINEERING CONSULTANT FOR A MAJOR INTERNATIONAL COMPANY**

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