Knovel®

EXPLORATION & PRODUCTION

Solution Story: Production Engineer at a Clean-Technology Energy Company

Knovel facilitated the scale-up of a cleaner, more energy-efficient process for heavy oil extraction

Summary

A clean-technology energy company had patented a cleaner, more energy-efficient process for heavy oil extraction. However, in the research around scale-up, potential problems with line erosion and pump cavitation arose. Information from Knovel was used to find the right pump type and operating conditions, enabling accelerated market entry for the optimized process.

Rapidly finding the right information in Knovel accelerates market entry for new technology

Challenge

Clean-technology energy is an exciting field that still has considerable potential for growth. The reduction of the environmental footprint of fossil fuel extraction and production is a major part of modern efforts.

The client in this case is a clean-technology energy company involved in solving the operational and environmental problems of heavy oil extraction. The company had patented a warm solvent-based method that required no water and less energy than steam-assisted gravity drainage with the potential to dramatically reduce the environmental footprint of oil extraction without compromising the return on investment of the oil companies.

To meet the demand for cleaner oil extraction, the company needed to scale up the method so that it could handle faster crude flows. However, there were real concerns that increased throughput might cause line erosion due to higher velocity and the effects on solids and impurities in the liquid. Fluid conditions reaching bubble point had also been found to cause cavitation in certain kinds of pumps.

Installing a single new pumping system would cost around $0.5 million; but system failure and the resultant loss of production capacity could cost in excess of $1 million. Clearly, a different pump would be needed for the scale-up, but how to choose the best one for the job?

Solution

The production engineer chose Knovel for the in-depth research into pump installation and operations, recognizing the value of the broad resources on offer. As well as being a recognized reliable source for engineering information, it includes interactive graphs, tables and equations for relevant oil throughput and pump behavior parameters.

The topics of research included:

- Fluid dynamics of multiphase fluids
- Electrical submersible pumps and their cavitation issues at bubble point
- Crude extraction pumps and their equivalent issues
- Line erosion under a variety of fluid–solid mix conditions

Figure 1 illustrates the kind of information that can be obtained using Knovel.

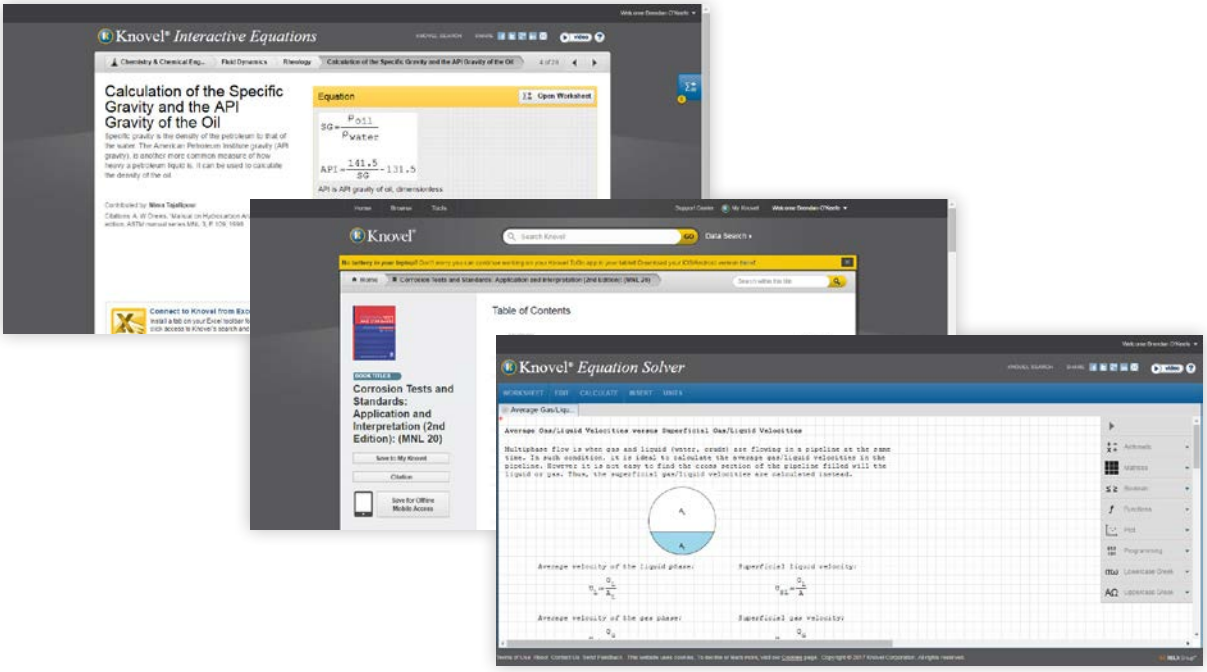


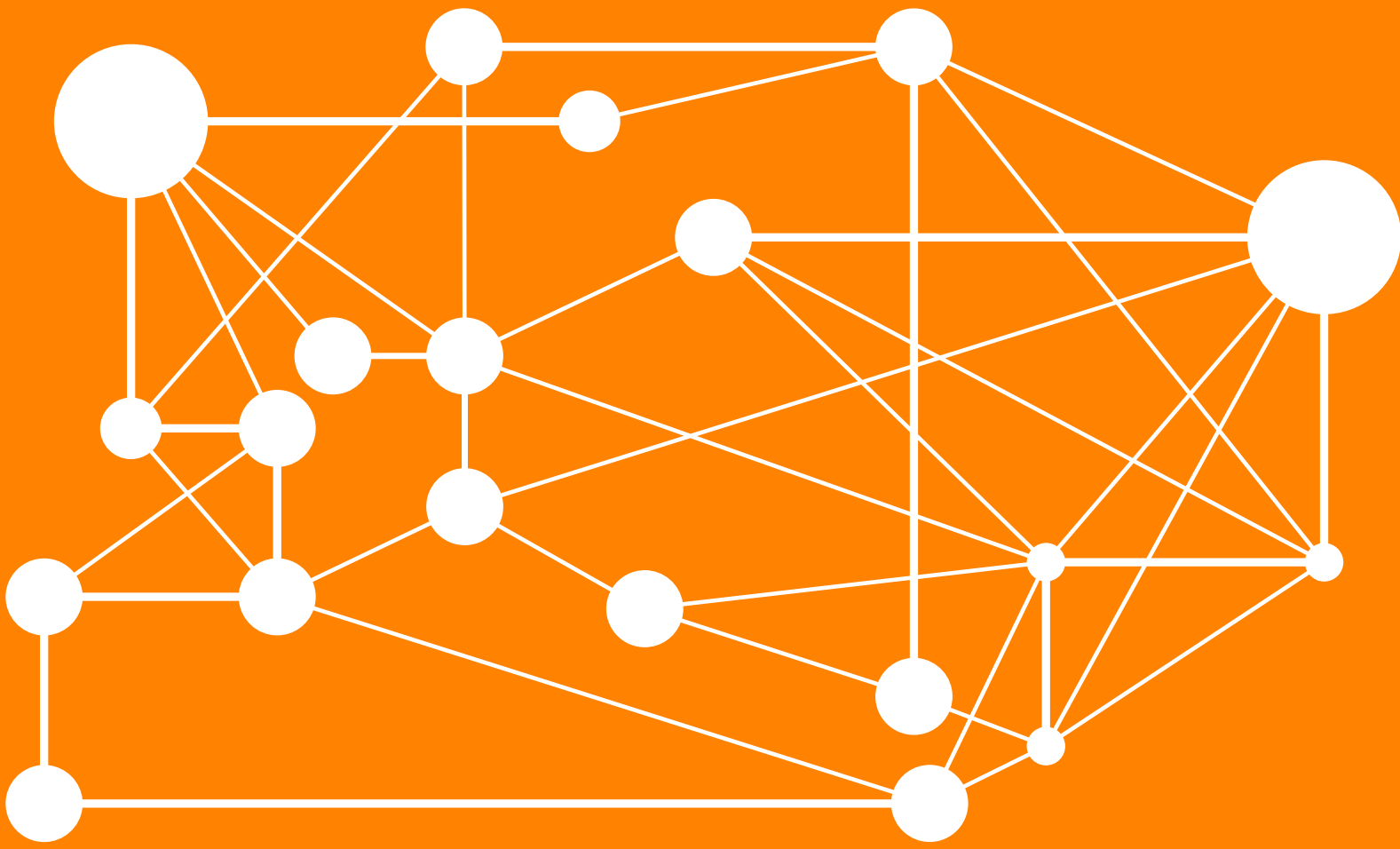
Figure 1. Knovel retrieves a whole range of precise information on fluid dynamics and various pump types, making it easier to determine the correct pump type for the conditions.

Business Impact

The engineering team successfully identified the correct pump and associated operating conditions to satisfy the needs of scale-up to a higher crude oil throughput. The facts found with Knovel supported their arguments in favor of the purchase and installation of an electrical submersible pump. The engineers were also able to define the optimal operating parameters to limit line erosion, cavitation and related system failure.

Since its installation, the pump has doubled the crude output in the target well in the pilot facility. Its successful operation has proven that the decisions made based on information found in Knovel were appropriate for the situation.

Rapidly finding the right information in Knovel also accelerated the market entry for the new technology. This means that at the pilot facility, crude oil is already being extracted using an environmentally friendlier process and that the same changes can be made at other facilities in the near future.



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