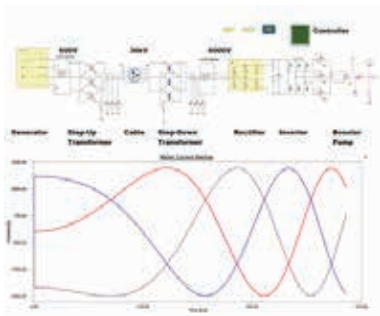
GALLERY: OIL AND GAS INDUSTRY APPLICATIONS

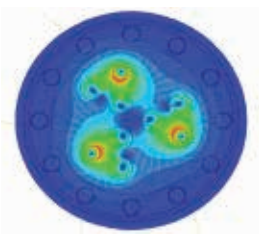
Oil and gas companies around the world rely on ANSYS software to refine and validate designs earlier in the design process, when the cost of making changes is minimal.

By *ANSYS Advantage* staff

SUBSEA ELECTRONIC AND POWER SYSTEMS

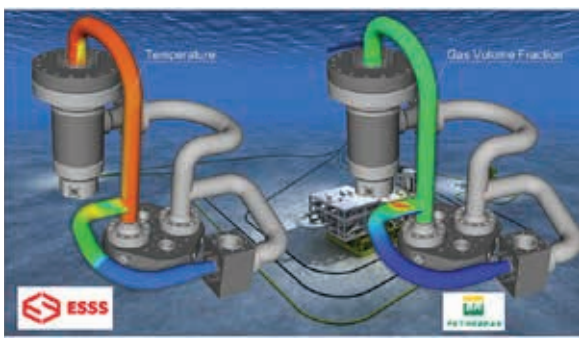
Simulation verifies correct operation under a variety of conditions and reduces the need for complicated testing procedures. A circuit schematic (left) of a power distribution system includes step-up generator voltage for subsea transmission and subsequent step-down for boosting and pumping power, including controllers and invertors. Resulting flux density and flux lines (right) from simulation of multi-component three-phase umbilical cable is shown. Simulation identifies hot spots in the fields and verifies electrical, thermal and mechanical performance.





DRILLING, PRODUCTION AND PROCESSING EQUIPMENT

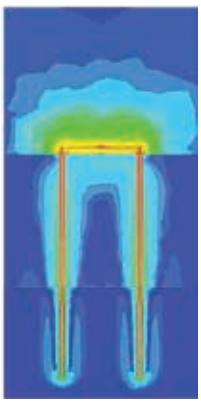
Subsea equipment requires a high level of reliability because maintenance operation is extremely expensive. Using ANSYS tools, engineers can verify operational and safety conditions early in the design stage — an evaluation that would be very difficult and expensive to do using physical prototypes. The image shows CFD results of a well-head separator simulation.

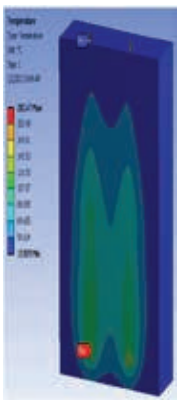


COURTESY PETROBRAS AND ESSS.

INNOVATION AND NEW CONCEPTS

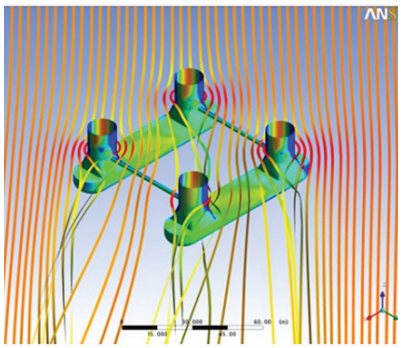
Simulation accelerates the pace of new technology development to reduce water and environmental impact in oil and gas drilling and production projects. The images illustrate the results for a concept project using high-frequency electromagnetics to heat oil sands in Alberta, Canada. Shown are electric field distribution (left) at 2 MHz for RF plus critical fluid extraction model and temperature gradients (right) as a result of an electromagnetic source.





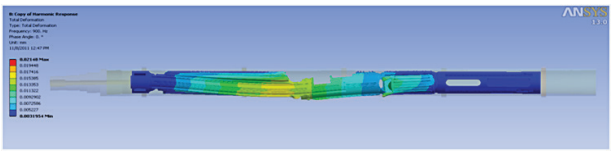
OFFSHORE AND SUBSEA STRUCTURES AND EQUIPMENT INCLUDING FLNG

Simulation is used for design, certification, construction, safety analysis, and operation of subsea and offshore structures to advance new equipment and vessel design for offshore processing facilities and floating LNG plants. The image illustrates contours of pressure and flow streamlines for a semi-submersible structure

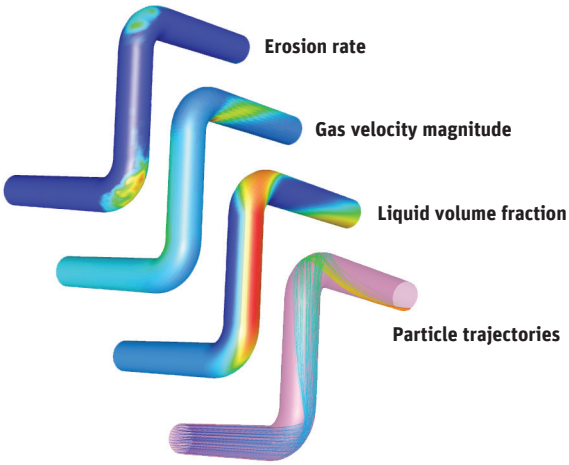


DOWN-HOLE TOOLS AND EQUIPMENT RELIABILITY

Oil and gas equipment must be designed to operate at remote locations and in harsh environments. To reduce downtime and increase product reliability, engineering simulation tools can test and evaluate the performance of equipment components and subsystems under real-world conditions. Simulation also enables root-cause and failure analysis early in the product design process.



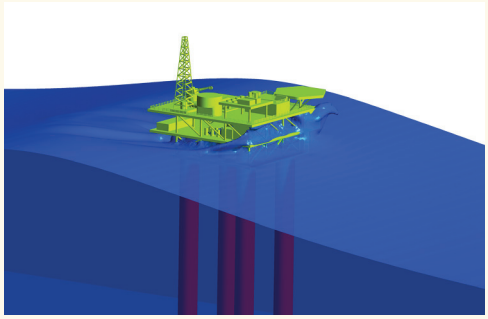
▲ **Harmonic response (top) of drill string.** Courtesy Baker Hughes.



▲ **Contours of volume fraction in three-phase analysis to better understand pipeline erosion**

ANSYS: A PLATFORM FOR GLOBAL COLLABORATION

Within the global energy supply chain, design, engineering and manufacturing groups span multiple geographies and involve teams engaged in discovery, generation, collection, storage, transportation, distribution and more. Each sector works on a broad set of challenges, solving problems that involve different physics, scale and components. Beyond simulation software, the ANSYS network of technical experts works with oil and gas customers around the world. We operate from local offices close to energy companies in Houston, Aberdeen, Rio de Janeiro, Stavanger, Kuala Lumpur, Calgary, Moscow and more. With our network of channel partners, the company fosters close relationships with customers and provides local value-added service and support.



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