



EDITORIAL

New frontiers in petroleum engineering



Although oil seepages are well known since long time ago by the Egyptians, Babylonians, Assyrians, and many other nations worldwide, its uses were very limited. The real oil discovery goes back to the year 1859 when oil was commercially produced through an oil well by Edwin Drake in Pennsylvania.

Petroleum engineering is considered as a relatively new among other engineering disciplines. Due to the need for a specialized petroleum engineering science, its pillars were set by mining engineers, geologists, mechanical engineers, civil engineers and many other contributors. The boundaries of petroleum engineering are well defined in the first quarter of the twentieth century. In 1915, specialized petroleum engineering programs were established in the United States universities followed by other universities worldwide. From that time petroleum engineering science was rapidly growing and evolving to provide the humanity with the power source for the modern technology.

Nowadays, Petroleum Engineering Programs became integral part of most prestigious worldwide universities. According to the Accreditation Board for Engineering and Technology (ABET) program criteria handbook, the typical petroleum engineering program must prepare graduates to be proficient in mathematics through differential equations, probability and statistics, fluid mechanics, strength of materials, and thermodynamics; design and analysis of well systems and procedures for drilling and completing wells; characterization and evaluation of subsurface geological formations and their resources using geoscientific and engineering methods; design and analysis of systems for producing, injecting, and handling fluids; application of reservoir engineering principles and practices for optimizing resource development and management; the use of project economics and resource valuation methods for design and decision making under conditions of risk and uncertainty.

“Petroleum Engineers make the World run” this proud quote, extracted from the Society of Petroleum Engineers (SPE) website indicates how highly we regard our career

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and, at the same time, indicates how important it should be the educational process that prepares the next generation of petroleum engineers to fulfill the industry needs.

As demand for oil and its derivatives is increasing, education, research, and technology are also rapidly developing to drive the oil and gas sector forward by developing new technical solutions, standards and industry best practices. Currently, several efficient technologies are being utilized in the oil industry such as:

- (1) Smart wells and smart oilfields
- (2) Maximum reservoir contact completion (MRC)
- (3) Nano fluids (drilling, completion, fracturing, IOR, etc.)
- (4) Geosteering drilling, Real-time drilling monitoring, and Real-time data services
- (5) Digital field data and software

Additionally, accessing the previously inaccessible oil and gas resources (unconventional oil and gas) is now become possible with modern drilling and hydraulic fracturing technologies. It is very important nowadays for petroleum engineers to realize the main challenges that petroleum industry is going through:

- (1) Overcome problematic fluctuation in oil prices
- (2) Resolve difficulties in producing the current conventional oil and gas fields
- (3) Economically developing oil and gas fields in deep waters
- (4) Protecting the environment through reusing produced water
- (5) Minimizing fresh water consumption in hydraulic fracturing operations.
- (6) Increasing hydrocarbon recovery factors for current fields.
- (7) Utilizing carbon capture and sequestration (CCS) as and an IOR process.
- (8) The need for developing efficient and economical exploitation means for unconventional hydrocarbon resources.

Solutions for the above mentioned challenges remain responsibility of petroleum engineering departments, research

centers, and industry experts. Whether we like it or not, hydrocarbon fuels are not going away anytime soon, and innovations in the oil technology have the potential to impact everyone. If technology makes oil and gas easier, safer, cleaner, and cheaper to extract, energy prices and quality of life could improve for everybody.

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