

THE AMAZON

# RESPONSIBLE OIL PRODUCTION IN THE AMAZON

Extracting heavy crude oil from a delicate environment presents multiple challenges for Perenco. Alfa Laval's centrifuge technology helps ensure the operation is viable.

TEXT: DAVID NIKEL PHOTO: PERENCO, GETTY





When new oil fields were discovered deep within the Amazon rainforest in 2006, Peru's then-President, Alan García, declared the find a "miracle" for the country's economy. It was the first new oil field put into production in Peru in 30 years. Nine years on, the real miracle is not the oil in the ground: it is the fact that oil can be extracted from this location at all.

**BLOCK 67 IS LOCATED** in one of the most inaccessible parts of the world, let alone Peru. To reach the site, workers must take a 90-minute flight from the capital Lima to Iquitos, which lies at the swampy confluence of the Amazon, Nanay and Itaya rivers. The jungle metropolis of Iquitos is the largest city in the world that cannot be reached by road, but the journey to Block 67 is far from over.

A two-day speedboat journey along the Amazon to the specially constructed terminal is followed by a helicopter flight to the site itself. Construction equipment and supplies must be transported by barge with a minimum journey time of ten days. To transport the oil away from the site, a 200km buried pipeline was constructed.

**"WE ARE GUESTS IN THE JUNGLE,"** explains Perenco's Benjamin Barraud. "Nobody lives anywhere near Block 67 except a few indigenous communities. It's virgin forest so we have a duty to minimize any disruption to the environment. Every decision is taken with a view to minimizing the footprint we leave behind."

"It's a harsh environment to work in because of the logistics but also the climate. It rains every day and there is no dry season. Constructing anything in wet mud is not straightforward."

As the world's energy demands continue to rise and conventional oil finds become rare, unconventional sources of oil such as deep-sea reserves and shale







The Alfa Laval centrifuge in operation. Three discoveries of oil, totaling 200m barrels, have been found in Block 67.

YouTube in which Costner demonstrated the technology. The solution was exactly what we needed to treat the heavy oil here in Peru. Almost immediately we contacted Alfa Laval due to their previous experience with centrifuge technology and quickly arranged a test using heavy crude oil at our facility in Gabon. Alfa Laval were very proactive and willing to cooperate, and the

deposits are now being exploited. Governments and oil companies are also taking a second look at deposits of heavy crude oil, previously thought of as uneconomical.

Perenco holds a 50 percent interest in Block 67 in the Marañón Basin, located in the north east of the Loreto region, along with the Vietnamese national company PVEP. To date, three discoveries have been made, giving a total of 200 million barrels of 2P certified reserves. Piraña and Dorado fields have been put on stream in November 2013 and today deliver a crude production of 6000 barrels of oil per day (bopd).

Heavy crude oil is difficult to extract from the ground due to its viscosity. It does not flow like light crude and its consistency is often compared to that of molasses. Steam is sometimes injected into the oil fields to ease the flow. Alternatively, as happens at Block 67, down-hole pumps can be used to produce oils that do not flow naturally. Once out of the ground, heavy crude requires a lot of processing to be usable. Firstly to remove the water, which can make up 60 percent of the extracted material. Tradition-



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BENJAMIN BARRAUD, PERENCO OIL

ally, this processing involves high temperatures, chemicals, large equipment and lots of time – none of which are appropriate given the environment at Block 67.

Perenco’s biggest challenge is to process the extracted material down to the 1 percent water specification required by PetroPeru before the oil can be exported. They looked at traditional methods to remove the water, such as electrostatic and chemical treatments. But such heavy technology, with a lot of requirements for space and heat, was not an option. A

difficult problem to solve, but inspiration came to Perenco via an unlikely source – Hollywood.

**FOLLOWING THE 2010** Deepwater Horizon spill in the Gulf of Mexico, BP spent \$16m on centrifuge technology from a company represented by Oscar-winning movie star Kevin Costner.

“I was looking for something simple,” explains Barraud. “I watched a video on

results were spectacular.”

The oil and gas industry is traditional and can be difficult to enter with new technology or techniques. It was undoubtedly a risk for Perenco to trial an unproven technology, but the results of both the trial and the initial performance of the centrifuge in Peru have been so good that Perenco has ordered two more for the other oil fields.

The Alfa Laval centrifuge – which works on the same basic principle as that demonstrated by Costner, but is otherwise a completely different technology – is at the heart of Block 67 and runs around the clock. It is operated solely by local staff with no Alfa Laval presence necessary, even for minor maintenance.

**“AFTER A COUPLE OF WEEKS** of testing and training, our local operators were ready to go without any assistance. They are now experts in the technology. The system is very flexible and on occasions when we get some sand or sediment in the machinery, the operator is capable of fixing the problem and getting the machine back online within two hours,” says Barraud.

The solution is a major breakthrough for both Perenco and Alfa Laval. Perenco is proud to be an early adopter of the technology thanks to the operational and economic benefits. For Alfa Laval, the successful implementation in Peru points to a bright future. By proving the centrifuge on a production site in such harsh conditions and with such heavy oil, a huge potential market opens up. ■





**PERENCO WORKS CLOSELY** with the regional government and local communities to improve healthcare and education in the area around Block 67. The company, the government and the communities have signed an Act of Social and Environmental Commitment and have established an open and transparent dialogue. "Today you cannot develop an oil project in the jungle as other companies did 40 years ago. Technology, mentality and responsibility have changed," says Yván Vásquez, president of the Loreto region.



## In brief: heavy crude oil

- Heavy crude oil is highly viscous and cannot easily flow to production wells.
- The density of crude oil is measured by API gravity, a scale from the American Petroleum Institute that measures how heavy or light a petroleum liquid is compared to water. The higher the API gravity, the lighter the crude.
- Any liquid petroleum with an API gravity of less than 20° is considered heavy crude oil.
- Separating oil from water is more difficult when the density difference between water and oil is low. Alfa Laval's solution manages this without excess use of heat or chemicals.



## New application for a proven technology

**USING A CENTRIFUGE** to separate oil and water is nothing new; in fact, it has been done for over 100 years. The technology is popular in marine environments and for producing olive oil, but it is a newcomer to the world of crude oil production.

At Perenco's Peru facility, the main separation process consists of four stages. The free water knockout removes the bulk of the free water from the stream before being further treated. The partly dehydrated liquid is heated and de-gassed before entering the disc-stack centrifuge. Rather than rely on chemicals, the centrifuge produces between 5,000-8,000G of centrifugal force to separate oil from water in a fraction of the time of traditional methods. The denser water collects around the periphery while the lighter oil remains in the core. Both substances are removed and the process continues.

The heavy crude oil at Block 67 has an API gravity of between 11° and 16° – an extremely high density. The entire viability of the operation depends on the ability to separate the oil and water as efficiently and reliably as possible. Traditionally, the crude oil is heated to temperatures of 150°C or above, whereas the Alfa Laval centrifuge operates at a temperature of below 100°C. The energy saving of this process is significant when running 24 hours a day. Perenco reports reduced operating costs of 66 percent against the electrostatic alternative.

More traditional gravity separation devices rely on the difference in density of oil and water but are time-consuming and expensive to operate. The initial outlay for a centrifuge is similar to the alternatives, but the total cost of installation, sundries and ongoing operational costs mean a lower total cost for producers working with heavy crude oil.