

Meeting Industry Requirements for High-end Seismic Projects

Superheavy vibrator offers improved performance, reliability and HSE features.

CONTRIBUTED BY SERCEL

High-density, wide-azimuth broadband seismic surveys are becoming the new paradigm for 3-D land acquisition. Multimillion traces per square kilometer can now be recorded on single-source, single-receiver 3-D projects using high-productivity techniques. The unequalled seismic data quality offered by such configurations optimizes interpretation of complex geologies and hydrocarbon detection and recovery. The use of single sources becomes mandatory on such projects to achieve the required levels of productivity to make these projects cost-effective.

However, deployment of vibrators as a single source implies reduced signal amplitude compared to conventional arrays, which means that more powerful sources are required to produce a satisfactory level of signal while maintaining an efficient sweep length. During previous decades, 60,000-pound-force (lbf) heavy vibrators became standard on the seismic market. The current industry focus is on 80,000-lbf superheavy vibrators that can meet the latest industry expectations.

To meet this need, Sercel has developed the Nomad 90 Neo, a new version of its superheavy vibrator. As an evolution of the Nomad 90, the Nomad 90 Neo vibrator capitalizes on the experience gained to offer improved performance, reliability and HSE features.

Broadband performance

Inherent from the larger scale of their design, superheavy vibrators are ideally suited to the generation of high-quality, low-frequency sweeps. A longer mass stroke, heavier mass and higher hydraulic pressures prove very beneficial for the generation of low frequencies. The low-frequency, high-amplitude mass oscillations required to generate the low-frequency seismic signal cause large pressure oscillation that can impact vibrator performance. To address this issue, the Nomad 90 Neo benefits from a mass design with integrated piston-type accumulators installed as close as possible to the servo valve to efficiently stabilize the hydraulic pressure.

For high frequencies, the Nomad 90 Neo performs well as a result of two key features:

- A 90,000-lbf hydraulic peak force (exceeding the 80,000-lbf hold-down weight) to address hydraulic pressure limitations, which can compromise ground force fidelity at the highest frequencies; and
- A baseplate design that is four times stiffer than that of the previous generation.

With these two features, the Nomad 90 Neo can ensure high-frequency signal fidelity and enable the bandwidth of the sweep to be extended.

The full-drive start frequency of conventional vibrators is between 6 Hz and 7 Hz. Below this frequency, custom sweeps with a reduced drive level ramp-up are used to remain within the physical constraints of the vibrator. However, this ramp-up requires time and affects productivity and cost. The Nomad 90 Neo actuator design makes it possible to reduce the full-drive start frequency down to 5 Hz. If used with a 62,000-lbf output, this frequency is further reduced down to 4.4 Hz. When compared to conventional vibrators, emitting a sweep starting from 1 Hz with a given level of energy can be achieved with a sweep length reduction of up to 76%, resulting in a significant productivity gain.

Blueback Changes Name to Cegal

Following the merger with Cegal, announced in August 2014, Blueback Reservoir will go forth under the Cegal name and logo. The companies are aiming to fill the gap between E&P and information technology (IT) by combining the expertise within geoscience and IT solutions.

Blueback Reservoir is a geoscience solutions partner, and Cegal is a provider of IT solutions to the oil and gas industry. Over the last nine months, the companies have established common offices in Stavanger and Oslo and have together opened an office in i2 Business Centre in Aberdeen, U.K. Going forward, the current and combined product portfolio will be brought to the market under the Cegal brand. With first roll out in Norway, Blueback Reservoir's subsidiaries in Houston, London, Calgary and Dubai are in the process of changing the company name. ■

Reduced environmental footprint

The Nomad 90 Neo is fully compatible with Intelligent Power Management (IPM), a capability developed for the Nomad vibrator family. It measures the engine load and adapts the engine rpm accordingly. While vibrators usually operate at a constant rpm, this new feature significantly reduces fuel consumption as well as noise and exhaust emissions. Field tests carried out on different seismic surveys show fuel savings of up to 15% on the vibrators equipped with IPM.

Enhanced reliability

The Nomad 90 Neo benefits from experience gained with the Nomad 90 to offer the highest level of reliability and safety. The vibrator's center of gravity has been lowered to offer safe access even to the most rugged areas, without compromising on baseplate clearance. Its overall dimensions have been designed to be comparable to those of a 62,000-lbf vibrator and address maneuverability and accessibility constraints. Numerous components are standardized with those of the Nomad 65 Neo to offer flexible spare parts management. The large 1430L fuel tank and a rapid refilling



A Nomad 90 Neo is operating in Oman. (Image courtesy of Sercel)

system are standard, simplifying refueling logistics and the associated high HSE exposure.

The Nomad 90 Neo has successfully been deployed on several recent projects in the Middle East where it has already demonstrated its improved features. Its 80,000-lbf output has achieved good signal levels for high-productivity, single-source projects. The ability to generate high-fidelity broadband (low- and high-frequency) sweeps with a reduction of the sweep length also has been demonstrated. For more information, visit Sercel at booth 430. ■



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