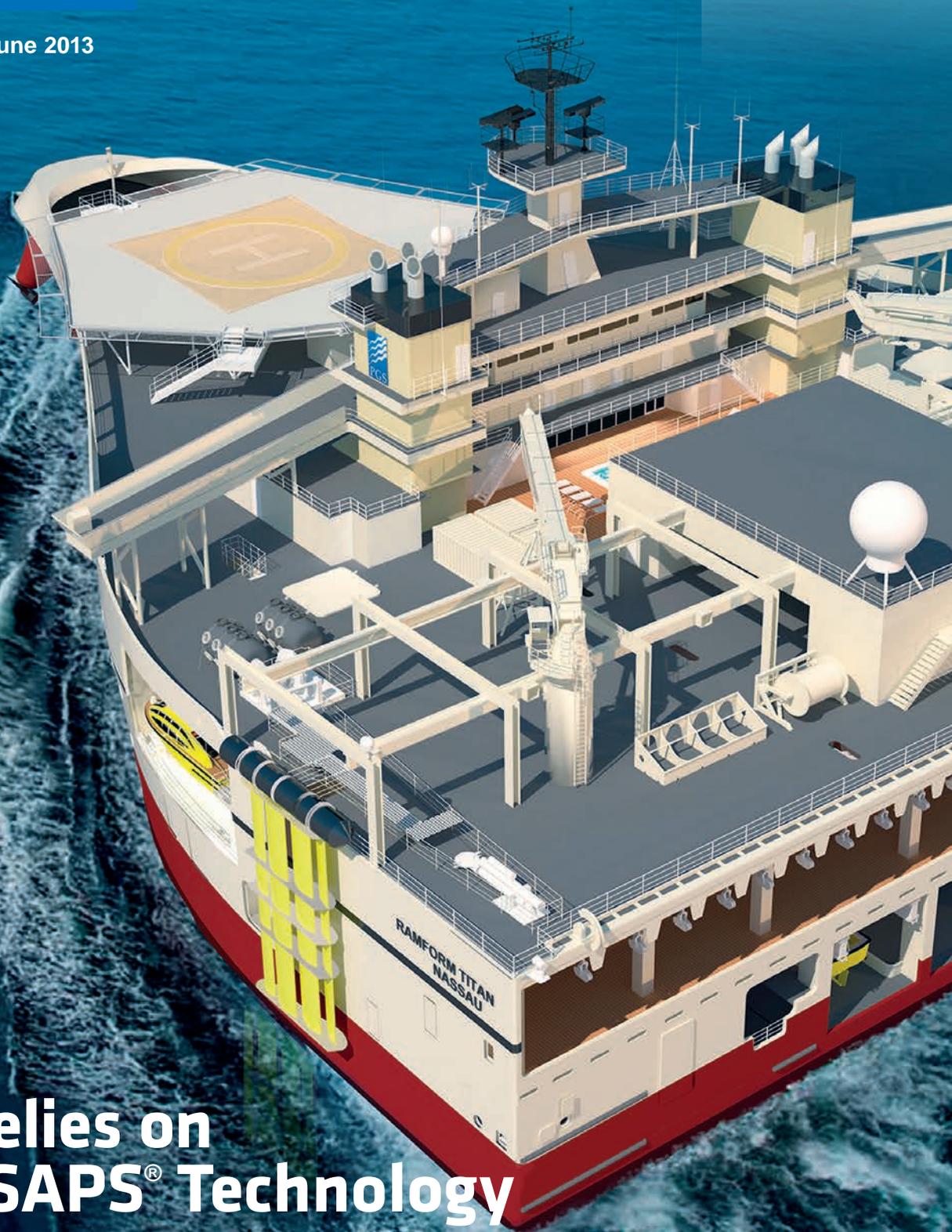


SEISMIC

Bulletin

Edition No. 2, June 2013



PGS relies on
BLUESAPS® Technology
Focus: Compressor Service

Foreword

After the first NEA GROUP's **Seismic Bulletin** at the end of last year, NEA received plenty of positive feedback. Thanks go to all readers for their interest, response, and well-meant advices.

In **Seismic Bulletin** No. 2 you'll find the focus on customer service. Product Managers *Rob van Lienen* and *Stefan Damberg* will speak about requirements and qualifications of service provider in the seismic industry.

Furthermore you find the first case story. The Norwegian company PGS invested in the new NEA **BLUESAPS**® system.

We hope you will enjoy **Seismic Bulletin** No. 2.

Sustainable Seismic Offshore Survey:

A Clear View of Deep Oil

Until the 1980s, explosive charges were used for offshore searching of crude oil reservoirs. Explosive devices generated the acoustic waves required to acquire seismic data and explore the sea floor. Stricter guidelines and regulations only reduce the burden for marine organisms due to seismic offshore activities as a result of the increased interest in protecting the oceans. The today applied high-pressure air guns not only keep the environmental damages lower, but also are considerably safer for the staff. However, it ought not be denied that the use of seismic sources can be disturbing or damaging to marine organisms.

PSG Commitment

This is why Petroleum Geo Services (PGS) has written an environmental declaration. The Norwegian company offers a wide range of seismic services and products for the crude oil industry. These also include seismic studies and analyses, data recording and processing.

In the declaration, PGS explains the environmental management across the Group according to the international Management Standard ISO 14001. The company, with its headquarters in Oslo and subsidiaries in more than 30 countries, is committed to the continuous improvement of the environmental compatibility of the seismic vessels. PGS measures, monitors and evaluates the worldwide applications in order to minimize the environmental risks and simultaneously to increase the efficiency of the exploratory activities.

Just by monitoring and observing the marine fauna, due to safety zones and restricted areas as well as appropriate time and weather windows, PGS has reduced the negative influence considerably. Above all, the so-called "soft start" process has proven to be highly successful. The output of the air source is



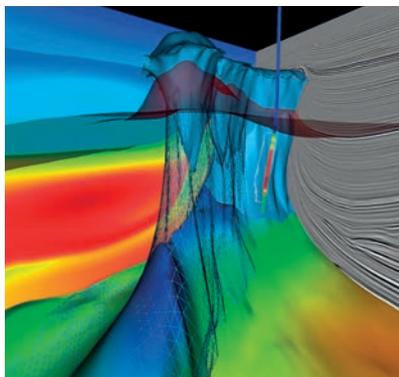
only increased gradually in order to provide the animals the opportunity to leave the sound source in good time.

The Norwegian company invests in new technologies such as the optimized fuel consumption of the seismic vessels for example. In the latest project, two new vessels of the most advanced RAMFORM TITAN series are equipped with NEUMAN & ESSER **BLUESAPS**® systems, which are at present the cleanest solution for providing the air

guns with compressed air.

Some 50 lubricated NEA SAPS systems serve as energy source for air guns on seismic vessels on all the world's seven oceans. The new development **BLUESAPS**® which is used for the Titan series by PGS is the oil-free version of the Seismic Air Power System. The special feature of the NEA **BLUESAPS**® units is that they provide clean air up to a pressure of 200 bar (3,000 psi) with a 2-stage oil-free screw compressor and a 3-stage oil-free reciprocating

compressor. Per 1,000 operating hours, this variant saves up to 450 liters' oil and 110m³ oil-contaminated condensate which would have to be stored and disposed expensively if lubricated compressors were used.



New Investments

In 2011 Petroleum Geo Services ordered two new generation Ramforms at Mitsubishi Heavy Industries Ltd. (MHI). Delivery of vessel number one and two is scheduled for 2013. Two additional vessels will be vessel number three and four in the Ramform Titan Class; planned delivery is 2015. Petroleum Geo Services equips the two latest seismic vessels with a total of six **BLUESAPS**[®] systems from the 62 series. These are then part of the eleven Ramform Fleet seismic vessels.

The decision regarding the renewal and extension of the fleet comes at a time when the demand for seismic services is increasing. The Ramform Titan Series has decisively developed success factors such as large spreads, long streamers and towing efficiency further. These factors make that little, decisive difference in geologically complex areas such as Brazil, West Africa, and the Gulf of Mexico. In areas which have been exploited as far as possible, such as the North Sea, the higher data precision reveals the new geological opportunities mentioned. Therefore, the Ramform Generation strengthens PGS' market leader position with improved productivity and efficiency in seismic data acquisition.

Interview with Rob van Lienen and Stefan Damberg

Support for Service

Rob van Lienen is working at NEAC Compressor Service since February 1990. His experience and training with the Dutch Navy are of benefit to him as "Seismic Industry" Product Manager. Stefan Damberg now assists him. The 34-year-old engineer started supporting Rob van Lienen, primarily in the field of mechatronics, in April. The two of them were available to answer three major questions.

How does the seismic area differ from other sectors?

Rob (right): When a customer calls us, we clarify extremely precisely which spare parts are needed for use. Normally, it is impossible to source anything

Rob: Moreover, it is not sufficient merely to know one's own compressor in the offshore area. The NEAC service technicians are familiar with the entire system; they know every single supply and drainage line.



locally in the short-term. As in the other sectors, we guarantee customers a 24/7 service. The service offered by us incorporates installation and commissioning, 6,000 hours' servicing, maintenance and repairs as well as spare parts.

Stefan (left): Our offshore experts are specially equipped for this kind of work. Naturally the customers have good engineers and tools, but we are simply the specialists and that is what the customers rely on and is how we operate on board: professionally!

Do the mechanics in the seismic sector require additional qualification?

Stefan: All the employees deployed there require so-called Helicopter Underwater Escape Training (HUET). This is carried out by our company as a standard as soon as it becomes apparent that the employees will work offshore.

You offer SAPS customers training at the Training Center in Germany. What do the customers learn there?

Stefan: Customers are given a specific individual training, either before or after commissioning and either on the vessel or at the packager's. The Training Center at our headquarters in Germany is another option.

Rob: Even though NEAC takes care of the problems, the participants learn troubleshooting. They gain deep theoretical and practical knowledge by implementing what they have learnt directly on the compressor block.

Visit us at the
75th EAGE Conference & Exhibition in London, United Kingdom,
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to unveil the secrets of
BLUESAPS

Compressor Systems



Siegfried Meyer
Sales & Product Manager
Phone: +49 (0) 24 51 / 481 121
Mobile: +49 (0) 171 / 6 06 78 42
siegfried.meyer@neuman-esser.de

**NEUMAN & ESSER
Deutschland GmbH & Co. KG**



Arno Thomas
Area Sales Manager
Phone: +49 (0) 24 51 / 481 446
Mobile: +49 (0) 173 / 7 09 80 46
arno.thomas@neuman-esser.de

**NEUMAN & ESSER
Deutschland GmbH & Co. KG**

Compressor Service



Rob van Lienen
Area / Product Sales Manager
Phone: +49 (0) 24 51 / 481 319
Mobile: +31 627 03 43 96
robert.vanlienen@neac.de

**NEAC Compressor Service
GmbH & Co. KG**



Timo Kitschen
Manager Spare Parts
Phone: +49 (0) 24 51 / 481 331
Mobile: +31 611 64 32 48
timo.kitschen@neac.de

**NEAC Compressor Service
GmbH & Co. KG**

Imprint

NEUMAN & ESSER GROUP
Werkstrasse, 52531 Übach-Palenberg,
Germany
Phone: +49 (0) 24 51 / 481 01
Fax: +49 (0) 24 51 / 481 100
E-mail: info@neuman-esser.de
Website: www.neuman-esser.com

Chief Editor
Martin Grolms
Corporate Communications

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