

## Press Release

### **'Lifting' a 48,000-ton platform in the open ocean is no easy task**

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Picture: Pioneering Spirit

#### **Special Bosch Rexroth components and control systems on board the 'Pioneering Spirit'**

**It was the biggest assignment Bosch Rexroth in Boxtel had ever faced, and it took more than two years to carry it out. But they seized with both hands the opportunity to research and supply the hydraulic components and associated local controls for the innovative lifting system on board the *Pioneering Spirit*, conceived and developed by Allseas.**

The request came from Allseas, an offshore specialist, or in fact from founder and part-owner Edward Heerema. A specially-designed ship would lift entire offshore platforms off their piles in a single movement, for which Allseas had developed in-house a complete motion compensation system and associated controls. Allseas also wrote the software for the principle behind the motion system. Then they asked Bosch Rexroth to further develop the design of the hydraulics and the arrangement of specific components of these lifting beams, and to supply specialist hydraulic components and drive systems.

Ron van den Oetelaar, Managing Director of Bosch Rexroth Benelux, says: "We'd already worked closely with the Allseas engineers in Delft in the past, on other projects. So we had already supplied all sorts of components for special ships laying pipelines in the ocean. We were honored when Allseas gave us the engineering task of investigating the technical design for a new lifting system. It was a unique opportunity to display our technological knowhow. Working closely with the Allseas engineers, who developed the unique form and functionality of the ship and the principle of the lifting beams for the 'topsides lift system', our engineering team investigated various

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technical control options for the individual lifting beams. They looked at many different variations: hydraulic, electrical, and hybrid combinations of both technologies. The hydromechanics and electromechanics were a challenge, but so was the digital technology (controls, software, bus systems, etc.). Allseas wanted the ship to be able to handle platforms weighing up to 48,000 tons. That's no easy task. Especially when you realize not only how accurately but how fast it has to happen. During the development process countless tests were carried out and simulations performed so that, together with the engineers at Allseas, we could find the optimal solution. When after a couple of years' development we had got it right 'on paper', we were given the job of manufacturing and supplying the hydraulic components and drive systems for the individual beams.

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### **Enormous efficiency gains**

It used to take ships with cranes and dozens of workers weeks or even months to construct or dismantle a platform piece by piece on the open ocean. The "*Pioneering Spirit*", 382 meters long and 124 meters wide, lifted the top section of a platform off its piles in 9 seconds. The motion compensation system is actively involved in preparing to pick up a platform. It consists of 16 lifting beams operated from the bridge of the *Pioneering Spirit*. Using the lifting beams, a platform is raised by 2.5 meters in a single swift movement so that the superstructure of the platform becomes detached from the substructure. Then the ship moves away, and the superstructure is carried towards the shore.

Partly due to the simultaneous movements of the lifting beams along multiple axes, the technology applied in this situation by Allseas, which is also known as swell compensation, is exceptionally complex in this application.

### **Engineered to order**

For this assignment, was it possible to use standard components from the Bosch Rexroth range, or were custom components required? "Standard components can rarely be used for special projects of this size," Van den Oetelaar replies. "Apart from a few catalog components, such as valves and plunger pumps, most of the components and subsystems were developed specifically for this ship. This includes cylinders, control devices, generators, mounting plates, etc. The local digital control systems that we supplied for the lifting beams were also developed specifically for this assignment. That applies to both the control hardware and the software. During the design process we made intensive use of powerful simulation tools to predict system behavior, finite element methods to compute critical parts and components for strength, and analysis techniques to identify risks in the process flow. But it's always exciting when the first job gets underway. That took place in August, and involved lifting the 13,500-ton top section of the Yme platform off the Norwegian coast. Everything worked perfectly. In the near future, the remaining four lifting beams (including Bosch Rexroth components) will be installed on the ship in readiness for larger jobs. It's great that our designers, production staff, service engineers and other technicians have been able to make such an important contribution."

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