

Offshore Bearing Systems

Trelleborg Ridderkerk BV



Introduction

To supply products to the Offshore Industry is challenging for any supplier. Products must be thoroughly and rigorously designed, manufactured, tested and documented. Often the requirements push the scope of current technology, the lead times are short and the delivery times are critical. Clients must have complete confidence in your ability to perform under these conditions. Trelleborg Ridderkerk BV is a leading global

supplier of elastomeric bearing systems to major offshore projects. Each of these products is designed to perform to the client's specified operating criteria. We are focused on working closely with our clients to develop innovative designs and cost effective solutions. Products are manufactured at our quality certified facility in Ridderkerk, The Netherlands.



Product Range:

- Shock Pads for Jack-ups
- Module Support Bearings for FPSOs
- Anti Vibration Mounts
- Shock Cells
- Leg Mating Units
- Deck Support Units

Company Profile

Trelleborg Ridderkerk BV is a member of the Trelleborg group - a global industrial group offering leading-edge expertise in polymer technology combined with advanced industrial know-how in respect of functional solutions and systems to meet our customers' requirements. The Group has approximately 20,000 employees in some 40 countries. The Group's Headquarters are located in Trelleborg, Sweden.

Shock pads for Jack-ups

Jack-ups are provided with jacking systems for lifting and lowering the platform on the legs. Since years Trelleborg Ridderkerk BV designs and supplies rubber shock pads for these jacking systems. The shock pads have to absorb loads in combination with relative low compression stiffness. Compared to ordinary steel-rubber laminated bearings, shock pads are built up with relative thick rubber layers. In order to monitor the loads during the jacking operations we have developed shock pads with an integrated electronic load cell.



Module Support Bearings for FPSOs

Floating Production Storage and Offloading Facilities (FPSOs) are a workhorse of the offshore industry. Their service requirements include multidirectional loads transferred between the hull and topside modules as a result of wave action. The module support bearings must be able to resist large alternating movements in all three directions and large rotational movements in line with the FPSOs longitudinal axis.

Trelleborg Ridderkerk BV designs and manufactures support bearings to match these exacting requirements.

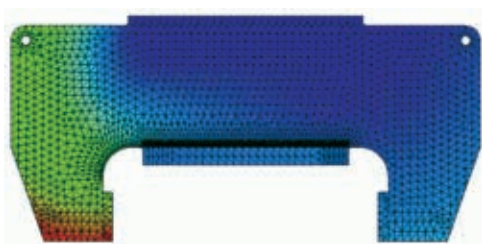


In 2003, Trelleborg Ridderkerk BV won the order from AMKC (Aker Marine Kvaerner Contractors) to design, manufacture, test and supply 42 module support bearings for the FPSO SeaRose. Trelleborg Ridderkerk BV successfully executed the order within a strict time schedule. The FPSO SeaRose is designed for offshore use at greater depth, where platforms are not technically and commercially viable. The ship will be operating at the White Rose Oil Field, 350 kilometers east of St. John's, New Foundland, Canada.



Module support Bearing Type B02

Trelleborg Ridderkerk BV used its rich experience in elastomeric bearings for bridges and shock pads for platforms to design the special module support bearings. In total 3 types have been designed for the FPSO SeaRose, the so called B01, B02 and B03. The heaviest of these elements is close to ten tonnes in weight and can withstand a vertical load of up to 10,000 kN and a horizontal load of up to 3,500 kN. The design is based on a combination of rubber and steel to compensate a displacement of 75 millimetres.



Finite Element Analysis on steel top of the B01 and B02

All bearings are steel plate reinforced in order to keep the stresses to an acceptable level and to secure a long design life. In addition, all steel structures are checked for stress and strain with Finite Element Analysis (FEA) software and to establish the production quality of the elements, compression and shear tests were carried out.

Andre anti-vibration mounts

Since the early 1970's Andre have utilised their expertise and experience to provide AVMs world-wide to many of the major gas turbine, generator, compressor and pump unit manufacturers for the isolation of structures from potentially damaging machine-borne vibration. Applications cover oil and gas exploration and production platforms, FPSOs, accommodation modules and helidecks. Andre AVMs are custom designed and consist of elastomeric bearing units located under the support skid.



Design Features

- Natural frequency of the isolated skid: Typically within the following band ranges: 10-12Hz, 12-15Hz, 15-20Hz. Lower frequency can be supplied if required.
- Vertical loads: Up to 10MN and up to 1MN in tension
- Horizontal loads: Up to 1MN under normal operation. Overload up to 2MN during storm, transport or seismic.
- Rotation: 0.01 radians about any horizontal plane.
- Fixing: AVMs can be supplied with or without holes for fixing bolts, with a deck fixing plate and shim pack.
- Maintenance: The elastomeric components are maintenance free for life.
- Operating Temperature Range: -20°C to +50°C
- Design life: In excess of 25 years
- Fire Resistance: In the event of exposure to a fire the outer rubber surfaces of the bearing would char forming a protective barrier. Even in a severe fire Andre AVMs will not fail catastrophically but take on further settlement whilst supporting the skid.

Leg Mating and Deck Support Units

Leg Mating Units (LMUs) and Deck Support Units (DSUs) are a critical part of the floatover process, one of the key installation methods for offshore constructions. During a floatover a deck is transported from the fabrication site and installed onto a pre-installed jacket. The decks typically weigh several thousand tonnes and this load has to be transferred to the lower structure in a controlled and progressive process. DSUs are applied between the deck load to the pre-installed jacket.



The heart of the LMUs or DSUs is the load absorbing elastomeric units. These units have to be designed for each loading configuration and the desired spring rate matched precisely to the requirements.

Trelleborg's experienced design team work closely with the client when designing these elements to ensure the optimum performance. New designs can be prototyped and tested in-house. We can supply either load absorbing elastomeric bearings or the complete assembly ready for fit out.

Policy quality, environment, safety and health

The policy of Trelleborg Ridderkerk BV is to design, produce and deliver rubber products which are in accordance with the customers' requests, needs and expectations. Our policy is based on the Trelleborg Group policy statement 'Code of Conduct', which is presented on the website www.trelleborg.com.

During the development of products and processes the environment, safety and health are integral to the process.

Trelleborg Ridderkerk BV is using an integrated management system which complies with international standards such as ISO 9001, ISO 14001 and SCC** 2008/05 Petrochemical.



Sliding bearings for Sakhalin II PA-A Molikpaq Tie In Project



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Trelleborg Ridderkerk BV is a member of the Product Area Infrastructure with companies in the Netherlands, Spain, Russia and China.