

# Ship Building i n d u s t r y

## **Danish Blue**

MAERSK TRIPLE-E SERIES

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## **Nor-Shipping**

AGENDA OFFSHORE

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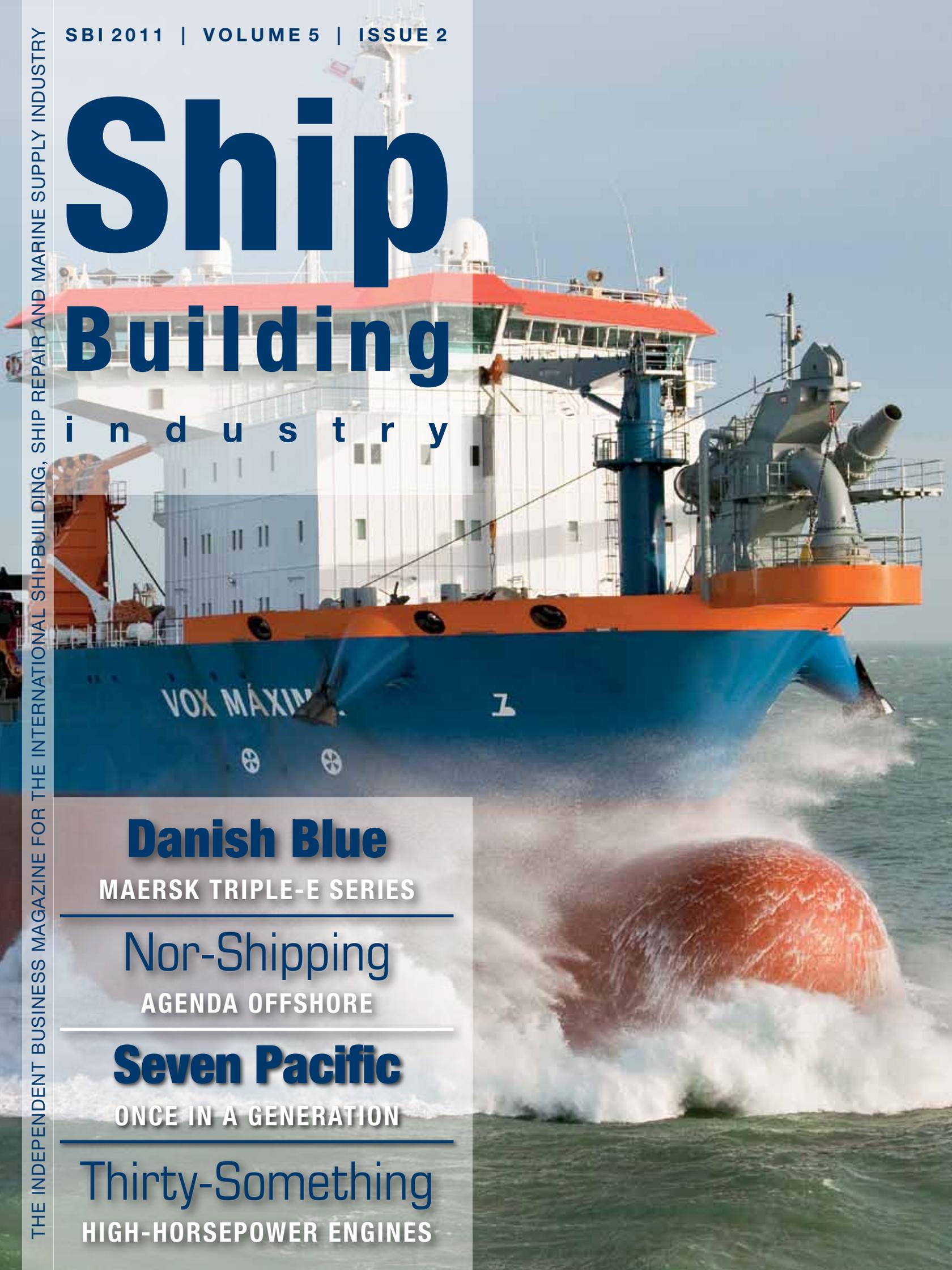
## **Seven Pacific**

ONCE IN A GENERATION

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## **Thirty-Something**

HIGH-HORSEPOWER ENGINES



# *Through the Motions*



## **Alignment Goes Dynamic**

*Following extensive technical and commercial investigation, STX Finland Oy, part of the STX Europe Group, has recently purchased SKF Machine Support's ShaftDesigner alignment and vibration analysis software for the STX Finland yards in Turku and Rauma. A milestone signifying the 'dynamics' of both Machine Support's and ShaftDesigner's evolution.*



Prior to the purchase, third parties supplied alignment and vibration calculations analyses to both yards, but it was decided to perform the analyses in-house. ShaftDesigner – extensively covered in ShipBuilding Industry Vol. 3, issue 5 – is capable of calculating shaft line alignment as well as all types of vibration, taking into account the entire shaft line and its components.

A particular feature that must have increased ShaftDesigner's appeal to STX is the new Ice Impact feature from the torsional vibration module that is part of the software package.

More so, as the first vessel that will 'go through the motions' is a polar supply and research vessel which is being built for the South African Department of Environmental Affairs at STX Finland Oy's Rauma shipyard. The multipurpose vessel will operate among other things as a supply, research and passenger ship as well as an icebreaker. The ice-strengthened vessel will be approximately 134 m long and it will accommodate a crew of 45 and some 100 researchers or passengers. The keel-laying took place on 31 January this year and yard number 1369 is now under construction for delivery in 2012.

### *Beyond the Realms*

The recent order – together with the new feature introduced in the vibrational analysis module – is exemplary for ShaftDesigner's evolution since its commercial debut at Nor-Shipping two years ago. Martin van Leest, service manager at SKF Machine Support puts it this way: "What separates us from the rest is our diversity and our continuous efforts to be on top of what the latest in technology might bring." Although a visit to their operations in Brazil, the US and Dubai was tempting, ShipBuilding Industry met with Martin at the company's premises in Ridderkerk, the Netherlands, together with engineering and development manager Arie Leeuwenburg and marketing manager Geoffrey de Vlaam. By their attitude, Machine Support is keen to look beyond the realms of their own alignment, mounting and levelling, and engineering business as well, Martin explains: "During the same time we introduced ShaftDesigner, we bought a Faro laser tracker followed by a Faro measuring arm. The laser tracker originates from the aerospace industry

and the measuring arm systems is a device stemming from the automotive world. But what we do is take a creative perspective and adapt the tools' possibilities and opportunities to our liking and needs."

### *Saving Days*

The laser tracker and measuring arm have greatly increased Machine Support's flexibility. In the past complex geometrical projects could take up to a week to perform, but there are cases where they have been able to reduce this to half a day. The new tools are for instance used when examining the sources of calamities and assessing damage to stern tubes and bushings. Machine Support also offers onsite machining to recondition the entire shaft line in these cases. Solutions delivered and performed by Machine Support cover all ranges from just 'simple' shaft alignment to full range repairs.

But their portable measuring solutions really are perfect tools for all sorts of projects. During the alignment of cutter arm hinges on cutter suction dredgers actual time savings of days have been obtained and at the same time accuracy has been increased. Also the use of podded propulsion, although without shaft line issues, comes with its own set of geometrical challenges, that Machine Support is able to tackle with their laser tracker in less time and with greater accuracy.

### *Dynamic Affair*

The next big thing that Machine Support brings to the market is their ability to perform and evaluate dynamic measuring analyses – which is under close watch from shipowners, OEMs and classification societies alike, Martin explains: "Alignment measuring has really always been something static. You of course try to involve dynamic behaviour in your calculations, and alignment procedures, but this is all based on assumptions. There was no way you could check if these assumptions were actually right to start with. Now, we are able to check whether these assumptions were right and we are able to fine-tune the assumptions to what is really happening on board in practice. That is something everybody from shipowner to OEM and classification bureau is keen to learn."





### *Full Context*

Arguably, classification bureaus do have their own software to perform a range of alignment and vibration analyses. According to Arie Leeuwenburg a considerable number of yards have come up with their own proprietary solutions as well. The distinct problem he likes to stress is that the majority of these solutions consists of 'island' solutions, that address only one particular aspect of what is actually SKF Machine Support's and ShaftDesigner's strong point – putting everything in the right context. Arie Leeuwenburg, Martin van Leest and Geoffrey de Vlaam, they are pretty convinced that theirs is the only solution that is commercially available and able to provide answers in their full context.

Furthermore an integrated solution such as ShaftDesigner where all data is derived from one single base model of the entire drive train, offers distinct advantages, Arie Leeuwenburg explains. When the outcome of a torsional vibration analysis dictates a shaft diameter change, this means all alignment calculations have to be redone and checked against other variables. When using an integrated solution like ShaftDesigner a change in diameter is immediately carried through in all modules associated with the base model, such as the whirling, bending, and axial vibration modules.

## Data Exchange

A question that springs to mind in this context is of course the ability to import third party 3D models as 3D design is more and more common place in design engineering. The exchange of design data between the variety of modellers available in the market, is however still prone to errors of interpretation. "That is why we, when using the software for our own purposes, enter the design model data ourselves based on the detail drawings of the drive train and its components. This to avoid any errors that might have been introduced by typos and such, earlier on in the process", explains Arie Leeuwenburg. Exchange of XML-based data between third party programs and ShaftDesigner is however possible and Geoffrey de Vlaam is keen to add there are additional dedicated possibilities: "There are of course parties that have the shaft alignment software of DNV. For these we have a specific module built in, which allows the users to directly import those models into ShaftDesigner." Which of course eases any plans such a user might have to go for the integrated alignment and vibration analysis offer of Machine Support.

An interesting development that they are working on is the integration of relevant classification bureau-specific boundary rules for all the societies out there. Prior to starting a project, the user will be able to tailor ShaftDesigner to specific rules set by any classification society, in order to yield results that comply with the society's demands – for instance for minimum shaft diameter based on the propulsion power.

## From the Rest

The dynamic analyses Machine Support is now able to perform is what separates the company from the rest. "In essence it is doing what we have always done in static analyses but now with strain gauges on the shaft in operation and collecting the data by means of telemetry", explains Martin. This is combined with laser measurements on shaft line components and their foundations, that deliver accurate data on for instance thermal growth of

bearing and gearbox housings. This data can give accurate and real-life answers on bearing arrangements and offsets, that will properly align a shaft – not just when its resting in its bearings but when it is in full operation. The latter is one example of where dynamic measurement can deliver answers on the accuracy of the rules-of-thumb that are used in the industry. Dynamic measuring and analysis can also reveal and illustrate facts that are probably seldom thought of as a problem source, explains Arie. He recalls own specific analysis that showed tilting of a gearbox as a result of propeller thrust which changed the alignment measured in static condition by several tenths of millimetres between the main engine, propeller shaft and generator. This phenomenon was caused by the elasticity of the gearbox seating.

**i. [www.machinesupport.com](http://www.machinesupport.com)**  
**i. [www.shaftdesigner.com](http://www.shaftdesigner.com)**



## Adjustable Steel Chocks

The STX Finland order is an extension of the existing cooperation between the global STX Business Group and SKF Machine Support. STX companies in Brazil, Korea, Norway, Romania and Vietnam are using the Vibracon adjustable steel chocks. These chocks can save time during the alignment and mounting of any type of rotating equipment. SKF Machine Support delivers complete Vibracon mounting kits that, besides Vibracon chocks, include a complete set of high quality components which allow accurate and fast installation of propulsion units and auxiliary equipment.



*Geoffrey de Vlaam, Martin van Leest and Arie Leeuwenburg*