Norway has always been closely linked to the sea. Since the dawn of civilisation, the ocean has been vital for transport and a rich reservoir of natural resources. The future of our country and continued improvements in our well-being will depend on how we manage the sea and invest in knowledge of the ocean space. It is in the oceans we will find solutions to the major challenges of our time; energy, climate and food.

CONTENTS

Preface ....................................................................................................................................................................................................................................... 3

Maritime ................................................................................................................................................................................................................................ 4
• LNG as fuel for ships ................................................................................................................................................................................... 5
• Safer marine operations in the Arctic ................................................................. 6
• Tools for the design and analysis of marine propulsion systems. 7

Oil and gas ................................................................................................................................................................................................................... 8
• Qualification of risers for deep water .................................................................................................................. 9
• Testing and verification of dynamic power cables ......................................................... 10
• Verification of floating production systems for extreme weather conditions in the Norwegian Sea ................. 11

Ocean energy ................................................................................................................................................................................................12
• Optimization of offshore wind power ................................................................................................................13
• Design and analysis tools for offshore wind turbines ............... 14
• Loading and flow investigation of tidal turbine................................................................. 15

Ocean Space Centre ................................................................................................................................................................................. 16

Organisation and key figures ............................................................................................................. 18

Report of the board (extract) ........................................................................................................ 22
There is no doubt that the need for expertise and technology related to the exploitation of the ocean space will increase in the near future. These are areas where Norway has special advantages to take a leading position.

Norway’s future competitiveness and ability to create value will depend on our ability to participate in the international knowledge and technology development. In certain areas, we need to be able to assume a global leadership position.

In the research project “A knowledge-based Norway”, led by Professor Torger Reve of BI Norwegian School of Management and presented at the end of 2011, it is concluded that Norway has developed three global industries that have the inputs needed to succeed internationally; the offshore industry (oil and gas), the maritime industry and seafood industry. All are related to the marine environment – the ocean space.

Norwegian companies have had global success in the maritime, offshore oil and gas and fisheries and aquaculture industries. The fact that as a nation we lead the way internationally in education, research and development in these fields has made an important contribution to this situation. However, there is no guarantee that Norway will be able to maintain this position.

In order to succeed in technological development in the future, we need more knowledge, multidisciplinary interaction and modern tools, such as world-class laboratories and scientific equipment. This is why we have been working for many years to realise a next-generation knowledge centre for marine technology, an Ocean Space Centre. The aim of the centre is to make Norway an international “centre of gravity” in ocean space technology. A major study that included concept analyses and reports on an Ocean Space Centre was submitted to the Ministry of Trade and Industry (NHD) at the end of September 2011. The study is currently being quality-assured under the auspices of the Ministry of Finance.

We are pleased to note that the work performed by MARINTEK employees continues to attract attention. For example, in the White Paper on petroleum policy which was presented by the government by the end of June 2011, MARINTEK and NTNU are described as “international leaders in their field”. For almost 75 years, MARINTEK and NTNU have been doing targeted research and development on most aspects of ship technology. For more than 30 years we have been working on technology development for the petroleum sector, and for more than a decade on various forms of ocean energy.

International competitiveness is first and foremost about having a competitive advantage. For high-cost Norway, this primarily involves constantly keeping ahead in knowledge and innovation. This means that we as a nation must be willing to invest in knowledge development.

Our annual report describes some aspects of what we have done in 2011 to contribute to the conquest of the ocean.

Oddvar Eide, President of MARINTEK
Shaping shipping
LNG as fuel for ships

For most Norwegian ships designed for short sea shipping, liquefied natural gas (LNG) is preferred as fuel primarily because of its low environmental emissions, but also because LNG is competitive with regard to traditional fuels such as Marine Diesel Oil (MDO). When the most stringent requirements of the International Maritime Organization (IMO) come into force for new vessels in 2016, the competitiveness of LNG will be even further strengthened. MARINTEK has long led the way in R&D on LNG as fuel, and in cooperation with the Norwegian maritime industry and the Norwegian shipping companies, we have been making purposeful efforts to develop more environmentally friendly and energy-efficient ships. An example of the results of this research work is a new “Ro-Ro” concept from Rolls-Royce that is being built for Norlines. Its main machinery consists of a pure gas engine designed specifically for ship propulsion, with a propeller-shaft generator that can run at variable speeds, which means that the vessel’s power requirements can be met without the use of auxiliary machinery. This provides significant improvements in energy consumption in comparison with conventional propulsion machinery running on MDO. In addition improvements are made to the hull and the propeller system that provide an overall reduction of 25 percent in energy consumption compared with conventional solutions. Greenhouse gas emissions, including methane slip, have been reduced by about 40% compared with the use of MDO.

In May 2011, Research Director Per Magne Einang received a special award at the Gas Conference in Bergen. The jury said that Einang won the prize “for his long and extensive pioneering work in developing solutions for the use of natural gas for fuel for the transport sector in Norway and internationally.”

Contact: Research director Per Magne Einang
Per.Einang@marintek.sintef.no
Safer marine operations in the Arctic

interest in petroleum activities in the North is on the increase following new discoveries in the western part of the Barents Sea (Skrugard and Havis fields). At the same time, the signing of the delimitation treaty with Russia has led to a hectic process of acquisition of seismic data in the eastern part of the Barents Sea. MARINTEK completed the project CIVARCTIC, which studied the development of a concept vessel for all-year intervention on a subsea production system. The project received support from the Research Council of Norway through its MAROFF programme, and the participants were Statoil, STX OSV, NTNU, VTT (Finland) and Aker Arctic Technologies.

Vessel design and operational characteristics have been investigated on the basis of available meteorology, oceanography and ice data for a particular field east of Svalbard. The study included model tests in open water at MARINTEK and in ice at Aker Arctic. Computational fluid dynamics (CFD) studies were used to check the effect of design changes on local resistance and fuel consumption. The study identified operational challenges that required further action, such as improving weather and ice forecasting systems, ice-management procedures and communications infrastructure in the region.

MARINTEK had the project management for MarSafe North, which came to an end in October 2011 and submitted 28 specific recommendations for enhancing maritime safety management in the Arctic regions. The goal is to ensure that the safety aspect regarding operations in the northern areas will be equivalent or better than the level in the North Sea. A total of 15 companies participated in the project, which was owned by Kongsberg Seatex and partially funded by the Research Council of Norway through the MAROFF program. In order to ensure that enough empirical data were obtained to allow conclusions to be drawn, a number of field tests were performed, some of them related to telecommunications system coverage and behavior, studies of available technologies and infrastructure, and studies of drifting icebergs. Some of the results of MarSafe North have been incorporated in the 2011 version of the key coastal guide “The Norwegian Pilot” published by the Norwegian Coastal Administration. In a parallel project MARINTEK has performed studies of telecommunications opportunities in the North on behalf of the European Space Agency and the Norwegian Space Centre.

www.sintef.no/marsafe

Contact: Principal research engineer Tor Einar Berg
Tor.Berg@marintek.sintef.no
Research scientist Beate Kvamstad
Beate.Kvamstad@marintek.sintef.no

Contact: Research manager Kay Fjørtoft
Kay.Fjortoft@marintek.sintef.no
For many years, in collaboration with a number of leading research institutions and industry partners, MARINTEK has been developing new knowledge and tools for the design and analysis of marine propulsion systems via the R&D project Norwegian Propeller Forum. These tools, which also include state-of-the-art Computational Fluid Dynamics (CFD) solutions, has been established not only as means of developing more accurate and cost-effective propeller designs, but also as a source of new knowledge about the relationship between physical flow phenomena and the operation of marine machinery and propulsors. The second phase (2008 – 2011) of the project has successfully dealt with such demanding topics as propeller cavitation and propulsor/hull interactions. Special attention has been paid to the development of CFD methods for propulsors to a practical level for their employment in engineering simulations. The underlying philosophy of the Propeller Forum, in which MARINTEK has played a leading role since its inception, has been to utilize a rational combination of numerical and experimental approaches. Significant contributions to the Propeller Forum have been made by its long-term partners, the State Marine Technical University (SMTU) in St. Petersburg, the China Ship Scientific Research Center (CSSRC) in Wuxi and INSEAN in Rome. The project is funded by the Research Council of Norway, Brunvoll AS, Det Norske Veritas, Finney Gear & Propeller AS, Heimdal Propulsion Norway AS, Helseth AS, Nogva Motorfabrikk AS, Scana Volda, Servogear AS, West Mekan Produksjon AS, Wärtsilä Norway AS and MARINTEK.

Contact: Senior research scientist Vladimir Krasilnikov
Vladimir.Krasilnikov@marintek.sintef.no
Enduring the ocean
Qualification of risers for deep water

In 2011, MARINTEK was highly active in research on vortex-induced oscillations of deepwater risers. Besides several numerical studies, we performed extensive model tests in the Ocean Basin, in which advanced instrumentation, including fibre-optic instrument, was used to measure the response of various riser designs. When risers are exposed to ocean currents, they may begin to oscillate, a behaviour that can lead to fatigue failure. The industry currently uses strakes and fairings to reduce these fluctuations (the photo shows strakes with simulated marine fouling).

MARINTEK also tested the effects of such equipment. The test results will be used to improve our understanding of the challenges involved and to develop better simulation software.

Contact: Research manager Halvor Lie
Halvor.Lie@marintek.sintef.no
Testing and verification of dynamic power cables

Since 1997 MARINTEK has gained extensive experience in full scale qualification and fatigue testing of flexible risers and umbilicals. During the last few years the interest for full scale testing of dynamic power cables for offshore applications has increased significantly. In 2009 MARINTEK was commissioned to test the world’s first power-from-shore dynamic AC cable by ABB. The cable was installed at Statoil’s Gjøa floating oil and gas platform in the North Sea in 2010. This was the first time an offshore floating platform was directly connected to the onshore power network. In 2011 MARINTEK performed a similar full-scale test of a power cable developed by ABB for the Goliat field in the Barents Sea. The power cable will become the world’s longest and most powerful dynamic AC cable.

As a result, the CO2 emissions from the Goliat FPSO are estimated to be reduced by 50% as compared to conventional power solutions. The flexible part of the cable, which hangs between the FPSO and seabed, will be exposed to significant structural loads from waves, current and platform induced motions. The objective of the full-scale test was to validate the structural integrity of the most vulnerable segment of the cable under simulated design life operational conditions. The test was performed in one of MARINTEK’s advanced rigs for full-scale dynamic testing over a period of six months. The behavior and characteristics of the cable were carefully monitored throughout the test, and no damage to critical components was found.

Contact: Research director Egil Giertsen
Egil.Giertsen@marintek.sintef.no
Verification of floating production systems for extreme weather conditions in the Norwegian Sea

Floating production vessel mooring systems were among MARINTEK’s central topics of research in 2011. Under extreme weather conditions mooring lines are subjected to severe stresses, and there have been cases of failure of one or even several lines during severe storms. Failures of this sort suggest that the accuracy of the numerical analyses used in the mooring line design process ought to have been better. For this reason, it is essential to calibrate numerical models against data from model tests in order to improve the accuracy of the calculations and thus obtain more reliable results.

MARINTEK has been very active in this area, both in the design of new concepts, and in developing better models for existing installations. We have also studied the consequences of the failure of one or more anchor lines. Vortex-induced motions, where currents produce fluctuating motions of floaters, have been another important topic. MARINTEK has run several experiments in the towing tank and the Ocean Basin to study this phenomenon in various types of floaters.

Contact: Research director Ole David Økland
Ole.Okland@marintek.sintef.no
Catching the breeze
Optimization of offshore wind power

Ocean energy has been identified as a priority at MARINTEK. The term covers the fields of offshore wind, wave and tidal power. The aim of this special effort is to build up a multidisciplinary team with a high level of expertise in marine operations and systems, in order to contribute to technology development in this field.

In addition to existing research programmes such as NOWITECH (Norwegian Research Centre for Offshore Wind Technology) and the European Union’s DeepWind project, MARINTEK, together with its expert partners, has been awarded three further research projects in 2011:

1) Windsense
The main aim of this project is to develop additional instrumentation for offshore wind turbines to cover areas that are not currently being monitored. The idea is to improve the basis for operational and maintenance planning for wind farms. Partners in Windsense include Kongsberg Maritime, Statoil, NTE, Trollhetta, Lightstructures, NTNU, HiST, SINTEF Energy and MARINTEK. The project receives financial support from the Research Council of Norway.

Contact: Research manager Anders Valland
Anders.Valland@marintek.sintef.no

2) FAROFF
This project is looking at ways of reducing the costs of energy from wind farms through the analysis of innovative vessel concepts and other cost drivers, and advanced decision-support tools for energy cost analysis. Participants include SINTEF Energy, Fred Olsen Windcarrier, Offshore Wind Services (Odfjell Wind), Statkraft, Statoil and MARINTEK.

Contact: Research manager Trond Johnsen
Trond.Johnsen@marintek.sintef.no

3) Cost-effective installation of offshore wind turbines
The goal of this project is to establish and verify new cost-efficient methods of transporting and installing offshore wind turbines. The study will answer the questions of how the installation can be optimised, and whether we can achieve real cost savings in the process. The project participants are Reinertsen, BOA Offshore, Statoil and MARINTEK, and it has received financial support from the Regional Research Fund for Central Norway and SkatteFunn.

Contact: Research scientist Mateusz Graczyk
Mateusz.Graczyk@marintek.sintef.no

Efforts are targeted at participation in new initiatives within the European Union’s Framework Programme for Research, in addition to the establishment of new industrial projects related to ocean energy.
Design and analysis tools for offshore wind turbines

We have put a significant amount of effort into developing our competence and ability to model and analyse offshore wind turbines. One important activity is the development and improvement of design and analysis tools for bottom mounted (piled) and floating wind turbines. These include NIRWANA for bottom-mounted offshore wind turbines and SIMO/RIFLEX for floating turbines.

Our focus in 2011 has mainly been on improving the spatial description of the wind field and implementing second-order wave kinematics. These tools enable MARINTEK to simulate the response of offshore wind turbines to loads from wind, waves and current, including extreme events and fatigue damage. These new features are currently being made available in MARINTEK’s software workbench SiMA.

Contact: Research scientist Petter Andreas Berthelsen
PetterAndreas.Berthelsen@marintek.sintef.no
Loading and flow investigation of tidal turbine

Tidal Generation Limited (TGL) a wholly owned subsidiary of Rolls-Royce Plc has developed a tidal turbine and associated installation, deployment and maintenance methodologies. The turbine power-train comprises an axial flow, variable pitch, variable speed, three bladed rotor coupled to a gearbox and induction generator. The tidal turbine and its tripod foundation were extensively tested in one of MARINTEK’s towing tanks to investigate their hydrodynamic performance including interaction between rotor and foundation. Particle Image Velocimetry (PIV), an advanced laser flow measurement technique was applied to document the detailed flow around and in the stream of the tidal turbine at various operating conditions. At the same time, rotor torque and total thrust of the installation were measured. These model tests provide detailed data for validation of numerical models for design and analysis of tidal turbines.

Contact: Research director Kourosh Koushan
Kourosh.Koushan@marintek.sintef.no
Ocean Space Centre
- A knowledge centre for future ocean space technology

Norway’s future competitiveness will depend on our ability to participate in knowledge and technology development at international level, which in turn requires us to be capable of assuming a leading global position in research in certain areas. In autumn 2011, MARINTEK completed and submitted a concept study for a future research centre on ocean space technology to the Ministry of Trade and Industry.
Success in future technological developments demands knowledge, coordinated actions and modern tools. This is the background for our efforts to realise the national knowledge centre for ocean space technology, the Ocean Space Centre. The centre will form part of the national knowledge and innovation infrastructure related to the ocean space.

The need for modern R&D infrastructure

On behalf of the Ministry of Trade and Industry, MARINTEK has collaborated with research institutions and industry in discussing the future infrastructure needed to ensure that Norway maintains its position as an international leader in ocean space technology. Since 2008, we have been working towards the realisation of infrastructure for R&D related to the ocean space, and a number of possibilities have been discussed and evaluated. MARINTEK’s Board recommends the construction of an Ocean Space Centre in Trondheim with new ocean space technology laboratories for research and education at Tyholt and a new innovation centre at Brattøra linked to Sealab’s existing research groups (NTNU/-SINTEF). This would meet the needs sketched out in the original vision, given the guidelines and experience that we have acquired in the course of the study. The Ocean Space Centre will be the hub of national efforts in ocean space technology, and will provide for extensive interactions and networking with national and international research institutions and industrial participants.

The objectives of the centre are to:

- educate future specialists in ocean space technology.
- ensure that industry and government enjoy access to leading expertise and infrastructure associated with the harvesting and management of our oceans.
- contribute to effective utilization of national expertise and knowledge through collaboration with Norwegian and foreign institutions and companies.
- actively contribute to increased innovation in ocean space technology.

The Ocean Space Centre will make Norway an international centre of gravity in ocean space technology, and is a response to growing internationalisation, advances in technology, the custodianship of the environment and the need for advanced technology in the future.

A number of industry organizations and industrial companies have endorsed this future knowledge centre. Stein Lier-Hansen, CEO of the Federation of Norwegian Industries, says: “International competition is fierce and Norway now needs to ensure that our centres of excellence in ocean space technology stay at the leading edge. A modern infrastructure for research and next-generation laboratories will make important contributions to winning new markets, guaranteeing jobs and industrial development, and resolving environmental challenges. This is the background for the Federation of Norwegian Industries’ eagerness to see that the Ocean Space Centre is realised, and that this happens as soon as possible.”

The development of the Ocean Space Centre and the new infrastructure by 2020, complemented by the growing collaboration between industry and research institutions at national and international level, will guarantee Norway’s international position, future welfare and competitiveness in the conquest of the ocean.

Contact: Project manager Atle Minsaas
Atle.Minsaas@marintek.sintef.no
MARINTEK and MARINTEK USA, Inc. are certified in accordance with ISO 9001 quality standards. We make systematic efforts to improve our work processes in order to ensure focus on our clients’ needs, and high quality and precision of our deliverables.

MARINTEK is accredited in accordance with ISO/IEC 17025 for measurements of exhaust gases from gas turbines and internal combustion engines.

MARINTEK operates in accordance with all current laws and regulations. We have the highest regard for personal safety, and our goal is zero harm to personnel, the environment and materials. In 2011 we met our goal of zero lost-time injuries.

Inclusive working life

MARINTEK is a signatory to the Agreement on Inclusive Working Life (the IA Agreement), which aims to prevent and reduce sick-leave rates, improve the work environment and attendance at work, and prevent exclusion and dropout from the labour market. MARINTEK is also an approved apprenticeship company.

Ownership

MARINTEK collaborates closely with the Institute of Marine Technology at NTNU in the Marine Technology Centre at Tyholt in Trondheim, for example in the joint use and operation of our marine technology laboratories. Strategic collaboration helps to ensure that our research is coordinated vis-à-vis both our industrial partners and the Research Council of Norway. As part of this community, MARINTEK participates in the financing of the Centre for Ship and Ocean Structures (CeSOS), one of three research groups at NTNU that have been awarded the title of Centre of Excellence.

MARINTEK also cooperates closely with other SINTEF units, both in submitting proposals for projects and in the implementation of major research programs, such as the Centres for Research-based Innovation (SFI) and the Centres for Environmentally Friendly Energy Research (CEER).

In 2011, MARINTEK was actively involved in establishing strategic collaboration between research groups in Trondheim (NTNU and SINTEF), Ålesund University College and industrial companies in the County of Sunnmøre.

MARINTEK has actively participated in initiatives such as Maritim21 and the Global Maritime Knowledge Hub.

Birger Åldstedt
Executive vice president

Jo Stein Moen
Communications director
The Board of Directors
- Unni Steinsmo (Chair)
- Hanna Lee Behrens
- Jan Kristian Haukeland
- Liv Astri Hovem
- Erik Haakonsholm
- Bjørnar Pettersen
- Kjetil Berget
- Brage Mo
- Hans Jørgen Rambech

SINTEF
Norwegian Shipowners’ Association
Det Norske Veritas
Federation of Norwegian Industries
NTNU
MARINTEK
MARINTEK
MARINTEK

Management
- President: Ørnulf Rødseth
- Executive vice president: Per Magne Einang
- QHSE manager: Karl Andreas Haugen
- Research director: Kourosh Koushan
- Research director: Ole David Økland
- Research director: Ørnulf Rødseth
- Research director: Oddvar Eide
- Research director: Egil Giertsen
- Personnel manager: Anne Jørgensen
An international company

A total of 201 employees from 20 countries

Employees
Composition of academic staff

Foreign trade
22% foreign share of turnover

Subsidiaries

MARINTEK do Brasil

MARINTEK do Brasil is based in Rio de Janeiro, and is MARINTEK’s bridgehead to the Brazilian market. After several years of building relationships and establishing strategic agreements, the company is now turning to focus its activities on marine technology, particularly for the petroleum sector, including neighbouring areas of the maritime sector. The company’s activities are based on the same model as used in Norway; academic - research - industry. A special feature of MARINTEK do Brasil is its ability to cooperate with both industry and the university sector in the country. The expertise of the company is being developed with the help of Brazilian competence, which enjoys the use of the numerical modelling tools developed in Norway. These will be utilized in demanding research and innovation tasks in collaboration with our clients and partners in Brazil.

MARINTEK do Brasil, Ltda.
Rua Lauro Muller 116, Suite 2201,
CEP 22290-160 Rio de Janeiro, Brazil
Phone: +55 21 2025 1811
www.marintekdobrasil.com

MARINTEK USA Inc.

The activities of MARINTEK (USA) focus on the petroleum sector in the oil capital of Houston. Our scientific efforts are based on hydrodynamics and structural mechanics and how these interact. More recently, we have shifted our focus in the direction of research and complex analyses. Our customer base is the large research departments of oil companies in and around Houston as well as the engineering industry. We have also established good relationships with several key universities in the United States. These relationships are important with respect to the rapidly expanding ocean energy industry, in which improving the efficiency of installations and marine operations are important topics. In cooperation with SINTEF Petroleum Research, we have also taken a number of initiatives in connection with the drilling technology of tomorrow. These initiatives and our close interaction with our parent company in Norway provide a good basis for further expansion.

MARINTEK (USA), Inc.
2603 Augusta Suite 200, Houston, Texas 77057, USA
Phone: +1 713 452 2767
www.marintekusa.com

Contact: Chief Operating Officer Lilia Nicolli
Lilia.Nicolli@marintek.com.br

Contact: President Terje Nedrelid
Terje.Nedrelid@marintekusa.com
## Key figures

### Main financial figures - concern (in NOK 1000)

Current exchange rate: 1 USD = NOK 5.61 - 1 EUR = NOK 7.79

#### Result

<table>
<thead>
<tr>
<th></th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gross operating revenue</td>
<td>270 682</td>
<td>292 337</td>
<td>309 572</td>
<td>296 705</td>
<td>295 692</td>
</tr>
<tr>
<td>Net operating revenue</td>
<td>227 956</td>
<td>245 614</td>
<td>255 141</td>
<td>253 705</td>
<td>250 168</td>
</tr>
<tr>
<td>Operating result</td>
<td>15 006</td>
<td>3 632</td>
<td>20 053</td>
<td>12 724</td>
<td>10 236</td>
</tr>
<tr>
<td>Annual result</td>
<td>18 321</td>
<td>9 072</td>
<td>21 059</td>
<td>14 182</td>
<td>13 328</td>
</tr>
</tbody>
</table>

#### Balance

<table>
<thead>
<tr>
<th></th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fixed assets</td>
<td>38 367</td>
<td>46 214</td>
<td>40 669</td>
<td>89 868</td>
<td>85 388</td>
</tr>
<tr>
<td>Liquid assets</td>
<td>218 837</td>
<td>223 049</td>
<td>256 489</td>
<td>256 309</td>
<td>276 534</td>
</tr>
<tr>
<td>Total assets</td>
<td>257 204</td>
<td>269 263</td>
<td>297 158</td>
<td>346 177</td>
<td>361 921</td>
</tr>
<tr>
<td>Equity capital</td>
<td>131 446</td>
<td>139 508</td>
<td>153 592</td>
<td>211 100</td>
<td>219 824</td>
</tr>
<tr>
<td>Liabilities</td>
<td>125 758</td>
<td>129 755</td>
<td>143 566</td>
<td>135 077</td>
<td>142 097</td>
</tr>
<tr>
<td>Total equity and liabilities</td>
<td>257 204</td>
<td>269 263</td>
<td>297 158</td>
<td>346 177</td>
<td>361 921</td>
</tr>
</tbody>
</table>

#### Profitability

<table>
<thead>
<tr>
<th></th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating margin %</td>
<td>6.6</td>
<td>1.5</td>
<td>7.9</td>
<td>5.0</td>
<td>4.1</td>
</tr>
<tr>
<td>Total profitability %</td>
<td>3.2</td>
<td>0.7</td>
<td>3.5</td>
<td>2.0</td>
<td>1.4</td>
</tr>
<tr>
<td>Profitability on equity %</td>
<td>7.4</td>
<td>3.3</td>
<td>7.2</td>
<td>3.9</td>
<td>3.1</td>
</tr>
</tbody>
</table>

#### Liquidity

<table>
<thead>
<tr>
<th></th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
</tr>
</thead>
<tbody>
<tr>
<td>Net cash flow from operations</td>
<td>41 404</td>
<td>-2 899</td>
<td>37 327</td>
<td>105 600</td>
<td>46 566</td>
</tr>
<tr>
<td>Degree of liquidity</td>
<td>1.7</td>
<td>1.7</td>
<td>1.8</td>
<td>1.9</td>
<td>1.9</td>
</tr>
</tbody>
</table>

#### Solidity

<table>
<thead>
<tr>
<th></th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
</tr>
</thead>
<tbody>
<tr>
<td>Equity capital in %</td>
<td>51</td>
<td>52</td>
<td>52</td>
<td>61</td>
<td>61</td>
</tr>
<tr>
<td>Operating working capital</td>
<td>102 698</td>
<td>109 073</td>
<td>128 883</td>
<td>143 303</td>
<td>155 860</td>
</tr>
</tbody>
</table>

#### Turnover

(Mill. NOK)

![Bar chart of turnover from 2007 to 2011](chart.png)

#### Auditors

Deloitte

### Income statement 2011 (in NOK 1000)

#### Operating revenues and expenses

- **Revenues** 287 730
  - **Direct project expenses** 46 492
  - **Net operating revenues** 241 239
- **Salaries, social security and other security costs** 168 205
- **Other operating expenses** 61 899

#### Operating costs

230 105

#### Operating result

11 134

#### Financial result

3 095

#### Annual result before taxes

14 229

### Balance sheet 2011 (in NOK 1000)

#### Assets

- **Intangible assets** 51 215
- **Fixed operating assets** 32 435
- **Financial long-term assets** 4 889
- **Fixed assets** 88 539
- **Other current assets** 135 131
- **Cash, bank accounts** 138 060

#### Liabilities

- **Long-term liabilities** 21 424
- **Current liabilities** 121 196

#### Equity and liabilities

361 730

#### Profitability

- **Operating margin %**
  - 2007: 6.6
  - 2008: 1.5
  - 2009: 7.9
  - 2010: 5.0
  - 2011: 4.1
- **Total profitability %**
  - 2007: 3.2
  - 2008: 0.7
  - 2009: 3.5
  - 2010: 2.0
  - 2011: 1.4
- **Profitability on equity %**
  - 2007: 7.4
  - 2008: 3.3
  - 2009: 7.2
  - 2010: 3.9
  - 2011: 3.1

#### Liquidity

- **Net cash flow from operations**
  - 2007: 41 404
  - 2008: -2 899
  - 2009: 37 327
  - 2010: 105 600
  - 2011: 46 566
- **Degree of liquidity**
  - 2007: 1.7
  - 2008: 1.7
  - 2009: 1.8
  - 2010: 1.9
  - 2011: 1.9

#### Solidity

- **Equity capital in %**
  - 2007: 51
  - 2008: 52
  - 2009: 52
  - 2010: 61
  - 2011: 61
- **Operating working capital**
  - 2007: 102 698
  - 2008: 109 073
  - 2009: 128 883
  - 2010: 143 303
  - 2011: 155 860

#### Turnover

(Mill. NOK)

![Bar chart of turnover from 2007 to 2011](chart.png)

#### Auditors

Deloitte
Our business concept
MARINTEK performs research and development for companies and public-sector bodies involved in marine activities. The company operates in an international market and are focusing on technologies and tools related to floating production systems for oil and gas, offshore pipelines, renewable energy, vessel concepts, maritime equipment industry, shipping and logistics.

Market and technology
MARINTEK had a good order backlog at the beginning of 2011. Throughout the year there have been positive developments in the shipping and the offshore markets. As a result, demand for our services has risen in most of our market segments, particularly in testing and analysis of structures and components for floating production systems for the offshore industry.

Mooring systems for floating production systems were a key business area in 2011. It has frequently been shown that numerical analysis of forces in anchor lines are affected by large uncertainties. For this reason, numerical models need to be calibrated against data from model tests in order to obtain reliable results. MARINTEK has been extremely active in this area, both related to the design of new concepts for floating production systems and in developing improved models of existing installations.

Testing of risers, control and power cables for offshore installations were another important market in 2011. Extensive studies of vortex-induced oscillations of flexible risers were performed in MARINTEK’s Ocean Basin. Studies of the mechanical behaviour and strength of these products were performed in the Marine Structures Laboratory to qualify products for industrial use. These experiments have utilized advanced instrumentation such as fibre optics to measure various types of loads and stresses. We have also performed tests in our H2S laboratory to study the requirements for risers in fields where the presence of CO2 and H2S produces an extremely corrosive environment.

The development of numerical software for floating production systems, including risers, control and power cables, has been another significant area of activity for many years, and important advances in such software systems were made in 2011. We also developed a new user interface that will make MARINTEK software more accessible and user-friendly.

In the field of operation and maintenance, we see a growing market in serving Norwegian subsea installations. MARINTEK is also a participant in the Centre for Research-based Innovation (SFI) in the field of integrated operations. The centre is a leading provider of strategies and methods for raising standards of overall integration of land-based and offshore organisations in performing various types of operations, in particular those related to operation and maintenance, integrated planning and logistics, and operations under emergency conditions.

In 2011 maritime research was once again a significant business area for MARINTEK. A large number of tests were performed in our Ship Model Tank and Ocean Basin to study speed, seaworthiness, manoeuvrability and safety of a wide range of vessels. This work included testing of classic vessel hulls, propulsion systems, PMM (Planar Motion Mechanism) tests of both surface ships and submarines, free-fall lifeboats, and support vessels for offshore installations such as offshore wind turbines. We also tested tidal turbines in order to study their hydrodynamic behaviour and flow patterns around installations. Numerical analysis and simulation also made up significant parts of the workload.

LNG-fuelled vessels are also arousing growing interest in Norwegian and international short sea shipping, and MARINTEK has carried out concept studies and development projects in cooperation with the maritime industry and Norwegian ship-owners for new gas-driven bulk carriers and tankers. A bulk carrier concept is currently being realised, and a new-building contract between a Norwegian ship-owner and a shipyard has been signed for the delivery of new vessels in 2013.

In the field of maritime transport, activity has centred on applied operations research and simulations of complex maritime transport operations, integrated planning and logistics and maritime communications technology, particularly in the Arctic. In this market too, MARINTEK enjoys high visibility and has also made significant contributions to two new international maritime IT standards as well as to an IMO Facilitation Committee (FAL) circular.
Prospects
Given the global political and economic situation, the Board expects to see greater fluctuations in MARINTEK’s market segments in the next few years, particularly in Europe. Emerging economies are investing heavily in competence-building, including investments in research infrastructure, within MARINTEK’s business segments. This will give increased competition in a global market.

MARINTEK’s most important market segments are offshore petroleum production and maritime operations, both of which have displayed steady national and international growth.

In recent years, oil and gas activities on the Norwegian shelf have focused on enhanced production, which also involves extending the life of existing infrastructure. This is an area in which our ambition is to offer improved technologies and solutions in the years to come.

2011 also saw significant new discoveries on the Norwegian shelf and in the Arctic. These findings will contribute significantly to maintaining our level of activity in the near future. Petroleum production in the Arctic will require significant developments in technology, including in areas in which MARINTEK will be a natural partner for industry.

On the international scene, the petroleum sectors of Brazil, the Gulf of Mexico and West Africa are the prime instances of stable growth conditions, but there is also significant activity in Australia and Indonesia. Much of this concerns field developments in deep water, a field in which MARINTEK has built up significant expertise over many the years. This implies that we should focus even more closely on international areas of petroleum activities. MARINTEK continues to aim to be a major international player and we intend to grow in both the national and international markets.

Within the maritime industry, a substantial foundation for future development was completed in 2010 by the finalization of the strategy document “Maritime 21 - a comprehensive maritime research and innovation strategy.” This effort continued in 2011 through the preparation of specific action plans for defined priority areas.

MARINTEK was an active participant in the development of Maritime 21, many of whose priority areas lie within MARINTEK’s areas of expertise; these will be followed up in the course of implementing the plan. It has been confirmed that the defined priority areas will form the basis for the Research Council’s Maritime Programme (MAROFF).

Renewable energy from the sea is also evolving as a core area of interest for MARINTEK. However, ocean energy is an immature area that still requires substantial research efforts. This is reinforced by the fact that major international companies have reduced their level of activity. MARINTEK wishes to contribute to sustainable development in this area, and is a participant in one of the Centres for Environmentally Friendly Energy Research, launched by the Research Council of Norway in 2009 to do research on offshore wind-power.

MARINTEK and NTNU’s Department of Marine Technology have during recent years been putting significant goal-oriented effort into profiling themselves vis-à-vis the authorities in certain business and political processes. These efforts concern industrial development and the need for increased innovation in areas in which Norway enjoys particular advantages and favourable conditions to maintain its position as a global leader.

In 2010 we completed the feasibility study for the visionary project Ocean Space Centre on behalf of the Ministry of Trade and Industry (MTI). Autumn 2011 saw the completion and submission to MTI of the concept study for the Ocean Space Centre - the future knowledge centre for ocean technology. External quality assurance of this work has begun under the auspices of the Ministry of Finance and will be completed during the first half of 2012.

The knowledge centre forms part of the national knowledge and innovation infrastructure related to marine activities. The Board believes that establishment of the knowledge centre is essential for confirming Norway’s position as one of three leading international centres of ocean technology. The report highlights the needs for infrastructure that will have to be satisfied to ensure that Norway takes its position among the leading nations, in line with the Government’s strategy for maritime operations.

Thanks to our staff
The Board would like to thank our employees and management for their fine efforts in 2011. We also thank the NTNU staff involved in MARINTEK’s activities and our customers for their excellent cooperation.

Trondheim, 29th February 2012
Unni Steinsmo,
Chair of the board, MARINTEK
Marintek
Norsk Marinteknisk Forskningsinstitutt AS
Norwegian Marine Technology Research Institute
Visiting address: Marine Technology Centre • Otto Nielsens veg 10 • 7052 Trondheim - Norway
Phone: +47 73595500 • www.marintek.com • info@marintek.sintef.no